Programme and abstracts

22-24 June 2016,
Bizkaia Aretoa, Bilbao

XV International Symposium on Oceanography of the Bay of Biscay

Changing Ecosystems:
Natural versus Anthropogenic Effects

ISOBAY 15

Bilbao 2016

Bay of Biscay

www.ehu.eus/isobay15

eman ta zabal zazu

Universidad del País Vasco
Euskal Herriko Unibertsitatea

XV International Symposium on Oceanography of the Bay of Biscay (ISOBAY 15)

Programme and abstracts

22-24 June 2016
Bizkaia Aretoa, Bilbao

XV International Symposium on Oceanography of the Bay of Biscay (ISOBAY 15)

Changing Ecosystems:
Natural versus Anthropogenic Effects

Programme and abstracts

22-24 June 2016
Bizkaia Aretoa, Bilbao

eman ta zabal zazu
Universidad del País Vasco
Euskal Herriko Unibertsitatea

Cover photograph by Isabel Díez

Depósito legal/Lege gordailua: BI-865-2016

Symposium Chairs

Arantza Iriarte (UPV/EHU, Gasteiz)
Sergio Seoane (UPV/EHU, Leioa)

Scientific Committee

Pierre Anschutz (U. Bordeaux, Talence)
Guy Bachelet (CNRS, Arcachon)
Ángel Borja (AZTI, Pasaia)
Miren Cajaraville (UPV/EHU, Leioa)
Alejandro Cearreta (UPV/EHU, Leioa)
Nestor Etxebarria (UPV/EHU, Leioa)
Moncho Gomez Gesteira (U. Vigo)
Arantza Iriarte (UPV/EHU, Gasteiz)
Bernard Le Cann (CNRS, Brest)
Olivier Le Pape (Agrocampus Ouest, Rennes)
Ricardo Prego (IIM, Vigo)
Francisco Sánchez (IEO, Santander)
Benoît Sautour (U. Bordeaux, Talence)
Sergio Seoane (UPV/EHU, Leioa)
Gerard Thouzeau (CNRS, Brest)
Francisco Velasco (IEO, Santander)

Organizing Committee

Arantza Iriarte (UPV/EHU, Gasteiz)
Sergio Seoane (UPV/EHU, Leioa)
Jose Maria Gorostiaga (UPV/EHU, Leioa)
Fernando Villate (UPV/EHU, Leioa)
Emma Orive (UPV/EHU, Leioa)
Ibon Uriarte (UPV/EHU, Gasteiz)
Aitor Laza (UPV/EHU, Leioa)
Egoitz Celaya (UPV/EHU, Plentzia)

Sponsoring Organizations

University of the Basque Country (UPV/EHU)
Basque Government
URA (Basque Water Agency)

Symposium address

ISOBAY 15
Department of Plant Biology and Ecology
University of the Basque Country (UPV/EHU)
PO Box 644, 48080 Bilbao, Spain
E-mail: isobay15.fct@ehu.eus; Web site: www.ehu.eus/isobay15

Sponsors

UPV EHU

ura ur agentzia agencia vasca del agua

EUSKO JAURLARITZA GOBIERNO VASCO

Contents

Welcome

As chairs of the symposium we want to welcome you all to the XV International Symposium on Oceanography of the Bay of Biscay.

In this 15th edition the symposium will focus on "Changing Ecosystems: Natural ***versus*** Anthropogenic Effects". "An ever changing global system defines the scientific and social problems and issues of our time" (Global and Planetary Change). In this context of change, to be able to distinguish between natural and anthropogenic drivers of change is probably one of the main scientific challenges of today. In addition, we want to address this issue from a multidisciplinary perspective, hoping that this will enable us to make a significant contribution towards an integrated knowledge of the Bay of Biscay.

This symposium is aimed to offer all of us the opportunity to present and discuss our most updated research works on the Bay of Biscay, and we would like to encourage participants to exchange experiences, share new ideas and network with other researchers. We hope to have fruitful discussions and to get to important conclusions, which will be reflected in the publication of the best contributions to the symposium in a special issue of "Journal of Sea Research".

We think ISOBAY 15 will also be a good opportunity for participants to visit Bilbao, a city which has undergone an internationally recognized urban transformation, with great architectural and infrastructure projects such as the Bilbao Guggenheim Museum, the Euskalduna Conference and Music Centre and Norman Foster's Underground, that have been the driving force of the regeneration of the city and have helped Bilbao become a dynamic, modern and attractive city.

Finally, we wish to thank the rest of members of the Scientific and Organizing Committees for their dedication and hard work, the University of the Basque Country (UPV/EHU) for hosting the symposium and The Basque Government, the University of the Basque Country (UPV/EHU) and URA, the Basque Water Agency, for their financial support. Without their committed collaboration this symposium would not have taken place.

Enjoy the symposium!

The Symposium Chairs
ARANTZA IRIARTE and SERGIO SEOANE

GENERAL PROGRAMME

Wednesday, 22 June

08:45 - 09:15 Registration

09:15 - 09:45 Opening
Iosu Madariaga, Deputy Minister for Environmnet of the Basque Government
Carmelo Garitaonandia, Vice-chancellor of the Campus of Biscay, UPV/EHU
Arantza Iriarte, Symposium Co-chair, UPV/EHU
Sergio Seoane, Symposium Co-chair, UPV/EHU

09:45 - 10:15 Opening Plenary Presentation
I. Marigómez, PIE, University of the Basque Country (UPV/EHU)
Sentinel mussels unveil long-term trends in ecosystem health status in the Bay of Biscay

10:15 - 10:35 Coffee break

Session 1. ***Climate-ocean relations and physical oceanography***
(Chairs: Jon Saenz and Moncho Gómez Gesteira)

10:35 - 11:05 **Valencia V., Fontán A., Borja Á., Goikoetxea N., González M.** (Keynote)
1986-2015: Three decades of oceano-meteorological data in the SE Bay of Biscay. Main trends, regime shifts and anomaly patterns observed

11:05 - 11:25 **González-Rojí S.J., Sáenz J., Ulazia A., Ibarra-Berastegi G., Esnaola G., Fontán A., González M.**
Using high resolution atmospheric models to study atmospheric-oceanic coupling over the Bay of Biscay

11:25 - 11:45 **Fernández-Nóvoa D., de Castro M., Costoya X., Gómez-Gesteira M.**
Variability of the main river plumes of the Bay of Biscay under the influence of forcing drivers and teleconnection indices

11:45 - 12:05 **Rodríguez L., Gómez-Gesteira M., Santos F.**
Migration duration of the European Anguilla eel.

12:05 - 12:25 **Laporte-Fauret Q., Ganthy F.**
Implementation and validation of a new method to take into account for small-scale seagrass patchiness within a 3-dimensional modelling system at regional scale

12:25 - 12:45 **Costoya X., Fernández-Nóvoa D., de Castro M., Gómez-Gesteira M., Lazure, P.**
Effect of river discharges on thermohaline structure along the French continental shelf

12:45 - 14:00 Lunch

14:00 - 14:20 **González-Pola C., Ivey G., Jones,N., Kelly S., Bluteau C., Somavilla R.**
Internal tide dynamics and enhanced mixing in the Avilés Canyon System, southern Bay of Biscay

14:20 - 14:40 **Solabarrieta L., Frolov S., Cook M., Paduan J., Rubio A., González M., Mader J., Charria G.**
Comparison of real and simulated trajectories in the Bay of Biscay, using HF radar derived currents

14:40 - 15:00 **Caballero A., Rubio A., Boyra G., Ferrer L., Cotano U., Aldanondo N., Urtizberea A.**
Mesoscale slope dynamics and its influence on juvenile anchovy abundances

15:00 - 15:20 **Cano D., González-Pola C., Somavilla R., Tel E., Rodriguez C., Ruiz-Villarreal M., Lavín A.**
Sensor Networks and derived products at Biscay AGL observatory. State of the art operational oceanography at IEO

15:20 - 15:50 Coffee break

Session 2. ***Fisheries and Aquaculture***
(Chairs: Haritz Arrizabalaga)

15:50 - 16:10 **Cort J.L., Abaunza P.**
The impact of massive fishing of juvenile Atlantic bluefin tunas on the spawning population (1950-2009)

16:10 - 16:30 **Arregui I., Galuardi B., Goñi N., Lam C.H., Fraile I., Santiago J., Lutcavage M.E., Arrizabalaga H.**
Fidelity of juvenile bluefin tuna to the Bay of Biscay

16:30 - 16:50 **Goñi N., Onandia I., Uranga J., Martinez U., Lopez J., Boyra G., Arrizabalaga H., Arregui I., Santiago J.**
Towards a fishery-independent abundance index for East Atlantic juvenile bluefin tunas: first outputs of a directed acoustic survey in the Bay of Biscay

16:50 - 17:10 **Fernández-Zapico O., Punzón A., Serrano A., Landa J., Ruiz-Pico S., Velasco F.**
Trends on the ontogeny of the dominant flatfish species on the southern Bay of Biscay. Ecoloy and distribution patterns

17:10 - 17:30 **Ferrer L., Caballero A., Ibaibarriaga L., Uriarte A., Urtizberea A., Aldanondo N., Rubio A., Cotano U., Santos M.**
Impact of oceanographic conditions on the dispersal of anchovy eggs and larvae in two contrasting years of recruitment success in the Bay of Biscay

17:30 - 17:50 **Modica L., Rodríguez-Cabello C., Ruiz S., Fernández O., Velasco F., Sánchez F.**
Historical trends of demersal elasmobranchs populations in the Cantabrian Sea

17:50 - 18:10 **Kermorvant C., Caill-Milly N., D'Amico F., Bru N., Sanchez F., Brown J., Lissardy M.**
Clam monitoring: optimization of a recurring survey in the Arcachon Bay using spatially balanced sampling

19:30 - 21:00 Welcome food and drinks

Thursday, 23 June

Session 3. ***Biodiversity; ecosystem structure and functioning***
(Chairs: Yolanda Del Amo and José Ignacio Saiz-Salinas)

09:00 - 09:20 **Chaalali A., Brind'Amour A., Dubois S., Le Bris H.**
Ecological role of an engineer species, Haploops nirae, for coastal benthic invertebrates and demersal fish

09:20 - 09:40 **Villate F., Iriarte A., Uriarte I., Sanchez I.**
Seasonal and interannual variability of mesozooplankton and the relationship to environmental factors in two contrasting estuaries of the Bay of Biscay

09:40 - 10:00 **Muñiz O., Revilla M., Rodríguez J.G., Laza-Martínez A., Seoane S., Franco J., Orive E.**
Potential effects of the phytoplankton community on bivalve aquaculture in Basque coastal waters (southeastern Bay of Biscay)

10:00 - 10:20 **Susperrégui N., Del Amo Y., D'Elbée J., Jude F., David V., Bru N., D'Amico F., Raimbault P., Bichon S., Bourasseau L., Lienart C., Savoye N., Rouaud V., Soulier L., Gaudin P., Pigot T.**
Planktonic biodiversity in the French Basque coast in relation with marine pelagic mucilage occurrence

10:20 - 10:50 Coffee break

10:50 - 11:10 **Bonnin A., Goñi N., Louzao M., Arrizabalaga H.**
New data on albacore diet and internal parasites in the Bay of Biscay and surrounding waters

11:10 - 11:30 **Lopez-Lopez L., Preciado I., Muñoz I., Decima M., Molinero J.C., Tel E.**
Does upwelling intensity influence feeding habits and trophic position of planktophagous fish?

11:30 - 11:50 **Ramos E., Puente A., Echavarri-Erasun B., Juanes J.A.**
Are environmental conditions involved in clam population decline?

11:50 - 12:10 **Muguerza N., Díez I., Quintano E., Enjamio A., García-Sánchez M., Veiga A., Pérez-Ruzafa I., Pérez-Ruzafa A., Gorostiaga J.M.**
Baseline characterization of rocky subtidal benthic vegetation of the north and southern Iberian Peninsula

12:10 - 12:30 **Ortega M.M., Barrenetxea M.**
Distribution, growth and recruitment of *Actinia equina* (Cnidaria, Anthozoa) in the Cantabric Sea: crevices vs. rock pools.

12:30 - 14:00 Lunch

14:00 - 14:20 **Boyé A., Legendre P., Grall J., Gauthier O.**
Spatial and temporal variations of *Zostera marina* meadows in Brittany: relationship between habitat complexity and macrofaunal diversity

14:20 - 14:40 **Sánchez F., Rodríguez A., García-Alegre A., Gómez-Ballesteros M.**
Hard bottoms bathyal habitats and epibenthic communities of Le Danois Bank

14:40 - 15:00 **Robert A.E., Dubois S.F., Le Bris H., Pinsivy L., Laffargue P.**
Biological traits analysis revealed combined effects of bottom trawling and sedimentary features on benthic ecosystem functioning in the Northern Bay of Biscay

15:00 - 15:20 **Quillien N.**
Dynamic ecosystems under anthropogenic stress: how does macrotidal sandy beach fauna respond to green tides?

15:20 - 15:40 **Gallon R., Labrune C., Lavesque N., Grall J., Grémare A., Gauthier O. RESOMAR data providers**
Biogeographic patterns of marine macrobenthic invertebrates in French Waters

15:40 - 16:00 **Serrano A., Cartes J., Punzón A., Arronte J.C., Ríos P., Lourido A., Papiol V., Frutos I., García-Alegre A., Blanco M.**
Epibenthic communities of a NE Atlantic deep seamount

16:00 - 17:00 Coffee break and poster session 1

Session 4. ***Geology; erosion; transport and sedimentation***
(Chair: Alejandro Cearreta)

17:00 - 17:20 **Baumann J., Chaumillon E., Schneider J.L., Schmidt S., Bonnin J.**
Are sediments of land-reclaimed coastal lowlands suitable for recording storm-induced marine floods?

17:20 - 17:40 **Michel G., Dupré S., Ehrhold A., Baltzer A., Battani A., Imbert P., Deville E.**
Multi-data characterization of methane seeps on the Aquitaine Shelf

17:40 - 18:00 **Liria P., Epelde I., Uriarte A., Garnier R., González M., Gainza J., Jaramillo C., Medina R., Monge-Ganuzas M.**
Laida beach morphodynamic evolution in response to the supratidal beach nourishment actions performed in 2015

18:00 - 18:20 **Gainza J., Garnier R., Nuñez P., Jaramillo C., González M., Medina R., Liria P., Epelde I., Uriarte A., Monge-Ganuzas M.**
Accelerating the beach recovery by ploughing the intertidal bar: Field experiment and numerical simulations

18:20 - 18:50 **Zabaleta A., Antiguedad I., Barrio I., Probst J.L.**
An approach to the conceptual model of Suspended Sediment Delivery from small catchments into the Bay of Biscay

20:30 Conference Dinner

Friday, 24 June

Session 5. ***Biogeochemical Cycles and Anthropogenic effects; quality assessment and ecosystem management***
(Chairs: Miren Cajaraville and Pierre Anschutz)

09:00 - 09:20 Anschutz P., Buquet D., Charbonnier C.
Nutrient sequestration in Aquitaine lakes limits nutrient flux to the coastal zone

09:20 - 09:40 Borja Á., Uyarra M.C.
From data to marine environmental status assessment: innovative tools for European seas management

09:40 - 10:00 Gil-Uriarte E., Bilbao E., Marigómez I., Soto M.
Xenostrobus securis: a challenge to classic Biomonitoring studies**?**

10:00 - 10:20 Valencia A., Ruiz M., Serrano M.T., Cancio I., Ortiz-Zarragoitia M.
Endocrine disruption and contaminant exposure assessment in male thicklip grey mullets, using liver and gonad histopathological and molecular biomarkers

10:20 - 10:40 Briaudeau T., Izagirre U., Marigómez I.
Screening sentinel fish species for biomonitoring programmes in the Bay of Biscay: histopathological and biomarker approaches

10:40 - 11:20 Coffee break and poster session 2

11:20 - 11:40 Mijangos L., Delgado A., Kortazar L., Ziarrusta H., Olivares M., Zuloaga O., Fernández L.A., Prieto A., Etxebarria N.
Analysis of emerging organic contaminants in the estuaries of Biscay: identification of potential sources

11:40 - 12:00 Rial D., Leon V., Bellas J.
Integrative assessment of coastal marine pollution in Santander Bay and Galician Rías

12:00 - 12:20 Huguenin L., Lalanne Y., Bru N., Lissardy M., D'Amico F., Milon E., Castege I., de Casamajor M.N.
Biodiversity and indicator species in intertidal boulder fields: a case study on the French Basque coast

12:20 - 12:40 Serrano H., Cearreta A., Irabien M.J., López, I.
Anthropocene geological record of the environmental regeneration process in the Bilbao estuary (N Spain)

12:40 - 13:00 Pouso S., Uyarra M.C., Borja A.
Does recovery of ecosystems equal to the recovery of ecosystem services? The Nervión estuary and recreational fishing ecosystem service case study

13:00 - 14:30 Lunch

14:30 - 14:50 **Mengual B., Cayocca F., Le Hir P., Garlan T.**
Trawling contribution to residual sediment dynamics over the French continental shelf of the Bay of Biscay (France)

14:50 - 15:10 **Franco J., Bald J., Garmedia J.M., González M., Martín I., Menchaca I., Muxika I., Revilla M., Rodríguez J.G., De la Sota A., Uriarte A., Zorita I.**
Detecting abrupt changes and gradual trends in water quality: the 1990-2015 data series of the Nervión estuary (SE Bay of Biscay) analyzed by the Kolmogorov-Zurbenko Adaptive filter

15:10 - 15:30 **Aylagas E., Borja Á., Dell´Anno A., Corinaldesi C., Tangherlini M., Michel C.T., Irigoien X., Danovaro R., Rodríguez-Ezpeleta N.**
A new biotic index based on bacterial diversity for the assessment of marine environmental status

15:30 - 15:50 **Garmendia J.M., Valle M., Borja Á., Chust G., Franco J.**
Zostera seagrasses in the Basque coast: Is Butroe estuary a suitable recipient site?

15:50 - 16:10 **Uyarra M.C., Borja Á.**
What is the environmental status of the Basque Coast? From individual ecosystem components to integrated assessments

16:10 - 16:30 Awards and Closing of symposium

POSTERS

Topic. Climate-ocean relations

P1 Biscay AGL Observatory: Measurements of Atmospheric and Oceanic Variables in the Cantabrian Sea.
Rodriguez C., Cano D., González-Pola C., Lavín A., Marcos E., Somavilla R., Viloria A.

P2 Isolation of *Vibrio* species from the Bay of Biscay
Ogayar E., Orruño M., Montánchez I., Kaberdin V.R., Arana I.

P3 An Exploratory Data Analysis of the Basque Government oceanometeorological buoys
Bilbao B., Maruri M.

Topic. Physical oceanography

P4 Improving Lagrangian mixed-layer drifter data with an onboard ADCP
Herrera J.L., González J., Varela R.A., Piedracoba S.

P5 Numerical analysis of poleward along-shore current pulses on the shelf of the Bay of Biscay
Le Cann B., Kersalé M., Marié L., Serpette A., Lathuilière C., Rubio A., Lazure P.

P6 The Basque coastal marine warning system
Gaztelumendi S., Egaña J., Liria P., González M., Aranda J.A., Anitua P.

P7 Damages analysis in Basque Country coastal area
Gaztelumendi S., Egaña J., Liria P., Epelde I., González M., Aranda J.A., Anitua P.

P8 Modeling the accumulation of floating litter in the NW Iberian region
Pereiro D., Gago J., Torres C.

P9 Towards 4D shelf/slope circulation and transport estimations in the SE Bay of Biscay, within the framework of JERICO-NEXT Joint Research Activity Projects
Rubio A., Caballero A., Charria G., Lazure P., De Mey P., Marié L., Ferrer L., Mader J., Puillat I.

P10 Field studies of residual suspended sediment fluxes in the upper Gironde estuary under different hydrological conditions
Jalón-Rojas I., Schmidt S., Sottolichio A.

Topic. Fisheries and Aquaculture

P11 Innovative on-line technologies towards an effective monitoring of fishing activity
Antelo L.T., Alonso A.A., Bellido J.M., Landeira F.

P12 Effect of environment on the dynamics of anchovy stock of Bay of Biscay : a bioenergetic individual-based modelling approach
Dortel E., Huret M., Petitgas P.

P13 A modelling approach to understanding anchovy larval growth patterns in an anticyclonic area in the Bay of Biscay
Urtizberea A., Aldanondo N., Caballero A., Ferrer L., Rubio A., Cotano U.

P14 Short-term effect of MPA management measure on the fisheries: the case of El Cachucho" MPA (Cantabrian Sea)"
Punzón A., García-Rebollo J.M., Rodríguez A., Ceballos E., Bolado I., Rodríguez-Cabello C., Sánchez F.

P15 How impacts the implementation of a sequential fleet behavior in the management strategy evaluation? The case of the Basque inshore fleet with FLBEIA
Andrés M., Urtizberea A.

P16 Evidence for size-selective mortality of European anchovy larvae in the Bay of Biscay based on otolith microstructure analysis
Aldanondo N., Cotano U.

P17 Ecosystem Approach to making Space for Aquaculture: the Basque Country case study
Galparsoro I., Garmendia J.M., Arantzamendi L., Murillas A., Franco J.

P18 Inter annual and inter seasonal differences in the gravimetric relationships between life weight and content in biochemical compounds of muscle and genitalia of the anchovy *Engraulis encrasicolus* of the Bay of Biscay
Txurruka E., Cotano U., Villate F., Txurruka J.M.

P19 Prevalence of the microsporidian parasite *Sprangea lophii* in white anglerfish *(Lophius piscatorius)* in the Bay of Biscay and in other Atlantic areas
Landa J., Antolínez A., Castro B., Autón U.

P20 Influence of ocean climate variability on fisheries: the sardine *(Sardina pilchardus)* case in the Iberian Atlantic shelf waters
Cabrero A., Gago J., González-Nuevo G., Cabanas J.M.

P21 Weight-length relationships, weight conversion factors and condition factor trends for two stocks of black anglerfish *(Lophius budegassa)* in southern Bay of Biscay, Galician waters and northern Atlantic areas from a decade
Landa J., Antolínez A., Castro B., Autón U., Hernández C., Dueñas-Liaño C., Navarro M.R., Villamor B.

P22 Morphological characterization and hydrodynamic behaviour of Biscay Bay's mako shark *(Isurus oxyrrinchus)* dorsal fin denticles
Fernandez-Waid P., Diez G., Izagirre U., Blanco J.M., Souto I.; Soto M.

Topic. Biodiversity; ecosystem structure and functioning

P23 Shelf and canyon suprabenthic assemblages from the SE Bay of Biscay
Frutos I., Sorbe J.C.

P24 Real-time PCR approach to estimate predation on anchovy and sardine eggs in the Bay of Biscay
Cuende E., Mendibil I., Bachiller E., Álvarez P., Cotano U., Rodriguez-Ezpeleta N.

P25 Structural impoverishment of the subtidal vegetation of southeastern Bay of Biscay: inferring its relationship with climatic and local factors
Muguerza N., Díez I., Quintano E., Rodriguez A., Gorostiaga J.M.

P26 Temporal and spatial variability in the distribution of non-indigenous faunal zoobenthic species in the intertidal hard substrates in the "Abra of Bilbao"
Tajadura F.J., Bustamante M., Saiz Salinas J.I.

P27 Using a seafloor observatory to assess patterns of behavior, abundance and biodiversity of bathyal communities in relation to water dynamics
Rodríguez A., Sánchez F., González-Pola C., Rodríguez-Cabello C.

P28 First approach to study the size and morphology of gorgonian corals and sponges using photogrammetric analysis from video transects in the Marine Protected Area "El Cachucho" (Cantabrian Sea)
Prado E., Sanchez F., Rodriguez A.

P29 Environmental factors influencing growth of *Zostera noltei* meadows in the Arcachon Bay: How to explain their drastic decline?
Cognat M., Auby I., Rigouin L., Michalet R., Sottolichio A., Ganthy F.

P30 Predator-prey relationships between *Molva macrophthalma* and *Gadiculus argenteus:* the role of prey size, ontogenetic and bathymetric variations
Aja A., Quelle P., Frande E., Robledo R., Preciado I., Punzón A.

P31 Indicator species of intertidal boulder fields on the French Basque coast
Lalanne Y., Huguenin I., Lissardy M., Bru N., D'Amico F., Castege I., Milon E., de Casamajor M.N.

P32 The RESOMAR Macrofaune Benthic Database: A useful database to investigate soft bottom communities along French coasts
Gallon R., Lavesque N., A. Caillo, Labrune C., Gauthier O., Grall J., Grémare A.

P33 New asellote isopods from bathyal soft-bottoms of the Bay of Biscay (NE Atlantic)
Frutos I., Kavanagh F., Brandt A., Sorbe J.C.

P34 Molecular and morphological analyses of *Minidiscus comicus* reveals two distinctive morphologies within the species.
Hevia-Orube J., Laza-Martínez A., Orive E., Seoane S.

P35 Seasonal replacement of attached and free-living bacteria in coastal waters of the Southern Bay of Biscay
Uranga A., Abad N., Baña Z., Ayo B., Artolozaga I., Unanue M., Azúa I., Arrieta J.M., Iriberri J.

P36 Seasonal and ontogenetic changes in the horizontal and vertical distribution of seven eggs fish species in Galician waters.
Alvarez P., Guevara-Fletcher C., Rubio A., Cotano U.

P37 Describing the Bay of Biscay's continental shelf food-web using an OSPAR common indicator: the Mean Trophic Level indicator.
Safi G., Vouriot P., Arroyo N.L., Féral J.P., Hattab T., Lamare S., Mialet B., Niquil N., Petit L., Preciado I., Serre S., Le Loc'h F.

P38 Variation in frond depigmentation, breakage, density and biomass of the red alga *Gelidium corneum* under different irradiance levels
Quintano E., Díez I., Muguerza N., Gorostiaga J.M.

P39 Three decades of changes in the structure of the subtidal vegetation at the western end of the Basque coast
Muguerza N., Díez I., Quintano E., Gorostiaga J.M.

P40 Spatial distribution patterns and population structure of the bluemouth *Helicolenus dactylopterus* (Delaroche, 1809) in the southern Bay of Biscay.
Frande E., Robledo R., Aja A., Blanco M., Quelle P., Preciado I., Punzón A.

P41 Impacts of oceano-climatic changes on top predators: long term study in the south of the Bay of Biscay (North-East Atlantic, France)
Castege I., Milon E., D'Elbee J., Milpied J.M., D'Amico F., Bru N.

P42 The role of biogenic substrata provided by canopy algae on the structural and functional diversity of rocky subtidal invertebrates
Bustamante M., Tajadura J., Saiz-Salinas J.I.

P43 Preliminary evidence for a rapid phenological shift at the southern range limit of a sentinel marine species of the Bay of Biscay
Saunier A., Pante E., Guesdon S., Becquet V., Garcia P.

P44 Scales of variability and seasonal and interannual coherence in the zooplankton of two contrasting estuaries of the Bay of Biscay along the salinity gradient.
Uriarte I., Villate F., Iriarte A., Sanchez I., Arranz S.

P45 Morphometric discrimination of two larval populations of anchovy larvae *(Engraulis encrasicolus)* from the Cantabrian Sea (Inner Bay of Biscay) and the Catalan Sea (NW Mediterranean)
Intxausti L., Villate F., Motos L., Uriarte I., Iriarte A.

P46 Differences in mesozooplankton communities along northeast Atlantic shelves, from the Bay of Biscay to the North Sea
Fanjul A., Villate F., Uriarte I., Iriarte A., Atkinson A., Cook K.

P47 Bacterial growth efficiency reveals the adaptation of the marine bacterioplankton to environmental changes
Baña Z., Abad N., Uranga A., Azúa I., Artolozaga I., Unanue M., Ayo B., Arrieta J.M., Iriberri J.

P48 Is spatial distribution of fauna dependent of algal belts on the intertidal boulders of the Basque coast (Bay of Biscay)?
Marticorena J., Huguenin L., Lalanne Y., Bru N., Lissardy M., de Casamajor M-N.

P49 The importance of the estuarine typologies defining the phytoplankton community composition
Pérez L., Guinda X., Seoane S., Puente A., Juanes J.A.

Topic. Geology; erosion; transport and sedimentation

P50 Present-day sedimentation rates in the Bay of Brest (NW France) and its evolution since the last millenaries
Ehrhold A., Grégoire G., Schmidt S., Jouet G., Le Roy P.

P51 The Quaternary 'rasas' of the basque coast: current status and a new project for its study
Bilbao P., Álvarez I., Aranburu A., Yusta I., Iriarte E., Galparsoro I., Arriolabengoa M., del Val M.

P52 Lithogenic sources, composition and intra-annual variability of suspended organic matter and particulate metals supplied from pristine rivers to the Western Cantabrian Sea (Bay of Biscay, SW Europe)
Bernárdez P., Prego R., Alvarez-Vazquez M.A., Ospina-Álvarez N., Santos-Echeandía J., Filgueiras A.V.

P53 Thousands of submarine microbial methane escapes at the Aquitaine Shelf (Bay of Biscay)
Dupré S., Loubrieu B., Scalabrin C., Ehrhold A., Gautier E., Ruffine L., Pierre C., Battani A., Michel G., Le Bouffant N., Berger L.

P54 Environmental changes and bioevents related to mid-Cretaceous Bay of Biscay opening: an example from the northern margin of the Basque-Cantabrian Basin
Agirrezabala L.M., López-Horgue M.

P55 MIS1-MIS5 palaeoceanographic signals in the Bay of Biscay: micropalaeontological approach
Rodriguez-Lazaro J., Pascual A., Varela Z.

Topic. Biogeochemical cycles

P56 A new approach for the determination of Total Alkalinity in estuarine waters
Esnaola M., Kortazar L., Milea D., Fernández L.A.

P57 Interrelation among metals and organic pollutants in a freshwater environment. Case Study: The Deba river urban catchment (Gipuzkoa)
Lechuga-Crespo J.L., García-García J., Ruiz-Romera E., Unda-Calvo J.

P58 Antimony diagenetic implications for radionuclide accidental release scenarios in the Gironde Estuary (France)
Gil-Díaz T., Schäfer J., Pougnet F., Husson A., Bossy C., Dutruch L., Derriennic H., Coynel A., Blanc G.

P59 Spatio-temporal distribution of metal pollution in an urban catchment. Case urban: Deba river.
Lechuga-Crespo J.L., Ruiz-Romera E., García-García J., Martínez-Santos M., Unda-Calvo J.

P60 Chemical reference-profiles from 20 years of Santander Standard Section
Viloria A., Tel E., Lavín A., Rodriguez-Puente C.

Topic. Anthropogenic effects; quality assessment and ecosystem management

P61 Effect of Lowered pH on Microalgae of the Chlorophyta Division
Alegria J., Laza-Martínez A., Seoane S.

P62 Evaluation of long-term, high-frequency and multisite monitoring of dissolved oxygen to investigate hypoxia risk in the Gironde estuary (SW France)
Schmidt S., Diallo P.Y., Derriennic H., Etcheber H., Lamouroux M.

P63 The sense of hearing in the oyster *Crassostrea gigas*
Charifi M., Sow M., Ciret P., Benomar S., Massabuau J.C.

P64 Analysis of basque beachgoers: profile in respect of rip currents knowledge
Maruri M., Sotes I., Basterrechea-Iribar I.

P65 Determination of per- and polyfluoroalkyl substances in grey mullet liver, mussel and oyster samples from the north coast of Spain, France and Portugal
Zabaleta I., Bilbao D., Bizkarguenaga E., Mijangos L., Etxebarria N., Prieto A., Zuloaga O.

P66 Molecular methods for the early detection of marine Non-Indigenous Species in ballast water
Rey A., Borrell Y., García-Vazquez E., Rodriguez-Ezpeleta N., C. Basurko O.C.

P67 Modelling ***Escherichia coli*** concentration in the Nerbioi-Ibaizabal estuary (Basque Country, SE Bay of Biscay) in the context of the European project MARS
Chifflet M., Del Campo A., Borja A.

P68 Gills and digestive gland 7,8-oxo-dG immunohistochemistry for detecting genotoxicity in mussels *(Mytilus galloprovincialis):* a field study in the Bay of Biscay
Zaldibar B., Blanco-Rayón E., Briaudeau T., Aguirre-Rubí J., Rementeria A., Garmendia L., Izagirre U., Marigómez. I.

P69 Gametogenesis and gonad histopathology in mussels *(Mytilus galloprovincialis)* from two estuaries of the Bay of Biscay with different pollution loads
De Diego M., Zubeldia A., Ortiz-Zarragoitia M., Zaldibar B.

P70 Assessment of the effects exerted by Cu and Ag in oysters *(Crassostrea gigas)* through an integrative biomarker index
Rementeria A., Mikolaczyk M., Lanceleur L., Blanc G., Soto M., Zaldibar B., Schäfer J.

P71 Chemical and physiological metal bioaccessibility assessment in surface bottom sediments from Deba River urban catchment: evaluation of urban and industrial inputs impact on sediments quality
Unda J., Martínez M., Ruiz E., Lechuga J.L.

P72 To what extent fishing effort is affecting trophic level of the demersal communities at small scale? Preliminary results of a new food web indicator
Preciado I., Punzón A., Arroyo N.L., López-López L., Serrano A.

P73 Application of a systematic conservation planning approach in the Basque Country
Galparsoro I.

P74 Effect of the implementation of a sewage treatment plant in the suspended sediments metal pollution during flood events in Deba river urban catchment
Garcia-García J., Ruiz-Romera E., Martínez-Santos M., Antigüedad I., Unda-Calvo J.

P75 Survival estimates of deep water sharks based on experimental longline surveys in the Cantabrian Sea (NE Atlantic)
Rodríguez-Cabello C., Sánchez F.

P76 Sex ratio variability in populations of the copepod *Acartia clausi* from estuaries with different pollution load
Hafez T., Ortiz-Zarragoitia M., Villate F.

P77 Lead incorporation in *Platichthys flesus* otoliths along an anthropogenic pressure gradient: validating the use of otolith as natural tracer of contamination
Selleslagh J., Pécheyran C., Baudrimont M., Amara R., Daverat F.

ABSTRACTS BY SESSIONS

Oral
Poster

Oral

Topic. **Climate-ocean relations**

O1

Using high resolution atmospheric models to study atmospheric-oceanic coupling over the Bay of Biscay

González-Rojí S.J.[1*], Sáenz J. [1,2], Ulazia A.[3], Ibarra-Berastegi G.[4], Esnaola G.[5], Fontán A.[6], González M.[6]

1. University of the Basque Country (UPV/EHU). Dept. Applied Physics II, Sarriena Auzoa z/g. 48940 Leioa, Spain.
2. Plentzia Marine Station (PIE-UPV/EHU), Areatza Pasealekua, 48620 Plentzia, Spain.
3. University of the Basque Country (UPV/EHU). Dept. Nuclear Engineering and Fluid Mechanics, Avenida Otaola 29. 20600 Eibar, Spain.
4. University of the Basque Country (UPV/EHU). Dept. Nuclear Engineering and Fluid Mechanics, Alameda Urkijo, s/n, 48013 Bilbao, Spain.
5. University of the Basque Country (UPV/EHU). Dept. Nuclear Engineering and Fluid Mechanics, Plaza Europa 1. 20018 Donostia-San Sebastian, Spain.
6. AZTI-Tecnalia, Marine Research Division, Herrera Kaia, Portualdea z/g, 20110 Pasaia, Spain.

* santosjose.gonzalez@ehu.eus

From the point of view of atmospheric ocean coupling, coastal waters in the south-eastern corner of the Bay of Biscay are affected by latent heat fluxes towards the atmosphere, runoff from coastal streams and wind-stress. These factors affect ocean salinity, temperature, density and surface momentum fluxes. These atmospheric forcings are commonly obtained from atmospheric coarse resolution reanalyses such as ERA Interim, MERRA of CFSR, to name a few. During the last years, the authors presenting this abstract have been producing a set of high-resolution integrations (hindcasts) with the WRF model and 3DVAR assimilation of observations every six hours (00UTC, 06UTC, 12UTC and 18UTC) over the Iberian Peninsula and covering the whole Bay of Biscay nested inside ERA40 or ERA Interim. These integrations have been run at a horizontal resolution of 15 km x 15 km and cover different periods of time (1960-2002 or 2010-2014). Output from these data sets has been archived every six (1960-2002) or three hours (2010-2014). A detailed verification of these integrations with respect to key aspects of the hydrological cycle such as daily and monthly precipitable water content and land precipitation are presented. These quantities allow us to close the hydrological cycle better than the closure that can be achieved using ERA Interim data. Other verifications presented show that the high resolution fields perform better than the forcing reanalysis over coastal areas in terms of surface wind, too. The highest spatial resolution in these datasets will allow a better understanding of coastal processes affected by fresh water balance or upwelling processes at small scales over coastal areas in future studies.

O2

1986-2015: Three decades of oceano-meteorological data in the SE Bay of Biscay. Main trends, regime shifts and anomaly patterns observed.

Valencia V.[1]*, Fontán A.[1], Borja Á.[1], Goikoetxea N.[1], González M.[1].

1. AZTI-Tecnalia, Marine Research Division, Herrera Kaia-Portualdea z/g. 20110 Pasaia (Gipuzkoa), Spain.

* vvalencia@azti.es

Along the 1986-2015 period, several time series of oceanographic and meteorological variables concerning the Basque Coast (SE Bay of Biscay) have been obtained. Under the umbrella of the tridecadal program "VARIACIONES" of the Marine Research Division of AZTI, a combination of internal oceanographic measurements and external data compilation provided consistent datasets of variables related with the thermal and water balance and the relationships with the thermohaline properties of the upper water masses of the inner Bay of Biscay. Trends, anomaly patterns and regime shifts, at different time-scales, in hydroclimatic conditions are analysed for the period 1986-2015 by means of different tools. Among others, the Kolmogorov-Zurbenko adaptive filter is applied to identify discontinuities in time-series. The time series analysis reflect some well know anomaly patterns such as the warm and dry period in the late 80s and early 90s and its influence upon the TS properties of the ENACW. The effect of events like some extremely warm summers or very cold winters, as the winter 2005, that brings a very deep winter mixed layer, can be pointed also. In relation with the water balance, as an example, intense precipitation and high river flow in 2008 contributed to counteract the increase in salinity and the advection of highly saline waters of previous years. In January 2009, the cyclone Klaus favoured strong and early vertical mixing of the water column and brought intense precipitations. Nevertheless, the increasing trend of salinity was really reversed in 2013. In general, a significant coupling between meteorological and oceanographic conditions is observed over the SE Bay of Biscay. In addition, the anomaly patterns and regime shifts observed over this marginal area are in agreement with those described for the NE Atlantic Ocean, related in some cases with the shifts of the NAO or Eastern Atlantic pattern indices.

Topic. **Physical oceanography**

O3

Variability of the main river plumes of the Bay of Biscay under the influence of forcing drivers and teleconnection indices

Fernández-Nóvoa D.[1] *, deCastro M.[1], Costoya X.[1], Gómez-Gesteira M.[1]

1. EPHYSLAB, Environmental PHYsics LABoratory, Facultad de Ciencias, Universidad de Vigo. 32004 Ourense, Spain.

* diefernandez@uvigo.es

Knowledge and predictability of turbid plumes formed by river discharges is of great importance since they control several parameters such as sediments, organic materials, pollutants, light availability, nutrients or the sea surface temperature, modulating the coastal productivity and biogeochemistry, as well as the coastal circulation, stratification or erosion-sedimentation processes. Although, several rivers flow into the Bay of Biscay, the Loire and Gironde Rivers provide the main freshwater inputs, with more than 75% of total runoff. In this sense, the intra-annual variability of Loire and Gironde River plumes was analyzed through MODIS satellite imagery from 2003 to 2015. During winter, when both plumes reach their maximum extension, a merged plume is formed between both estuaries. During summer, when Loire and Gironde plumes reach their minimum extension, each river plume remains located in the vicinity of its estuary mouth. The variability of these turbid plumes was also analyzed under the influence of their main forcing drivers. River discharge showed to be the main factor affecting both plumes with plume area increasing with the increase of the river flow. River discharge controls the fresh water and the material exported by the river to the ocean. Wind also presents an important influence on plume variability, favoring the offshore dispersion of the plumes (under seaward and upwelling winds) or the retention against the coast (under landward and downwelling winds). The maximum extension of Loire and Gironde plumes is observed under downwelling winds. The influence of the most important regional climate patterns in the Bay of Biscay, the Eastern Atlantic (EA) and North Atlantic Oscillation (NAO) on plumes spreading was also evaluated. Both atmospheric indices influence river plumes in a similar way although the EA index showed to have more influence on both plumes. Positive EA values imply larger plumes and vice-versa.

O4

Migration duration of the European Anguilla eel

Rodríguez L. [1] *, Gómez-Gesteira M. [1], Santos F. [1, 2]

1. EPhysLab, Departamento de Física Aplicada, Facultade de Ciencias, Universidade de Vigo, As Lagoas. 32004 Ourense, Spain.
2. CESAM, Departamento de Física, Universidade de Aveiro. 3810-193 Aveiro, Portugal.

* larodriguez@uvigo.es

The European Anguilla eel has its highest stock around the Bay of Biscay. However since the last decade, European Anguilla eel recruitment has decreased. Changes on the ocean currents can be one of the possible causes since they can affect the larvae survival. This study aims to simulate Lagrangian trajectories for different numbers of particles or "larvae" considering different strategies of migration. It also seeks to analyze the dispersion of those particles by using the data of the components U, V from the speed of currents provided by the database Global Hybrid Coordinate Ocean Model (HYCOM) version GlBu0.08 experiment 19.1 (http://hycom.org/dataserver/glb-reanalysis). The horizontal resolution of this database is 0.08° x 0.08° with 40 vertical levels range from surface to 5000 m. Data is available for the period August 1995 to December 2012 with a timescale of 3 hours. The simulations have been run considering biological parameters of the European eel (Anguilla Anguilla) larvae. Particles were released from March to June at the Sargasso Sea to fit the spawning season and spawning area of European eel larvae. Particles were tracked for 24 months and their position was recorded every 15 days over the period 1996-2012. Instantaneous mortality (M) from 1-4 yr^{-1} was also included. The area of study covers The North Atlantic Ocean so the principal aim of the study is analyze the minimal migration duration for *Anguilla anguilla* larvae to reach the European shelf from the Sargasso Sea using a velocity field data as accurate as possible.

O5

Implementation and validation of a new method to take into account for small-scale seagrass patchiness within a 3-dimensional modelling system at regional scale

Laporte-Fauret Q.[1], Ganthy F.[1]*

1. Ifremer, LER-AR, F-33120 Arcachon, France.

* florian.ganthy@ifremer.fr

The Arcachon Bay is colonized by extensive meadows of seagrass *Zostera noltei.* However, between 1990 and 2008, their extent has dramatically decreased, associated with a significant increase in their patchiness. The MARS3D model is deployed over the Arcachon Bay to investigate impacts of seagrass decline on hydrodynamics and sediment dynamics. The effects of *Z. noltei* meadows on hydrodynamics were implemented within the hydrodynamics core through additional source terms within the k-epsilon turbulence model and the advection equation. The aim of this study is to investigate sub-grid processes and propose a method to consider small-scale (1-10 m) seagrass patchiness within the regional model of the Arcachon Bay (mesh size 230 m). Schematic simulations are performed over a rectangular domain (90 m x 60 m) with three different mesh sizes (0.5, 2.5 and 5 m) for contrasted realistic seagrass characteristics (density, coverage) and currents, and random arrangement of seagrass position. For rough grids, patchiness is parameterized for each grid cell using an effective seagrass leaf densities (De) calculated as a function of reference seagrass leaf densities (Dr) and corresponding seagrass coverage (C) of the rough grids (i.e. De=F(Dr,C)). The function, F, allowing the best agreement between water fluxes simulated for the rough grids and for the finest (reference) grid is searched. Our results show that the effects of seagrass patchiness are well simulated using exponential relationship, highlighting important non-linear effects of small-scale seagrass patchiness on larger-scale hydrodynamics. Furthermore, the patterns of errors obtained for the two rough grids are quite similar using the same relationship, indicating a weak model sensitivity to the grid resolution. The obtained parameterization of seagrass patchiness will be tested within the regional 3D model of the Arcachon Bay, and a significant improvement of the simulation performances can be expected.

O6

Effect of river discharges on thermohaline structure along the French continental shelf

Costoya X.[1]*, Fernández-Nóvoa D.[1], de Castro M.[1], Gómez-Gesteira M.[1], Lazure P.[2]

1. EPHYSLAB, Environmental PHYsics LABoratory, Science Faculty, University of Vigo, Ourense, Spain.
2. IFREMER, Physed-DYNECO, Laboratory Physique HYdrodynamique et SEDimentaire, Centre de Bretagne, Plouzane, France.

* xurxocostoya@uvigo.es

River plumes have a great impact on the characteristics of the adjacent seawater, affecting economic activities associated to these areas. Plumes influence the morphodynamics and the ecological balance of the affected areas since they transport sediments, contaminants, organic material, and fresh water, among others. Physical modifications are associated with variations in circulation patterns, stratification, available light, or SST. The main freshwater inputs affecting the Bay of Biscay are provided by the discharge of Loire and Gironde (Garonne+Dordogne) Rivers. Turbid plumes generated by both rivers can merge forming a great plume under high discharge conditions due to the synchronism of both rivers. The area influenced by this river plume cooled (at a mean rate of –0.15 °C dec^{-1}) over the period 1982-2014 during winter months. However, the adjacent oceanic areas warmed (at a mean rate of 0.3 °C dec^{-1}). The same pattern was detected over the period 2003-2014 by means of satellite data. In addition, difference between the warming rate at coastal and oceanic areas was observed to be higher over this period. Cooling along the area under the influence of the river plume was detected in spite of no changes in river discharge or wind intensity. The influence of freshwater inputs on thermohaline variability along the French continental shelf was also analyzed. Special attention was paid to the role that variations in the mixed layer depth play to explain the different warming rate along the French continental shelf during winter months. With this aim, different databases from the Copernicus project were combined in order to take advantage of their spatial and temporal resolution.

O7

Internal tide dynamics and enhanced mixing in the Avilés Canyon System, southern Bay of Biscay

González-Pola C. [1]*, Ivey G. [2], Jones N. [2], Kelly S. [3], Bluteau C. [2], Somavilla R.[1]

1. Instituto Español de Oceanografía. 33212 Gijón, Spain.
2. University of Western Australia, Crawley, WA (Australia).
3. University of Minnesota Duluth, Duluth, MN, USA.

* cesar.pola@gi.ieo.es

The Aviles Canyon System (ACS) is major geomorphological structure of the Cantabrian Sea, southern Bay of Biscay, disrupting the continuity of the northern Spain narrow continental shelf. The site holds rich fishing grounds and biodiversity hotspots, highlighting structured coral reefs. Multidisciplinary studies aiming to support the declaration of the site as a Marine Protected Area have been conducted recently. Within this framework, long-term moorings and short-term landers where deployed at the ACS, some focusing specifically in near bed tidal dynamics. Analytic properties relating the local barotropic tide, stratification and topography were computed to identify potential sites of internal tide (IT) generation. These include the critical sites mapping where seafloor slopes match the internal tide propagation angle, and the so-called body forcing term. Some regions emerged as potential generation sites, mainly the lower shelf-break to upper slope transition, but also some deep topographic features. The analytical study was combined with field measurements and a simulation of IT generation by MITgcm model to provide insights on the IT dynamics of the ACS. Most of the observed IT seems to be locally generated since (i) there is agreement between observed IT and the local IT generation model (ii) the IT strength is modulated by the barotropic tide most of the time and (iii) incoming IT beams are not observed in the outer mooring lines. A secondary canyon, La Gaviera, presented the strongest tidal current within the region and the development and breaking of a violent tidal bore. The phase speed of the IT/bore was estimated about 0.9 m/s, consistent with a bottom trapped mode. Very large overturns up to 90 m and extreme rates of diapycnal diffusivities were observed. The bore breaking triggers the development of a high-freq (30 min) train of up/down vertical velocities, indicative of a hydraulic jump feature.

O8

Comparison of real and simulated trajectories in the Bay of Biscay, using HF radar derived currents

Solabarrieta L.[1, 4] *, Frolov S.[2], Cook M.[3], Paduan J.[3], Rubio A.[4], González M.[4], Mader J.[4], Charria G.[5]

1. DeustoTech, Unibertsitate etorbidea, 24. 48007 Bilbo, Spain.
2. University Corporation for Atmospheric Research/Naval Research Laboratory, Monterey, USA.
3. Naval Postgraduate School, Monterrey, USA.
4. Marine Research Unit, AZTI-Tecnalia, Pasaia, Spain.
5. LOPS-Laboratoire d'Oce´anographie Physique et Spatiale, Plouzane´, France.

* lohisola@hotmail.com

High spatial resolution surface current data are being collected, since 2009, by a long-range high-frequency (HF) radar system, in the south-eastern Bay of Biscay. The hourly temporal resolution of the HF radar surface currents permits to simulate drifter trajectories with the same time step as that of real drifters deployed during several campaigns in 2009. In this work, real drifter trajectories have been compared with simulated trajectories, using differently processed HF radar currents, including forecast currents. To obtain the forecast, Open-Boundary Modal Analysis (OMA) has been applied to radar data and then a linear autoregressive model on the Empirical Orthogonal Functions (EOF) decomposition of an historical data series has been used to forecast currents. Mean distances between real trajectories and their radar derived counterparts range from 4 to 5 km for real-time and forecast currents, respectively, after 12 h of simulations. Then, a second approach spatial and temporal distribution of the lagrangian distances between real-time and forecast trajectories calculated only using HF radar currents for the period 2009-2012 has been analyzed to study the accuracy of the forecast method. After 48 hours of simulation, the forecast model improves the prevision of trajectories using persistent currents, up to 28%. The performance of the forecast is observed to be variable in space and time, according to the different ocean processes governing the local ocean circulation.

O9

Mesoscale slope dynamics and its influence on juvenile anchovy abundances

Caballero A.[1]*, Rubio A.[1], Boyra G.[1], Ferrer L.[1], Cotano U.[1], Aldanondo N.[1], Urtizberea A.[1]

1. AZTI-Marine Research. Herrera Kaia. Portualdea z/g. 20110 Pasaia. Spain.

* acaballero@azti.es

Frontal dynamics influence planktonic organisms and subsequently the overall pelagic ecosystem. The physical processes under this influence are the strong vertical velocities and the horizontal stirring related to the front. Whilst the first process drives episodic nutrient pulses into the euphotic zone, the second one may induce patchiness of planktonic species in the horizontal plane. During September 2013, the GESSEB glider campaign took place in the south-eastern Bay of Biscay. The glider crossed a strong front around 44.2°N-4°W that split the northern fresher, colder and high-chlorophyll oceanic water masses from the southern ones. This front was clearly observed in Sea Surface Temperature (SST), chlorophyll and altimetry satellite maps. Two weeks later, during the PROTEVS oceanographic campaign, a transect parallel and close to that followed by the glider was sampled. In that occasion, in addition to the surface front, a coherent cyclonic eddy with a strong vertical signal from the surface to 1,500 m depth was observed. Around the same dates, the JUVENA campaign sampled the area. This campaign, devoted to the biological/acoustical sampling of anchovies, revealed a higher abundance of juveniles near the front. The SST and chlorophyll maps showed a cyclonic circulation with colder and low-chlorophyll waters in the core to the southeast of the front and an anticyclone with warm and high-chlorophyll waters in the core to its northwest. Finally, the Finite-Size Lyapunov Exponents (FSLE) computed from altimetry maps suggest the presence of a front at the edge between both eddies, with FSLE values around 0.06 $days^{-1}$. In this study, multiplatform and multidisciplinary data are integrated in order to analyse the hydrography and dynamics of an intense frontal feature and its potential impacts on the local ecology processes of the south-eastern Bay of Biscay.

O10

Sensor Networks and derived products at Biscay AGL observatory. State of the art operational oceanography at IEO.

Cano D.[1]*, González-Pola C.[2], Somavilla R.[2], Tel E.[3], Rodriguez C.[1], Ruiz-Villarreal M.[4], Lavín A.[1]

1. Instituto Español de Oceanografía. Centro Oceanográfico de Santander. Promontorio San Martín, s/n Apdo. 240. 39080 Santander.
2. Instituto Español de Oceanografía. Centro Oceanográfico de Gijón. Avenida Príncipe de Asturias, 70 bis. 33212 Gijón.
3. Instituto Español de Oceanografía. Servicios Centrales. Calle del Corazón de María, 8. 28002 Madrid.
4. Instituto Español de Oceanografía. Centro Oceanográfico de Coruña. Paseo Marítimo Alcalde Francisco Vázquez, n.º 10. 15001 A Coruña.

* daniel.cano@st.ieo.es

Since 1991, shelf and slope waters of the Southern Bay of Biscay are regularly sampled in a monthly hydrographical section north of Santander, and on June 2007, an ocean meteorological buoy was moored at the end of Santander Section (www.boya_agl.st.ieo.es). Both are part of IEOOS (IEO Observing System). Biscay AGL is one observatory for the EU FixO3 project. Many sensor networks have been deployed to monitor marine environment, and more will follow in the future. Due to the large number of sensor technologies, integrating diverse sensors into observation systems is not straightforward. By defining standardized service interfaces (like those based on OGC standards) it is possible to enable access to sensor networks and archived sensor data that can be discovered and accessed using standard protocols and application programming interfaces, therefore complying with the requirements of the INSPIRE directive. Future developments include the deployment of a full sensor network as well as adding new devices to the Biscay AGL tool in order to achieve a deeper knowledge of the ocean. Biscay AGL is more than the combination of the AGL Buoy and the hydrographical samplings. This observatory produces not only time series of several parameters at different time resolutions but also derived products, both in real and in delayed time. Derived products from this buoy include annual cycles as well as anomalies of physical and biogeochemical magnitudes like air-sea heat fluxes, salinity and water temperatures, sub inertial currents, surface chlorophyll. Different products are derived from in-situ measurements at the AGL buoy like estimates of the mixed layer depth, wind and currents roses and wave intensity diagrams.

Topic. **Fisheries and Aquaculture**

O11

The impact of massive fishing of juvenile Atlantic bluefin tunas on the spawning population (1950-2009)

Cort J.L.[1]*, Abaunza P.[2]

1. Instituto Español de Oceanografía, Santander, Spain.
2. Instituto Español de Oceanografía, Madrid, Spain.

* jose.cort@st.ieo.es

The fisheries of Atlantic bluefin tuna, *Thunnus thynnus* (L.) juveniles began to develop at the end of the 1940s (Bay of Biscay), middle of the 1950s (off the coast of Morocco) and in 1958 off New England (USA). The results of an analysis of the juvenile ABFT population of the eastern Atlantic part between 1949 and 1962 reveal that under different scenarios the high fishing mortality exerted on the juvenile fish groups (<5 years) in the period studied may have been one of the main factors behind the decline of the north eastern Atlantic fisheries of spawners from 1963. Juvenile catches of that magnitude (6,984,352 ABFT) may have given rise to the limited recruitment from juvenile age to spawning stocks. The analysis has also been made for the periods 1970-2006 and the present (2009). In the first of these two cases fishing mortality (F) fell as a result of a fall in the catch of juveniles, mainly the fishery of Morocco. Nevertheless, during these years over 4 million specimens of 1 year were caught illegally in the Atlantic part of the eastern stock. The fall in F is now even greater due to the practically entire disappearance of the juvenile fisheries as a result of the implementation of the Pluriannual Recovery Plan of the International Commission for the Conservation of Atlantic Tunas (ICCAT), which began in the fisheries of the eastern stock in 2007.

O12

Fidelity of juvenile bluefin tuna to the Bay of Biscay

Arregui I.[1], Galuardi B.[2, 3], Goñi N.[1], Lam C.H.[3], Fraile I.[1], Santiago J.[4], Lutcavage M.E.[3], Arrizabalaga H.[1]*

1. AZTI Tecnalia, Herrera Kaia Portualdea z/g. 20110 Pasaia, Spain.
2. NOAA Greater Atlantic Regional Office, Gloucester, MA, USA.
3. Large Pelagics Research Center, University of Massachusetts Boston, Gloucester, Massachusetts, USA.
4. AZTI Tecnalia, Txatxarramendi Ugartea z/g. 48395 Sukarrieta, Spain.

* harri@azti.es

From 2005 to 2010, 80 internal archival tags and 29 X-tags (miniaturized pop-up satellite archival tags) were released on juvenile Atlantic bluefin tuna *(Thunnus thynnus)* in the Bay of Biscay with average fork length of 95.9 cm. Information from fifteen X-tags and five internal archival tags was successfully recovered in the mid-Atlantic and the Bay of Biscay. The data were analysed allowing classification of migration behaviours and characterization of horizontal and vertical habitat utilization. Analysed results show important geographic dispersion from autumn to spring. During the overwintering period, 50% of the bluefin tuna were classified as residents in the Bay of Biscay and surrounding areas. This finding contradicts the generally assumed seasonal nature of the feeding migration to the Bay of Biscay, supported by the clear seasonality of traditional fisheries. Archival data from the electronic tags also reported the first trans-atlantic roundtrip by a bluefin tagged in the eastern Atlantic coast. During summer, we found high concentration and fidelity to the Bay of Biscay, where they inhabit shallower waters. Results suggest that the Bay of Biscay is a key feeding area for juvenile Bluefin tuna in the Atlantic.

O13

Towards a fishery-independent abundance index for East Atlantic juvenile bluefin tunas: first outputs of a directed acoustic survey in the Bay of Biscay

Goñi N.[1]*, Onandia I.[2], Uranga J.[1], Martinez U.[1], Lopez J.[1], Boyra G.[1], Arrizabalaga H.[1], Arregui I.[1], Santiago J.[2]

1. AZTI, Herrera Kaia, Portu-aldea z/g. 20110 Pasaia, Gipuzkoa (Spain).
2. AZTI, Txatxarramendi ugartea z/g. 48395 Sukarrieta, Bizkaia (Spain).

* ngoni@azti.es

Uncertainties regarding the Atlantic bluefin tuna stock status and the problems associated to fishery-dependent abundance indices raised the need to develop fishery-independent abundance indices for this species. In the Eastern temperate North Atlantic, the Bay of Biscay is a well-konwn summer feeding area for juvenile bluefin tunas (ages 1 to 4). An acoustic survey was performed in the Bay of Biscay during July 2015 on-board a baitboat fishing vessel, using a long-range 90 kHz sonar and a SIMRAD EK60 38kHz scientific echosounder. The survey followed systematic transects throughout the fishing ground defined according to bluefin tuna catch locations by baitboats in the summers 2000 to 2011. Along these transects, all bluefin tuna detections by sonar and echosounder were recorded. In each aggregation, no-kill fishing events were conducted in order to verify the species as well as to sample the sizes of the bluefin individuals. The spatial distribution of detected bluefin schools is shown, and the estimated number and size of individuals in the detected schools is provided. Work is ongoing in order to set the methodology to produce an acoustic, fishery independent abundance index in the Bay of Biscay as an alternative to the one, based on catch rates, that is being used in the stock assessment of the East Atlantic and Mediterranean bluefin tuna.

O14

Trends on the ontogeny of the dominant flatfish species on the southern Bay of Biscay. Ecoloy and distribution patterns

Fernández-Zapico O.[1]*, Punzón A.[1], Serrano A.[1], Landa J.[1], Ruiz-Pico S.[1], Velasco F.[1]

1. Instituto Español de Oceanografía, Centro Oceanográfico de Santander, Promontorio de San Martín s/n. 39004 Santander, Spain.

* olaya.fernandez@st.ieo.es

Knowledge about distribution patterns of flatfish species in the area is needed in order to bring new insights into the ecology of the order Pleuronectiformes, due to their ecological importance as they are closely linked to the bottom, as well as the economical importance of some species in the group. Ontogenetic changes in distribution between the juvenile and adult stages of the dominant flatfish in the Southern Bay of Biscay *(Arnoglossus laterna, A.imperialis, Microchirus variegatus, Lepidorhombus whiffiagonis, L. boscii, Pegusa lascaris, Buglossidium luteum, Solea solea* and *Bathysolea profundicola)* have been related with the main environmental drivers affecting their ecology through the use of multivariate methods and also calculating the centers of gravity for each length group by species with respect to each environmental driver. The study was done with data from bottom trawl surveys carried out in the North Spanish continental shelf (Southern Bay of Biscay) every autumn covering a time series from 1983 aiming to characterize demersal and benthic ecosystems. This study shows that in general, the dominant flatfish species in the southern Bay of Biscay go through an ontogenetic niche shift mainly as a function of depth and sediment size. Juveniles tend to be in shallower waters than adults, except *A. laterna, M. variegatus* and *L. boscii,* that show the opposite behaviour. Most of the dominant species also show affinity for larger grain sizes as they grow. Keywords: Ontogeny, Flatfish species, Pleuronectiformes order, distribution patterns, environmental drivers.

O15

Impact of oceanographic conditions on the dispersal of anchovy eggs and larvae in two contrasting years of recruitment success in the Bay of Biscay

Ferrer L.[1]*, Caballero A.[1], Ibaibarriaga L.[1], Uriarte A.[1], Urtizberea A.[1], Aldanondo N.[1], Rubio A.[1], Cotano U.[1], Santos M.[1]

1. AZTI-Marine Research. Herrera Kaia. Portualdea z/g. 20110 Pasaia. Spain.

* lferrer@azti.es

The main objective of this study was to analyze the existing oceanographic conditions during the spawning and dispersal of anchovy eggs and larvae in the Bay of Biscay in 2008 and 2010. According to DEPM (Daily Egg Production Method) BIOMAN surveys, anchovy egg production was rather similar in these two years (only 30% higher in 2010), but there was a great contrast in recruitment success per spawning biomass (about five times higher in 2010). To achieve the proposed objective, we used the Regional Ocean Modeling System (ROMS) to obtain three-dimensional velocity, temperature, and salinity fields in the central and eastern Bay of Biscay from April to August, and the Sediment, Oil spill, Fish Tracking model (SOFT), along with an egg spawning model, to simulate the dispersal of anchovy eggs and larvae. On the one hand, the results showed that the environmental conditions in 2008 and 2010 were significantly different. In spring 2010, the freshwater discharges from the Loire, Gironde, and Adour Rivers were lower than in spring 2008. This fact was reflected in the velocity, temperature, and salinity fields obtained with ROMS. On the other hand, the dispersal of anchovy eggs and larvae (until the age of 40 days) obtained with SOFT differed considerably between the two analyzed years. In the near future, these results will provide the basis for analyzing the role of mesoscale eddies in the anchovy life cycle.

O16

Historical trends of demersal elasmobranchs populations in the Cantabrian Sea.

Modica L.[1]*, Rodríguez-Cabello C.[1], Ruiz S[1]., Fernández O.[1], Velasco F.[1], Sánchez F.[1]

1. Instituto Español de Oceanografía. 39004 Santander, Spain.

* larissa.modica@gmail.com

Bottom trawl surveys along the continental shelf of the North of Spain are carried out annually since 1990 to provide data and information for the assessment of the main commercial demersal and benthic species of the Galician and Cantabrian Sea (ICES Divisions VIIIc and IXa North). Around 160 fish species about 70% of the total stratified biomass catch, are commonly caught during these surveys where the elasmobranchs comprised about the 7%. Their life histories, body features, and their behavior make them sensitive species, vulnerable to depletion as a result of low selective bottom-trawl fishing activity. For all these reasons elasmobranchs play an important role in the southern Bay of Biscay demersal ecosystem. In the study the abundance and biomass indices, length frequency distributions and geographic and bathymetric distributions of the most common elasmobranch species are described. The abundance trends and major changes are discussed. In general terms all the species considered *(Scyliorhinus canicula, Galeus melastomus, Etmopterus spinax, Raja clavata, Raja montagui* and *Leucoraja naevus)* showed an increasing trend. These results could be explained taking into account that, even if they are not considered as target fish species, and consequently, they are not directly involved in protection measures, measures for stocks recovery adopted following the Common Fishery Policy guidelines starting from the 1990s and artificial reefs laying, probably have had indirect favorable effects on the populations studied.

O17

Clam monitoring: optimization of a recurring survey in the Arcachon Bay using spatially balanced sampling

Kermorvant C.[1]*, Caill-Milly N.[1], D'Amico F.[2], Bru N.[2], Sanchez F.[1], Brown J.[3], Lissardy M.[1]

1. Ifremer. Aquitaine Laboratory of Halieutic Resources. FED 4155-MIRA. UFR Côte Basque. 1 allée du Parc Montaury. 64600 Anglet. France.
2. UNIV PAU & PAYS ADOUR. Laboratory of Mathematics and their Applications of Pau. UMR CNRS 5142 (FED 4155-MIRA). UFR Côte Basque. 1 allée du Parc Montaury. 64600 Anglet. France.
3. University of Canterbury. School of Mathematics and Statistics. Private Bag 4800. 8140 Christchurch. New Zealand.

* Claire.Kermorvant@ifremer.fr

A collaborative joint management approach is being developed for the Manila clam *(Ruditapes philippinarum)* resource in Arcachon Bay between scientists and fishermen. The basis of decisions in this management framework is information on the resource from data collected in field surveys. It is relatively time consuming and costly for the local community to conduct them and our interest is in finding more efficient ways to collect field data, while maintaining good statistical precision. Here we explore the option of refining the sampling protocol. Stratified Random Sampling (StratRS) is the design currently used for the resource, and is the most commonly used surveys for collecting such data at this scale. In our study we used a large dataset gathered over several surveys, to compare StratRS with a recently developed spatially balanced survey design called Generalized Random Tessellation Stratified sampling (GRTS). The latter improves the spatial balance of a sample, is more flexible, and allows for unequal probability sampling. We used a simulation methodology, divided into four steps: 1) creation of a virtual population from existing data and using geostatistics, that mimicked the real biological population, 2) selection of sampling stations (optimal number and locations) with StratRS and GRTS designs using statistical resampling methods, 3) interpolation of the biomass and abundance values at the selected stations to compute population estimates, and, 4) evaluation of the designs by comparing statistical accuracy and precision of the estimates, and approximate survey costs. The spatially balanced design, GRTS, globally performed better than StratRS for estimating biomass and abundance. We consider GRTS to be a promising sampling design for clam populations. It improves survey reliability, or, for the same current level of reliability, it offers cost savings. Such design may be useful for other exploited bivalves populations, and we discuss its practical implementation into large-scale operational surveys.

Topic. **Biodiversity; ecosystem structure and functioning**

O18

Ecological role of an engineer species, Haploops nirae, *for coastal benthic invertebrates and demersal fish*

Chaalali A.[1]*, Brind'Amour A.[1], Dubois S.[2], Le Bris H.[3]

1. IFREMER, Fisheries Ecology and Modelling Department, Nantes, France.
2. IFREMER, Laboratory of Benthic Ecology, Brest, France.
3. Agrocampus Ouest, Ecology and Ecosystem health Research unit, Rennes, France.

* aurelie.chaalali@ifremer.fr

Coastal nurseries are composed of a mosaic of sedimentary habitats including muds, sands or rocks. An original facies of the French Atlantic coast is formed by small filter-feeding, gregarious, and tubicolous amphipods, *Haploops nirae*. This study aims to investigate the ecological functions provided by this engineer species for the taxa inhabiting or temporarily exploiting coastal ecosystems. Using data from a recent scientific survey conducted in two French Bays, our study tested (i) whether *Haploops* community facilitates or modifies invertebrate and ichthyologic diversity and biomass and (ii) two hypotheses of ecological role of *H. nirae* engineer species for these communities (refuge and feeding areas). The consideration of Available Benthic Energy Coefficients (ABEC), in complement of classic diversity indices, provided new insights on the higher profitable energy available in *Haploops* habitat compared to the two nearby habitats *(Sternaspis scutata* and *Amphiura filiformis/Owenia fusiformis muds)*. The ABEC was combined with isotopic functional indices (IFIs) to provide scale-dependent trophic understandings of the habitats under study. At the food-web scale, IFIs suggested (i) a higher functional richness in *Haploops* community in relation with a higher diversity of food sources and longer food chains, and (ii) a higher functional divergence, probably associated to a larger use of secondary source. IFIs provided another description of *Haploops* habitat while considering fish prey only. Our results pointed out a lower degree of specialization, suggesting a homogenous habitat and less trophic redundancy. Moreover, our analyses seem validating the refuge hypothesis although the number of fish species supporting this hypothesis was very limited. Despite the specific assemblage described in *Haploops* habitat, the hypothesis of preferential feeding area was not emphasized. However, a specialist feeding behavior of fish was showed and needs further investigation. Following this study, further work should also be dedicated to a temporal analysis of *H. nirae* ecological role.

O19

Seasonal and interannual variability of mesozooplankton and the relationship to environmental factors in two contrasting estuaries of the Bay of Biscay

Villate F.[1], Iriarte A.[2]*, Uriarte I.[2], Sanchez I.[1]

1. Department of Plant Biology and Ecology, Faculty of Science and Technology, University of the Basque Country (UPV/EHU), PO Box 644. 48008 Bilbao, Spain.
2. Department of Plant Biology and Ecology, Faculty of Pharmacy, University of the Basque Country (UPV/EHU), Paseo de la Universidad 7. 01006 Gasteiz, Spain.

* arantza.iriarte@ehu.es

Seasonal and interannual variations of the mesozooplankton community and the influence of environmental factors were assessed at 3 different salinity sites (35, 33, and 30) along the longitudinal axis of two estuaries of the Bay of Biscay (estuary of Bilbao: B and estuary of Urdaibai: U) with contrasting geomorphology and anthropogenic influence, for the period 1998-2005, using redundancy analysis (RDA). The main mode of seasonal variability was similar along the longitudinal axis of Bilbao, with peaks in early summer, whereas in Urdaibai the annual peak were delayed from U35 to U30 from early spring to early summer, these differences being related to differences in the seasonal pattern of chlorophyll. Cladocerans and cirripede larvae made a high contribution to the mesozooplankton seasonal pattern in Bilbao, and cirripede larvae also made a high contribution in Urdaibai, but there were differences along the salinity gradient in both estuaries. Additionally, in Urdaibai, unlike in Bilbao, gastropod larvae also showed high contribution to the seasonal pattern at U33 and U30. These differences in taxa contributions were likely related to the type and extension of benthic habitats. Regarding interannual variations, a unidirectional temporal change was found in Urdaibai, but it was not so clear for Bilbao. Polychaete larvae and hydromedusae (in some cases siphonophores too) made a high contribution to these interannual variations at most salinity sites in both estuaries. Exception was at B30 where copepods showed the highest contribution, explainable by the introduction of invasive species, and at U35 where bivalves and gastropods showed the highest contributions. Temperature was the main factor explaining temporal variations in mesozooplankton community in both estuaries at all salinity sites. The percentage of variation of the mesozooplankton community explained by environmental factors increased from the inner to the outer estuary of Bilbao, whereas it showed the opposite pattern in Urdaibai.

O20

Potential effects of the phytoplankton community on bivalve aquaculture in Basque coastal waters (southeastern Bay of Biscay)

Muñiz O.[1,*], Revilla M.[1], Rodríguez J.G.[1], Laza-Martínez A.[2], Seoane S.[2], Franco J.[1], Orive E.[2]

1. AZTI-Tecnalia, Marine Research Division, Herrera Kaia Portualdea, s/n. E-20110 Pasaia, Spain.
2. Department of Plant Biology and Ecology, Faculty of Science and Technology, University of the Basque Country, UPV/EHU. 48940 Leioa, Spain.

* omuniz@azti.es

World aquaculture has undergone a great development in the last decades. In Basque coastal waters in particular, there is an increasing interest in implementing bivalve offshore aquaculture. For filter-feeding bivalves phytoplankton constitutes the main source of energy. Nevertheless, some phytoplankton species are considered harmful due to its potential ability to form high-biomass blooms and/or produce toxins. These can be accumulated by filter-feeding organisms and get transferred to higher trophic levels, posing a threat to human health. All this, together with a recently installed pilot-scale bivalve farming off the coast of Mendexa (Bizkaia), motivated a study of the phytoplankton community, which involved the analysis of taxonomic data obtained between 2003 and 2013, at 16 nearshore and 3 offshore stations along the whole Basque coast. Several harmless phytoplankton species showed occasionally significant increments in cellular abundance. These bloom events were generally caused by diatoms, a fact that could imply a favourable condition for bivalve growth, as indicated by other authors. Bloom frequencies presented no statistically significant spatial differences and a total of 31 bloom-forming taxa were detected. In regard to harmful species, all stations presented many potentially toxic taxa, mostly dinoflagellates. The diatom genus *Pseudo-nitzschia* was the most widely distributed taxon. *Pseudo-nitzschia* spp., as well as the dinoflagellates *Dinophysis* spp. and *Alexandrium* spp., which might be causative of Amnesic, Diarrheic and Paralytic Shellfish Poisoning, respectively, exceeded the abundance limits that imply toxicity risk in several occasions, mostly in spring and summer. Finally, since in this time series only data from surface waters were available, a complementary study on phytoplankton, which also includes phytotoxins, is being carried out through the water column in the pilot-scale bivalve farming.

O21

Planktonic biodiversity in the French Basque coast in relation with marine pelagic mucilage occurrence

Susperrégui N.[1], Del Amo Y.[2*], D'Elbée J.[3], Jude F.[2], David V.[2], Bru N.[4], D'Amico F.[4], Raimbault P.[5], Bichon S.[2], Bourasseau L.[2], Lienart C.[2], Savoye N.[2], Rouaud V.[6], Soulier L.[1], Gaudin P.[7], Pigot T.[6]

1. Institut des Milieux Aquatiques, 64. 100 Bayonne, France.
2. Université de Bordeaux, UMR CNRS EPOC-Arcachon. 33405 Talence, France.
3. LAPHY. 64210 Ahetze, France.
4. Université de Pau, LMA. 64 000 Pau, France.
5. Université Aix Marseille, M.I.O. 13288 Marseille, France.
6. Université de Pau, UMR IPREM, 64. 000 Pau, France.
7. Université de Pau, Fédération de recherche MIRA. 64600 Anglet, France.

* y.delamo@epoc.u-bordeaux1.fr

Located at the ocean-land boundary, marine coastal ecosystems are highly productive zones, yet ecologically sensitive areas where biological diversity is often threatened. Amongst the ecological compartments, phytoplankton represents the first level of trophic pelagic food webs, being therefore the main prey for higher consumers, as well as the result and regulator of nutrient levels. The study of this compartment seems therefore necessary in order to understand the ecosystem functioning. A one-year exhaustive data collection was carried out in the South Bay of Biscay from April 2013 to June 2014 in order to (i) characterize seasonal and spatial phenology of phytoplankton blooms; (ii) determine the main controlling factors of their succession and (iii) evaluate potential links between plankton diversity and the occurrence of seasonal Marine Pelagic Mucilages (MPM) recurrently observed in this area within the last few decades. Phytoplankton phenology is characterized by three seasonal increases of primary production observed during spring, summer and fall periods. Main phytoplankton blooms are dominated by microphytoplancton (>10 µm), mostly diatoms as *Ceratoneis closterium, Leptocylindrus danicus* (spring 2013), *Pseudonitzschia* spp. (fall 2013) and *Thalassiosira* sp. (spring 2014). Nanophytoplankton is also a productive group during late spring / summer and winter / fall transition periods. According to typical primary production patterns of Bay of Biscay waters, phytoplankton is essentially controlled by P-limitation during late spring / summer. MPM events are associated with phytoplankton production increases, especially during P-limitation and water column stabilization. Furthermore, such events are associated to diversity decline. Interestingly, the co-occurrence of diatoms and TEP is revealed, while virus and s-EPS concentrations are correlated. Cnidarians and Appendicularians seem to further contribute to MPM presence, possibly due to discarded houses. Main environmental and biological factors liable to control the succession, as well as those potentially involved in mucilage production and accumulation will further be discussed.

O22

New data on albacore diet and internal parasites in the Bay of Biscay and surrounding waters

Bonnin A.[1]*, Goñi N.[1], Louzao M.[1], Arrizabalaga H.[1]

1. AZTI. Herrera Kaia, Portu-aldea z/g. 20110 Pasaia, Gipuzkoa (Spain).

* abonnin@azti.es

Albacore is a pelagic high trophic level predator that performs a seasonal trophic migration every summer to the Bay of Biscay and surrounding waters. As such, it constitutes an interesting proxy to give an insight on the epipelagic and mesopelagic micronekton of the temperate Eastern North Atlantic. Several studies were conducted on albacore in this area since the 1970s, most of them having a short temporal coverage and thus providing a snapshot of albacore diet. In the present work we analyzed the stomach contents of 300 albacore sampled throughout the summers (July to October) of 2012 to 2015 in the Bay of Biscay. Dietary composition was studied in terms of frequency of occurrence and mean weight percentage of prey species, prey diversity and overall temporal and spatial variations of diet. Diet composition varies in space and time, with important amounts of krill in summer and in oceanic areas and a predominance of anchovy in autumn and near the continental slope. This study completes an almost continuous previous time series started in 2004, compiling data from 1658 stomachs of albacore sampled in the Bay of Biscay and surrounding waters. The long-term temporal trends observed are discussed in the context of changes in the pelagic ecosystem in the last decades. Parasitism has not been included in many studies and thus its potential use as albacore movement tracer remains unexplored. The occurrence of *Hirudinella fusca* and nematodes in albacore stomachs are related with biometrics data (total length, weight), diet composition and sampling area. The results should confirm and complete or invalidate the observations of previous studies.

O23

Does upwelling intensity influence feeding habits and trophic position of planktophagous fish?

Lopez-Lopez L.[1]*, Preciado I.[1], Muñoz I.[1], Decima M.[2], Molinero J.C.[3], Tel E.[4]

1. Spanish Institute of Oceanography. C.O. Santander, Spain.
2. National Institute of Water and Atmospheric Research, Wellington, New Zealand.
3. Helmholtz Centre for Ocean Research Kiel, Kiel, Germany.
4. Spanish Institute of Oceanography. S.C. Madrid, Spain.

* lucia.lopezlopez@gmail.com

The effect of upwelling conditions on the trophic level of four planktophagous fish *(Gadiculus argenteus, Capros aper* and juveniles of *Micromesistius poutassou* and *Merluccius merluccius)* on the continental shelf off Northwestern Spain was assessed by coupling stomach content analyses and isotopic data. The study was performed during two consecutive years characterized by contrasting oceanographic conditions during the summer season; the first year (2012) had an intermittent and weak upwelling season, while the second (2013) had an intense and extended upwelling period. Sampling was carried out in autumn, after the summer upwelling, along a transect parallel to the coast on the continental shelf (130-190 m depth), following the main upwelling gradient towards the Northeast. In addition to stomach content sampling and isotopic analyses of fish muscle, the isotopic signature of benthic detritus and sub- superficial phytoplankton were also identified to characterize the basal isotopic level. We hypothesize that differences in isotopic ratios under these contrasting upwelling intensities possibly originate from both changes in the isotopic ratios of basal levels and shifts in the feeding habits of planktophagous species. Basal ratios of carbon and nitrogen in benthic detritus showed neither interannual variability nor relation with the upwelling gradient. However, particulate organic matter (POM) had significantly higher δ15N and δ13C during the first year. Isotopic signature of the fish species was significantly different among years but followed different patterns in the four species. The ratio of 15N indicated that the four fish species considered had a trophic level of two, standing approximately 6 units over the basal level and probably predating on consumer species. Stomach sampling evidenced that *C. aper has* a more diverse diet based on mesozooplankton and suprabenthos, while euphausiids constituted the majority of diet in *G. gadiculus* and juvenile *M. merluccius* and *M. poutassou* in both years. Euphausiid species would act then rather as consumers than predators, as a preliminary analysis of their isotopic signature confirmed. While differences in isotopic ratios exist at the base of the food web, our analyses suggest that shifts in feeding habits may have a major role in determining species isotopic position.

O24

Are environmental conditions involved in clam population decline?

Ramos E.[1]*, Puente A.[1], Echavarri-Erasun B.[1], Juanes J.A.[1]

1. Instituto de Hidráulica Ambiental de la Universidad de Cantabria (IHCantabria). C/ Isabel Torres n.º 15, PCTCAN. 39011 Santander. Spain.

* ramose@unican.es

Productive natural populations of shellfish resources have significantly decreased along the estuaries of Cantabria (N Spain) during the last years. It is specially remarkable the decline in clam populations, both the native *Ruditapes decussatus* and the nonindigenous *R. philippinarum*. This decline has occurred gradually but the reason is not clear. Among the possible causes there are changes in sediment composition, climatic conditions, hydromorphological alterations, pollution events, competition with other species, pathological phenomena or overfishing. Thus, the objective of this study is to analyse the environmental conditions that could have been involved in the clam populations decline. The main estuaries of Cantabria have been analysed: the Bay of Santander and the Marismas de Santoña wetlands. Biological data is available for the years 2005, 2010 and 2015. Clam sizes, density and stocks were compiled in a homogenous way during these years. Through different statistical analysis, the temporal evolution of *R. decussatus* and *R. philippinarum* was related with physico-chemical characteristics of water and sediment and with meteo-oceanographic variables. The information obtained in this study is a key element to evaluate clam populations exploitation situation and the performance of management measures in large estuaries where intertidal shellfishing is carried out. The results may be also powerful to support restoration strategies.

O25

Baseline characterization of rocky subtidal benthic vegetation of the north and southern Iberian Peninsula

Muguerza N.[1], Díez I.[1], Quintano E.[1], Enjamio A.[1], García-Sánchez M.[2], Veiga A.[3], Pérez-Ruzafa I.[4], Pérez-Ruzafa A.[3], Gorostiaga J.M.[1]*

1. Department of Plant Biology and Ecology, University of the Basque Country, PO Box 644. 48080 Bilbao, Spain.
2. Department of Ecology and Hydrology, Faculty of Biology, University of Murcia. 30100 Murcia, Spain.
3. Aquarium Finisterrae, Paseo Marítimo Alcalde Francisco Vázquez. 34, 15002 A Coruña, Spain.
4. Department of Plant Biology, University Complutense. 28040 Madrid, Spain.

* jm.gorostiaga@ehu.eus

Recent changes in the distribution and abundance of marine seaweeds in the north of the Iberian Peninsula have been recently documented in relation to climate change and local factor. In order to obtain a baseline information of the subtidal vegetation and tracking future changes, a survey was carried out in summer of 2015. Eight locations (two sites per location) along the Cantabrian coast and another two at the Mediterranean coast (Granada and Murcia) were selected. For each location, continuous measurements of temperature and PAR and UVA light were recorded. The general pattern emerging from the multivariate results shows that macroalgal communities in the Atlantic localities exhibited a gradual change following the east/west gradient which is by extension a thermal gradient from 22.5 °C to 16.8 °C (September, upper quartile p75). Vegetation at the easternmost locations of the study area (Basque Country) was largely devoid of large perennial algae, whereas the red alga *Gelidium corneum* increased westwards, reaching its highest abundance in Cantabria. As *Gelidium corneum* decreased farther west (Asturias), the kelp *Saccorhiza polyschides* became abundant, with the highest coverages showed at the westernmost part (Galicia). Assemblages from the Mediterranean locations were found to be different from each other, and different from those of the Atlantic locations. The warmest location (Murcia, 30.3 °C) was dominated by *Halopteis scoparia,* whereas *Padina pavonica* was the most abundant macrophyte in Granada (27.9 °C). Light availability (PAR and UVA) was significantly higher at the Mediterranean locations, however differences in irradiance along the north Iberian locations were not found to follow an east/west gradient overlapped with the thermal gradient. These results suggest that temperature is the main underlying factor regulating macrophyte distribution, while irradiance seems to play a secondary role within locations with similar temperature. Nevertheless, since irradiance is highly variable in time, further records are needed to characterize light availability at the locations studied.

O26

Distribution, growth and recruitment of Actinia equina *(Cnidaria, Anthozoa) in the Cantabric Sea: crevices vs. rock pools.*

Ortega M.M. [1]*, Barrenetxea M[1].

1. University of the Basque Country (UPV/EHU) Animal Physiology, Bº Sarriena, s/n. 48940. Leioa. Spain.

* mercedes.ortega@ehu.es

A comparative study of size distribution, growth and spring recruitment in a population of the intertidal sea anemone *Actinia equina* dwelling in crevices and rock pools was undertaken using photogrammetric methods. Two adjacent sites in the littoral area of Sopelana (43° 23´N, 2° 59´ W in Biscay, Spain) characterized by a well represented intertidal rocky area (loamy limestone) and located at similar zonation level (tidal exposure ranging from 12 to 16 hr/day) were selected: A long crevice (4,640 mm length) and a succession of shallow rock pools (4,500 mm length) on a rocky platform separated by a distance of 200 m. *Actinia equina* appeared well represented at both sites (75 to 130 for the crevice and the rock pool at the beginning of the experiment) including mainly red and green morphs, brownish specimen occurring occasionally. These two sites were monitored in 7 occasions between February 10th and August 17th 2015 (7 sampling episodes) and physical parameters (luminosity, air and water temperature and humidity) were also recorded. Additionally a group of 20 specimens was taken to the laboratory to perform biometrical and growth determinations and evaluating individual offspring production. Simultaneous determinations of live weight (mg) and pedal area (mm^2) obtained from picture examination (Image-J) in the laboratory specimens allowed scaling biomass to biometric parameters to analyze field images. Initial size distribution ranged from 1 to 10 g live weight in the crevice and between 0.25 and 5 gr in the rock pools accounting for 350 and 275 g of accumulated live weight respectively. Laboratory specimens released offspring continuously (1 to 17 mg live weight) from February to June showing a peak in May. No spawning was detected in the crevice whereas in the rock pools offspring from 2 to 20 mg live weight, appeared throughout the period of inspection.

O27

Spatial and temporal variations of Zostera marina *meadows in Brittany: relationship between habitat complexity and macrofaunal diversity*

Boyé A.[1, 2]*, Legendre P.[2], Grall J.[1, 3], Gauthier O.[1]

1. LEMAR UMR 6539, Institut Universitaire Européen de la Mer, Université de Bretagne Occidentale, Plouzané, France.
2. Laboratoire de Recherche de Pierre Legendre, Département des Sciences Biologiques, Université de Montréal, Montréal, Canada.
3. UMS 3113, Institut Universitaire Européen de la Mer, Université de Bretagne Occidentale, Plouzané, France.

* aboye@univ-brest.fr

Seagrasses are ecosystem engineers that create precious habitats providing many valuable ecosystem services, supporting substantial abundances and holding great biodiversity. Yet, they are increasingly threatened by global changes and direct anthropogenic impacts. Conservation efforts to protect and restore these exploited habitats are still lacking comprehensive and quantitative knowledge of factors affecting seagrass meadows and their functioning at large spatial and temporal scales. We used data collected by the REBENT (Réseau Benthique) monitoring program on 9 intertidal *Zostera marina* meadows along the coast of Brittany (France, north of the Bay of Biscay) during 5 years to deepen our understanding on the relationships between seagrass beds, their biocenosis and their environment. *Z. marina* demonstrated extensive morphological plasticity at the regional scale, especially in their investment between above and belowground biomass per shoot and in shoot density. Both were strongly related to environmental variability, in particular temperature and desiccation stress, but displayed opposite responses. Interplay between shoot morphology and density appeared to control associated epifauna community, especially for dominant grazers. Leaf surface area (and not habitat complexity) was the main feature explaining β diversity at the regional scale, with tremendous impacts on macrofaunal abundances. Endofauna appeared primarily structured by sediment characteristics. No effect of root structure was detected but our results suggest that endofauna responded to meadows characteristics through detrital pathways and leaf biomass decomposition. Overall, temperature, and to lesser extent current regime, appeared as the main factors constraining biodiversity, both directly and through the changes they induced in *Zostera marina* beds morphology. Further work with this unique dataset will address the links between habitat and functional diversity as the present results call for a re-examination of the role of habitat structure on macrofaunal communities in these NE Atlantic meadows.

O28

Hard bottoms bathyal habitats and epibenthic communities of Le Danois Bank

Sánchez F.[1]*, Rodríguez A.[1], García-Alegre A.[1], Gómez-Ballesteros M.[2]

1. Instituto Español de Oceanografía, P.Box 240. 39080 Santander, Spain.
2. Instituto Español de Oceanografía, Corazón de María 8. 28002 Madrid, Spain.

* f.sanchez@st.ieo.es

The Marine Protected Area "El Cachucho", which comprises Le Danois Bank and the intraslope basin, was included in 2008 on Nature 2000 network mainly because of the presence of "1170 Reefs" habitat of EU Directive. For the purpose of reviewing the effectiveness of the existing management plans, several activities aimed at the characterization of the more structurally complex seabeds were planned and developed undertaking studies during the ESMAREC 0514 survey. For the identification of these habitats, the ROTV Politolana was submerged on 33 places on the Le Danois Bank searching for the places with higher values of slope and reflectivity, those who characterizes the hard substrata. Visual transects have been conducted in a range between 420 and 1400 m depth. Photogrammetric techniques were used for the image scaling so we could get the surface area and the species measurement. A total area of 21,977.7 m^2 was analyzed in the photographs of 18 of the 33 transects verifying that 83% of the substrata of our study area were represented by 4 different facies: hard substrata, hard substrata with mixed sediments, mixed sediments with pebbles and boulders, and mixed sediments. The relative abundance of the 116 macro-epibenthic species identified show that the most abundant fall into the group of the sponges (29%), cnidarians (26%), crustaceans (26%) and echinoderms (14%), i.e. mostly species sessile or with low mobility. The most representative species of the hard substrata are 3 cnidarians: *Callogorgia verticillata, Paramuricea* cf *placomus* and *Dendrophyllia cornigera* and 3 sponges: *Asconema setubalense, Geodia megastrella* and *Phakellia robusta.* Maximum Entropy Index (MAXENT) was used in this study to get the habitat suitability models of these vulnerable species and obtain the spatial distribution according to probability values, distribution that appears to be located inside the area protected by the current management measures.

O29

Biological traits analysis revealed combined effects of bottom trawling and sedimentary features on benthic ecosystem functioning in the Northern Bay of Biscay

Robert A.E. [1, 2, 3,*], Dubois S.F. [1], Le Bris H. [2], Pinsivy L. [3], Laffargue P. [3]

1. Ifremer, LEBCO, Technopole Brest Iroise, Pointe du Diable, CS10070. 29280 Plouzané, France.
2. Agrocampus Ouest, UMR 985 Ecologie et Santé des Ecosystèmes, 65 rue de Saint Brieuc, 35042 Rennes, France.
3. Ifremer, Ecologie et Modèles pour l'Halieutique, Rue de l'île d'Yeu, 44311, Nantes, France.

* alexandre.robert@ifremer.fr

Bottom trawling is known to cause chronic and widespread disruptions to benthic ecosystems and large part of continental shelves have been intensively exploited during the last decades. Several studies have highlighted the effects of bottom trawling on benthic assemblages and in the decline of vulnerable species. Changes in community composition and diversity have been experienced in many places as the trawling pressure increases. Yet, contrasting and sometimes contradictory conclusions are drawn regarding the effects of bottom trawling in benthic ecosystem functioning. This study focuses on a homogeneous sedimentary habitat exhibiting strong gradients of trawling intensity in the "Grande Vasière" (GV) of the Northern Bay of Biscay. Macro and mega-invertebrates have been collected using grabs and scientific trawls during spring and summer. Functional groups of macro and mega-invertebrates were identified using 4 categorized biological traits with 2 to 5 modalities as proxies of the main ecological functions potentially modified by trawling (bioturbation, habitat and resource utilization, secondary production). None of the functional groups showed a negative relationship to an increase in bottom-trawling intensity. However, a short-term increase in the biomass of epifaunal predators-scavengers has been highlighted after a trawling event. Small variations in mud proportion, quantity and quality of the organic matter and sediment porosity appeared to have more influence on the benthic ecosystem functioning than the bottom trawling intensity. A long-term adaptation of those benthic communities to relatively high level of chronic trawling could impair our ability to identify some effects of fishing impact nowadays especially on more sensitive functional groups like sessile filter feeders species. However the transience of epifaunal predator-scavengers response and the relatively low biomass of this functional group suggest that bottom-trawling could have a reduced effect on several functions, such as secondary production and/or benthic food-web structure in the GV habitat.

O30

Dynamic ecosystems under anthropogenic stress: how does macrotidal sandy beach fauna respond to green tides?

Quillien N. [1, 2, 3*]

1. Laboratoire des Sciences de l'Environnement Marin, UBO/IUEM, Place Nicolas Copernic. 29280 Plouzané, France.
2. Environmental and Marine Biology, ÅAU, Artillerigatan 6. 20520 Turku, Finland.
3. Observatoire Marin, UBO/IUEM, Place Nicolas Copernic. 29280 Plouzané, France.

* nolwenn.quillien@gmail.com

Coastal areas harbour dynamic ecosystems in the form of open sandy beaches (SBs), which cover the vast majority of the world's ice-free coastline. These ecosystems are currently threatened by increasing human-induced pressure, among which mass-development of opportunistic macroalgae (mainly composed of Chlorophyta, so called green tides [GT]) resulting from the eutrophication of coastal waters. The ecological impact of opportunistic macroalgal blooms (GT and blooms formed by other opportunistic taxa), has long been evaluated within sheltered and non-tidal ecosystems. Little is known, however, on how more dynamic ecosystems, such as open macrotidal SBs, respond to such stress. Based on four field studies, which analyse natural community dynamics over several temporal and spatial scales, we assessed the effects of GT on the structure and functioning of SBs located in south Brittany (Bay of Biscay, France). We found large spatial-temporal and long-lasting responses of benthic communities to GT that were more pronounced considering fauna living in exposed SBs compared to semi-exposed sands. Within exposed sites and across a vertical scale, we demonstrated that intertidal benthic invertebrate communities are more affected by GT than subtidal zoobenthic assemblages, but also than flatfish communities. Thus focussing on the most affected faunal group (i.e. intertidal benthic invertebrates) and investigating its small-scale variation, we revealed significant structural shifts along a eutrophication-gradient manifested in the form of GT. To explore potential mechanisms that would explain the observed changes, we studied the influence of GT on the trophic structure and functioning of SBs. We found a progressive simplification of SB food web structure and a modification of energy pathways over time, through direct and indirect effects of *Ulva* mats on several trophic levels. Overall, we demonstrated that highly dynamic systems respond differently and more subtly to anthropogenic stress compared to what has been previously shown within more sheltered and non-tidal systems.

O31

Biogeographic patterns of marine macrobenthic invertebrates in French Waters

Gallon R.[1, 2*], Labrune C.[3], Lavesque N.[2], Grall J.[4], Grémare A.[2], Gauthier O.[1, 4], RESOMAR data providers.

1. LEMAR, UMR CNRS/UBO/IRD/IFREMER 6539, Institut Universitaire Européen de la Mer, Place Nicolas Copernic. 29280 Plouzané, France.
2. Univ. Bordeaux, CNRS, EPOC, UMR 5805, Station Marine d'Arcachon, 2 Rue du Professeur Jolyet. 33120 Arcachon, France.
3. LECOB, UMR CNRS/UPMC 8222, Observatoire Océanologique. 66650 Banyuls/Mer, France.
4. Université de Brest, CNRS, UMS 3113, Observatoire, Séries Faune-Flore, OSU-IUEM, Rue Dumont d'Urville. 29280 Plouzané, France.

* reg.gallon@gmail.com

The recent emergence of macrobenthic fauna databases with large temporal and spatial coverage allows data-mining studies helping to formulate and test biogeographical concepts. In France, the collaborative efforts of the REseau des Stations et Observatoires MARins (RESOMAR, CNRS), a national network of marine stations, have led to a national database comprising 106 datasets covering the totality of French metropolitan coasts, from 1961 to the present. Using this database, we here describe patterns of biodiversity in soft bottom habitats (EUNIS level 3) along the three main regions of French coasts: the English Channel (EC), the Bay of Biscay (BB) and the Mediterranean Sea (MS). Macrobenthic regional richness follows a latitudinal gradient showing significant variations in intensity depending on taxonomic group and habitat. Indeed, latitudinal gradients of increases in richness, from north to south, were revealed for dominant taxa (i.e. polychaetes, crustaceans, molluscs and echinoderms). We also confirm the MS as a hotspot that hosts a large number of taxa not found elsewhere. The EC hosts the lowest taxonomic richness despite having the highest total abundance. The BB has intermediate species richness but is characterized by a wide variety of habitats. The RESOMAR database appears as a useful and robust database for biogeographic investigations and in the context of global change, it will be used to determine stability of patterns in time and how they are influenced by environmental conditions.

O32

Epibenthic communities of a NE Atlantic deep seamount

Serrano A. [1]*, Cartes J.[2], Punzón A.[1], Arronte J.C.[1], Ríos P.[3], Lourido A.[4], Papiol V.[2], Frutos I.[1], García-Alegre A.[1], Blanco M.[1]

1. Instituto Español de Oceanografía, Centro Oceanográfico de Santander. SPAIN.
2. Institut de Ciències del Mar de Barcelona, CSIC. SPAIN.
3. Instituto Español de Oceanografía, Centro Oceanográfico de Gijón. SPAIN.
4. Instituto Español de Oceanografía, Centro Oceanográfico de A Coruña. SPAIN.

* aserrano@st.ieo.es

The Galicia Bank (GB) is the deepest SAC of the Spanish Natura 2000 Network proposal. GB is a large seamount located at 150 miles far from the west coast of Galicia, with a flat summit with slight slopes from 600 m to the bank break around 1,000 m. Deeper 1,500 m on its western flank, slope increases sharply until it reaches the abyssal plain, at around 5,000 m deep. Epibenthic fauna was collected with a beam trawl (10 mm mesh size) Multivariate analyses show the existence of 4 benthic assemblages. The shallowest one (750-780 m) is characterised by ophiuroids of the family Ophiacanthidae *(Ophiacantha* sp. and *Ophiomyces grandis),* the solitary corals *Deltocyathus moseleyi* and *Flabellum chuni,* and the bivalve *Limopsis minuta.* The second assemblage (780-1000 m) is characterised by the presence of cold-water coral communities dominated by *Lophelia pertusa* and *Madrepora oculata,* and an associated fauna of solitary corals *(Desmophyllum dianthus),* small crustaceans *(Uroptychus* spp., *Munidopsis* spp.), and antipatharians. These two assemblages are located on the flat sedimentary area of the bank summit, with low organic matter content and sandy sediments. The third assemblage, located on the bank break (1,000-1,100 m), in carbonate seafloor areas with scarce sedimentary coverage, is typified by benthopelagic shrimps *(Systellaspis debilis, Sergia robusta, Aristaeopsis edwardsianus),* the sponge *Thenea muricata* and the urchin *Cidaris cidaris.* Finally, the deepest assemblage dwells in muddy sediments of the flanks of the bank (1,500-1,800 m). The epibenthic fauna of this assemblage is dominated by the elasipodid holothurid *Benthogone rosea,* the giant sea spider *Colossendeis colossea* and the crab *Neolithodes grimaldii.* The three top of the bank assemblages are associated to the Mediterranean outflow waters (MOW), whereas the flank assemblage is affected by the Labrador Sea Water (LSW).

Topic. **Geology; erosion; transport and sedimentation**

O33

Are sediments of land-reclaimed coastal lowlands suitable for recording storm-induced marine floods?

Baumann J.[1]*, Chaumillon E.[1], Schneider J.L.[2], Schmidt S.[3], Bonnin J.[2]

1. Univ. La Rochelle, LIENSs, UMR7266, 2 rue Olympe De Gouges. 17000 La Rochelle.
2. Univ. Bordeaux, EPOC, UMR5805. F-33615 Pessac Cedex, France.
3. CNRS, OASU, EPOC, UMR5805. F-33615 Pessac Cedex, France.

* juliette.baumann@univ-lr.fr

Land reclamation seriously increases the surface area of coastal lowlands and their vulnerability to marine submersion. To better evaluate this vulnerability, it is essential to provide information about past marine floods. For this, sediment records represent key-archives. Most studies are conducted on sandy barrier coasts, where sediment records of marine floods consist of sand layers in the mud-dominated back barrier sequence. As coastal vulnerable lowlands (particularly land-reclaimed areas) are not always bounded by a sandy barrier, it is critical to assess their potential in terms of records of marine floods. We focus on lowlands located along the central part of the Bay of Biscay coastline, the most vulnerable area to marine flooding along the French Atlantic coasts. We use a multiproxies approach (210Pb, XRF core scanning, foraminifera) on sediment cores, sampled in 3 marsh sites isolated from the ocean, but submerged during recent storm surges, to compare records in different settings.

Cores in the two marshes bounded by a sandy barrier, reveal mud-dominated sequences including: (1) thin sand layers associated with abundant benthic foraminifera and peaks of Si, Br and Zr, interpreted as typical records of marine floods, (2) layers only characterized by abundances of foraminifera and geochemical anomalies, interpreted as the distal records of marine floods, when water inundates further inland beyond the extension of syn-event clastic sediment transport. Cores in the coastal marsh bounded by an artificial levee do not show any grain size anomalies, but layers with low 210Pb activities, suggesting mixing with older eroded sediments, and peaks of foraminifera are identified. They are interpreted as marine flood records in sand-free coasts. This study shows that, depending of the setting, sediment records of marine floods are not always associated with grain size changes, but could consist of layers with foraminifera concentrations, age and/or geochemical anomalies.

O34

Multi-data characterization of methane seeps on the Aquitaine Shelf

Michel G.[1*], Dupré S.[1], Ehrhold A.[1], Baltzer A.[2], Battani A.[3], Imbert P.[4], Deville E.[3]

1. IFREMER. Institut Français de Recherche pour l'Exploitation de la Mer (IFREMER), Département de Géosciences marines, B.P. 70. 29280 Plouzané, CEDEX, France.
2. Université de Nantes CNRS: UMR6554, Université. 44312 Nantes Cedex 3, France.
3. IFP Énergies Nouvelles, 1 et 4 avenue de Bois Préau. 92852 Rueil-Malmaison, France.
4. TOTAL. Centre Scientifique et Technique Jean Féger. Avenue Larribau. 64018 Pau Cedex, France.

* Guillaume.Michel@ifremer.fr

Recent discovery of biogenic methane emissions and Methane Derived Authigenic Carbonates (MDAC) at the Aquitaine Shelf (140 and 220 m water depth) questions about the initiation and temporal evolution of this fluid system. A multi-data study is conducted to better characterize this wide seepage area (~200 km²). Seafloor backscatter data from former marine expeditions were revisited and the area covered by (sub)-outcropping MDAC extends 3 km further east. Pockmarks on the continental slope (>400 m) do not exhibit seafloor and water column backscatter signatures linked to MDAC or fluid emissions. These pockmarks do not show amplitude anomalies on sub bottom profiler. Dewatering is an alternative process to methane emission to explain pockmark formation on the continental slope. However, gas expressed as a seismic blanking (between 75-100 ms TWT and the first multiple) is present in the sedimentary pile further west than the seeping area, even below some pockmarks. Based on 1) geothermal gradients on the Aquitaine Shelf about 25 °/km below the seafloor and 2) window for methanogenesis ranging from 4 to 60 °C, our estimation of potential biogenic generation window is about 1.5 km below the seafloor. Well cuttings (from FREGATE-1, PELICAN-1 and DANU-1) inside the methanogenesis window present low TOC (Total Organic Carbon) of 0.5% and some coal levels (only PELICAN-1 cuttings) at 30-35% TOC in Oligocene stratigraphic levels between 1490 and 1540 m below the seafloor. Gas within sediments appears present westward and eastward of present-day methane seeps. Constraining the geometry of the fluid system including the methane distribution and the extension of MDAC is one of the main keys to understand gas generation, migration and the interactions, e.g. with groundwater circulation. The PhD thesis of Guillaume Michel is co-funded by TOTAL and IFREMER as part of the PAMELA (Passive Margin Exploration Laboratories) scientific project.

O35

Laida beach morphodynamic evolution in response to the supratidal beach nourishment actions performed in 2015

Liria P.[1]*, Epelde I.[1], Uriarte A.[1], Garnier R.[2], González M.[2], Gainza J.[2], Jaramillo C.[2], Medina R.[2], Monge-Ganuzas M.[3]

1. AZTI-Tecnalia, Marine Research Unit. Herrera Kaia, Portualdea z/g. 20110 Pasaia, Gipuzkoa, Spain.
2. Environmental Hydraulics Institute ?IH Cantabria?, Universidad de Cantabria. C/ Isabel Torres 15, 39011, Santander, Spain.
3. Service of Urdaibai Biosphere Reserve. Environment and Territorial Policy Department. Basque Government. Madariaga dorretxea. San Bartolome auzoa 48350 Busturia (Bizkaia), Spain.

* pliria@azti.es

Laida beach, located at the Oka estuary mouth (Urdaibai Biosphere Reserve) in the southeastern region of the Bay of Biscay, suffered the impact of a severe succession of storms during the first months of 2014. As a result of the erosion induced by these events, the beach lost its supratidal zone almost completely. The absence of a dry beach generated an impact on the recreational use of the beach during the summer 2014, and represented a potential impact for the coming summer 2015. Furthermore, it resulted in an overexposure and damage of adjacent infrastructures due to impinging strong waves. Therefore, the competent authorities, in coordination, decided to take action in order to nourish the supratidal zone of this beach. The solution adopted combined two different actions. The first action accomplished in spring of 2015, consisted in the mobilization of 40,000 m^3 of sand from the intertidal beach (proximal ebb tidal delta) to the zone next to the eastern rocky contour. The second action consisted in the mechanical ploughing of the intertidal sandbars with the aim of accelerating and increasing the sand transport towards the supratidal beach. The novelty of this second action, as well as the high complexity of the sedimentary processes involved in the estuary mouth, demanded a specially detailed monitoring and analysis. The objective of this contribution is to describe the morphodynamical response of the estuarine mouth after the performed actions with special emphasis on the evolution of the ploughed bars and the supratidal beach area. The information here presented represents an innovative step in the understanding of the complex mechanisms driving the supratidal beach formation in the Oka estuary mouth. Moreover, results contribute to the general understanding of beach and sand spit formation processes in the estuaries of the southeastern region of the Bay of Biscay.

036

Accelerating the beach recovery by ploughing the intertidal bar: Field experiment and numerical simulations

Gainza J. [1]*, Garnier R.[1], Nuñez P.[1], Jaramillo C.[1], González M.[1], Medina R.[1], Liria P.[2], Epelde I.[2], Uriarte A.[2], Monge-Ganuzas M.[3]

1. Environmental Hydraulics Institute IH Cantabria, Universidad de Cantabria. C/ Isabel Torres 15. 39011 Santander, Spain.
2. AZTI-Tecnalia, Marine Research Unit. Herrera Kaia, Portualdea z/g. 20110 Pasaia, Gipuzkoa, Spain.
3. Service of Urdaibai Biosphere Reserve. Environment and Territorial Policy Department. Basque Government. Madariaga dorretxea. San Bartolome auzoa. 48350 Busturia (Bizkaia), Spain.

* june.gainza@unican.es

The accretionary sequence of meso- macro-tidal beaches is often characterized by the onshore migration of one or several intertidal bars which can eventually weld to the shore and contribute to the increase of the dry (subaerial) beach surface. The purpose of this study is to investigate if this process can be accelerated perturbing artificially the intertidal bar, for instance, ploughing it mechanically. The study is based on a field experiment performed in Laida beach (Bizkaia, Spain) presented in a companion study (Liria et al., ISOBAY16). From July to September the eastern side of the intertidal bar was ploughed. The western side was kept as a control zone so a comparison between both areas could be carried out. The aim of this work is to understand the effect of this perturbation and to determine the main mechanisms governing the changes in the beach morphodynamics. The study is performed by applying sediment transport formulas and morphological numerical models (Delft3D/ Xbeach). An extensive database is used to complete/validate the study. It consists of: periodic topo-bathymetric surveys (every 15 days), continuous video images, continuous velocity measurements in the nearby channel entrance, continuous offshore wave and tide data from the Spanish network (Puertos del Estado), and, finally, data of 3 wave gauges and 3 current meters deployed in the intertidal zone during a specific field campaign (12-14 August). The study is achieved within two steps. The first step consists of understanding/simulating the natural behavior of the beach system in Laida during its accretionary sequence, where, systematically, the intertidal bar migrates onshore. In particular, the effect of the tidal current in this sequence will be assessed. The second step consists of understanding/quantifying the effect of the perturbation of the intertidal bar, for instance, changes in the bed characteristics (porosity, roughness, critical shear stress), in the sediment transport.

O37

An approach to the conceptual model of Suspended Sediment Delivery from small catchments into the Bay of Biscay

Zabaleta A.[1]*, Antiguedad I.[1], Barrio I.[2], Probst J.L.[3]

1. Hydrology and Environment Group, Science and Technology Faculty, University of the Basque Country UPV/EHU. 48940 Leioa, Basque Country (Spain).
2. Department of Applied Mathematics, Statistics and Operations Research, Science and Technology Faculty, University of the Basque Country UPV/EHU. 48940 Leioa, Basque Country (Spain).
3. EcoLab, University of Toulouse, CNRS, INPT, UPS, Toulouse, France.

* ane.zabaleta@ehu.eus

The transport and yield of suspended sediment (SS) in catchments all over the world have long been topics of great interest. This research work addresses the scarcity of information on SS delivery and its environmental controls in small catchments of the Bay of Biscay. Five steep catchments in Gipuzkoa with areas between 56 and 796 km^2 were continuously monitored for precipitation, discharge and SS concentration (SSC) in their outlets from 2006 to 2014. Environmental characteristics such as elevation, slope, land-use, soil depth and erodibility of the lithology were also calculated. The information obtained allows for the construction of a conceptual approach on the suspended sediment dynamics that considers the spatial and temporal variability of SS delivery. The total delivery of sediments from the catchments of Gipuzkoa into the Bay of Biscay and its standard deviation was 272,200 ± 38,107 $t \cdot yr^{-1}$, or 151 ± 21 $t \cdot km^{-2} \cdot yr^{-1}$, and the suspended sediment yields (SSY) ranged spatially from 46 ± 0.48 to 217 ± 106 $t \cdot km^{-2} \cdot yr^{-1}$. At the inter-annual scale, hydroclimatic variables and catchment areas do not explain the spatial variability found in inter-annual SSY, whereas land-use (especially non-native plantations) and management (human impacts) are the main factors that control this variability. However, at finer scales, hydroclimatic variables are important drivers of SS transport, as SS delivery mainly occurs during discharge events. Even so, the amount of sediment that an event can deliver does not only depend on its magnitude (return-period) but also on the availability of sediments to be transported in the main water courses or near the outlet of the catchments. This availability is controlled by the approaching-accumulation-delivery-exhaustion cycles observed in the sediment dynamics. Obtaining longer-term measurements on sediment delivery would allow for the effects of environmental and human induced changes on SS fluxes to be better detected.

Topic. **Biogeochemical cycles**

O38

Nutrient sequestration in Aquitaine lakes limits nutrient flux to the coastal zone

Anschutz P.[1] *, Buquet D.[1], Charbonnier C.[1]

1. UMR CNRS 5805 EPOC Université de Bordeaux. 33615 Pessac, France.

* pierre.anschutz@u-bordeaux.fr

Through a combination of land runoff and, in some areas, groundwater discharge, oligotrophic coastal zones are disappearing from increased nutrient loading. The quantity of nutrients reaching the coast is determined not only by their original source (e.g. fertilizers used in agriculture, waste water discharges) and the land use, but also by the pathways through which nutrients are cycled from the source to the river mouth. In particular, lakes sequester nutrients and, hence, reduce downstream transfer of nutrients to coastal environments. Here, we quantify the impact of Aquitaine great lakes on the fluxes and speciation of macro-nutrients (C, N, P, Si). For that, we have measured nutrient concentrations and fluxes during two years (2014 and 2015) upstream and downstream lakes of Lacanau and Carcans-Hourtin, which belongs to the Arcachon Bay catchment. Data were compared to values obtained from the Leyre River, the main freshwater and nutrient source of the lagoon. Results show that processes in lakes greatly limit nutrient flux to the lagoon compared to fluxes from Leyre river, although the watershed is similar in terms of land cover, except the lakes. In lakes, phosphorus and silicon are trapped for long term in the sediment, silicon as amorphous biogenic silica and phosphorus as organic P and P associated with Fe-oxides. Nitrogen that enters lakes mostly as nitrate is used for primary production. N is mineralized in the sediment; a fraction diffuses as ammonium and another fraction is oxidized as nitrate. N_2 production through benthic denitrification or nitrate reduction with Fe(II) or methane eventually extracts nitrogen from the aquatic system.

Topic. **Anthropogenic effects; quality assessment and ecosystem management**

O39

From data to marine environmental status assessment: innovative tools for European seas management

Borja Á.[1*], Uyarra M.C.[1]

1. AZTI, Marine Research Division, Herrera Kaia, Portualdea s/n. 20100 Pasaia (Spain).

* aborja@azti.es

The objective of DEVOTES (Development of innovative tools for understanding marine biodiversity and assessing good environmental status) project is to understand the relationships between human pressures and climatic influences and their effects on marine ecosystems, to support the ecosystem-based management and fully achieve the good environmental status (GES) of European marine waters. DEVOTES has: (i) proposed an operational definition of GES; (ii) completed new models on the relationships between Drivers-Activities-Pressures-State-Impacts-Human Welfare and Management Responses; (iii) completed and analyzed the gaps of EU monitoring networks in the four regional seas; (iv) produced a software (DEVOTool) that collates >700 indicators used across the EU for the implementation of the Marine Strategy Framework Directive (MSFD); (v) proposed and tested 29 indicators, from which 16 are new and 13 are refined, covering all ecosystem components and biological descriptors of the MSFD; (vi) collated information of ecosystem models that can be used in the implementation of the MSFD; (vii) developed new monitoring systems and sequenced many species of microbes, plankton, meio- and macrofauna; (viii) tested new monitoring methods through remote sensing, acoustics and genomics; (viii) proposed different ways to integrate the information to assess the status; and (ix) made a software (NEAT: Nested Environmental status Assessment Tool) enabling to determine the environmental status in any location and at any spatial scale. In addition to these achievements, we have so far (i) published 115 papers; (ii) organized 6 stakeholders meetings; (iii) organized 9 scientific sessions; (iv) made 325 contributions to conferences; (v) trained 12 PhD students; (vi) organized 21 training courses; and (vii) organized 4 summer schools. Here we will present the main achievements of the project, especially regarding the tools to assess the status of marine waters and the ways in which they can be used.

O40

Xenostrobus securis: a challenge to classic Biomonitoring studies?

Gil-Uriarte E*, Bilbao E, Marigómez I, Soto M

1. CBET Research Group, Research Centre for Experimental Marine Biology and Biotechnology (PiE-UPV/EHU), University of the Basque Country UPV/EHU, Areatza Pasalekua, 48620 Plentzia – Bizkaia, Basque Country.

* endika.gilu@ehu.eus

Impacts caused by non-indigenous species (NIS), both in ecological and economic/societal terms are of great importance. The Marine Strategy Framework Directive aims to ensure sustainable environmental management to maintain good environmental status including the presence of NIS. It has been reported that, temperature and salinity affect potential invasions and the success of NIS. Recently, the Australasian mussel *Xenostrobus securis* has successfully colonized brackish water environments in the Atlantic coast of the Iberian Peninsula, including the Basque Coast. This NIS is able to tolerate great environmental fluctuations, and its ecotoxicological response is poorly understood. Currently, *Xenostrobus* coexists with *Mytilus spp.* (used in biomonitoring programmes worldwide) in multi-specific aggregations in intermediate parts of the Bilbao Estuary. Discrimination of both species results crucial in biomonitoring programmes since species with dissimilar physiological characteristics can exhibit different sensitivity against environmental factors including pollutants. Mussels *X. securis* and *M. galloprovincialis* were collected in Arriluze between August 2015 and June 2016. Both species were distinguished based on the Glu 5' molecular marker. In each species, biometry and alometric ratios of shells and shell structure (Scanning Electron Microscopy) were determined. Whole mussel tissues were processed for histology to assess histopathological alterations and gametogenic development. Both mussel species were readily distinguished by shell morphometry and microstructure. The reproductive cycle of *X. securis* was found to be asynchronous to *M. galloprovincialis* and population skewed towards females, and showed conspicuous interspersed gametogenesis, intense focal oocyte atresia and oocyte pycnosis. *X. securis* exhibited a higher air exposure tolerance (SOS) than *M. galloprovincialis* (Lethal Exposure Time 50 = **22 d vs 10 d**). Therefore, in order to accurately assess environmental health status, species identification is essential in Biological Monitoring Programmes. Acknowledgements: UPV/EHU (UFI 11/37); Basque Gov CRG (IT810-B).

O41

Endocrine disruption and contaminant exposure assessment in male thicklip grey mullets, using liver and gonad histopathological and molecular biomarkers

Valencia A.[1]*, Ruiz M.[1], Serrano M.T.[1], Cancio I.[1], Ortiz-Zarragoitia M.[1]

1. CBET Research Group, Research Centre for Experimental Marine Biology and Biotechnology of Plentzia (PiE-UPV/EHU), University of the Basque Country (UPV/EHU). 48620 Plentzia, Basque Country, Spain (maren.ortiz@ehu.eus)

* ainara.valencia@ehu.eus

Chelon labrosus thicklip grey mullets have been used as sentinel species to assess exposure to endocrine disrupting chemicals (EDCs). Endocrine disruption in terms of altered transcription pattern of endocrine system related genes and incidence of intersex condition has been identified in mullet populations from the Basque coast. One of the hot spots is the Biosphere Reserve of Urdaibai, downstream the wastewater treatment plant of Gernika, where up to 33% of individuals have been shown to be intersex males. The aim of this study was to compare the EDC impacted mullet population from Gernika with the population from Bilbao estuary, with no previous data. For this purpose, a combination of histopathological and molecular biomarker approaches were followed in male mullets collected in December 2015. A detailed histopathological study of liver and gonad together with transcriptional characterization of cyp1a and vitellogenin in liver and cyp19a1a in gonads was carried out. Histopathological liver lesions such as lymphocytic infiltrations and vacuolation were common in males from both Gernika and Bilbao. In addition, hepatic melanomacrophage aggregates were very abundant. Presence of intersex mullets was observed in both populations. Intersex gonads were detected in 2 out of 7 males in Gernika and 1 out of 8 in Bilbao. Intersex severity was very high in one of the intersex males from Gernika and was low in the one from Bilbao. These results suggest exposure to EDCs but transcriptional determination of vitellogenin in the liver did not reveal exposure to xenoestrogens. In conclusion, mullets from Gernika and Bilbao showed marked histopathological alterations in liver and gonads, demonstrating exposure to aquatic pollutants with capacity to disrupt the endocrine system, but further analyses are required to elucidate the causative chemicals and the mechanisms leading to intersex condition in mullets. Spanish MINECO (AGL2015-63936-R), Basque Government (IT810-13, PhD fellowship AV), UPV/EHU (UFI 11/37).

O42

Screening sentinel fish species for biomonitoring programmes in the Bay of Biscay: histopathological and biomarker approaches

Briaudeau T.[1*], Izagirre U.[1], Marigómez I.[1]

1. University of the Basque Country, Research Centre for Experimental Marine Biology and Biotechnology (PiE-UPV/EHU), Department of Zoology and Animal Cell Biology, Areatza, E-48620 Plentzia-Bizkaia, Spain.

* tifanie.briaudeau@ehu.eus

Marine pollution monitoring programmes integrate both chemical data and biological effects assessment, as recommended by international intergovernmental institutions (ICES/OSPAR, UNEP...). Thus, histopathology and biomarker approaches are gaining relevance in assessing disturbance of marine ecosystem health. The present investigation is aimed at screening potential sentinel fish species suitable for the assessment of marine health status in biomonitoring programmes in the Bay of Biscay. A variety of fish species (25) were collected by midwater trawling along the Basque continental shelf once a year during early summer, over three years (2010, 2011 and 2013). Species identification and biometrical data were recorded for all individuals caught during the campaign, giving an overview of species available in this area. Additionally, when a minimum of five individuals of the same species were encountered, samples of liver and gonad were collected and processed according to well established banking consensus procedures. All samples were archived in the Biscay Bay Environmental Biospecimen Bank (BBEBB) until further analysis. Specimens of selected species were tested for a set of cell and tissue-level biomarkers recognised by ICES/OSPAR (histopathology, autometallography, gonad development, lysosomal biomarkers, intracellular neutral lipid and lipofuscin accumulation). Species selection was guided by several criteria including their abundance and geographical distribution, longevity, ease of sampling, and their suitability to the different tests applied. Five species showed the greatest potential as sentinel species for biomonitoring programmes based on histopathological and biomarker approaches: *Merluccius merluccius, Trachurus trachurus, Lepidorhombus* sp., *Solea* sp. and *Raja* sp. Their strengths and weaknesses as sentinel species are identified. Acknowledgment: Work funded by Spanish MINECO (CTM2012-40203-C02-01 and PhD fellowship to T.B.), University of the Basque Country, UPV/EHU (UFI 11/37) and Basque Government through Consolidated Research Groups fellowship (IT810-B). Many thanks to Azti-Tecnalia for assisting with the sampling.

O43

Analysis of emerging organic contaminants in the estuaries of Biscay: identification of potential sources

Mijangos L.[1]*, Delgado A.[1], Kortazar L.[1], Ziarrusta H.[1], Olivares M.[1], Zuloaga O.[1], Fernández L.A.[1], Prieto A.[1], Etxebarria N.[1]

1. Department of Analytical Chemistry, Faculty of Science and Technology, University of the Basque Country (UPV/EHU), PK. 644. 48080 Bilbao, Spain.

* leire.mijangos@ehu.es

The occurrence of 43 relevant emerging and priority contaminants in three estuarine waters of Biscay (Nerbioi-Ibaizabal, Urdaibai and Butroe) were analyzed. Among all those contaminants, we included herbicides, hormones, life style products (stimulants and artificial sweeteners), phytoestrogens, industrial chemicals (corrosion inhibitor, personal care products and fluorinated compounds) and pharmaceuticals (antibiotics, tricyclic antidepressant, antihypertensive, antiinflammatory, β-blocker cardiovascular drugs, lipid-regulating and anticonvulsant). At each estuary, intermareal areas and two depths were studied. In addition to this, nearly located wastewater treatment plant effluents (Galindo, Gernika and Gorliz) were also evaluated. A previously optimized solid-phase extraction (Oasis HLB-SPE) method was applied and the analyses were performed by liquid-chromatography-triple quadrupole mass spectrometry (LC-MS/MS). Acetaminophen, acesulfame, bezafibrate, caffeine, carbamazepine, diclofenac, irbesartan, losartan, methylparaben, 2-hydroxybenzothiazole, sucralose and valsartan were the compounds more frequently detected, in concentrations between 0.3-1161 ng/L. The distribution of most of the contaminants shows a similar pattern in the three estuaries since the highest hot spots were localized close to the WWTP effluents. However, other potential sources have also been identified: the pattern observed in the estuary of Bilbao with some industrial compounds (methylparabens and hydroxybenzotrialzoles) suggests that the most likely sources are closer to harbour activities. Moreover, the relation between the water psycochemical properties (temperature, °C; pH, redox potential, mV; conductivity, µs/cm; salinity, psu; total dissolved solids, mg/L; dissolved oxygen, mg/L; total organic carbon, mg/L and ammonium, nitrate, silicate and phosphate concentrations, mg/L) and the pollutants distribution in the three studied estuaries was evaluated. The high correlation observed between the concentration of contaminants and the concentration of phosphate, which is typically attributed to WWTP effluents, support that WWTP are the predominat entering-pathways. In the estuary of Bilbao, a clear difference is also observed at the two depths, being more contaminated the superficial water, where the salinity is lower.

O44

Integrative assessment of coastal marine pollution in Santander Bay and Galician Rías

Rial D.[1]*, Leon V.[2], Bellas J.[1]

1. Instituto Español de Oceanografía. Centro Oceanográfico de Vigo. Subida Radio Faro, 50. 36390 Vigo. Galicia. Spain.
2. Instituto Español de Oceanografía. Centro Oceanográfico de Murcia. Varadero, 1. 30740 San Pedro del Pinatar. Murcia. Spain.

* diegorialconde@gmail.com

Sediments from the Bay of Santander (n = 11) and the Rías of A Coruña, Ferrol, Betanzos and Ares (n = 26) were sampled in July 2012. The concentration of organic contaminants in sediment elutriates (CBs, PAHs, pesticides and pharmaceutical drugs) and sea urchin *(Paracentrotus lividus)* embryotoxicity were assessed. The concentration of organic pollutants in the elutriates were relatively low (Contaminants < 400 ng/L) and their interpretation in terms of the observed toxicity was not straightforward. A clear gradient of toxicity from the inner part to the outer side of the Santander Bay was observed. Sediment elutriates from two stations situated close to the city of A Coruña showed moderate toxicity values, whereas sediment elutriates from the Rías of Ares and Betanzos showed no marked toxicity. Stations located close to the city of Ferrol showed moderate to high toxicity, which is indicative of a nearby source of contamination. On the contrary, the outer side of the Ría of Ferrol was classified as clean according to the calculated toxic units. These results allowed for an integrative assessment of the environmental quality in the studied areas, which highlights the usefulness of embryo-larval test to monitor the coastal pollution.

O45

Biodiversity and indicator species in intertidal boulder fields: a case study on the French Basque coast

Huguenin I.[1,2]*, Lalanne Y.[2], Bru N.[3], Lissardy M.[1], D'Amico F.[3], Milon E. [4], Castege I.[4], de Casamajor M.N.[1]

1. IFREMER-Laboratoire Ressources Halieutiques d'Aquitaine (FED 4155 MIRA), 1 allée du parc Montaury 64600 Anglet France.
2. UNIV PAU & PAYS ADOUR, UFR Sciences et Techniques de la Côte Basque (FED 4155 MIRA), 1 allée du parc Montaury 64600 Anglet, France.
3. UNIV PAU & PAYS ADOUR, Laboratoire de Mathématiques et de leurs Applications de Pau UMR CNRS 5142 (FED 4155 MIRA), 1 allée du parc Montaury 64600 Anglet, France.
4. Centre de la Mer de Biarritz, Plateau de l'Atalaye, 64200 Biarritz, France.

* laura.huguenin@ifremer.fr

The rocky Basque coast presents an interest in terms of biogeography natural heritage. To determine the environmental and conservation status of the southern marine area of the Bay of Biscay, implementation of new rocky intertidal habitats monitoring is needed. Currently, no protocol has been validated for fauna in front of southern characters of the benthic communities. Investigations carried out under the Water Framework Directive, since 2008, constitute an important basis of work on integration of flora. This is the aim of the BIGORNO research project (Intertidal Biodiversity of the south of the Bay of Biscay and Observation for New research and Monitoring for decision support) which responds to significant gaps in knowledge of biocenosis in the southern marine subregion "Bay of Biscay". Assessment has been undertaken on Boulder fields' habitat by sampling quadrats of 0.1 sqm. They were drawn under a stratified random sampling scheme allowing for species or higher level taxa allocation in lower and upper mediolittoral zone. Taxa were subsequently assigned to one of the following groups: i/ abundance for mobile fauna, ii/ percentage cover for fixed fauna, or iii/ flora). Analysis highlight dependent faunistic and floristic structuration according to bathymetric level which confirm the need of such a stratification. Moreover, an indicator value analysis is applied to determine taxa and taxa association as indicators of microhabitat. These various analysis allow to propose improvements in sampling design, management and statistic analysis to suggest a new tool adapted to monitoring Basque intertidal biocenosis.».

O46

Anthropocene geological record of the environmental regeneration process in the Bilbao estuary (N Spain)

Serrano H.[1]*, Cearreta A.[1], Irabien M.J.[2], López, I.[1]

1. University of the Basque Country (UPV/EHU). Department of Stratigraphy and Palaeontology. Bº Sarriena, s/n. 48940 Leioa. Spain.
2. University of the Basque Country (UPV/EHU). Department of Mineralogy and Petrology. Bº Sarriena, s/n. 48940 Leioa. Spain.

* humberto.serrano@ehu.eus

The Bilbao estuary (Biscay province) has been considered as the most polluted coastal area of northern Spain during the 20th century. During the last 150 years, the natural features of this estuary have been dramatically modified by urban and industrial developments, together with an intense port activity. However, a significant decrease in the flux of contaminants has occurred over recent decades due to the closure of some major factories during recent periods of economic recession, the implementation of environmental protection policies, and the improvement in waste-treatment systems. This study uses an integrated geochemical-microfaunal approach to examine the recent history of anthropogenic impact in the estuary and how its possible environmental regeneration process can be registered in the recent geological record. Benthic foraminifera and concentration of heavy metals and As have been analysed in six short cores (20 cm long) sampled in January-March 2015 to infer post-industrial environmental changes. These cores were obtained in six locations along the estuary: La Benedicta, Erandio, Galindo, Simondrogas, Rontegi and Zorrotza. A monitoring programme carried out on surface samples since 1997 allowed comparison of this historical series with the recent geological record. High concentrations of heavy metals (mainly Cd, Cu, Ni, Pb y Zn) and low presence of benthic foraminifera were observed in all these cores indicating the environmental degradation that persisted in this estuary for the last decades. However, this sedimentary record shows also a microfaunal increase and a decline of metal concentrations in the most recent materials, confirming a general improvement in the sediment quality and the consequent (paleo) biological response in the Bilbao estuary through time. Research funded by the ANTROPICOSTA-Anthropocene sedimentary record in the Cantabrian coastal environments (MINECO, CGL2013-41083-P) and HAREA-Coastal Geology Research Group (Basque Government, IT976-16) projects.

O47

Does recovery of ecosystems equal to the recovery of ecosystem services? The Nervión estuary and recreational fishing ecosystem service case study

Pouso S.[1] *, Uyarra M.C.[1], Borja A.[1]

1. Azti Tecnalia. Marine Research Division. Herrera Kaia, Portualdea z/g. 20110 Pasaia, Gipuzkoa.

* spouso@azti.es

The estuary of the Nervión has moved from being one of the most polluted estuaries in Europe in the 20th Century to being a recovered system, mainly due to the Sewage Treatment Plant (STP) that started in 1979. For the last 30 years physic-chemical and biological parameters have been well monitored and improved; however, little is known about how this relates to the provision of ecosystem services (ES). This study focuses in understanding the response of recreational fisheries to the Nervión estuary recovery. Between January and April 2016 we carried out face-to-face interviews with people that fish inside the estuary. Respondents answered a total of 29 questions that were structured into five sections. All in all, respondents seem to prefer to fish in the outer part of the estuary. Accordingly, in this area a larger proportion of anglers was found. Anglers perceive that water quality parameters and environmental characteristics have improved dramatically inside the estuary. Furthermore, they indicate that the STP has also favoured recreational fisheries. However, when it comes to quality and quantity of fish catches, those seem to have decrease. Anglers associate this decrease to the intensification of professional fishing activity in the estuary, the expansion of the Bilbao port or other external factors. Although most of the fishermen are not fully satisfied with the quality of the recreational fishing activity inside the estuary, most of them confirmed their intention to continue fishing in the area. This result shows the complexity of recreational fisheries as an ES which seems to depend not only on the number of catches but also on other factors (e.g. improved water quality) and motivations (e.g. relaxation and social interaction). Understanding the link between the ecosystem conditions and the provision of ES provides insights for better management of human activities.

O48

Trawling contribution to residual sediment dynamics over the French continental shelf of the Bay of Biscay (France)

Mengual B.[1]*, Cayocca F.[2], Le Hir P.[1], Garlan T.[3]

1. IFREMER, DYNECO/PHYSED, ZI pointe du Diable. CS10070 Plouzane, France.
2. AAMP (Agency for Marine Protected Areas), 16 Quai de la Douane. 29200 Brest, France.
3. SHOM, Hydrographic Center, BP146. F-29280 Brest, France.

* Baptiste.Mengual@ifremer.fr

Bottom trawling is a well-known worldwide anthropogenic forcing responsible of numerous impacts on marine environments, mainly occurring on continental shelves and slopes. It can drastically disturb benthic ecosystems (i.e. species mortality, alteration of benthic habitats) and significantly influence the sediment dynamic (i.e. erosion/deposition, sediment transport, seabed properties and lithology). For instance, some studies on physical trawling-induced effects highlighted how trawling could significantly contribute to off-shelf export of sediment (e.g. Churchill 1989; Ferré et al. 2008; Oberle et al. 2015). This study aims to assess the trawling influence on natural sediment dynamic at the continental shelf scale of the Bay of Biscay (BoB). Mengual et al. (in revision) quantified the local trawling-induced resuspension generated in the wake of a classical otter trawl over the main mud belt of the BoB shelf, the so-called Grande-Vasière» (GV) area. They estimated a trawling-induced erosion flux from door tracks let on the seabed. This trawling-induced erosion dynamic has been implemented in a 3D hydro-sedimentary modelling system [MARS3D hydrodynamic core: Lazure and Dumas (2008).

O49

Detecting abrupt changes and gradual trends in water quality: the 1990-2015 data series of the Nervión estuary (SE Bay of Biscay) analyzed by the Kolmogorov-Zurbenko Adaptive filter

Franco J.[1]*, Bald J.[1], Garmedia J.M.[1], González M.[1], Martín I.[1], Menchaca I.[1], Muxika I.[1], Revilla M.[1], Rodríguez J.G.[1], de la Sota A.[2], Uriarte A.[1], Zorita I.[1]

1. AZTI, Marine Research División. Herrera Kaia, Portualdea z/g. 20110 Pasaia (Gipuzkoa). Spain.
2. Consorcio de Aguas Bilbao Bizkaia. EDAR de Galindo, c/ Maesu Jose, s/n. 48910 Sestao. (Bizkaia). Spain.

* jafranco@azti.es

The Nervión estuary is a 22 km long system formed by the tidal part of the Nervión river (N Spain, SE Bay of Biscay). Since the mid-19th Century the estuary received waste waters from many sources due to an intense industrial development and a high increase in population in the surrounding area. This situation degraded drastically its environmental quality. In order to reverse this situation, a sewerage scheme was planned and projected in 1979; an environmental quality standard of 60% oxygen saturation was defined as the objective. The 'clean-up' of water started in 1991 with physico-chemical treatment and the biological treatment was implemented in 2001. A monitoring programme was put into operation in 1989 in order to survey the evolution of the water quality. In this work we present an analysis of long-term data of water variables (salinity, temperature, pH, dissolved oxygen, ammonium, chlorophyll, transparency, total organic carbon and faecal coliforms) by means of the Kolmogorov-Zurbenko Adaptive (KZA) filter with the objective to assess the existence of temporal trends. This basically consists on a series of iterations of a moving average filter of length *m,* where *m* is a positive, odd integer. The KZA filter belongs to the class of low-pass filters. It is especially adequate to distinguish, in long data series, abrupt changes from gradual temporal trends. The analysis indicates a relevant improvement in dissolved oxygen, ammonium, transparency and faecal coliforms, resulting from a combination of abrupt changes and gradual trends. The abrupt changes are clearly related to the entrance into operation of the biological treatment with nutrient removal in the waste water treatment plant, while the gradual changes could be explained by the progressive increasing coverage of the sewerage scheme.

O50

A new biotic index based on bacterial diversity for the assessment of marine environmental status

Aylagas E.[1]*, Borja Á.[1], Dell´Anno A.[2], Corinaldesi C.[2], Tangherlini M.[2], Michel C.T.[3], Irigoien X.[3], Danovaro R.[2], Rodríguez-Ezpeleta N.[1]

1. AZTI, Marine Research Division, Sukarrieta, Spain.
2. Università Politecnica delle Marche, Dipartimento di Scienze della Vita e dell'Ambiente, Ancona, Italy.
3. King Abdullah University of Science and Technology, Thuwal, Saudi Arabia.

* eaylagas@azti.es

Biotic indices for environmental monitoring in transitional and marine coastal ecosystems are mostly based on the analysis of benthic macroinvertebrate communities, which have the advantage of being largely studied and having short- and mid-term responses to a wide variety of anthropogenic impacts. Due to their high sensitivity to pollution and fast response to environmental changes, bacterial assemblages could complement the information provided by benthic metazoan communities as an early warning indicator of impacts, but this biological component is less explored for that purpose. Yet, the easy access to and cost-efficiency of high-throughput sequencing technologies make the characterization of bacterial assemblages in numerous samples simultaneously achievable by most laboratories. Here, we have developed a biotic index based on the sediment bacterial community analyzed through small subunit ribosomal DNA (16S rDNA) amplicon sequencing. To do this, we have investigated 51 transitional and coastal sites along the Basque Coast characterized by different environmental conditions and anthropogenic pressures. We provide evidence that such a new biotic index is significantly correlated with a sediment quality index calculated on the basis of organic matter content, redox potential and concentrations of metals, PAHs and PCBs. This new index based on bacterial diversity can be a sensitive tool for providing a fast assessment of the environmental quality as required by the European Marine Strategy Framework Directive.

O51

Zostera seagrasses in the Basque coast: Is Butroe estuary a suitable recipient site?

Garmendia J.M.[1]*, Valle M.[2], Borja Á.[1], Chust G.[2], Franco J.[1]

1. AZTI-Tecnalia, Marine Research Division, Herrera Kaia Portualdea z/g. 20110 Pasaia, Spain.
2. AZTI-Tecnalia, Marine Research Division, Txatxarramendi ugartea z/g. 48395 Sukarrieta, Spain.

* jgarmendia@azti.es

Seagrass meadows are considered ecologically important habitats in coastal marine ecosystems due to their provision of several physical, biological, economic and social benefits. However, their habitat is declining and fragmenting worldwide. Consequently, efforts to restore seagrass meadows are increasing widely. In the Basque coast (SE Bay of Biscay, north of Spain), 7 out of the 12 estuaries are classified under the type "estuaries with extensive intertidal flats" according to the European Water Framework Directive and, therefore, appropriate for hosting *Z. noltii* meadows. However, the presence of this seagrass is restricted to 3 of these estuaries. Furthermore, this species is currently listed as an endangered species within the Catalogue of Threatened Species in the Basque Country. In this context, a seagrass restoration program was planned. Butroe estuary was chosen as the best candidate to serve as trial site. Small scale transplant actions were decided as necessary previous steps, and sod transplant was selected as the best method. Patches of approx. 0.1 m^2 were transplanted from Oka estuary to Butroe in 2009 (4 patches), 2011 (12 patches), and 2012 (28 patches). In sum, 4.8 m^2 were transplanted to Butroe estuary. These transplanted surfaces have been monitored yearly, measuring shoot density (shoots/m^2) and occupied area (m^2), aiming to assess the survival, the quality and the development of the seagrass patches. In July 2015 the five transplants survived covering an area of 9.1 m^2, i.e., almost twice the initially transplanted surface. Hence, after monitoring 3-6 years it can be concluded that Butroe estuary shows adequate conditions and is a suitable site to host a seagrass.

052

What is the environmental status of the Basque Coast? From individual ecosystem components to integrated assessments

Uyarra M.C.[1]*, Borja Á.[1]

1. AZTI Tecnalia, Marine Research Division, Herrera Kaia Portualdea z/g, 20110 Pasaia, Spain.

* mcuyarra@azti.es

Determining the environmental status of marine ecosystems is a challenge. Only by assessing the environmental status of the marine ecosystems is possible to understand the impacts of human activities and the potential effects of management measures. Within the Marine Strategy Framework Directive (MSFD), 11 descriptors and 56 indicators, applicable to many ecosystem components (e.g. plankton, fish, birds, mammals, etc.) are meant to be used by Member States to assess the seas status. While an indicator provide insights on how a specific species/ecosystem component progresses, it is the issue on how to integrate the outputs of several indicators to have an overall perspective of the status of an area. In the EU project DEVOTES, we have developed the Nested Environmental status Assessment Tool (NEAT) software, aiming at assessing the marine environmental status in an integrated manner, providing the assessment uncertainty. This software has been applied to the Basque Coast, using 48 indicators belonging to six of the MSFD descriptors and seven ecosystem components. For performing the assessment, NEAT requires the extent of the study area, the encompassed habitats, the indicators for which information is available (assigned to specific ecosystem components), their estimated values, and their reference conditions. Results of NEAT indicate that the overall status of the Basque Coast is good. However, the outputs of NEAT also allows us to understand that main issues facing the marine environment, which in this area is related to fishing, as well as the status of marine mammals (for which little information is available). NEAT is a very useful tool to integrate diverse indicators and to understand what are the issues and uncertainty that lay underneath the results. This software could be useful to any marine area to perform the environmental assessment, under the MSFD, allowing for advancing in the future towards more sustainable seas.

Poster

Topic. **Climate-ocean relations**

P1

Biscay AGL Observatory: Measurements of Atmospheric and Oceanic Variables in the Cantabrian Sea.

Rodriguez C.[1*], Cano D.[1], González-Pola C.[2], Lavín A.[1], Marcos E.[1], Somavilla R.[2], Viloria A.[1]

1. Instituto Español de Oceanografía, P.Box 240. 39080-Santander, Spain.
2. Instituto Español de Oceanografía. C.O. Gijón. Avda. Príncipe de Asturias. 33212 Gijón. Spain.

* carmen@st.ieo.es

An oceano-meteorological buoy was deployed 22 nautical miles north of the city of Santander Section (43° 49 N, 3° 47 W) in June 2007. The site is along an oceanographic section that has been sampled on monthly basis since 1991 as part of the Radiales Project for continued monitoring of ocean climate and ecology. Station 7, the closest to the buoy, is also the deepest of the Project (2,600 m), which allows studying the physical and biogeochemical properties of the different water masses in the area: Eastern North Atlantic Central, Mediterranean and Labrador Sea Water. The Biscay AGL observatory, part of the IEOOS (Spanish Institute of Oceanography Observing System), has been the focal point of a range of oceanographic studies: a mooring line equipped with current meters at the cores of the three main water masses, experimental deployment of gliders, vertical array of thermistors to study the mixed layer, etc. Physical and chemical CTD registers of the water column and hourly AGL buoy meteorological and oceanographic parameters are quality controlled and stored. These time series data are most suitable for the characterization of water column and for detecting the different variability scales in the area, high-frequency variability as daily cycles or episodic events and low- frequency variability as the seasonal cycles or interannual variability and tendencies Data from this observatory, formatted to internationally accepted standard formats, and metadated following the SeaDataNet protocols, are incorporated to the IEO data archive structure and also disseminate to national and international Organisms, like WMO, IGMETS or FixO3.

P2

Isolation of Vibrio *species from the Bay of Biscay*

Ogayar E.[1]*, Orruño M.[1], Montánchez I.[1], Kaberdin V.R.[1,2], Arana I.[1]

1. University of the Basque Country (UPV/EHU). Department of Immunology, Microbiology and Parasitology. Bº Sarriena, s/n. 48940. Leioa. Spain.
2. Basque Foundation for Science (IKERBASQUE), Bilbao, Spain.

* elixabet.ogayar@ehu.eus

Members of the *Vibrio* genus are ubiquitously present in marine ecosystems. Although their life cycles and viability can be influenced by the fluctuation of temperature, salinity and availability of nutrients, temperature is believed to be the main factor that controls *Vibrio* survival in the marine environment. This assumption is consistent with the reversible reduction in the number of culturable vibrios during the winter season followed by their increase in the summer time. The global warming inevitably leads to an increase in the temperature of surface waters and is likely responsible for the recent outbreaks of Vibrio-associated diseases in European countries. Due to the lack of data concerning the seasonal distribution of *Vibrio* species in the coastal water of the Basque Country and their potential importance for understanding the spread of pathogenic vibrios, we decided to quantify and identify the *Vibrio* species present in the coastal water collected from three different areas (Astondo, Armintza and Laida) in the Bay of Biscay. Analysis of seawater samples revealed no significant variations in the total number of bacteria during the annual cycle. In contrast, the number of culturable heterotrophic bacteria and putative vibrios was significantly higher in the summer time (when compared to winter) reaching 2.2-4.4 10^4 ml^{-1} and 1-3 10^2 ml^{-1}, respectively. Bacterial species that were able to grow on selected media (namely, TCBS or CPC agar) and additionally identified as *Vibrio* species by using API 20E (Biomerieux) tests were further verified by 16S RNA gene sequencing. The final identification of some isolates was achieved on the basis of multilocus sequence analysis (MLSA) by using the housekeeping genes: gapA, ftsZ, topA, mreB, gyrB, pyrH and recA. We found that most of the identified *Vibrio* belonged to the Splendidus and Orientalis clusters.

P3

An Exploratory Data Analysis of the Basque Government oceanometeorological buoys

Bilbao B.[1], Maruri M.[1*]

1. University of the Basque Country (UPV/EHU). Mathematics Department; Urkixo Zumarkalea, s/n. 48013 Bilbao. España.

* mapmamam@ehu.eus

In order to better understand the oceanometeorological processes and achieve a quality historical oceanometeorological database, it is crucial to study the quality of the present data and quantify and qualify the independence of observations of the buoys along the coast of the Biscay Bay. This research has been done with an exploratory analysis of the available oceanometeorological information, taking into account three different locations along the coast: San Sebastian and Matxitxako, monitored by the DAEM/Euskalmet (The Emergency Attention Directorate of the Basque Government / Basque Meteorological Service), and Armintza, monitored by Bimep (EVE-Basque Energy Entity). Although these facilities have different objectives, the inclusion of the information provided by them can be very useful for studying the field in general. Other sources, such as the State Ports, are used as a consultation and decision-making tool in the methodology. The work gathers all the available information from the buoys (real time vs .pre-recorded, hourly data and raw data). The series were analyzed and compared considering their origin and temporal resolution. The results are presented in a manual which contains the meta-information and methods of managing it, along with the descriptive data that characterize the waves at these points independently and altogether.

Topic. **Physical oceanography**

P4

Improving Lagrangian mixed-layer drifter data with an onboard ADCP

Herrera J.L. [1,2], González J. [2,3] *, Varela R.A.[2], Piedracoba S.[2]

1. Independent Scholar. 9289 N 40th Street, 49060 Hickory Corners, MI, United States of America.
2. Grupo de Oceanografía Física, Universidad de Vigo. Facultad de C.C. del Mar. Campus de Vigo. 36310 Vigo, Spain.
3. Estación de Ciencias Mariñas de Toralla, Universidad de Vigo. Illa de Toralla s/n, 36331 Vigo, Spain.

* josegonzalez@uvigo.es

The success of a Lagrangian experiment relies on the performance of the drifter used. Ideally, the speed of the drifter relative to the water volume located at the drifter's drogue depth should be as close to zero as possible. Deviations from this ideal will result in a relative velocity between the drifter's drogue and its surrounding water commonly named "slip". A common approach used for the estimation of a drifter's slip is to compare the drifter motion against current velocity measured at the drogue's depth with other methods. A different approach, used in this work, is to obtain direct measurements of the slip. We describe how a Self-Contained Acoustic Doppler Current Profiler attached to the drifter can be used to measure the slip of a particular Lagrangian drifter during long experiments directly, and how it provides with complementary current data at depths others than the drogue depth. Our experimental setup involved two nine-day Lagrangian experiments performed at the North Atlantic Gyre. Two aspects of the operation required a careful monitoring of the slip: first, we used a heavily instrumented mixed-layer Lagrangian drifter; second, the current in the areas chosen was weak and evaluating the accuracy of the drifter motion was critical.

P5

Numerical analysis of poleward along-shore current pulses on the shelf of the Bay of Biscay

Le Cann B. [1]*, Kersalé M. [2], Marié L. [1], Serpette A. [3], Lathuilière C. [3], Rubio A. [4], Lazure P. [1]

1. Laboratoire d'Océanographie Physique et Spatiale. UMR 6523 CNRS-Ifremer-UBO-IRD, Brest, France.
2. Marine Research Institute, Department of Oceanography, University of Cape Town, Rondebosch, South Africa.
3. Division HOM, Service Hydrographique et Océanographique de la Marine, Brest, France.
4. AZTI-Marine Research, Herrera Kaia, Portualdea z/g. 20110 Pasaia, Spain.

* blecann@univ-brest.fr

In a recent work, strong events of coastal poleward along-shore subinertial currents on the inner shelf (50-80m depth) from the Spanish coast to the Brittany coast of the Bay of Biscay were analysed. These currents, with speeds up to 50 cm s^{-1}, were observed during an observation program (ASPEX) and were classified into three types: southern, bay-scale and strong events. At short time lags, the in-situ along-shore currents were clearly related to along-shore wind stress at upstream locations. An explanation was provided for longer time lags, in terms of coastal trapped wave (CTW) dynamics. As a consequence of the limitations of the available in-situ observations (which were too sparse), many key questions and issues remained open, such as which are the main propagation processes of these waves over the continental shelf and their vertical structure. Here we provide further investigation using the HYCOM model and based on interesting and unexplained features of the observed currents over the shelf. To this end, we choose the region and time period of the ASPEX field experiments (2010-2011) for a regional configuration simulation, which enables direct model comparisons with the data set. Overall, the events are well reproduced in the numerical simulation, and no additional events have been detected in the simulations using the same selection criteria applied to the in-situ data. The analysis of some specific events, allow us to evaluate the vertical structure of the simulated currents and the propagation speed of the associated coastal trapped waves.

P6

The Basque coastal marine warning system

Gaztelumendi S.[1, 2] *, Egaña J.[1, 2], Liria P.[3], González M.[3], Aranda J.A.[1,4], Anitua P.[4]

1. Basque Meteorology Agency (EUSKALMET), Vitoria-Gasteiz, Basque Country, Spain.
2. Meteorology Area, Energy and Environment Division, TECNALIA R&I, Vitoria-Gasteiz, Basque Country, Spain.
3. Marine Research, AZTI-Tecnalia, Pasajes, Basque Country, Spain.
4. Emergencies and Meteorology Directorate, Security Department, Basque Government, Vitoria-Gasteiz, Basque Country, Spain.

* santiago.gaztelumendi@tecnalia.com

In Basque Meteorology Agency (Euskalmet) case, marine-coastal warning system is based on traffic-light color thresholds considering the main severe events that affect Basque Country coastal area, and grouping them in three different concepts; coastal impact, navigation and "Galerna" "Coastal impact" is related with the confluence of high energetic waves and spring tides that promote flooding and different impacts in specific littoral areas. "Navigation" risk, when severe sea conditions in coastal areas (first two miles) affect different navigation activities. "Galerna" risk, deals with sudden changes of the wind direction and magnitude that may affect littoral activities, especially for beach and near-coast navigation and recreational activities. In this work we present the main characteristics of the Basque marine-coastal warning system. This system is used by Basque Government in order to establish warnings, alerts or alarms for Basque coastal-marine areas. The system focuses on three main aspects; on one hand oriented to sea conditions mainly for navigation in first two miles, and on the other hand oriented to coastal impact. We also present different communication products and strategies used in coastal-maritime severe episodes.

P7

Damages analysis in Basque Country coastal area

Gaztelumendi S.[1, 2] *, Egaña J.[1, 2], Liria P.[3], Epelde I [3]. González M.[3], Aranda J.A.[1, 4], Anitua P.[4]

1. Basque Meteorology Agency (EUSKALMET), Vitoria-Gasteiz, Basque Country, Spain.
2. Meteorology Area, Energy and Environment Division, TECNALIA R&I, Vitoria-Gasteiz, Basque Country, Spain.
3. Marine Research, AZTI-Tecnalia, Pasajes, Basque Country, Spain.
4. Emergencies and Meteorology Directorate, Security Department, Basque Government, Vitoria-Gasteiz, Basque Country, Spain.

* santiago.gaztelumendi@tecnalia.com

Basque Country is regularly affected by high waves as a consequence of high swell situations generated by remote deep lows and NW gales configurations. The confluence of those situations with spring tides usually promotes some degree of littoral impact and economic losses in the area. The characterization of these situations is complex. Different factors as ocean-meteorological conditions (significant wave high, swell, peak period, tides, etc...), coastal configuration (slope and orientation among others) and anthropogenic factors (demographic, socioeconomic...) must be considered in order to characterize potential severity of a given episode and its impact. In this work we present an analysis of damages in Basque Country coastal areas. For this purpose we study "battering of coastal waters" damage data provided by the Spanish Insurance Compensation Consortium. Those data are analyzed considering different aspects as location, date, damage type, etc. in order to extract some conclusions. We also include different analysis of the met-ocean observations available in the area. The final objective is to contribute in reducing the knowledge gaps between available ocean-meteo analysis/observation/prediction systems and impact observed in Basque Country littoral areas.

P8

Modeling the accumulation of floating litter in the NW Iberian region

Pereiro D.[1], Gago J.[2]*, Torres C. [1]

1. University of Vigo. Campus Universitario As Lagoas, Marcosende, s/n. 36310 Vigo, Spain.
2. Instituto Español de Oceanografía (IEO), Subida a Radio Faro, 50-52. 36390 Vigo, Spain.

* jesus.gago@vi.ieo.es

Field data from oceanographic surveys show a high concentration of floating litter in the Bay of Biscay. A Regional Ocean Modeling System (ROMS) was used to simulate the accumulation of marine litter in the Bay of Biscay during a period of 32 months, from May 2012 to December 2014. Marine litter items were represented as virtual particles initially deployed at random locations of the domain of the model. Virtual particles were tracked offline following a second-order advection scheme. Sea surface temperature and salinity results from the ocean model were compared with satellite data and in situ measurements from moored buoys. The distribution of numerical trajectories was statistically compared to that of real drifter data obtained from the Global Drifter Program (GDP), and the skill of the Lagrangian model was evaluated using the two-sample Kolmogorov-Smirnov test in a one-dimensional section. Marine litter persistence in one particular area was estimated by computing the cumulative sum of the number of virtual drifters during the entire period of simulation in that area. Also, coastal exposure was assessed and the most sensitive regions were identified. Ocean model results were in good agreement with observational data. Both numerical and real trajectories may share the same underlying distribution, thus supporting the results from the Lagrangian model. Virtual particles were more frequently found in the Bay of Biscay than in other regions of the domain of the model, although no accumulation was observed. A possible explanation could be that floating litter in the Bay of Biscay has a little residence time.

P9

Towards 4D shelf/slope circulation and transport estimations in the SE Bay of Biscay, within the framework of JERICO-NEXT Joint Research Activity Projects

Rubio A.[1]*, Caballero A.[1], Charria G.[2], Lazure P.[2], De Mey P.[3], Marié L.[2], Ferrer L.[1], Mader J.[1], Puillat I.[2]

1. AZTI-Marine Research. Herrera Kaia. Portualdea z/g. 20110 Pasaia. Spain.
2. Laboratoire Océan Côtier. Ifremer. ZI de la Pointe du Diable. CS 10070. 29280 Plouzané. France.
3. LEGOS-Laboratoire d´Etudes en Géophysique et Océanographie Spatiales. 18 avenue Edouard BELIN. 31401 Toulouse CEDEX 9. France.

* arubio@azti.es

Surface transport in coastal areas is driven by a large variety of processes (tides, current instabilities, coastal jets, eddies, fronts, etc.) acting simultaneously, in response to different forcing, and over a broad spectrum of time-space scales. These processes play a key role in the dispersal/retention of pollutants, planktonic species, and more generally in cross-shelf exchanges. The characterisation and better predictability of these structures are critical to understand the physical and biological interactions in the coastal zone and to accurately monitor the resulting complex surface circulation. This is the main reason why coastal observatories are developing along the global ocean coasts. In this context, the Joint Research Activity Project #4 of the JERICO-NEXT H2020 project, entitled "4D characterisation of trans-boundary hydrography and transport in the SE Bay of Biscay", aims to demonstrate the potential of coastal observatories and the JERICO Research Infrastructure for the understanding and monitoring of the 4D shelf/slope circulation. Additional effort is devoted to quantify the potential impact of ocean transport on the distribution of floating and dissolved matter in line with the 2, 7 and 10 Marine Strategy Framework Directive descriptors. Through this project, several new deployments, in addition to historical observations, will be used to make a step forward on the characterisation of the main coastal ocean processes and resulting 4D transports at different temporal and spatial scales. These will include: a new HF radar system along the French coast, moored high-frequency thermistor chains, drifting buoys and high-resolution numerical model experiments. The SE Bay of Biscay, an area characterised by complex circulation patterns and where relevant human activities linked to marine resources are concentrated, represents a particular challenge for 4D transport accurate estimation and forecast.

P10

Field studies of residual suspended sediment fluxes in the upper Gironde estuary under different hydrological conditions

Jalón-Rojas I.[1], Schmidt S.[2]*, Sottolichio A.[1]

1. Univ. Bordeaux, EPOC, UMR5805, Allee Geoffroy St Hilaire,Bat B18. 33600 Pessac, France.
2. CNRS, EPOC, UMR5805, Allee Geoffroy St Hilaire, Bat B18. 33600 Pessac, France.

* sabine.schmidt@u-bordeaux.fr

The Gironde fluvio-estuarine system is a major contributor to the sediment budget of the margin of the Bay of Biscay. Understanding and quantifying current flux of suspended particulate matter (SPM) is a standing priority in this system due to the role of fine sediments on water quality, biogeochemical processes, and morphodynamics. It is also essential to predict the future potential evolution of fluxes as a result of ongoing climatic and anthropogenic changes. Because of the need of filtering flood and ebb, the residual, tidally-averaged SPM fluxes are seldom estimated. Here, we conducted a field study to investigate the temporal variability of residual SPM flux under different hydrological contexts. From April to November 2014, repeated depth profiles of SPM concentrations were obtained over a semidiurnal tidal cycle at two sites (channel and left edge) of a cross-section in the fluvial-estuary (current profiles were also obtained at the channel point for the same periods). The edge point is also equipped of an automated station that records since 2005 turbidity every 10 minutes in surface waters. Results indicate that residual SPM flux in the channel was controlled by landward tidal pumping during dry periods (from June to October) and by downward advective transport in November, when fluvial discharge increased. Consequently, during dry periods, sediment flux is strongly modulated by tidal range. The landward residual fluxes were about 8.2 kg/m/s and 1 kg/m/s during the campaigns of August (spring tides) and October (neap tides), respectively. SPM showed different patterns in the two sites of the cross-section at the beginning of the period of low river discharge, but greater similarity from August to November. The combination of discrete fluxes measurements with long-term, high-frequency turbidity monitoring could help in defining an indicator of SPM fluxes to investigate long-term trends in the upper estuary.

Topic. **Fisheries and Aquaculture**

P11

Innovative on-line technologies towards an effective monitoring of fishing activity

Antelo L.T.[1] *, Alonso A.A.[1], Bellido J.M.[2], Landeira F.[3]

1. Process Engineering Group, Marine Research Institute IIM-CSIC. Eduardo Cabello, 6. 36208. Vigo. Spain.
2. Instituto Español de Oceanografía, Centro Oceanográfico de Murcia, c/Varadero, 1. 30740 San Pedro del Pinatar. Murcia. Spain.
3. Centro de Supercomputacion de Galicia-CESGA. Avenida de Vigo s/n. 15705 Santiago de Compostela. Spain.

* ltaboada@iim.csic.es

An immense challenge faced by sustainable fisheries management and policies is that of finding cost-effective monitoring methods. To overcome this and other drawbacks detected on current applied electronic monitoring (EM) systems (e.g. off-line evaluation of catches, crew interferences, etc.), robust and reliable innovative technologies for captures registering, processing and transmitting to land in real-time could ultimately be a much effective and cheaper option. In this framework, we have defined the so-called BEOS, which is formed by a system based on artificial vision. This system is capable of initially identifying up to seven discarded species in trawling fisheries with high accuracy levels, by processing through morphological models images captured by a single high-resolution camera placed over the conveyor belt in the fishing park. Once the data of every catch is obtained, the relevant data information (no images) is pre-processed and sent in real time (through satellite connection or 4G/3G/GPRS) to the central in-land system (Management Geoportal Network) that manages and makes the generated database available to end users. This is done by the so-called RED BOX module. The proposed EM system was tested on oceanographic and commercial vessels, comparing its estimations with the real catch data, being the good results obtained in this validation a guarantee of the robustness and applicability of the developed technology. However, some limitations mainly related to the low number of species that can be identified were detected. To overcome this drawback, an improved new version (named iObserver) is being developed in the framework of LIFE iSEAS Project. Through its open, accessible software, the iObserver is able to identify up to 20 species commonly caught by trawling fleets together with the possibility of easily adding new ones by the final user through an user-friendly app, improving its transferability and applicability to other fisheries and areas.

P12

Effect of environment on the dynamics of anchovy stock of Bay of Biscay: a bioenergetic individual-based modelling approach

Dortel E.[1*], Huret M.[2], Petitgas P.[1]

1. Ifremer, EMH, Centre Atlantique, Rue de l'Ile d'Yeu, BP 21105. 44311 Nantes Cedex 03.
2. Ifremer, STH-LBH, Centre Bretagne, ZI de la Pointe du Diable, CS 10070. 29280 Plouzané.

* emmanuelle.dortel@ifremer.fr

The management of the anchovy stock in the Bay of Biscay relies on a predictive assessment of stock status for different scenarios of fishing effort and recruitment. A reliable prediction of recruitment would allow to anticipate stock productivity and resilience to fishing and oceanographic changes. Coupled physical-biological models have proved useful tools to describe the environment effects on marine populations' dynamics and their interactions with population processes. An individual-based bioenergetics population model was developed for Bay of Biscay anchovy. This model describes the full life cycle of anchovy through a bioenergetics module based on the Dynamic Energy Budget (DEB) theory. Individuals are aggregated in super-individuals whose abundance decreases due to three mortality factors, a starvation mortality through DEB module, a constant natural mortality and fishing mortality as assessed by ICES. The natural mortality is optimised based on population estimates of research survey series. The model is forced with temperature and zooplankton biomass provided by the physical-biogeochemical model ECO-MARS 3D for the period 2000-2008. Although based on an average environment, the model showed a great ability to predict the interannual variations of population abundance. Thus the model allows to understand the drivers of recruitment. Based on the simulation outputs, a set of indicators has been developed both at individual and population scale. Recruitment is mainly driven by the overall population fecundity which depends on the reproductive biomass and its distribution by age class, the youngest having a lower fecundity. It is also affected by the harsh winter conditions leading to starvation mortality of early life stages. Fishing mortality affects total fecundity by reducing spawning stock biomass. The analysis suggests a new recruitment index based on the model prediction.

P13

A modelling approach to understanding anchovy larval growth patterns in an anticyclonic area in the Bay of Biscay

Urtizberea A.[1]*, Aldanondo N.[1], Caballero A.[1], Ferrer L.[1], Rubio A.[1], Cotano U.[1]

1. AZTI-Investigación Marina, Herrera Kaia, Portualdea z/g. 20110 Pasaia, Spain

* aurtizberea@azti.es

Anchovy larvae are not able to swim against the current and therefore their survival mainly depends on the environment that they encounter as a consequence of their advection. In a previous study of the Bay of Biscay, different areas were statistically discriminated considering environmental data collected in a survey in June 2004. However, due to the wide area considered in the analysis, that study did not analyse in particular an anticyclone that is characterized near Gironde River through temperature and chlorophyll satellite data. In this study, we aim to analyse the differences in larval growth patterns (as an approach of survival) inside and outside of this anticyclone. Growth rates of larvae sampled in the survey were estimated based on otolith microstructure analysis and compared inside and outside of the anticyclone. While a modelling approach was used in order to understand the impact of the differences on environmental conditions in growth. The model is a one-dimensional Individual Based Model, with a bioenergetic, foraging and a vertical migration module. The model estimates temperature limited potential growth if food is not limiting and simulates larval vertical migration as a trade-off between growth and predation risk. Temperature profiles and mesozooplankton data collected in the survey were used as input data. This study is a first step to understand the consequences of larval drift to an anticyclonic area but more studies are required to reach a general conclusion.

P14

Short-term effect of MPA management measure on the fisheries: the case of El Cachucho" MPA (Cantabrian Sea)"

Punzón A.[1]*, García-Rebollo J.M.[2], Rodríguez A.[1], Ceballos E.[1], Bolado I.[1], Rodríguez-Cabello C.[1], Sánchez F.[1]

1. Instituto Español de Oceanografía. Promontorio de San Martín SN. 39080 Santander. PO BOX 240.
2. Tecnologías y Servicios Agrarios S.A. (Tragsatec). Avenida de los Castros 55. 39005 Santander.

* antonio.punzon@st.ieo.es

The reasons why an MPA is created are many, but most of them have had long-term objectives (habitat recovery, vulnerable species safeguard, protection and rehabilitation of resources, sustainable exploitation, etc). But when a protected area of these features is created, generally they produce a rejection by the sectors involved due to the consequences that in short term will produce, mainly a reduction or limitation of the fishing activities in the area. In this paper, the short-term effects of the creation of the El Cachucho MPA are analyzed, in order to obtain an objective tool to show to the stakeholders the real effect on the fishery, and to provide advice for the management of the MPA in order to minimized the negative effect at short-term. To accomplish this task different approaches have been considered, social, fisheries and resources. In order to study the social aspects, the acceptance of the measures of management by fishermen working in the area were surveyed in 2014 using opinion poll. The aim of this study was to identify the perception of the sector after the creation or declaration of this area as MPA of this area. With the purpose of studying the fishing activity, the changes undergone in the spatial distribution of fishing effort were analyzed. In this case logbook, VMS (Vessel Monitoring by Satellite) and sales slips data were used. Finally, regarding fishing resources, sampling on board were performed in several fishing commercial vessels. The yields of commercial species were analyzed both from longlines targeting (*Beryx* spp., *Pagellus* spp.) and gillnets targeting monkfish (*Lophius* spp.).

P15

How impacts the implementation of a sequential fleet behavior in the management strategy evaluation? The case of the Basque inshore fleet with FLBEIA

Andrés M.[1] *, Urtizberea A.[2]

1. AZTI, Marine Research. Sustainable Fisheries Management. Txatxarramendi ugartea z/g. 48395 Sukarrieta, Bizkaia (Spain).
2. Marine Research. Sustainable Fisheries Management. Herrera Kaia, Portualdea z/g. 20110 Pasaia (Gipuzkoa)

* mandres@azti.es

The Basque inshore fleet operates sequentially distributing its activity across three seasons: the mackerel season (from February to May), the anchovy season (from April to June) and the tuna season (from June to November). Currently, the implemented management measure does not consider the main characteristics of the fleet dynamic and, in fact the same harvest control rule could have different biological, economic and social impacts depending on the fleet behavior. The aim is to analyze the bioeconomic impact of the application of single species based HCR to a fleet that operates sequentially. For this purpose, the toolbox FLBEIA is used to analyze the impacts (from the biological and socioeconomic point of view) under a framework based on Management Strategy Evaluation. The Basque inshore fleet case study will be simulated with FLBEIA on the one hand, without taking into account the fleets'' sequential behavior, and on the other hand, considering that fleets distributes it fishing effort sequentially (real case study). In both cases, all the target species are included in the model.

Results suggest that fleet behavior must be taking into account in order to give a more realistic advice where the biological as well as economical sustainability is assured.

P16

Evidence for size-selective mortality of European anchovy larvae in the Bay of Biscay based on otolith microstructure analysis

Aldanondo N.[1]*, Cotano U.[1]

1. AZTI, Marine Research Unit, Herrera Kaia, Portualdea z/g. 20110 Pasaia, Spain.

* naldanondo@azti.es

Recruitment success in small pelagic fish populations, such as anchovies, is mainly determined by the degree of survival in their early life stages. It has been generally assumed that mortality occurring over this period is largely size-dependent. In this context, central hypotheses on recruitment dynamics suggest that fast growth reduces the stage-specific mortality rate and increases the survival probability by 1) lowering vulnerability to predators at a given age, 2) leading to shorter exposure to intense predation and 3) lowering energy gain for predators preying on fast growers. In this study, we used the growth record from otolith microstructure to test the hypothesis that anchovy juveniles that survived until autumn in the Bay of Biscay were the larger and faster growing members of their cohorts. For that, anchovy larvae were collected in August 2005 and juveniles in September-October 2005 in the south-eastern part of Bay of Biscay. Their otoliths were analysed and larval and juvenile hatch-date distributions and daily growth patterns were estimated. Thereafter, growth trajectories of juveniles were compared with those larvae of the same cohort. Our findings help to better understand the role of the predation pressure on anchovy larval survival in the Bay of Biscay.

P17

Ecosystem Approach to making Space for Aquaculture: the Basque Country case study

Galparsoro I.[1]*, Garmendia J.M.[1], Arantzamendi L.[2], Murillas A.[2], Franco J.[1]

1. AZTI; Herrera kaia portualdea z/g. 20110 Pasaia, Spain.
2. AZTI; Txatxarramendi ugartea z/g. E-48395 Sukarrieta, Spain.

* igalparsoro@azti.es

Food security is a current global societal challenge, and with the declines in wild fisheries, increasing aquaculture production is a possible way to address this question. Further developments of the aquaculture industry should be based on the Ecosystem Approach to Aquaculture which focuses on ecological sustainability, social equity, and harmonisation of multiple uses. AquaSpace project is funded by the EU Framework Programme for Research and Innovation-H2020 (Grant Agreement: 633476) and was launched in spring 2015 with the participation of 22 partners across 14 nations. The central goal of the AquaSpace project is to provide increased space of high environmental quality for aquaculture by adopting the Ecosystem Approach to Aquaculture (EAA) using Marine Spatial Planning (MSP) to deliver food security and increased employment opportunities through economic blue growth. AquaSpace will customize and develop tools specifically for aquaculture site selection and spatial planning purposes. To test these tools Aquaspace will be carried out by means of 16 case studies; one of them is located in the Basque coast. Key constraints experienced by aquaculture development in the Basque Country (e.g. physical, policy and legislative) were identified. Main stakeholders in the promotion, licensing and management of the aquaculture, as well as environmental agents and NGOs, were contacted and a questionnaire was distributed. Main issues to unlock aquaculture development identified were: (i) transparent, simple and fast licensing process, (ii) promotion of an operational Marine Spatial Planning to avoid conflicts among different uses, (iii) stakeholders platforms guaranteeing the involvement of all relevant stakeholders, (iv) historical data access for site selection, (v) monitoring network of environmental parameters (including food security), (vi) economical support from authorities, (vii) analysis of candidate species for aquaculture diversification, and (viii) Continued Professional Development (CPD) training to address gaps in capacities for skilled planning and management of aquaculture.

P18

Inter annual and inter seasonal differences in the gravimetric relationships between life weight and content in biochemical compounds of muscle and genitalia of the anchovy Engraulis encrasicolus of the Bay of Biscay

Txurruka E.[1*], Cotano U.[2], Villate F.[1], Txurruka J.M.[3]

1. Dept. of Plant Biology and Ecology. Bº Sarriena s/n. 48940 Leioa. Spain.
2. AZTI. Herrera Kaia, Portualdea s/n. 20110 Pasaia. Gipuzkoa. Spain.
3. Dept. of Genetics, Physical Anthropology and Animal Physiology. Bº Sarriena s/n. 48940 Leioa. Spain.

* estitxutxurruka@gmail.com

Condition factors based in life weights (LW) have a limited utility when estimating well-being status of a fish population. Quantification of major biochemical constituents is much more biologically informative, but it requires time and resources. In 2005, after several consecutive failures in annual recruitment, anchovy biomass dropped to dangerous levels so that fishery was closed, up to be reopened in 2010. During the last years of this closure, 4 surveys, two in September, 2007 (Sept-2007) and 2008 (Sept-2008), and two in spring, May-2008 and May-2009, were carried out in order to estimate biological parameters of both juveniles and adults, respectively. 1380 anchovies were fished and dissected; their LW were registered and total biochemical compounds of muscle and genitalia were quantified. In all the studied cases ANOVA analyses showed that there were significant differences ($p<0.01$) in the LW and dry weights (DW) of muscles of anchovies fished in Sept-2007 (LW=12203.0±5876.4; DW=1528.8±985.6) and Sept-2008 (LW=7073.5±5044.3, DW=1002.3±746.5). Their respective survivors were collected in the campaigns of May-2008 (LW=22759.3±9826.8; DW=3049.0±1458.0) and May-2009 (LW=20926.8±13713.8; DW=2671.4±1889.6). As a consequence of those lower weights, it was clear that Sept-2008 anchovies had to deal with winter with a 64% of the protein, 70% of the lipids and 54% of the carbohydrate content of anchovies of Sept-2007. Therefore, a lower survivorship rate would be expected in that population. As it would be logically expected, the survivor anchovies fished in May-2009 were smaller than those collected in May-2008. Actually, they had in their muscles a 94% of the protein, a 58% of the lipid and a 59% of the carbohydrate content of anchovies collected the previous year. As far as ANOVA analyses of the DW of genitalia of May-2008 and May-2009 didn't show significant differences, it seems that May-2009 anchovies were diverting a higher proportion of their resources to reproduction.

P19

Prevalence of the microsporidian parasite Sprangea lophii *in white anglerfish* (Lophius piscatorius) *in the Bay of Biscay and in other Atlantic areas*

Landa J.[1]*, Antolínez A.[1], Castro B.[2], Autón U.[2]

1. Instituto Español de Oceanografía, Centro Oceanográfico de Santander, Promontorio de San Martín s/n, 39080 Santander, Spain.
2. Instituto Español de Oceanografía. Centro Oceanográfico de A Coruña, Apdo. 130. 15080 A Coruña. Spain.

* jorge.landa@st.ieo.es

The white anglerfish *(Lophius piscatorius)* is an important commercial species in the European fisheries, included those in the Bay of Biscay. This species is infected by the microsporidian parasite *Sprangea lophii.* Samplings of white anglerfish were performed from a nine year time-series (2006-2014) from Spanish commercial fleet and bottom research surveys operating in southern Bay of Biscay and Galician waters (ICES Div. VIIIc and IXa), Celtic Sea (Div. VIIh), south-western Ireland (Div. VIIj and VIIk), western Ireland and Porcupine Bank (Div. VIIb and VIIc). Length of fish and presence or absence of the parasite were recorded. The prevalence by *S. lophii* was used to analyse infestation level. This is the first study in which the prevalence of this parasite in relation to the size and sex of the host, as well as its area and catch year, are analyzed in Atlantic. No significant differences were found between sexes of the fish or among years. Differences in parasite infestation level by fish length among areas are discussed. The results were compared with those from the scarce previous studies.

P20

Influence of ocean climate variability on fisheries: the sardine (Sardina pilchardus) *case in the Iberian Atlantic shelf waters*

Cabrero A.[1], Gago J.[1]*, González-Nuevo G.[1], Cabanas J.M.[1]

1. Instituto Español de Oceanografía (IEO). Centro Oceanográfico de Vigo. Subida a Radio Faro, 50. 36390 Vigo. Spain.

* jesus.gago@vi.ieo.e

Sardine landings in the Iberian Atlantic shelf shows decadal cycles, with positive and negative phases that alternate. The last positive phase took place in the late 70s followed by one negative that started at the end of 80s. In 1998, the last one shift, expected to be positive, was negative again, leading the fishery at its lowest level. Using climatic and oceanographic data at different scales as forcing factor, and sardine stock as result, the aim is to identify the physical variables that explain most of the sardine natural variance and try to clear up the variability of the sardine stock in the region. Circa 1998, the main patterns of large-scale atmospheric circulation in Northern Hemisphere with influence in the study area, North-Atlantic Oscillation (NAO) and East Atlantic pattern (EA) changed and coupled in the worst combination to sardine population, triggering changes at regional scale that lead to an increase in water temperature, an increment in stratification and a decline in the coastal upwelling. How a decadal period of a downwelling situation in average, in the main spawning areas could affect the stock abundance and distribution is analyzed.

P21

Weight-length relationships, weight conversion factors and condition factor trends for two stocks of black anglerfish (Lophius budegassa) *in southern Bay of Biscay, Galician waters and northern Atlantic areas from a decade*

Landa J.[1]*, Antolínez A.[1], Castro B.[2], Autón U.[2], Hernández C.[1], Dueñas-Liaño C.[1], Navarro M.R.[1], Villamor B.[1]

1. Instituto Español de Oceanografía, Centro Oceanográfico de Santander, Promontorio de San Martín s/n, 39080 Santander, Spain.
2. Instituto Español de Oceanografía. Centro Oceanográfico de A Coruña, Apdo. 130. 15080 A Coruña. Spain.

* jorge.landa@st.ieo.es

The weight-length relationship has a wide application in fish biology and fisheries management, such as for predicting weight from length data, or for the calculation of production and biomass of a fish stock. Weight-length relationship, weight conversion factors and condition factor are presented from a decade (2006 to 2015) for both stocks of black anglerfish *(Lophius budegassa)* in southern Bay of Biscay and Galician waters (ICES Div. VIIIc-IXa, southern stock) and in Celtic Seas (ICES Div. VIIb, c, h, j, k, northern stock). A total of 2035 and 1263 specimens were sampled respectively in each stock from commercial landings and research surveys. Total length [Lt (cm)], total weight [Wt (g)], "commercial" weight (gutted with liver) [Wgl (g)] and "scientific" weight (gutted without liver) [Wg (g)] were obtained. The weight-length relationships for the combined sexes were: Lt = 0.020 Wt2.916; Lt = 0.017 Wgl2.929; Lt = 0.017 Wg2.922 in Div. VIIIc-IXa, and Lt = 0.025 Wt2.841; Lt = 0.013 Wgl2.984; Lt = 0.013 Wg2.971 in Div. VIIb,c,h,j,k. These updated values can be used in the annual assessment of the state of both stocks in the ICES working group, replacing those previous estimated more than a decade ago. The conversion factor (total weight - gutted weight) here estimated is also useful in fisheries management due to the commercial landings of this species are available in gutted weight. The evolution of the condition factor along the year, indicator of nutritional status evolution, is estimated and can be a proxy for estimating the spawning season. Its evolution is studied throughout the year for immature and mature individuals of each sex. The results are similar to the previously estimated in other studies. Keywords: weight-length relationships, weight conversion factors, condition factor, black anglerfish, *Lophius budegassa,* Bay of Biscay, Atlantic.

P22

*Morphological characterization and hydrodynamic behaviour of Biscay Bay's mako shark (**Isurus oxyrrinchus**) dorsal fin denticles*

Fernandez-Waid P.[1*], Diez G.[2], Izagirre U.[1], Blanco J.M.[3], Souto I.[3]; Soto M.[1]

1. Department of Zoology and Animal Cell Biology, Research Centre for Experimental Marine Biology and Biotechnology (PiE-UPV/EHU), University of the Basque Country, Bilbao and Areatza z/g. Plentzia, Bizkaia.
2. Marine Research Division, AZTI, Txatxarramendi, s/n. 48395 Sukarrieta, Bizkaia.
3. Department of Nuclear Engineering and Fluid Mechanics, School of Engineering, (UPV/EHU) University of the Basque Country, Alameda de Urquijo, s/n. 48013 Bilbao, Bizkaia

* patrifw1992@gmail.com

The shortfin mako shark *Isurus oxyrinchus* settled in the Bay of Biscay is considered one of the fastest marine fishes reaching speeds of up to 70 km/h. This speed is higher than what would be expected given the physiological and muscular capacities of this species. This particular hydrodynamic efficiency is closely related to the design of the skin surface composed of tiny dermal denticles whose design is species specific. The scales can vary in size and shape with placement on the body and act by breaking the boundary layer of water in contact with the skin minimizing the turbulence around the body and thus reducing the drag in swimming. The hydrodynamic effect of the configuration and morphology of denticles is thought to be responsible for the high swimming efficiency of mako sharks compared to other species of fishes. In recent years artificial coats/films bioinspired by shark-skin scales have been tested in experimental conditions on aircrafts and vessels and have shown interesting aero-hydrodynamic properties providing a drag reduction of up to 9.9% when oriented in the same direction as the air/water flow. In this work individuals of the pelagic shark *Isurus oxyrinchus* were obtained from licensed vessels fishing in the Bay of Biscay. The morphology, density, and orientation of the denticles of the dorsal fin were calculated. With this information computational fluid dynamics (CFD) using ANSYS FLUENT and STAR CCM+ softwares were applied. 3D reconstruction of denticles as well as the entire dorsal fin was performed. Simulations of fluid passage over reconstructed denticles were carried out to describe the hydrodynamic efficiency in different conditions and scenarios. The main conclusions of this work can potentially be applied to hydrodynamic structures like boat hulls to also increase their efficiency and reduce the fuel consumption. Acknowledgements: Basque Government SAIOTEK 2008-09 (SHILAM S-PE08AZ01), Consolidated Research Groups fellowship (IT810-B).

Topic. **Biodiversity; ecosystem structure and functioning**

P23

Shelf and canyon suprabenthic assemblages from the SE Bay of Biscay

Frutos I.[1,*], Sorbe J.C.[2]

1. Universidad de Alcalá, Departamento Ciencias de la Vida, Apdo. 20. 28871 Alcalá de Henares. Spain.
   Present address: Universität Hamburg, Zoologisches Museum (CeNak), Martin-Luther-King-Platz 3. 20146 Hamburg. Germany.
2. Station Marine, 2 rue Jolyet. 33120 Arcachon. France.

* inmafparralejo@gmail.com

During several surveys carried out in the southeastern Bay of Biscay (May 1995, June 2001), different suprabenthic environments were quantitatively sampled with a small hand-operated sledge (1 station in the swash-zone of Hendaye Beach) and multinet sledges towed over the sea floor from a research vessel (1 station within the Capbreton Canyon and 4 stations on the shelf). The fauna collected (21,292 specimens) was classified into 11 major taxa and at least 197 species (91 amphipods, 34 mysids, 22 cumaceans, 18 decapods, 16 isopods, 5 euphausiids, 5 tanaids, 3 fishes, 1 cephalopod, 1 lophogastrid, 1 pycnogonid). A multivariate analysis of abundance data discriminates 4 groups of stations: G1 (swash-zone station; 0.2 m) with *Gastrosaccus roscoffensis* (61.9% of total abundance) and *Cumopsis fagei* (29.7%); G2 (inner shelf stations; 12-30 m) with *Acanthomysis longicornis* (36.7%) and *Gastrosaccus/Haplostylus* (12.9%); G3 (outer shelf stations; 90-175 m) with *Nyctiphanes couchii* (22.5%) and *Anchialina agilis* (14.3%) and G4 (canyon station; 761 m) with *Melphidippa* sp.B (13.2%) and *Parvipalpus major* (8.5%). Species richness and diversity indices showed minimal values in the swash-zone (7 species; $H'[\log_2] = 1.4$) and maximal values on the outer shelf (123 species) and in the canyon ($H'[\log_2] = 5.2$). Amphipods and mysids were the most speciose taxa in all assemblages. Total abundances ranged between 1941 ind./100 m^2 (inner shelf) and 6,982 ind./100 m^2 (outer shelf), with a numerical dominance of mysids (28.4-66.7% of total abundance) in the swash/shelf areas *versus* amphipods in the canyon (61.6%). The similarity level observed between outer shelf and canyon stations is probably related to the geomorphological peculiarity of the study area (a gouf-type canyon), allowing both shelf species to extend their distribution down to bathyal depths *(Anchialina agilis)* and bathyal species to colonize the shelf break *(Chelator insignis* and *Munnopsurus atlanticus)* and even the outer shelf *(Eudorella* cf. *parvula).*

P24

Real-time PCR approach to estimate predation on anchovy and sardine eggs in the Bay of Biscay

Cuende E.[1]*, Mendibil I.[1], Bachiller E.[1], Álvarez P.[1], Cotano U.[1], Rodriguez-Ezpeleta N.[1]

1. AZTI-Tecnalia, Marine Research Division, Sukarrieta, Bizkaia, Spain.

* elsacuende@gmail.com

Sardines *(Sardina pilchardus)* and anchovies *(Engraulis encrasicolus)* are small pelagic species inhabiting the Bay of Biscay. Due to their high commercial value, significant effort is devoted to understand the factors affecting the recruitment of these species, which is partly regulated by mortality of their eggs and larvae, predated by other organisms. Traditional stomach content analyses may underestimate this predation particularly when applied to small predators such as fish larvae, where genetic tools may provide more cost-effective and accurate estimates. In this study, we have developed a multiplex real-time polymerase chain reaction (RT-PCR) assay based on TaqMan probes amplifying a fragment of the Cytochrome b gene to simultaneously detect sardine and anchovy in the gut contents of potential predators. The assay combines previously described and newly generated species-specific primers and probe for anchovy and sardine detection respectively. The reaction conditions were optimized for the detection of both species simultaneously allowing best results in terms of sensitivity, efficiency, and reproducibility. The assay allows detecting 0.0005 ng of target DNA, which corresponds to one thousand of the DNA present in a single egg, and performs well with digested DNA. We applied the method to Atlantic Mackerel *(Scomber scombrus)* larvae, which are considered to be potential predators of anchovy and sardine eggs and larvae and prove it valid to offer new insights to understand the effects of intraguild predation on the survival of anchovy and sardine early life stages.

P25

Structural impoverishment of the subtidal vegetation of southeastern Bay of Biscay: inferring its relationship with climatic and local factors

Muguerza N.[1]*, Díez I.[1], Quintano E.[1], Rodriguez A.[1], Gorostiaga J.M.[1]

1. Department of Plant Biology and Ecology, University of the Basque Country, PO Box 644. 48080 Bilbao, Spain.

* nahiara.muguerza@ehu.eus

This study assesses changes in the taxonomic and functional diversity of the shallow (3-9 m) subtidal vegetation off the Basque coast by studying 19 locations over the period of 1991-2013. Results indicate that coastal ecosystem of the Basque coast is undergoing substantial changes as a result of the redistribution of the foundation species that form the canopy of marine vegetation. Perennial heavily corticated *(Gelidium corneum)* and leathery *(Cystoseira baccata)* species are being replaced by calcareous articulated and polysiphonous species that form a turf vegetation. As a result, a simplification of the vertical layering of the vegetation is taking place with the subsequent loss of the biogenic substrata provided to other organisms. On the other hand, our results reveal a significant increase in species richness and diversity, mainly due to the development of morphologically simple forms with short life-cycles and warm water affinity. Moreover, the introduction and expansion of non-native species has been detected. The potential relationship with climatic and local environmental factors is discussed. Along with the rise of sea surface temperature, increases in solar radiation, lower input of nutrients and increased wave energy might have synergistically acted as stressors, being partially responsible for the alterations detected in the coastal ecosystem. The updated knowledge of the coastal ecosystem status and the factors regulating the distribution of species will be crucial in future decision-making for their proper management.

P26

Temporal and spatial variability in the distribution of non-indigenous faunal zoobenthic species in the intertidal hard substrates in the "Abra of Bilbao"

Tajadura F.J.[1]*, Bustamante M.[1], Saiz Salinas J.I.[1]

1. University of the Basque Country (UPV/EHU).Departament of Zoology and ACB. P.O. Box 644, E-48080 Bilbao, Spain

* fj.tajadura@ehu.es

The spread of non-indigenous species (NIS) has been largely documented in different environments. Among all NIS, benthic invertebrates represent a proportion above 50%, attaining high richness values in estuaries, harbours and channels. The "Abra de Bilbao" is placed in the mouth of the Nervión estuary, being the Bilbao Harbour located in outer left bank of the aforementioned river. Thus, this area is a potential target for the establishment of NIS, taking into account the ballast waters exchange that takes place in it as a result of shipping activities and also its estuarine nature. Here, we analyse the spatio-temporal variability in the distribution of NIS in 9 intertidal locations during a period of 15 years (1994-2009). Of the 128 taxa recorded, up to 7 were NIS, 10 cryptogenic, 86 native and 25 indeterminate species. Taking into account the abundance of the whole investigated area, NIS represent a 2.3% of the total, cryptogenics the 33,5%, indeterminate species the 20.4%, while natives showed a 43.7% cover rate. Among NIS, the arthropods *Austrominius modestus* and *Amphibalanus amphitrite* were the most abundant species. In general, the statistical analyses performed show that NIS were not determinant for the formation of the different groups of localities obtained. In this sense, no temporal trends were detected in the study area, but our results reveal a greater spread of NIS in the localities placed in the inner part of the "Abra de Bilbao" in the most recent campaigns, due to the abundance of *Austrominius modestus.* Regarding the cryptogenic species, the mussel *Mytilus galloprovincialis* has been the most abundant during the whole study period reaching high coverage values in the innermost estuary localities, where the salinity and the hydrodynamism are lower.

P27

Using a seafloor observatory to assess patterns of behavior, abundance and biodiversity of bathyal communities in relation to water dynamics

Rodríguez A.[1]*, Sánchez F.[1], González-Pola C.[2], Rodríguez-Cabello C.[1]

1. Instituto Español de Oceanografía CO Santander
   Promontorio de San Martín, s/n. 39004 Santander (Spain).
2. Instituto Español de Oceanografía CO Gijón Avda. Príncipe de Asturias, 70 bis. 33212 Gijón/Xixón, Spain.

* augusto.rodriguez@st.ieo.es

The use of non-invasive methods is becoming increasingly important, particularly in the study of vulnerable habitats or singular species. The use of baited cameras and environmental variables measurement using landers (multiparametric benthic platforms), is an important tool for the study of Marine Protected Areas (MPAs) ecosystems, as in the case of El Cachucho, an MPA located on the central Cantabrian Sea. In June 2014, five lander moorings were deployed on the seafloor at different depths ranging from 501 to 960 m for a period of 24-26 hours. The lander was designed to obtain high-frequency bottom images and environmental variables of the BBL (benthic boundary layer). A total of 4552 valid photographs were downloaded and synchronized using a time-code with all the environmental variables recorded (pressure, temperature, salinity, water current, etc.). To study the link between species, environment and ecosystem processes, we incorporated information on biological traits (mobility, feeding habits, sociability, etc.) for the 30 species identified. In a first approach we analyze the cumulative richness and the species contribution on the similarity of each deployment using data of the first arrival time, t_0 (the time required for the first individual to arrive at bait after the lander touchdown), and peak abundance, n_{max} (maximum number of species observed in any single image throughout the deployment). We also analyze the possibility of using this methodology to estimate the species abundance in vulnerable habitats calibrating the results with other approaches, such as trawls and visual underwater transects. Finally, we try to understand the effects of tidal dynamics within the BBL over the feeding behavior of species using multivariate analysis. Results suggest that certain environmental conditions, such as the intensity and direction of the water current, determine the trophic behavior of some species.

P28

First approach to study the size and morphology of gorgonian corals and sponges using photogrammetric analysis from video transects in the Marine Protected Area "El Cachucho" (Cantabrian Sea)

Prado E.[1]*, Sanchez F.[1], Rodriguez A.[1]

1. Instituto Español de Oceanografía, Centro Oceanográfico de Santander, Promontorio San Martin, s/n. 39004 Santander.

* elena.prado@st.ieo.es

The use of non-invasive methodology, which does not cause damage or alterations on benthic communities, is particularly necessary in vulnerable ecosystem studies and Marine Protected Areas (MPA) monitoring. The European directives on protection and the OSPAR Commission described the habitats structured by sessile species of great size, such as corals or sponges, as particularly vulnerable habitats requiring special protection. The knowledge of population structures as indicators of their state of health is a requirement to improve the management programs. The presence of gorgonian forests and deep-sea sponge aggregations in the Le Danois Bank was the cause of its declaration by the Ministry of the Environment as "El Cachucho" MPA, being included in the Natura 2000 network. Follow-up surveys are currently being performed to know their conservation status. This study presents methodology and first results obtained in the analysis of the video transects acquired in "El Cachucho" MPA, during the ESMAREC survey using the ROTV Politolana underwater towed vehicle. Video was recorded to pilot the ROTV, so characteristics of video camera were not specifically designed for monitoring the habitats. But recent developments in specific software of photogrammetric image analysis have allowed extracting valuable information of these video transects. The outputs of the photogrammetric approach include products such as geo-referenced orthomosaic, Digital Surface Model (DSM) and point cloud (XYZ). These data show the possibility to evaluate the size and morphology (including 3D analysis) of the vulnerable species in the area, as the gorgonians *Paramuricea placomus* and *Callogorgia verticillata* and the sponges *Asconema setubalense* and *Geodia megastrella.* The non-invasive growth rate studies need a set of measurement, fan height, fan width, and others. This methodology will make easier future studies about age and rate of growth of these species and population structure in the zone.

P29

*Environmental factors influencing growth of **Zostera noltei** meadows in the Arcachon Bay: How to explain their drastic decline?*

Cognat M.[1]*, Auby I.[2], Rigouin L.[2], Michalet R.[1], Sottolichio A.[1], Ganthy F.[2]

1. UMR CNRS 5805 EPOC-University of Bordeaux. Allee Geoffroy St Hilaire, CS50023. 33615 Pessac Cedex. France.
2. Ifremer, LER-AR. F-33120 Arcachon. France.

* mathis.cognat@u-bordeaux.fr

The Arcachon Bay is colonized by extensive *Zostera noltei* and smaller *Zostera marina* meadows. However, between 1990 and 2008, their extent has dramatically decreased in the Bay. Although a recent study has shown that summer heat waves in 2003 and 2006 may be involved, the causes of this decline remain to be completely understood. Since the beginning of the decline, a general increase of suspended sediment concentration has been observed, without any correlation with an increase of wind-wave forcing. It is likely that sediment dynamics were activated by seagrass regression, causing changes in water turbidity, and therefore triggering complex feedback to the seagrass development cycle. In order to understand the present ecosystem state and its future response to changes of environmental conditions, it is crucial to confirm and evaluate this interaction. In this context, the aim of this study is to quantify and unravel effects of environmental forcing parameters on seagrass growth. A field experiment starting in December 2015, consists of a one-year monitoring of *Zostera noltei* characteristics and environmental parameters in nine intertidal meadows with contrasted coverage. Seagrass (for biometry and leaf chlorophyll content measurements) and sediment (for grain size and organic matter content analysis) samples are collected monthly. In the meantime, light intensity reaching the seagrasses, temperature and water levels including tides and wind waves are recorded continuously at high frequency. Preliminary results from the first 4 months of survey (covering the winter and the beginning of the spring seagrass growth period) suggest that light availability controls seagrass growth. To complete this survey, a 3D numerical model coupling hydrodynamics, sediment transport, biogeochemistry and seagrass will be applied to reproduce the observed patterns and to deepen the respective roles of the physical factors though the simulation of realistic and idealized scenarios.

P30

Predator-prey relationships between Molva macrophthalma *and* Gadiculus argenteus: *the role of prey size, ontogenetic and bathymetric variations*

Aja A.[1]*, Quelle P.[2], Frande E.[3], Robledo R.[3], Preciado I.[2], Punzón A.[2]

1. Consejería de Medio Rural, Pesca y Alimentación. Servicio de Actividades Pesqueras. Santander, Spain.
2. Instituto Español de Oceanografía, Centro Oceanográfico de Santander. Spain.
3. Museo Marítimo del Cantábrico, Santander. Spain.

* ana.aja.lopez@gmail.com

Molva macrophthalma (Osteichthyes, Class Actinopterygii) is a demersal species restricted to the northeastern Atlantic Ocean, from the southern Bay of Biscay to the Mediterranean Sea, whose diet is based on crustaceans and other fishes. Silvery pout *(Gadiculus argenteus)* is a bentho-pelagic species considered to be a forage fish, with broad geographic distribution and high abundance. Data come from the demersal trawl surveys, carried out by the Instituto Español de Oceanografía (IEO) each autumn since 1983 across the southern Bay of Biscay. Total biomass, abundance and size structure of both species were recorded by haul. Stomach contents of *Molva macrophthalma* were also collected from 1992 to 2015. Size structure of *G. argenteus* was recorded both in the ecosystem and in the stomachs. More than 90% of *Molva macrophthalma* diet was composed by *Gadiculus argenteus* showing a clear dependence on this food resource. Most of the variations in *M. macrophthalma* feeding behaviour were a function of prey availability and were dependent on the density of *G. argenteus* in the ecosystem.

P31

Indicator species of intertidal boulder fields on the French Basque coast

Lalanne Y.[1]*, Huguenin I.[1, 2], Lissardy M.[2], Bru N.[3], D'Amico F.[3], Castege I.[4], Milon E.[4], de Casamajor M.N.[2]

1. UNIV PAU & PAYS ADOUR, UFR Sciences et Techniques Côte Basque - 1 allée du parc Montaury. 64600 Anglet, France.
2. IFREMER-Laboratoire Ressources Halieutiques d'Aquitaine (FED 4155 MIRA), 1 allée du parc Montaury. 64600 Anglet France.
3. UNIV PAU & PAYS ADOUR, Laboratoire de Mathématiques et de leurs Applications de Pau UMR CNRS 5142 (FED 4155 MIRA), 1 allée du parc Montaury. 64600 Anglet, France.
4. Centre de la mer de Biarritz, Plateau de l'Atalaye. 64200 Biarritz, France.

* yann.lalanne@univ-pau.fr

Located in the South of the Bay of Biscay, the whole French Basque coast (38 km) presents an interest due to its geomorphology diversity and biogeographical specificity. Dominated by rocky substrates, it presents remarkable habitats exposed to swells and storms. Boulder fields constitute one of the main habitats and present a high floristic and faunistic diversity. Surprisingly, few studies have been conducted to assess benthic fauna whereas macroalgae, the dominant group of organisms thriving in rocky shores, is considered as a relevant indicator in the determination of the ecological quality status of coastal water for the European Water Framework Directive. However, the simultaneous use of both flora and fauna could be appropriate to evaluate ecosystem integrity by implementing indicators taxa. Our study aims at filling this lack of knowledge by identifying indicator taxa of the Boulder fields' habitat. Macroalgae and benthic fauna were surveyed at two sites of the French Basque coast from 2015 on, between March and July, during high tidal coefficients periods. Sampling units were selected using a stratified random sampling plan. True abundance (mobile fauna) and percentage cover (fixed fauna and macroalgae) were measured in quadrates of 0.1 m^2 spread both on upper and lower mediolittoral zones. The strength and statistical significance of the relationship between the taxa occurrence or abundance values, species associations and the microhabitats were assessed using functions included in the "indicspecies" package (CRAN). More than 200 taxa were identified during the study. Among them, we suggest a list of indicator species or taxa. The properties of several related indices measuring the association between species and micro-habitats are discussed. A remaining challenge is to select (and on which criteria) which species/genus or species groups best describe boulder fields, as an alternative to sampling the entire local biodiversity.

P32

The RESOMAR Macrofaune Benthic Database: A useful database to investigate soft bottom communities along French coasts

Gallon R.[1, 2]*, Lavesque N.[2], A. Caillo[2], Labrune C.[3], Gauthier O.[1, 4], Grall J.[4], Grémare A.[2]

1. LEMAR, UMR CNRS/UBO/IRD/IFREMER 6539, Institut Universitaire Européen de la Mer, Place Nicolas Copernic. 29280 Plouzané, France.
2. Univ. Bordeaux, CNRS, EPOC, UMR 5805, Station Marine d'Arcachon, 2 Rue du Professeur Jolyet. 33120 Arcachon, France.
3. LECOB, UMR CNRS/UPMC 8222, Observatoire Océanologique, 66650 Banyuls/Mer, France.
4. Université de Brest, CNRS, UMS 3113, Observatoire, Séries Faune-Flore, OSU-IUEM, Rue Dumont d'Urville. 29280 Plouzané, France.

* reg.gallon@gmail.com

The REseau des Stations et Observatoires Marins (RESOMAR, CNRS) is the result of a national collaboration between marine stations and observatories. This network aims to federate coastal marine biology research at the national level. In 2007, largely inspired by the Marbef experience and the Macroben database, it undertook the task of implementing databases of current and historical datasets relating to benthic and pelagic compartments of Metropolitan France coastal and littoral ecosystems. To date, the RESOMAR Macrofauna Benthic database (BMDB) gathers 106 datasets covering more than 50-years (1961 to present), consequently it is a useful and robust tool to investigate biogeographic issues and large spatial and temporal patterns of diversity. The BMDB has been also developed to safeguard the historical and current data and tackle difficult scientific questions at spatial scales beyond that of the single marine station. It is thus particularly well adapted to address questions raised by the application of the Water Framework Directive (WFD), the Habitats Directive and the Marine Strategy Framework Directive (MSFD).

P33

New asellote isopods from bathyal soft-bottoms of the Bay of Biscay (NE Atlantic)

Frutos I.[1, 2]*, Kavanagh F.[3], Brandt A.[2], Sorbe J.C.[4]

1. Universidad de Alcalá, Departamento Ciencias de la Vida, Apdo. 20, 28871 Alcalá de Henares, Spain.
2. Universität Hamburg. Zoologisches Museum (CeNak), Martin-Luther-King Platz 3; 20146 Hamburg. Germany.
3. Martin Ryan Institute, National University of Ireland, Galway, Ireland.
4. Station Marine, 2 rue Jolyet, 33120 Arcachon, France.

* inmafparralejo@gmail.com

Bathyal suprabenthic assemblages from the Bay of Biscay were sampled during several multidisciplinary surveys between 1989 and 2011, with multinet sledges (0.5 mm mesh size). Two asellote isopods belonging to genera *Ischnomesus* (Ischnomesidae) and *Munnopsurus* (Munnopsidae) were new to science. The genus *Ischnomesus* Richardson, 1908 contains 36 species, four of them from European waters, also recorded at bathyal depths in the Bay of Biscay. *Ischnomesus harrietae* can be distinguished at a glance from all known European species *(I. armatus, I. bispinosus, I chardyi* and *I. norvegicus)* by its body aspect, covered by numerous projections on all segments except cephalon (more abundant in females than in males). It also differs from the sympatric *I. bispinosus,* by pereonites 2-6 with lateral processes and pereopod 1 carpus more elongate. The new species was recorded on bathyal bottoms between 619 and 1099 m depth. It lives on very fine sand and muddy bottoms with organic content between 3.88 and 6.31% (temperature: 9.7-10.5 °C; salinity: 35.7-35.8). Its maximum abundance (41.8 ind./100 m^2) was registered on the Aquitanian Slope at 693 m depth. The genus *Munnopsurus* Richardson, 1912 contains eight species, four of them from the Atlantic Ocean, including the well-known *M. atlanticus* (Bonnier, 1896) from the Bay of Biscay. *Munnopsurus* sp. A can be easily distinguished from the sympatric *M. atlanticus* by larger size at adult stage, non-twisted article 3 of mandibular palp, pereopod 2 basis shorter than pereopod 1 basis and huge maxillipedal palp in adult males. The new species was recorded on bathyal bottoms between 462 and 1082 m depth. It lives on very fine sand and muddy bottoms, with organic content between 3.50 and 7.63% (temperature: 9.7-10.9 °C; salinity: 35.6-35.9). Its maximum abundance (73.6 ind./100 m^2) was registered on the thalweg of the Capbreton Canyon at 761 m depth.

P34

Molecular and morphological analyses of Minidiscus comicus *reveals two distinctive morphologies within the species.*

Hevia-Orube J.[1]*, Laza-Martínez A.[1], Orive E.[1], Seoane S.[1]

1. Department of Plant Biology and Ecology, Faculty of Science and Technology, University of the Basque Country (UPV/ EHU). 48940 Leioa, Spain.

* joana.hevia@ehu.eus

The picophytoplankton (0.2-2nm) size fraction, despite being an abundant component of the phytoplankton community, has not been generally identified to species level due to that their individuals are inconspicuous under the light microscope. In addition, species within some genera show similar features, as occurs with *Skeletonema* and *Minidiscus*. This makes of *Minidiscus* a scarcely known genus of centric diatoms. Only a few studies are based on cultures of its species, what makes difficult the study of molecular or morphological traits or life cycles studies. In this work, a detailed study of *Minidiscus comicus* based on field samples and cultured strains isolated from the Bilbao estuary was performed. The results showed a wider morphological variation than that previously described, with specimens belonging to two different morphologies. For the molecular analysis, two markers were analyzed (ITS and 28S regions of the rDNA), what confirmed the strains identity.

P35

Seasonal replacement of attached and free-living bacteria in coastal waters of the Southern Bay of Biscay

Uranga A.[1]*, Abad N.[1], Baña Z.[1], Ayo B.[1], Artolozaga I.[1], Unanue M.[1], Azúa I.[1], Arrieta J.M.[2], Iriberri J.[1]

1. University of the Basque Country (UPV/EHU). Department of Immunology, Microbiology and Parasitology. Faculty of Science and Technology. Bº Sarriena, s/n. 48940. Leioa. Spain.
2. King Abdullah University of Science and Technology (KAUST), Red Sea Research Center (RSRC), Thuwal 23955-6900, Saudi Arabia.

* ainhoa.uranga@ehu.eus

To live free-living (FL) or attached to particles (ATT) is relevant for a bacterial cell because it affects both the accessibility to the resources and the edibility to the grazers. Hence, the free-living and attached lifestyles establish two major bacterial communities, distinct in terms of abundance and activity, because their regulation by resources and grazers is different. Recently, some studies have even found unequal taxonomic composition and diversity for these communities. Here, we study the diversity of relevant taxa of the FL and ATT bacterial communities during a changing seasonal situation driven by a phytoplankton bloom. Molecular fingerprinting techniques (ARISA, DGGE) revealed beta- and alpha-diversity differences between the ATT and FL communities. Most of the identified taxa (83%) were detected in only one lifestyle: 82% of Alphaproteobacteria and 80% of Cyanobacteria were found as FL, and 83% of Bacteroidetes were found as ATT. With regard to seasonality, as much as 60% of ATT taxa vs. only 21% of FL taxa were present during the all the study. Moreover, the phytoplankton bloom was just previous to the replacement of 40% and 79% of the ATT and FL taxa, respectively, being this replacement coincident with a sharp drop of the whole bacterial growth efficiency. These results show that, for the case of coastal waters, the particles and the surrounding water are different niches supporting bacterial communities which are different in composition and seem to be structured by different ecological drivers. Moreover, the large proportion of exclusivity at high taxon ranks points towards two lifestyles highly conserved phylogenetically. Finally, the very great replacement of quantitatively important taxa suggests the relevance of specialist bacteria, which fits well with the metabolic response observed in the whole bacterial community.

P36

Seasonal and ontogenetic changes in the horizontal and vertical distribution of seven eggs fish species in Galician waters.

Alvarez P.[1]*, Guevara-Fletcher C.[1], Rubio A.[1], Cotano U.[1]

1. Fundación AZTI. Herrerra kaia portualdea, z/g. 20110 Pasaia. Gipuzkoa.

* palvarez@azti.es

The horizontal and vertical distributions of fish eggs species of anchovy *(Engraulis encrasicolus),* sardine *(Sardina pilchardus),* mackerel *(Scomber scombrus),* horse mackerel *(Trachurus trachurus),* hake *(Merluccius merluccius),* blue whiting *(Micromesistius pottasou)* whiting *(Lepidorhombus whiffiaginis)* and Silvery lightfish *(Maurollicus muelleri),* in the Galician waters in winter and summer 2012 are described from the results of sampling with a Multinet midi net. Seasonal fluctuations were observed in the number of specie and abundance of eggs species. In winter, 7 of these species were identified (except anchovy). The highest abundance corresponded to mackerel (70.0% of total sampled eggs) followed, at a considerable distance, by blue whiting (1.0%), horse mackerel and hake (0.8% and 0.6% respectively). In summer, only 6 species were identified (not whiting nor blue whiting), being horse mackerel the dominant specie (20.4%) followed by sardine and anchovy (3.6% and 1.7%, respectively). Not significant difference was observed in the mean depth of their vertical distribution between seasons. Eggs of hake, megrim, blue whiting and silvery liightfish had a deeper distribution than eggs of mackerel and horse mackerel. Eggs of anchovy and sardine were predominantly in the upper 50 m of the water column. Eggs at the earliest stages of development tended to be deeper in the water column than latest stages. Temperature and adult spawning depth showed a significant effect on the vertical egg distribution.

P37

Describing the Bay of Biscay's continental shelf food-web using an OSPAR common indicator: the Mean Trophic Level indicator.

Safi G.[1], Vouriot P.[2], Arroyo N.L.[3], Féral J.P.[2], Hattab T.[4], Lamare S.[5], Mialet B.[5], Niquil N.[1], Petit L.[1], Preciado I.[3]*, Serre S.[2], Le Loc'h F.[6]

1. UMR 7208 CNRS BOREA. Université de Caen. Esplanade de la Paix. 14032 Caen Cedex 05. France.
2. UMR 7263 CNRS IMBE. CNRS/Aix-Marseille Université/IRD/Université d'Avignon. Station Marine dEndoume. Chemin de la Batterie des Lions. 13007 Marseille. France.
3. Instituto Español de Oceanografia IEO. C. O. de Santander. Promontorio San Martin, s/n. 39004 Santander. España.
4. FRE 3498 CNRS EDYSAN. Université de Picardie Jules Verne. 1 Rue des Louvels. 80000 Amiens. France.
5. UMR 6250 CNRS LIENSs. Université de La Rochelle. Avenue Michel Crépeau. 17042 La Rochelle Cedex 01. France.
6. UMR 6539 IRD LEMAR. Institut Universitaire Européen de la Mer. Rue Dumont d'Urville. 29280 Plouzané. France.

* ipreciado@st.ieo.es

The current development of biodiversity indicators adopted as common in the North East Atlantic (under OSPAR Regional Sea Convention) is missing some elements necessary for their application as food-web indicators. The Mean Trophic Level (MTL) indicator is based on species biomass and trophic level (TL). These metrics are commonly used in the food-web holistic approach of interactions in an ecosystem. The aim of the present study was to propose an improved and standardized methodology to calculate MTL for food-web status assessment (1) considering a better regionalisation of the indicator (i.e. using local TL estimations and ecosystem survey data), (2) looking at the MTL sensitivity regarding ecosystem species and compartments and (3) discussing the food web approach of the indicator. Different scenarios were thus tested on the MTL indicator with EVHOE survey data (i) using various data sources of TL, and (ii) applying several cut-offs to focus on different compartments in the ecosystem. Species influence on each scenario was also investigated. Two species were found to be highly influencing the MTL indicator trend. Capros aper, a low TL species catching the bottom up effect in the food-web, was strongly acting on the MTL when considering all species in the ecosystem. On the other hand, *Merluccius merluccius* was driving the indicator when low trophic level species were cut-off. This high predator reflected more the top down effect on the ecosystem. Based on these results we recommend to assess the MTL indicator using three TL cut-offs (TL= 2, 3.25 and 4) to capture a holistic view of changes in the ecosystem. Furthermore, scientific surveys and local estimations of TL are crucial in order to reduce uncertainty around the MTL estimation.

P38

Variation in frond depigmentation, breakage, density and biomass of the red alga ***Gelidium corneum*** *under different irradiance levels*

Quintano E. [1]*, Díez I.[1], Muguerza N.[1], Gorostiaga J.M.[1]

1. Department of Plant Biology and Ecology, University of the Basque Country, PO Box 644. 48080 Bilbao, Spain.

* endika.quintano@ehu.eus

In recent decades a decline in the foundation species *Gelidium corneum* (Hudson) J. V. Lamouroux has been detected along the Basque coast (northern Spain) together with the appearance of unusual frond depigmentation and breakage patterns. Thallus depigmentation (also known as bleaching) is a common phenomenon in corals and macroalgae frequently associated with reductions in growth and disease resistance, weakening or even death. Despite its potential consequences, little is known about the environmental factors affecting this phenomenon. The present study seeks to establish whether shallow subtidal populations of *G. corneum* living under two different irradiance conditions exhibit differences in population structure in relation to depigmentation, frond breakage, density and biomass. The results showed that the coverage and percentage of depigmentation incidence were positively related to irradiance, whereas biomass was negatively related. Although thalli were significantly thinner and depigmented under high light conditions, no correlation was detected between irradiance and frond breakage. The effect of the irradiance level on the frond density was found to vary with size-class, i.e. smaller size-classes exhibited greater densities under high light conditions whereas the number of larger fronds per unit area was lower. The results suggest that irradiance might be an important factor controlling the along-shore demographic variation, robustness and depigmentation in *G. corneum*.

P39

Three decades of changes in the structure of the subtidal vegetation at the western end of the Basque coast

Muguerza N.[1]*, Díez I.[1], Quintano E.[1], Gorostiaga J.M.[1]

1. Department of Plant Biology and Ecology, University of the Basque Country, PO Box 644. 48080 Bilbao, Spain.

* nahiara.muguerza@ehu.eus

This study aims to evaluate changes in subtidal communities of the westernmost part of the Basque coast in the period 1982-2014. A significant decline in the biomass of the red alga *Gelidium corneum* was detected, exhibiting only a testimonial presence at the end of the study. This canopy-forming macrophyte used to form extensive stands between 2 and 9 m depth in 1982. Taking its place, a spatially more heterogeneous vegetation was established, including species of southern affinity such as the annual chlorophyte *Codium decorticatum,* several basal species: *Halopteris scoparia, Corallina* spp., *Jania rubens, Phyllophora crispa* and *Cladostephus spongiosum,* and epiphytic forms (mainly *Aglaothamnion pseudobyssoides* and *Asparagopsis armata*). Moreover, in the deepest samples (10-11 m) the rhodophyte *Pterosiphonia complanata* was replaced mainly to *Cystoseira baccata.* These results are discussed in relation to changes in water temperature, surface irradiance, wave energy and nutrient availability. Climatic alterations in combination with local environmental factors might be involved in the biological changes detected.

P40

Spatial distribution patterns and population structure of the bluemouth ***Helicolenus dactylopterus*** *(Delaroche, 1809) in the southern Bay of Biscay.*

Frande E.[1]*, Robledo R.[1], Aja A.[2], Blanco M.[3], Quelle P.[3], Preciado I.[3], Punzón A.[3]

1. Museo Marítimo del Cantábrico (MMC). C/ Severiano Ballesteros, s/n. 39004 Santander. Spain.
2. Consejería de medio rural, pesca y alimentación. C/ Albert Einstein, 2. 39011 Santander. Spain.
3. Instituto Español de Oceanografía (IEO). C/ Severiano Ballesteros, s/n. 39004. Santander. Spain.

* desli87@hotmail.com

Spatial distribution patterns of the bluemouth *Helicolenus dactylopterus* were analysed, using a spatial and temporal approach. *H. dactylopterus* is a worldwide distributed demersal fish with traditionally low commercial value in the study area. However, its economic importance has increased during the last 15 years in the north of Spain. Data come from Demersales surveys (IBTS) carried out by IEO every autumn since 1983. A stratified sampling scheme was used with 5 geographical sectors and 3 depth strata (70-120 m, 121-200 m and 201-500 m). From each haul, number of specimens and total biomass were collected. Length structure was also recorded. Center of gravity analyses (CoG) showed significant geographic and bathymetric variations. An increasing temporal trend (in number and total biomass) was detected along the historical series. In the first 15 years the highest percentage of biomass and number was found in the westernmost part of the study area. During the past decade, an increasing frequency of occurrence was found in the Cantabrian Sea suggesting an expansion of its spatial distribution towards inner Bay of Biscay. An increased number of individuals and biomass captured in the Bay of Biscay corroborated these results. Throughout the study area, the larger abundance and biomass was detected in the deepest depth strata (200-500 m). It seems therefore, that changes observed spatially in the last decade were due to both a longitudinal expansion and a bathymetric one. Population structure and spatial distribution of juveniles have also been analyzed in order to find nurseries areas.

P41

Impacts of oceano-climatic changes on top predators: long term study in the south of the Bay of Biscay (North-East Atlantic, France)

Castege I.[1]*, Milon E.[1], D'Elbee J.[2], Milpied J.M.[3], D'Amico F.[4], Bru N.[4]

1. Centre de la mer de Biarritz, Plateau de l'Atalaye. 64200 Biarritz, France.
2. LAPHY, 1341 chemin d'Agerrea. 64210 Ahetze, France.
3. Météo France Station de Biarritz-Parme. 64200 Biarritz, France.
4. Universite de Pau & Pays Adour, Laboratoire de Mathématiques et de leurs Aplications de Pau UMR CNRS 5142 (FED-4155 MIRA). 64600 Anglet, France.

* iker.castege@centredelamer.fr

Large-scale univariate climate indices such as NAO are thought to outperform local weather variables in the explanation of trends in animal numbers but might not suit to describe regional scale patterns. We advocate the use of a multivariate oceanic and climatic index called SBC (South Biscay Climate Index). We used 44 initial variables describing the oceanic and atmospheric conditions and characterizing the four annual sesions in the study area. This index has been tested using long-term data from top predator populations. Between 1975 and 2015 we monitored cetaceans and seabirds along standardized line transects from ships. Boreal species (e.g. *Alca torda, Hydrobates pelagicus, Rissa tridactila*) declined significantly in the area while meridional species had significant increasing abundances (e.g. *Puffinus mauretanicus, Ichthyaetus melanocephalus, Tursiops truncates*). Inter-annual fluctuations of most species are correlated to the SBC index. Beside the demographic trends may reaveal a regime shift during the 90's. Understanding the human pressures, including the discard reform, and the impacts of climate changes in the south of the Bay of Biscay is fundamental to ongoing species management and conservation in the context of MPAs designation.

P42

The role of biogenic substrata provided by canopy algae on the structural and functional diversity of rocky subtidal invertebrates

Bustamante M.[1], Tajadura J.[1*], Saiz-Salinas J.I.[1].

1. Department of Zoology and Cell Biology, Faculty of Science and Technology, University of the Basque Country, Box 644. E-48080 Bilbao, Spain.

* fj.tajadura@ehu.es

A loss of vegetation canopy has been reported in temperate rocky reefs worldwide due to global climate and other specific anthropogenic stressors. These foundation organisms provide a 3-dimensional habitat resource for other algae, invertebrate and fish. Here, we investigate how biogenic space provided by seaweeds regulates invertebrate structure and function in rocky assemblages. A total of 17 locations were studied along the northeast Atlantic coast of Spain, comprehending the current availability of canopy forming algae resources in non contaminated areas. The analyses revealed distinct ranges of canopy abundance that regulate significant responses of invertebrate assemblages. Where the dosel of the vegetation occupied from 100% to 50% of the rocky substrate, faunal abundance, species and functional traits diversity values were the highest recorded. A notorious decrease in these values was detected where biogenic substrate ranged from 40% to 20%. Limiting resources offered by canopy availability bellow 10% drastically hamper the abundance, composition and functional traits of invertebrates. On the other hand, evenness and dominance diversity indexes seem to be not affected by the amount of habitat provided by seaweeds. Invertebrate assemblages where characterized by herbivores, detritivores, mobile and solitary forms when canopy layer cover was below 10%, whereas suspensivores, colonial and sedentary invertebrates were distinctive of benthic assemblages dominated by larger macrophytes. Taxonomic composition of assemblages was also markedly different with bryozoans, hydrozoans and poriferans typical of rocky substrate dominated by the canopy of the vegetation and echinoderms and gastropods distinctive of assemblages with limited biogenic structure. These results highlight a critical boundary of canopy decline for marine conservation in terms of stability and resilience of assemblages capable to preserve natural ecosystems processes and services in marine rocky reefs.

P43

Preliminary evidence for a rapid phenological shift at the southern range limit of a sentinel marine species of the Bay of Biscay

Saunier A.[1], Pante E.[1], Guesdon S.[2], Becquet V.[1], Garcia P.[1]*

1. Littoral, Environnement et Sociétés, UMR 7266 CNRS, Université de La Rochelle, 2 rue Olympe de Gouges. 17000 La Rochelle, France.
2. IFREMER LER-PC, Avenue de mus de Loup. 17390 La Tremblade, France.

* pascale.garcia@univ-lr.fr

There is overwhelming evidence that climate change influences the distribution of marine species but little is known about changes in phenology, especially for benthic molluscs. Using contemporary data collected in the warming Bay of Biscay (France) over the last 38 years (1977-2015), the present study aims at characterizing the timing of gonadal development and onset of spawning in a key intertidal species, *Macoma balthica* and comparing it to past monitoring data to measure phenological changes at the trailing edge. In parallel, to try to further investigate reproductive strategy, seasonal patterns in body mass were analysed throughout the year and compared to the annual body mass cycle observed in other bivalve species and localities in Europe. During the study period, a linear increase of the spring temperatures of 0.03 °C.year^{-1} was detected with an acceleration of 0.08°C.year^{-1} over the first decade (1977-1993). No increase was observed since 1993. While the onset of spawning was previously estimated to recede at a rate of 0.99 day.year^{-1} in the western Wadden Sea between 1983 and 2001, here we report a receding rate of 1.65 day.year^{-1} in Bay of Biscay, between 1977 and 2015. Although phenological changes occur faster at the species trailing edge (France), data suggest that northern *M. balthica* populations are subjected to faster warming of sea-surface temperatures. This observation is consistent with the fact that populations at the trailing edge are closer to their physiological limits and are therefore more sensitive to environmental change. The estimated rate of phenological change in southern *M. balthica* is among the fastest recorded among marine bivalves, and prompts the consideration of this species as a sentinel for monitoring the response of soft-sediment benthic invertebrates of the Bay of Biscay in response to a warming environment.

P44

Scales of variability and seasonal and interannual coherence in the zooplankton of two contrasting estuaries of the Bay of Biscay along the salinity gradient.

Uriarte I.[1]*, Villate F.[2], Iriarte A.[1], Sanchez I.[2], Arranz S.[2]

1. Department of Plant Biology and Ecology, Faculty of Pharmacy, University of the Basque Country (UPV/EHU), Paseo de la Universidad 7. 01006 Gasteiz.
2. Department of Plant Biology and Ecology, Faculty of Science and Technology, University of the Basque Country (UPV/EHU), PO Box 644. 48080 Bilbao.

* ibon.uriarte@ehu.eus

Interannual, seasonal and residual variability and the coherence of interannual and seasonal variations of the main mesozooplankton groups from three salinity sites (35, 33 and 30) in the estuaries of Bilbao and of Urdaibai were assessed for the period 1998-2005. Decomposition in interannual, seasonal and residual components was made according to Cloern and Jassby (2010), and coherence in temporal variations was determined by resemblance analysis (Bray-Curtis similarity). Interannual variability of zooplankton groups increased with decreasing salinity in both estuaries, as well as residual variability in the estuary of Bilbao. In both estuaries, interannual variability was higher than the seasonal at 30, but lower at 35. Between-estuary coherence in the interannual variations of groups was highest at 35 (8 groups), and lowest at 30 (1 group). Coherence in the seasonal variations was also higher at 35 (5 groups) than at 33 and 30 (2 groups). Within the estuary of Bilbao, both interannual and seasonal coherences were higher at 35 (6-8 groups) than at 33 or 30 (<6-3 groups). Within the estuary of Urdaibai, differences between salinities in the interannual and seasonal coherence were not so clear, and the highest number of groups with similar variations was observed at 33 (6-4 groups). Overall, the mesozooplankton of the estuary of Urdaibai showed higher residual variability and lower coherence in the interannual and seasonal variability than that of the estuary of Bilbao, this being attributable to the higher hydrological instability of the estuary of Urdaibai. Along the salinity gradient, differences were more marked in the estuary of Bilbao, since, in contrast with 30 salinity site, 35 showed the lowest residual variability, the strongest dominance of the seasonal over the interannual variability and the highest interannual and seasonal coherence between groups, likely related to the landward increase in environmental instability, partly associated to anthropogenic activities.

P45

Morphometric discrimination of two larval populations of anchovy larvae (Engraulis encrasicolus) *from the Cantabrian Sea (Inner Bay of Biscay) and the Catalan Sea (NW Mediterranean)*

Intxausti L.[1]*, Villate F.[2], Motos L.[3], Uriarte I.[4], Iriarte A.[4]

1. Dept. Science Education. Begoñako Andra Mari Teacher Training University College, BAM. Barrainkua, 2. 48009 Bilbao. Spain.
2. Dept. Plant Biology and Ecology. Faculty of Science and Technology, University of the Basque Country, UPV/EHU. Sarriena auzoa, z/g. 48940 Leioa. Spain.
3. Marine Research Unit. AZTI Tecnalia. Herrera Kaia, Portualdea, z/g. 20110 Pasaia, Gipuzkoa, Spain.
4. Dept. Plant Biology and Ecology. Faculty of Pharmacy, University of the Basque Country, UPV/EHU. Paseo de la Universidad, 7. 01006 Vitoria-Gasteiz. Spain.

* lintxausti@bam.edu.es

European anchovy *(Engraulis encrasicolus)* is one of the most important species in the traditional Spanish fishery, and especially in the Basque Country and Catalonia. It is a short-lived species that depends on the annual recruitment for its maintenance. Larvae survival, in turn, highly depends on several factors such as the development of the necessary structures to enable breathing, growth, feeding and avoidance of predators, among others. In this study we measured several morphometric variables in anchovy larvae from 2.5 mm to 15 mm in size collected in the Cantabrian Sea and in the Catalan Sea, and carried out a discriminant analysis to determine the morphological differentiation during the ontogenetic development of larvae and between the two larval populations of the studied areas. Results revealed that morphometric differences were much higher between areas than between developmental stages. Catalan Sea larvae showed a larger head and jaw than the ones from the Cantabrian Sea. These differences could be explained as the ecological answer to the need of Catalan Sea larvae to cope with a higher metabolic rate due to a higher water temperature, allowing an earlier ingestion of larger and energetically more profitable prey. These results suggest an ecotype differentiation to respond specifically to the challenge of adapting to different environmental conditions. We also found that the discriminant analysis using morphometric variables is an effective tool to distinguish morphological differences between larval populations.

P46

Differences in mesozooplankton communities along northeast Atlantic shelves, from the Bay of Biscay to the North Sea

Fanjul A.[1]*, Villate F.[1], Uriarte I.[2], Iriarte A.[2], Atkinson A.[3], Cook K. [4]

1. Laboratory of Ecology, Department of Plant Biology and Ecology, Faculty of Science and Technology, University of the Basque Country (UPV/EHU), PO Box 644. 48080 Bilbao.
2. Laboratory of Ecology, Department of Plant Biology and Ecology, Faculty of Pharmacy, University of the Basque Country (UPV/EHU), Paseo de la Universidad, 7. 01006 Gasteiz.
3. Plymouth Marine Laboratory, Prospect Place, The Hoe, Plymouth, United Kingdom.
4. Marine Laboratory, Marine Scotland Science, Scottish Government, 375 Victoria Road, Aberdeen AB11 9DB, United Kingdom.

* alvaro.fanjul@ehu.eus

Differences in the community structure of mesozooplankton (> 200 µm) from four sites located in the south-western Bay of Biscay (Bilbao 35: B35; and Urdaibai 35: U35), the western English Channel off Plymouth (L4), and the north-western North Sea (Stonehaven: SH), were analysed by correspondence analysis (CA) using data from 15-year time-series (1999-2013). For the analysis coarse mesozooplankton groups, and dominant copepod and cladoceran genera were considered separately. The CA for groups revealed that the main mode of variability (22.5% of taxa variability) showed seasonal differences (winter vs. summer) combined with differences along the latitudinal gradient. Such differences were mainly attributable to the decrease in the contribution of doliolids to the zooplankton from B35 and U35 to SH, and the decrease in the contribution of bryozoan and polychaete larvae from SH to B35 and U35. Secondarily (15.5% of taxa variability), the zooplankton of L4, with a higher contribution of chaetognathes and echinoderm larvae, was mainly differentiated from that of U35, which had a higher contribution of cirripede larvae. The CA for genera showed that the first two modes of variability (34.5% and 21.0% of the variability, respectively) accounted for differences between the zooplankton of L4 associated to *Oncaea* and *Corycaeus* and those of B35 or SH associated to *Podon* and *Evadne* and to *Acartia, Oithona* and PCPC-*calanus*, respectively. The third mode of variability (14.2% of taxa variability) reflected the latitudinal gradient, which was mainly accounted for by the decrease in the contribution of *Temora* and *Calanus* from SH to B35 and U35. Overall, the major variability mode of zooplankton groups reflected the latitudinal gradient, accounted for mainly by winter and late summer-early autumn groups, while the major variability mode of copepod and cladoceran genera reflected neritic-oceanic gradients accounted for mainly by spring-summer and autumn-winter genera.

P47

Bacterial growth efficiency reveals the adaptation of the marine bacterioplankton to environmental changes

Baña Z.[1]*, Abad N.[1], Uranga A.[1], Azúa I.[1], Artolozaga I.[1], Unanue M.[1], Ayo B.[1], Arrieta J.M.[2], Iriberri J.[1]

1. University of Basque Country (UPV/EHU). Department of Immunology, Microbiology and Parasitology. Faculty of Science and Technology. Sarriena, s/n. 48940 Leioa, Spain.
2. King Abdullah University of Science and Technology (KAUST). Red Sea Research Center (RSRC). Thuwal 23955-6900. Saudi Arabia.

* zurine.bana@ehu.es

The microbial community of coastal ecosystems is sensitive to impacts in the habitat, such as shifts of organic matter quantity and quality, rainfall, daylight hours or temperature. These environmental changes affect the activity of the microbial trophic web in the ecosystem, and therefore the functioning of major biogeochemical cycles. The Bacterial Growth Efficiency (BGE) is defined as the fraction of consumed organic carbon that is incorporated into biomass and characterizes this ecological function of the bacterioplankton. However, research on the regulation of BGE has generated such many contradictory results that it is essential to study its physiological meaning in the long-term. For that aim, during the period 2008-2012 it was analyzed the functioning and composition of the microbial community and the environmental properties in the Southeastern Bay of Biscay. Two annually recurrent situations were identified as a high metabolism (HM) situation (May to August; bacterial carbon demand (BCD) of 144 ± 9 μgC l^{-1} d^{-1}), and a low metabolism (LM) situation (October to March; BCD of 86 ± 6 μgC l^{-1} d^{-1}). BGE was high during these two situations despite the differences in bacterial abundance and metabolism, the grazing pressure and other major environmental factors. The predominance of Bacteroidetes in HM situation and of Alphaproteobacteria in LM changed in April and September, driven by the blooms of eukaryotic and prokaryotic phytoplankton, respectively. In these transition months, BGE sharply and recurrently fell down and the amount of carbon transferred to higher trophic levels declined, revealing the instability of the ecosystem. These results suggest that the BGE should be considered as an indicator of the adaptation level of the bacterial community to main environmental changes.

P48

Is spatial distribution of fauna dependent of algal belts on the intertidal boulders of the Basque coast (Bay of Biscay)?

Marticorena J.[1]*, Huguenin L.[1], Lalanne Y.[2], Bru N.[3], Lissardy M.[1], de Casamajor M-N.[1]

1. Ifremer, Laboratoire Ressources Halieutiques d'Aquitaine, HGS\LRHA\ FED4155MIRA, UFR Côte basque, 1 allée du parc Montaury. F-64600 Anglet, FED 4155 MIRA.
2. Université de Pau et des Pays de l'Adour, UFR Côte basque, 1 allée du parc Montaury. F-64600 Anglet FED 4155 MIRA.
3. Université de Pau et des Pays de l'Adour, Laboratoire de Mathématiques et de leurs Applications de Pau, UMR CNRS 5142, UFR Côte basque, 1 allée du parc Montaury. F-64600 Anglet FED 4155 MIRA.

* julien.marticorena@ifremer.fr

To determine good ecological status and conservation of the Sub-Marine area of the Bay of Biscay, the implementation of a new rocky intertidal habitats monitoring is needed. A protocol has been adapted from the Brittany protocol for the water body FRFC11 Basque coast» for the two indicators «intertidal macroalgae» and «subtidal macroalgae» under the Water Framework Directive to qualify the ecological. However no protocol has been validated for fauna in front of meridional characters of the benthic communities. Investigations carried out on macroalgae communities on intertidal area in WFD framework, since 2008, constitute an important working basis. This is the aim of the Bigorno project (Intertidal Biodiversity of the south of the Bay of Biscay and Observation for New search and Monitoring for decision support), financed by the Agency of Marine Protected Areas and the Departmental Council. To implement knowledge, a sampling protocol has been used in 2015 on the boulder fields of Guéthary. This site is part of Natura 2000 area «rocky Basque coast and offshore extension «It constitutes also a Znieff site and restricted fishing area. The sampling strategy considers the heterogeneity of substrates and the presence of intertidal microhabitats. Two main habitats are present: «mediolittoral rock in exposed area habitat» and «boulder fields». Habitat «intertidal pools and permanent ponds» is also present but, it is not investigated. Sampling effort is of 353 quadrats of 0.1 m^2, drawn randomly according to a spatially stratified sampling plan, defined by habitat and algal belts. Taxa identification and enumeration are done on each quadrat. The objective of this work is to expose results from data collected during 2015 sampling program. The importance of characterizing benthic fauna communities spatial distribution belonging to the Basque coast according to algal belts defines during the WDF survey was highlighted. Concurrently, indicators of biodiversity were studied.

P49

The importance of the estuarine typologies defining the phytoplankton community composition

Pérez L.[1]*, Guinda X.[1], Seoane S.[2], Puente A.[1], Juanes J.A.[1]

1. Instituto de Hidráulica Ambiental de la Universidad de Cantabria. C/ Isabel Torres, n.º 15. Parque Científico y Tecnológico de Cantabria. 39012 Santander.
2. Department of Plant Biology and Ecology. University of the Basque Country (UPV/EHU). Bº Sarriena, s/n. 48940 Leioa. Spain.

* luisa.perez@unican.es

Over a period of 9 years the composition and structure of the phytoplankton community has been analyzed in the estuaries of Cantabria (Bay of Biscay). In addition, it has been related with the different hydro-morphological types of estuaries existing in the region: a) dominated by river dynamics, b) dominated by tidal dynamics and with a complex/rounded/elongated morphology and c) coastal lagoons with a limited sea influence. Several multivariate analyses, such as MDS, ANOSIM and SIMPER, were applied to analyze the composition and structure of the phytoplankton assemblages among different estuarine typologies. Estuaries dominated by tidal dynamics and with a complex morphology showed higher diversity and abundance of cryptophytes and a smaller abundance of diatoms. Those influenced by river dynamics had the lowest diversity, high abundance of diatoms and a low abundance of cryptophytes. The coastal lagoon presented a balanced community between diatoms and cryptophytes and diversity values depending on the presence or absence of blooms. Tidal estuaries with a rounded morphology showed greater similarity with the complex morphology.

Topic. **Geology; erosion; transport and sedimentation**

P50

Present-day sedimentation rates in the Bay of Brest (NW France) and its evolution since the last millenaries

Ehrhold A.[1]*, Grégoire G.[1, 4], Schmidt S.[2, 3], Jouet G.[1], Le Roy P.[4]

1. IFREMER, Géosciences Marines, Centre de Brest, BP70, CS10070. 29280 Plouzané, France.
2. CNRS, OASU, EPOC, UMR5805. F-33615 Pessac Cedex, France.
3. Université de Bordeaux, EPOC, UMR5805. F-33615 Pessac Cedex, France.
4. Institut Universitaire Européen de la Mer, UMR 6538 Domaines Océaniques, Technopôle Brest-Iroise. 29280 Plouzané, France.

* axel.ehrhold@ifremer.fr

Despite its importance in term of human activities, there are only few studies of the coastal sedimentation in the original estuary system formed by the Bay of Brest. Two rivers, Aulne in the South and Elorn in the North, discharge into the confined area by an undersea valley connected with the Atlantic Ocean by a narrow strait. 40% of the bay concerns the shallow zones (depth < 10m) corresponding to a succession of small bights and were characterized by a superficial cover of muddy sediments. The superficial sedimentary unit of 1 to 2 meters thick corresponds to the late Holocene sedimentation. This work aims to present the first large-scale investigation of the present-day sedimentation framework in this bay and its evolution since the last two millenaries. Interface and gravity cores were collected in 2014 and 2015. Sedimentation intensity was characterized on a century timescale using 210Pb and on longer time scale using AMS 14C. 210Pbxs excesses are detected at depth ranging between 5 and 25 cm, depending on the sites, testifying to heterogeneous sedimentation rates. The highest sedimentation, up to 0.5 cm yr^{-1}, is observed in the inner parts of the Elorn and Daoulas estuaries. In the protected South-West sector of the Bay of Brest, 210Pbxs-derived sediment rates are much lower, < 0.15 cm yr^{-1}. Differences mainly reflect the geomorphologic positions of depositional areas relative to sediment deliveries and the local impact of hydrodynamics factors on various sedimentary environments. Based on AMS 14C, the extrapolated sediment rate broadly confirms the accumulation trend in the South part of the bay fed by the Aulne river in contrast with the Northern part where sediment was less conserved and/or supplied by the Elorn river. This discrepancy imprinted the decoupling evolution in watershed sediment production or/and marine hydrodynamics in the two estuaries during the Late-Holocene.

P51

The Quaternary 'rasas' of the basque coast: current status and a new project for its study

Bilbao P.*[1], Álvarez I.[1], Aranburu A.[2], Yusta I.[2], Iriarte E.[3], Galparsoro I.[4], Arriolabengoa M.[2], del Val M.[2]

1. Universidad del País Vasco / Euskal Herriko Unibertsitatea. Departamento de Expresión Gráfica y Proyectos de Ingeniería, Escuela de Ingeniería de Bilbao.
2. Universidad del País Vasco / Euskal Herriko Unibertsitatea. Departamento de Mineralogía y Petrología, Facultad de Ciencia y Tecnología. Bº Sarriena, s/n. 48940 Leioa.
3. Universidad de Burgos, Burgos. Laboratorio de Evolución Humana, Dpto. de Ciencias Históricas y Geografía, eiriarte@ubu.es
4. AZTI-Tecnalia.

* peru_bl@hotmail.com

The Quaternary period is characterized by a large number of climatic oscillations between glacial and interglacial phases. Due to those oscillations, the sea level has varied periodically, affecting directly the morphology and the dynamics of the littoral zone. In periods when the sea level remains stable in a highstand situation, erosion and abrasion marine surfaces can be developed. Afterwards, when the sea level drops, those surfaces are emerged and exposed to subaerial erosion (fluvial processes, karstic processes, etc.). Nowadays, those 'rasas' are situated below and above the present sea level, and they represent an excellent record, as in them we can find evidences of paleoclimatic and geomorphological changes that have occurred throughout the Quaternary. In general in the Iberian Peninsula are very few the researches that have been carried out about these surfaces, and in the Cantabrian coast, the ones with the latest technologies are limited to the occidental zone. In the basque coast, despite the presence of some papers that show their existence, it has not been carried out any research that analyses them in depth in all its extension. Within a new research project, our aim is to gather all the current information and delimitate the existing potential 'rasas', analysing the data obtained with topographic LiDAR technology (emerged 'rasas'), bathymetric LiDAR and multibeam echo sounders (submerged 'rasas'). The research will focus on the submerged (until 100m depth) and emerged littoral zone (until 10km inland from the coastline). The next steps in the project are to characterize chronologically the formation of the 'rasas', to establish their evolution until the present, and to define the factors that control their evolution.

P52

Lithogenic sources, composition and intra-annual variability of suspended organic matter and particulate metals supplied from pristine rivers to the Western Cantabrian Sea (Bay of Biscay, SW Europe)

Bernárdez P.[1], Prego R.[2]*, Alvarez-Vazquez M.A.[2, 3], Ospina-Álvarez N.[4], Santos-Echeandía J.[5], Filgueiras Ana V.[2]

1. Dpto. Geociencias Marinas y Ordenación del territorio (Univ. Vigo). 36310 Vigo, Spain.
2. Instituto de Investigaciones Marinas (IIM-CSIC). 36208 Vigo, Spain.
3. Grupo GEAAT, Área de Geografía Física, (Univ. Vigo). 32004 Ourense, Spain.
4. Institute of Earth and Environmental Science (Univ. Potsdam). 14476 Potsdam-Golm (Germany).
5. Centro Oceanográfico de Murcia (IEO). 30740 Murcia, Spain.

* prego@iim.csic.es

Fluvial transport of suspended particulate matter (SPM) is one of the main pathways by which terrestrial constituents are dispersed over continental shelves. Despite the extensive research on large rivers there is still little information available of organic matter and metals content in SPM for small world rivers, particularly, those of the Western Cantabrian coast. In this region of the Bay of Biscay are located the rias of Viveiro, Barqueiro and Ortigueira where the pristine Rivers Landro, Sor, Mera, Landoi and Lourido flow into. The present study is part of a broader effort aiming to characterize the hydrological and sedimentological behavior of the river-ria systems in the Western Cantabian coast, and their impact on shelf sediments. From January 2008 to February 2009, hydrochemical fluvial samplings were carried out fortnightly. Conductivity, temperature and pH were in-situ measured. River waters were sampled to determine dissolved oxygen saturation and concentrations of chlorophyll-a, SPM, and particulate organic carbon and nitrogen. Moreover, 71 surface sediment samples from the Northern Galician Rias were recovered. Metal contents were analyzed in SPM and sediments.

The local lithology has a relevant influence in the trace metal composition of fluvial SPM and coastal sediments, i.e. mafic and ultramafic rocks of the Ortegal Complex (Landoi and Lourido river basins), the Ollo-de-Sapo metamorphic domain (Sor and Mera) and the Manto-de-Mondoñedo granitic domain (Landro). Thereby, the contents and distribution of Cr, Ni and Co in SPM and shelf sediments is a result of the parental minerals in the hinterland of the Ortegal Complex. Thus, the observed coastal metal enrichments is due to natural conditions instead of an anthropogenic influence. This fact should be carefully considered when developing environmental management strategies. This communication is a contribution to the INTERESANTE (CTM2007-62546-C03/MAR) and MEFIO (CTM2011-28792-C02) projects, financed by MINECO. Authors thanks to Aguas-de-Galicia and EMAFESA Co. for daily data of river gauging stations.

P53

Thousands of submarine microbial methane escapes at the Aquitaine Shelf (Bay of Biscay)

Dupré S.[1]*, Loubrieu B.[1], Scalabrin C.[1], Ehrhold A.[1], Gautier E.[1], Ruffine L.[1], Pierre C.[2], Battani A.[3], Michel G.[1], Le Bouffant N.[4], Berger L.[4]

1. IFREMER, Unité Géosciences Marines. 29280 Plouzané CEDEX, France.
2. Université Pierre et Marie Curie-LOCEAN, 4 place Jussieu. 75252 Paris cedex 05, France.
3. IFPEN-1 et 4 avenue de Bois Préau. 92852 Rueil-Malmaison, France.
4. IFREMER, Unité Navires et Systèmes Embarqués. 29280 Plouzané, CEDEX, France.

* stephanie.Dupre@ifremer.fr

The recent identification of acoustic and visual gas release in the water column at the Aquitaine Shelf led to the discovery of a 200 km^2 fluid system with 3000 bubbling sites associated to microbial methane escapes and the formation of methane derived authigenic carbonates. This active microbial gas system is exclusively located at the present-day shelf edge between 140 and 220 m water depths, and has no genetic link with thermogenic gases from the Parentis Basin beneath, neither originated from gas hydrates, but originates from CO_2 reduction as shown by gas geochemistry. The moderate methane fluxes (measured in situ, in average 200 mLn/min per bubbling site) contribute to the formation of small-scale sub-circular carbonate mounds (on average with reliefs < 1 m in height). No pockmarks scatter the seafloor there. Based on estimated thickness and growth rate of carbonates, the system has been lasting for at least since several tens to possibly hundreds of kyears with a volume of escaping methane reaching 3.1012 Ln/10 kyr. The GAZCOGNE project is co-funded by TOTAL and IFREMER as part of the PAMELA (Passive Margin Exploration Laboratories) scientific project.

P54

Environmental changes and bioevents related to mid-Cretaceous Bay of Biscay opening: an example from the northern margin of the Basque-Cantabrian Basin

Agirrezabala L.M.[1]*, López-Horgue M.[1]

1. Estratigrafia eta Paleontologia Saila, Euskal Herriko Unibertsitatea UPV/EHU, 644 P.K., 48080 Bilbo.

* l.agirrezabala@ehu.eus

Many oceanographic changes at different scales are directly related to the geodynamic evolution of sedimentary basins. The Basque-Cantabrian Basin (BCB), western Pyrenees, was a peri-cratonic rift related to the Bay of Biscay opening during the Cretaceous. The extreme crustal thinning and general extensional to transtensional synsedimentary tectonics of the northern margin of the BCB during the mid-Cretaceous constituted the major control on the marine environmental conditions of that margin such as depth, sea bottom physiography, seaways, sedimentary systems and sea-water chemistry. The pulsating increase of tectonic activity during the Albian led to the increment of the subsidence rate and the deepening of the basin and to the progressive increase of oceanic circulation between the BCB and the nascent Bay of Biscay and North Atlantic. Moreover, Albian synsedimentary faults acted as conduits for ascending magmas, hydrothermal fluids and hydrocarbons, which caused changes in the deposited sediments, the sea-water chemistry and biota. Late Albian ammonite associations are a good example of faunal changes occurring in this scenario; main ammonite bioevents are diversity changes in the associations, occurrence of giant forms (diameter up to 0.50 m) in at least two families, and the introduction of forms from other Atlantic basins.

P55

MIS1-MIS5 palaeoceanographic signals in the Bay of Biscay: micropalaeontological approach

Rodriguez-Lazaro J.[1] *, Pascual A.[1], Varela Z.[1]

1. University of the Basque Country (UPV/EHU). Department of Stratigraphy and Palaeontology, Bº Sarriena, s/n. 48940 Leioa. Spain.

* julio.rodriguez@ehu.eus

Palaeoceanographic evolution of the last 130 ka (MIS1 to MIS5; Marine Isotopic Stages) in the Bay of Biscay has been studied by considering changes of microfossils from sediment samples of deep core PP10-17. This core was retrieved at 2,882 mwd in the Landas Plateau and is formed by 1792 cm of silty clay continuously deposited sediment. A subset of 114 centimetre samples has been used for this study, yielding more than 62 thousands of specimens of foraminifers and ostracods. Benthic forams (BF) have been studied with more detail, based on 182 species found in these samples. MIS5 is characterized by oscillations of the oceanity index (OI; 60-90); this index is higher (90-100) and stable through the MIS4-MIS3 intervals. We found BF species indicators of different climatic-related events. Thus, MIS5 interglacials are evidenced by *Bulimina aculeata* and *B. gibba,* while the stadials MIS5b,d are shown by the occurrence of *Melonis pompilioides.* The Heinrich events HE, when there was strong iceberg discharges into the N Atlantic Ocean, are indicated by *Globobulimmina affinis,* particularly during the MIS4 to MIS2 interval. The beginning of MIS4 is indicated by the entrance of new species of BF and a shift of *Cassidulina laevigata.* The later species is a good indicator of cold intervals as the LGM (Last Glacial Maximum, 19-23 ka) when decreased the OI. Minor cooling periods as YD (Younger Dryas, around 12-13 ka) are shown as well by a shift of *M. pompilioides,* similar to that of the MIS5d stadial. The Holocene (11.5 ka to present) is marked by the increase of the oceanity index, disappearance of cold-water indicators and the occurrence of *Uvigerina peregrina.* Detailed palaeoceanographic evolution of MIS5 to MIS1 is completed by the study of other proxies as planktic forams, ostracods, stable isotopes, and sediment parameters (granulometry, magnetic susceptibility, Gamma spectrometry).

Topic. **Biogeochemical cycles**

P56

A new approach for the determination of Total Alkalinity in estuarine waters

Esnaola M.[1]*, Kortazar L.[1], Milea D.[2], Fernández L.A.[1]

1. University of the Basque Country (UPV/EHU). Department of Analytical Chemistry. Bº Sarriena, s/n. 48940 Leioa. Spain.
2. University of Messina. Department of Chemical Sciences. V.le F. Stagno d'Alcontres, 31. I-98166 Messina. Italy.

* esnaolamaialen@gmail.com

Ocean acidification has been spotted as one of the biggest problems arising from climate change. The role of increasing atmospheric CO_2 (g) uptake by the oceans and its release by biota respiration is still under active investigation. In order to be able to enlighten these processes, accurate measurements of chemical parameters like Total Alkalinity (TA) and Dissolved Inorganic Carbon (DIC), as well as some others like organic carbon, nitrogen, phosphate and silicate species (nutrients) is of the highest relevance. Concerning the measurement of TA, much attention has been paid to the classical determination by potentiometric titration. However, most of the work in this area has concentrated almost solely in "open" ocean waters, that is, solutions with constant salinity around 35 psu. However, the investigation of acidification processes in estuaries has received much less attention. TA determination in these waters using the conventional potentiometric approach (using HCl 0.1 mol.L^{-1} in NaCl 0.6 mol.L^{-1}) leads to inaccurate results due to large changes in the ionic strength along the titration arising from the variability of the salinity of estuaries (tides, river water input, etc.). In this work we offer an approach consisting in the accurate calculation of the equilibrium constants of the carbonate system, according to the ionic strength of each point in the potentiometric titration, by taking into account the activity coefficients of all the involved chemical species. Different models for the calculation of the activity coefficients have been tried and their suitability for the most accurate determination of TA is discussed and empirically demonstrated using hidrogencarbonate solutions of varying salinities in synthetic estuarine and sea waters.

P57

Interrelation among metals and organic pollutants in a freshwater environment. Case Study: The Deba river urban catchment (Gipuzkoa)

Lechuga-Crespo J.L.[1]*, García-García J.[1], Ruiz-Romera E.[1], Unda-Calvo J.[1]

1. Department of Chemical and Environmental Engineering, University of the Basque Country, Alameda Urquijo, s/n. 48013 Bilbao, Spain.

* jlechuga001@ikasle.ehu.eus

Metals are naturally occurring elements that become contaminants when human activity raises their concentrations. Similarly, when an excess of nutrients appears in aquatic systems, changes in the structure and functioning of associated ecological communities are caused (Newman & Unger, 2003). As ecosystems are dynamic and every part plays a role in the whole, interactions should be studied. Therefore, the main target of our project is not to study metallic pollution or nutrient compounds on their own, but to establish relations between these two groups. The Deba River urban catchment (Gipuzkoa) has been chosen because it has historically been influenced by industrial and urban wastewater inputs (Martínez-Santos et al, 2015). In order to achieve this goal, monthly samples were taken and analysed: concentrations of metals (Al, Fe, Si, Mn, Cu, Zn, Pb, Ni and Cr), nutrients (nitrate, nitrite, ammonia and phosphates) and some other parameters (pH, electrical conductivity, temperature, etc.). Since October 2014 until January 2016, data shows different tendencies and relations. On one side, oxidized forms of nitrogen appear related to Si and Ni. While Si is common in the lithology of this area, Ni seems to have an anthropogenic origin. Industrial activities like battery production (Newman & Unger, 2003) or manufacture of stainless steel are usual origins forms of nitrogen that tend to appear associated to Zn, which is common for preventing corrosion. As PCA analysis shows, these associations are strong in specific sampling points: like at Ego affluent for Zn (218 mg · m^{-3}) or at upstream of main river for Ni (11 mg · m^{-3}). Data were classified according to flow rates so associations of nutrients and metals showed stronger as dryer the period.

Further sampling campaigns are expected to show more or different relations as environmental and pollution parameters evolve along with the environmental quality.

P58

Antimony diagenetic implications for radionuclide accidental release scenarios in the Gironde Estuary (France)

Gil-Díaz T.[1] *, Schäfer J.[1], Pougnet F.[1], Husson A.[1], Bossy C.[1], Dutruch L.[1], Derriennic H.[1], Coynel A.[1], Blanc G.[1]

1. University of Bordeaux, UMR CNRS 5805 EPOC, Bat 18, Allée Geoffroy Saint-Hilaire. 33615 Pessac, France.

* teba.gil-diaz@u-bordeaux.fr

The nuclear power plant (NPP) accident of Fukushima Dai-ichi (Japan, 2011) raised concern on radionuclide behavior/dispersal in coastal aquatic systems. Parallelism in the biogeochemical behavior of accidentally formed radionuclides and their natural stable isotopes helps predicting their environmental fate. Antimony (Sb) is a NPP fission product (i.e., 125Sb: half-life of 2.76y) and its behavior in dynamic estuarine and coastal environments needs better understanding. We have studied the vertical distribution of Sb particulate concentrations (Sbp) and the solid speciation in sediment and suspended particulate matter (SPM) along the salinity gradient of the Gironde Estuary to support radionuclide dispersion scenarios for this aquatic environment hosting the Blaye NPP (52 km away from Bordeaux). Total Sbp and its distribution between operationally defined carrier phases was determined by ICP-MS after total sediment digestion and parallel selective extractions. Our results show relatively homogeneous Th-normalized Sbp ~0.14±0.02 in the upper 25 cm depth range of surface sediments. Comparison with Sbp/Thp in estuarine SPM suggests sediment Sbp depletion by ~10-15%, consistent with the combined ascorbate-extracted (reducible) and 1M HCl-extracted (reactive or potentially bio-available) fractions. This observation suggests post-depositional Sb mobilization from the sediment, probably related to diagenetic processes (reductive dissolution of Sb and/or reducible Sb carrier phases) and/or ionic interactions related to variable salinity gradients imposed by estuarine dynamics (tides, deposition/erosion cycles, etc.). This implies potential recycling of dissolved Sb from sediment to the water column. Assuming that Sb radionuclides accidentally released into the estuary will rapidly adsorb onto SPM, undergoing sedimentation/erosion cycles and related salinity and redox gradients, sediments may represent secondary, retarded Sb radionuclide sources to the water column. Further research should focus on the temporal coupling of sediment dynamics, diagenetic processes and radionuclide half-lives, because the latter control the timescales at which the radionuclides emit radioactivity and/or decay into other elements with different biogeochemical behavior.

P59

Spatio-temporal distribution of metal pollution in an urban catchment. Case urban: Deba river.

Lechuga-Crespo J.L.[1]*, Ruiz-Romera E.[1], García-García J.[1], Martínez-Santos M.[1], Unda-Calvo J. [1]

1. Department of Chemical and Environmental Engineering, University of the Basque Country, Alameda Urquijo, s/n, 48013 Bilbao, Spain.

* jlechuga001@ikasle.ehu.eus

River urban catchments affected by urban and industrial inputs present an important and common spot for pollution. In this case, Deba river basin has been influenced by metal pollution over the last decades. This situation has changed as some actuations have taken place on this urban catchment. Improvement of the water quality in the long term is expected but short time effects are not clear. That leads to the main scope of this project: to show how metal pollution will vary in a short term. Here, metal distribution in the soluble phase along time and space is studied. Water samples were taken periodically at all sampling points and physical-chemical parameters were measured and analysed through descriptive analysis. Hydrological factor presents a great influence over metal concentration distribution, for that reason, classification of the analysis was chosen through flow value. According to this, the spatial-temporal difference is presented through this classification. Hydrological period October 2014 to January 2016 presented only three months (January, February and March, 2015) with high flow rate, in contrast with other eleven with low flow rate. Dragging phenomena seems to prevail for the high flow rate, as higher proportion of Fe and Al (common in the lithology of this area) is presented in most of the sampling points. For that low-flow period, trace elements get higher importance as majority metal concentration decreases. That effect is significantly pronounced for Zn and Mn in Ego affluent, which impacts is shown downstream to the main course. This affluent has been historically reported as a polluted one. Another important polluted input to the main course is Oñati affluent; in this case Mn concentration is bigger than Zn in comparison to Ego. According to the results, even though some actuations have taken place in this area, pollution is still present. Differences are more pronounced by hydrological classification than by chronological analysis.

P60

Chemical reference-profiles from 20 years of Santander Standard Section

Viloria A.[1] *, Tel E.[2], Lavín A.[1], Rodriguez-Puente C.[1]

1. Spanish Institute of Oceanography (IEO). Santander Oceanographic Center. Promontorio de San Martín, s/n. 39004 Santander. Spain.
2. Spanish Institute of Oceanography (IEO). Headquarters. C/ Corazón de María, 8. 28002 Madrid. Spain.

* amaia.viloria@st.ieo.es

Since 1991, Spanish Institute of Oceanography (IEO), within the RADIALES time-series monitoring program, has monthly sampled key oceanographic variables in 5 standard sections around the Galician and Cantabrian coast. In the framework of the European Marine Observation and Data Network (EMODnet) project, the IEO has performed an important effort to validate and control its biogeochemical data collections. This study is focused on chemical data from the Santander standard section, which covers coastal, shelf-break and oceanic waters. One of its goals is to describe the chemical behavior of the area and its variability along the time, including as short changes as long-term ones. Early detection of variations in nutrient concentrations is essential to predict the ecosystem responses. To reach these objectives a 20-years dataset (1991-2012) has been validated and flagged according to internationally accepted quality criteria. This dataset is used to define chemical reference-profiles for each station and to determinate their seasonal variability. This reference-profiles are a useful tool to validate future data on the area and to compare environmental conditions in order to determinate changes not only explained by seasonal variability.

Topic. **Anthropogenic effects; quality assessment and ecosystem management**

P61

Effect of Lowered pH on Microalgae of the Chlorophyta Division

Alegria J.[1], Laza-Martínez A.[2], Seoane S.[2]*

1. University of Groningen (RUG). ICBM-Terramare. Schleusenstraße 1. D-26382 Wilhelmshaven. Germany.
2. University of the Basque Country (UPV/EHU). Department of Plant Biology and Ecology. Bº Sarriena, s/n. 48940 Leioa. Spain.

* sergio.seoane@ehu.es

Sea surface average pH is predicted to decrease from 8.1 to 7.8 in 2100 due to the absorption of anthropogenic CO_2 by the oceans. This will have consequences on many different organisms at all trophic levels. The effect on primary producers is of special interest since changes in productivity could have a strong cascade effect through the trophic chains. Because of this, several research has focused on different phytoplankton divisions in this issue; however, some of the main divisions, as Chlorophyta, are understudied. The present study tests the effect of lowered pH values on the growth rates of three different species of the Chlorophyta division: *Nephroselmis pyriformis, Pyramimonas orientalis* and *Pyramimonas propulsa.* The strains were cultured separately at four different pH treatments (from a control at pH 8.1 to pH 7.2) and their growth rates were measured during three days of exponential phase. Results showed a significant increase in growth rates under acidified conditions for *N. pyriformis* and *P. orientalis*. On the other hand, *P. propulsa* did not increase the growth rates in any of the pH treatments. These results show a heterogeneous response of chlorophytes to lowered pH conditions and suggest that productivity of these species could increase in the predicted acidified oceans.

P62

Evaluation of long-term, high-frequency and multisite monitoring of dissolved oxygen to investigate hypoxia risk in the Gironde estuary (SW France)

Schmidt S.[1]*, Diallo P.Y.[2], Derriennic H.[3], Etcheber H.[1], Lamouroux M.[4]

1. CNRS, OASU, EPOC, UMR5805. F-33615 Pessac Cedex, France.
2. CentraleSupélec. 91192 Gif-sur-Yvette Cedex, France.
3. Univ. Bordeaux, EPOC, UMR5805. F-33615 Pessac Cedex, France.
4. Agence de l'Eau Adour-Garonne. F-33049 Bordeaux.

* sabine.schmidt@u-bordeaux.fr

The Gironde Estuary (S.W. France) is the largest fluvial-estuarine system which drains to the Bay of Biscay. Episodes of low dissolved oxygen (DO) content have been occasionally recorded in the up estuary, close to Bordeaux Metropole. In a context of long-term environmental changes (increase in temperature and population, decrease in river discharge), the establishment of permanent seasonal hypoxia is expected in the next decades, that could be problematic for downstream migration of juvenile fishes. A prerequisite to predict the evolution of DO in waters of the Gironde estuary is to better understand DO dynamics in relation to natural and anthropic forcings. Since 2004 the MAGEST (MAreL Gironde ESTuary) real-time, high-frequency monitoring network records each 10 min temperature, salinity, turbidity and dissolved oxygen of surface estuarine waters at four stations. Continuous measurements provide extremely detailed information on DO that would not be obtained by classical sampling, even on a daily basis. Only high-frequency measurements are able to record unpredictable and brief events, like a storm or a flood. It reduces uncertainties in DO concentrations from tidal to inter-annual timescales and shows reliable inter-annual variability in relation with the local hydrology and climatology. The 12-years time-series permits to extract the main tendencies of dissolved oxygen in relation with external forcing (meteorology, summer temperature, fluvial discharges) and to predict the potential evolutions of this system with environmental changes.

P63

The sense of hearing in the oyster Crassostrea gigas

Charifi M.[1,2,3]*, Sow M.[1, 2], Ciret P.[1,2], Benomar S.[3], Massabuau J.C.[1,2]

1. University of Bordeaux, EPOC, UMR 5805. F-33120 Arcachon, France.
2. CNRS, EPOC, UMR 5805. F-33400 Talence, France.
3. Mohammed V-Agdal University, Biology, Morocco.

* mohcine.charifi@u-bordeaux.fr

There is an increasing concern that anthropogenic noise could have a significant impact on marine environment. It has been shown that man-made noise has deleterious effect on marine mammals and cephalopods, but there is still no sufficient data on the effect of noise on other invertebrates. The aim of our study was to define the sensitivity of the oyster *Crassostrea gigas* to pure sound exposure and to get insights into their sense of hearing. We exposed groups of 16 oysters to quantifiable sinusoidal sounds ranging from 10 Hz to 20 kHz at various sound pressures. The experiment was conducted in running seawater (open system), using an experimental flume equipped with loudspeaker and hydrophone. The oyster sensitivity was measured by recording their valve movements by high-frequency, non-invasive (HFNI) valvometry (http://molluscan-eye.epoc.u-bordeaux1.fr/). Briefly, each valve was equipped with a light electromagnet and the change of valve behavior associated to sound stimulation was used as an indicator of sound perception. Our results indicate that, at high enough sound pressures, oyster partially close their valves in response to specific frequencies. Oysters were responsive to frequencies in the range 10-600 Hz with a maximum sensitivity from 10-200 Hz. No response was obtained above 700 Hz. The minimum sound pressure required to elicit a response was 129 dB re 1µPa@1m (at 100 Hz). As the partial valve closure must be taken as a response to a nociceptive stimulus we are unable to say if oysters can hear sounds at lower sound pressures. In conclusion we characterized the sound frequencies hear by *C. gigas*. This hearing range fits precisely to the louder part of the sounds emitted by numerous anthropogenic activities (large vessels, pile driving, etc). Further work has to be done to improve our knowledge about the potential consequence of this problem.

P64

Analysis of basque beachgoers: profile in respect of rip currents knowledge

Maruri M.[1]*, Sotes I.[2], Basterrechea-Iribar I.[2]

1. University of the Basque Country (UPV/EHU), Department of Applied Mathematics.
2. University of the Basque Country (UPV/EHU), Department of Nautical Sciences and Marine Systems Engineering.

* mapmamam@ehu.eus

The annual report of 2015 concerning drownings in Spain points out that more than fifty per cent have taken place on the beaches. In this respect, one of the hidden risks for most of the beachgoers is the rip current. That is due to the lack of beachgoers' awareness on the right way of facing this danger. Taking into account that more than eighty percent of beachgoers in the Basque Country have a swim when going to the beach, rip current is a danger to be taken into account. Moreover, it is difficult to post signs with information about this type of currents due to their daily and seasonal changes of direction and intensity caused by the tides and storms. The aim of this paper is to research the knowledge that first year undergraduates have on rip currents, provided that they are studying in colleges located on the Basque coast. The research was carried out with 364 questionnaires related to rip currents. The ability to identify them, the beachgoer's experience involved in these currents and the ability to gather the proper information from beach signals was analyzed. The target of this research is to improve beach safety regarding rip currents by means of recommendations.

P65

Determination of per- and polyfluoroalkyl substances in grey mullet liver, mussel and oyster samples from the north coast of Spain, France and Portugal

Zabaleta I.[1], Bilbao D.[1], Bizkarguenaga E.[1], Mijangos L.[1]*, Etxebarria N.[1], Prieto A.[1], Zuloaga O.[1]

1. Department of Analytical Chemistry, Faculty of Science and Technology, University of the Basque Country (UPV/EHU), PK. 644. 48080 Bilbao, Spain.

* leire.mijangos@ehu.es

Per- and polyfluoroalkyl substances (PFASs) have attracted increasing attention as emerging environmental contaminants in recent years due to their potential toxicity, persistence and bioaccumulation. Due to the growing concern about this class of chemicals, perfluorooctane sulfonate (PFOS) and its derivatives have been listed as priority hazardous substances in the field of water policy under the European Union Directive 2013/39/EU. Since PFASs are generally more hydrophobic than lipophobic, they are primarily retained in protein-rich compartments (blood, liver and kidneys). Within this context, concentration levels of 24 PFASs congeners, including 3 perfluoroalkylsulfonates (PFSAs), 7 perfluorocarboxylic acids (PFCAs), 3 perfluorophosphonic acids (PFPAs) and perfluorooctanesulfonamide (PFOSA), and 10 precursors (4 polyfluoroalkyl phosphates (PAPs), 4 fuorotelomer saturated acids (FTCAs) and 2 fluorotelomer unsaturated acids (FTUCAs)) were determined in grey mullet *(Chelon Labrosus)* liver, mussel and oyster samples collected along the Basque coast (N Spain), France and Portugal. Sampling campaigns were carried out between the years 2007-2014. Concerning to the analysis of PFASs and their precursors, a previously optimized focused ultrasonic solid-liquid extraction (FUSLE) method was applied and the analyses were performed by liquid-chromatography-triple quadrupole mass spectrometry (LC-MS/MS). Our study showed the evidence of widespread contamination by PFOS and PFOSA in all the studied matrices, while high levels of 8:2 mono-substituted polyfluorodecyl phosphate (8:2 monoPAP) were reported for the first time in mussel samples. Acknowledgements: This work was financially supported by the Ministry of Economy and Competitiveness through the project CTM2014-56628-C3-1-R.

P66

Molecular methods for the early detection of marine Non-Indigenous Species in ballast water

Rey A.[1] *, Borrell Y.[2], García-Vazquez E.[2], Rodriguez-Ezpeleta N.[1], C.Basurko O.[1]

1. AZTI, Marine Research Division-Sukarrieta, Txatxarramendi ugartea, z/g. 48395 Txatxarramendi, Bizkaia. Spain.
2. University of Oviedo, Department of Functional Biology, C/Julian Claveria, s/n, 33006 Oviedo, Spain.

* arey@azti.es

Unintentional and intentional human interventions have allowed Non-Indigenous Species (NIS) to move over natural environmental barriers and facilitated their introduction into new environments. To prevent the establishment of Non-Indigenous Species before they become invasive, it is crucial to develop efficient early warning and monitoring methods. The Marie Curie 2014 ITN H2020 Aquainvad-ED project aims to develop innovative methods that combined with the power of crowd data sourcing (citizen science) will allow early detection, control and management of Aquatic Invasive Species (AIS). Eight PhD fellows are involved and are dedicated to four projects: development and application of novel methods for the early detection AIS of freshwater and marine invaders; identification of vectors of introduction and pathways of dispersal; impacts of freshwater and marine invaders; and risk assessment and control of AIS. Our contribution in Aquainvad-ED focuses on bridging the gap between research and management in the early detection of NIS in ballast water, a critical vector by which AIS are being introduced, by developing new tools to facilitate the implementation of the regulatory framework of ballast water. To answer this challenge, different actions are proposed including: 1) analyzing the efficiency of DNA-based methods to detect organisms at low densities and by creating a standardized DNA library of NIS present in Atlantic Coast of Spain; 2) investigating the viability of these organisms in artificial communities with an RNA metabarcoding approach; 3) elaborating a first national overview of ballast water activities with data on the origin and amount to assess the risk level of NIS introduction and exportation and; 4) conducting ballast water sampling and port risk assessment associated to the Ballast Water Convention in the Bilbao port. Our work will contribute to improve biological invasion surveillance by implementing a standardized early detection method very advantageous for marine management stakeholders.

P67

Modelling Escherichia coli *concentration in the Nerbioi-Ibaizabal estuary (Basque Country, SE Bay of Biscay) in the context of the European project MARS*

Chifflet M.[1]*, Del Campo A.[1], Borja A.[1]

1. AZTI. Herrera Kaia, Portualdea, z/g. 20110 Pasaia (Gipuzkoa), Spain.

* mchifflet@azti.es

The FP7 European project MARS supports water managers and policy makers at the water body, river basin and European scales in the practical but modernized implementation of the Water Framework Directive. Using existing data from some of Europe's most intensively monitored river basins, MARS links catchment models benchmark indicators and risk assessment to appraise how multiple stressors affect water quantity and quality, ecological status, ecological functions and ecosystem services under contrasting scenarios of water resource management, land use and climate change. One of the specific objectives of MARS is to test and improve existing modelling techniques, including: (i) full process-based models; (ii) simpler, linked process-based models; and (iii) empirical/statistical models, to assess complex multi-stressor scenarios. In the context of this project, the 3D hydrodynamic process-based model MOHID-water has been implemented in the Nerbioi-Ibaizabal estuary, using two nested levels. The objective is to support the improvement of an ecosystem service (bathing waters), after the water treatment plan implemented in recent decades in this estuary. This modelling study is included within a theoretical Driver-Pressure-States-Impact-Response (DPSIR) model that will allow us to link the results of the process-based model to the recovery of that ecosystem service. To achieve this objective, a 1-year simulation has been performed (2004), using solar radiation as atmospheric forcing and considering the daily flow observations for the Nerbioi River. In the present contribution, the seasonal evolution of simulated temperature and river plume are shown for the year 2004. Once validated, the results of the hydrodynamics model are applied to investigate the changes of water quality in the bathing areas of this estuary, simulating the seasonal evolution of the bacteria E. coli in relation to the hydrological conditions. This will be complemented in the near future with other socio-ecological studies, using surveys to the users of the beaches.

P68

Gills and digestive gland 7,8-oxo-dG immunohistochemistry for detecting genotoxicity in mussels (Mytilus galloprovincialis): *a field study in the Bay of Biscay*

Zaldibar B.[1]*, Blanco-Rayón E.[1], Briaudeau T.[1], Aguirre-Rubí J.[1], Rementeria A.[1], Garmendia L.[1], Izagirre U.[1], Marigómez. I.[1]

1. Cell Biology and Environmental Toxicology Research Group, Zoology and Animal Cell Biology Department, Research Centre for Experimental Marine Biology and Biotechnology (PiE-UPV/EHU) & Faculty of Science & Technology, University of the Basque Country, P.O. Box 644. E-48080 Bilbo, Basque Country, Spain.

* benat.zaldibar@ehu.eus

Genotoxicity biomarkers in sentinel species, such as mussels and fish, are core measurements in marine pollution monitoring. Different methods can be applied to assess genotoxicity including the detection of both double- and single-strand breaks of DNA, DNA-adducts, micronuclei formation (MN), chromosome aberrations and 7,8-dihydro-8-oxodeoxyguanosine (7,8-oxo-dG) histochemistry. 8-oxo-dG is the oxidized form of the deoxyguanosine, one major product of DNA oxidation, and its presence has been related to oxidative damage caused by pollutants. In the present work, mussels were collected in 6 localities (Arriluze, Arrigunaga, Plentzia, Mundaka, Pasaia and Hondarribia) of the Bay of Biscay from 2012 to 2015 in two different seasons (spring and autumn) and routinely processed for histological examination. 7,8-oxo-dG immunohistochemistry was applied to gills and digestive gland and the intensity of staining was measured by image analysis. The results indicated that significant differences between localities and seasons were more marked in the gills than in the digestive gland, which suggested that the gills could be a more sensitive target tissue for assessing genotoxicity in mussels in marine pollution monitoring. Regarding differences between localities, in some sampling campaigns higher staining intensities were recorded in Hondarribia and Arrigunaga than in the other four localities, revealing the occurrence of a slightly more severe genotoxicity, especially in autumn. Indeed, a clear seasonality was observed as a general rule, with higher staining intensities obtained in autumn than in spring. In agreement, a similar seasonal trend in genotoxicity was previously recorded in mussels using MN as endpoint; however, a clear relationship between the reported levels of chemical pollution and the recorded trends in genotoxicity cannot be easily envisaged. Acknowledgements: Funded by the Basque Government (grant to Consolidated Research Groups; GIC07/26-IT-393-07) and research project CTM2012-40203-C02-01 (MINECO).

P69

Gametogenesis and gonad histopathology in mussels (Mytilus galloprovincialis) *from two estuaries of the Bay of Biscay with different pollution loads*

De Diego M.[1], Zubeldia A.[1], Ortiz-Zarragoitia M.[1], Zaldibar B.[1]*

1. Cell Biology & Environmental Toxicology Research Group, Research Centre for Experimental Marine Biology & Biotechnology (PIE) & Zoology & Animal Cell Biology Department (Faculty of Science & Technology), University of the Basque Country, P.O. Box 644. E-48080 Bilbo, Basque Country, Spain.

* benat.zaldibar@ehu.eus

Mussels *(Mytilus galloprovincialis)* are sentinel organisms widely used in environmental monitoring studies. The presence of pollutants in the marine environment exerts deleterious effects in mussels compromising their gamete development and reproduction. In the present work, mussels from two estuaries presenting different pollution loads (Arriluze in the Bilbao estuary and Plentzia in the Butroe estuary) were collected monthly (October 2014-August 2015) during a whole reproductive cycle and differences in gametogenesis and histopathological alterations in gonads were assessed. Sex ratio, gametogenic stages and gonad index (GI) were determined and a detailed histopathological study of the gonad was carried out. Both mussel populations showed similar gametogenic cycle. During autumn gametogenesis occurred and early spawning events were observed in winter. These early spawning consisted of small sized follicles. In spring fully mature follicles were observed and spawning extended during spring and early summer months. Then mussels showed gonad at post-spawning and resting stages. Differences between sexes were detected in autumn months. Males showed more advanced gametogenic stages than females, but during the winter months both sexes showed coordinated gametogenesis. Regarding histolopathological alterations oocyte atresia and heamocytic infiltrations were the most relevant lesions observed in gonads of mussels from both populations and presented similar prevalence. It is noteworthy that necrotic areas (more relevant in autumn-winter) and parasitic infestation were detected in mussels from both estuaries, and also one intersex mussel was detected in April in the Bilbao estuary. Mussels from both estuaries presented similar reproductive cycle with earlier male gamete development and with autumn-winter months presenting more alterations than spring-summer months. Acknowledgements: Funded by the Basque Government (grant to Consolidated Research Groups; IT810-13) and the UPV/EHU (UFI11/37).

P70

Assessment of the effects exerted by Cu and Ag in oysters (Crassostrea gigas) *through an integrative biomarker index*

Rementeria A.[1,2]*, Mikolaczyk M.[2], Lanceleur L.[2], Blanc G.[2], Soto M.[1], Zaldibar B.[1], Schäfer J.[2]

1. CBET Research Group, Dept. Zoology and Animal Cell Biology, University of the Basque Country UPV/EHU, Leioa, Basque Country, Spain. Research Centre for Experimental Marine Biology & Biotechnology PiE.
2. Université de Bordeaux, Équipe TGM, UMR CNRS 5805 EPOC, Allée Geoffroy St. Hilaire, 33615 Pessac, France.

* ane.rementeria@ehu.eus

Human activities have altered estuarine environments by the intake of different pollutants including heavy metals. The implementation of new environmental policies and regulations together with the closure of major historical sources, have caused a considerable decrease of trace metal concentrations in estuaries from the Bay of Biscay. Nevertheless, some elements regarded as very toxic for aquatic biota such as copper (Cu) and silver (Ag) are still present in relatively high concentrations. Oysters have been widely used in environmental biomonitoring programmes as sentinel organisms. However, the influence of natural variables such as salinity in biomarker interpretation is of relevant interest since silver accumulation in oysters decreases at higher salinities. Therefore, the effect of natural variables into biomarker response needs a deeper understanding. Presently, oysters *Crassostrea gigas* were exposed to sublethal concentrations of Cu (2000 ng Cu/L) and Ag (500 ng/L) during 14 days in 18 salinity seawater. A battery of cell and tissue level biomarkers at different levels of biological complexity was applied and integrated into the Integrative Biological Response (IBR) index including: metallothionein contents, intralysosomal metal accumulation, digestive gland atrophy, tissue integrity and Condition Index. Results indicated an increase on intralysosomal metal accumulation after 7 and 14 days of exposure to silver On the other hand, a general decrease in neutral lipids content occurred while Cu exerted the contrary effect after 14 days. The responses detected with the aid of biomarkers integrated in the IBR index presented different response pattern compared to oysters exposed to seawater salinity (28) indicating the effect of salinity in biomarker responses. Moreover, under the present experimental conditions, higher toxicity was observed in silver exposed oysters and the onset of detoxification processes was detected. Acknowledgements: Funded by Basque Government (GIC07/26-IT-393-07), research project CTM2012-40203-C02-01 (MINECO), La Région Aquitaine and the "Agence de l'Eau Adour-Garonne".

P71

Chemical and physiological metal bioaccessibility assessment in surface bottom sediments from Deba River urban catchment: evaluation of urban and industrial inputs impact on sediments quality

Unda J.[1]*, Martínez M.[1], Ruiz E.[1], Lechuga J.L.[1]

1. Departmet of Chemical and Environmental Engineering, University of the Basque Country, Alameda Urquijo, s/n. 48013 Bilbao, Spain.

* junda001@ikasle.ehu.eus

Urban and industrial activities produce strong impacts on river waters and sediments quality, such as Deba River catchment. However, several actions were undertaken in pursuit of the objective of improve the ecological quality of the catchment, such as the implementation of the wastewater treatment plant Epele (in Arrasate) in May 2012 and the recent connection of municipal wastewaters of Ermua to the wastewater treatment plant Apraitza (in Elgoibar). In the present study, TCLP and PBET methods (gastric and intestinal phases) have been used to assess the leachability/bioaccessibility of metals (Fe, Mn, Zn, Cu, Ni, Cr and Pb) in sediments samples collected in 2012 and 2015. Furthermore, risk assessment has been done determining the hazard quotient (HQ). The principal aims of the work are: (i) to analyse the temporal variability of these parameters from 2012 to 2015 and (ii) to identify the relationship between these parameters variability and urban/industrial activity decrease. Experiment data have showed that bioaccessibility was higher than leachability for all metals except for Mn and Zn in 2012 and for Mn in 2015. However, bioaccessibilities have been lower in the intestine than in the stomach, except for Cu in 2012 and for Cu and Cr in 2015. Various metals bioaccessibilities (Fe, Zn, Ni, Cr and Pb) increase downstream in 2012, in sites near major urban and industrial areas, whereas they did not present high spatial variation along the catchment in 2015. Therefore, contamination in Deba River is closely related to urban-industrial wastewater discharges and appears to have declined in recent years. Finally, toxicological risk assessment demonstrates that sediments from catchment are not enough to cause adverse effects on human health, being Cr the most potentially toxic element.

P72

To what extent fishing effort is affecting trophic level of the demersal communities at small scale? Preliminary results of a new food web indicator

Preciado I.[1]*, Punzón A.[1], Arroyo N.L.[1], López-López L.[1], Serrano A.[1]

1. IEO, Spanish Institute of Oceanography (Oceanographic Centre of Santander), Promontorio San Martín, s/n. 39004 Santander, Spain.

* ipreciado@st.ieo.es

Due to the complexity of benthic and demersal ecosystems, to be really helpful, a food web indicator should summarize, in a single number, a variety of complex processes that are otherwise hard to apprehend. The present work assesses the direct impact of bottom fishing gears on the trophic level (TL) of benthic and demersal communities dwelling in the continental shelf of the southern Bay of Biscay. Using a spatio-temporal approach at small scale, we tackle two main objectives: 1) to evaluate temporal trends in mean TL at community scale per sampling rectangle (5 x 5 miles grid resolution), and 2) to assess to what extent these trends are related to fishing effort. Two types of data are involved in the analyses: 1) TL data (mean trophic level by sampling rectangle), and 2) VMS data (number of fishing days by sampling rectangle). TL data were calculated using stomach contents sampled for demersal fish species during the Demersales surveys (IBTS), carried out every autumn in the southern Bay of Biscay since 1983, and combined with data from Fishbase and local references for those species which lacked empirical data. We only considered species that appeared in a minimum of 5 years and were consistently well identified along the whole historical series, in order to keep consistency in the community spatiotemporal sampling. Preliminary results point to a significant increase in TL in most of the sampling rectangles, suggesting that the trend observed globally is spatially homogeneous. A clear relationship between fishing effort and TL was also identified, particularly in those areas where fishing effort (mainly otter trawl fisheries) has been decreasing in recent years.

P73

Application of a systematic conservation planning approach in the Basque Country

Galparsoro I.[1]*

1. AZTI; Herrera kaia portualdea, z/g. 20110 Pasaia, Spain.

* igalparsoro@azti.es

Systematic Conservation Planning (SCP) is a structured, quantitative approach to the planning of both single Marine Protected Areas and networks of reserves. It can be used to identify reserve networks that capture the most biodiversity whilst reducing area or other costs, and it will, in theory, allow for the more effective protection of biodiversity. The main objective of the research presented here was to produce information that could potentially be used in the designation of management plans in the continental shelf in front of the Basque Country. The proposed space ordination should fulfill the established environmental targets and, at the same time, the minimization of conflicts with the existing socioeconomic activities; as well as the possibility of designing scenarios adding future new activities foreseen to be implemented in the area (renewable energy production and aquaculture). When implementing the tool, the biodiversity surrogate elements used were the distribution of benthic habitats, the biological value of different ecosystem components (i.e. cetaceans, seabirds, macrobenthos and macroalgae) and the already existing protected elements. Besides, when considering the existing socioeconomical activities in the area, the total fishing pressure produced by artisanal fisheries was used as a proxy for the characterization of the spatial distribution of such activity.

The obtained results show the flexibility and the potential use of systematic planning as a decision supporting element within a transparent process that could help the achievement of both, environmental and socioeconomic targets. The implementation of such kind of approaches could be considered as being of high relevance towards the Ecosystem-based Marine Spatial Planning.

P74

Effect of the implementation of a sewage treatment plant in the suspended sediments metal pollution during flood events in Deba river urban catchment

Garcia-García J.[1], Ruiz-Romera E.[1], Martínez-Santos M.[1*], Antigüedad I.[2], Unda-Calvo J.[1]

1. University of the Basque Country (UPV/EHU). Department of Chemical and Environmental Engineering. Alameda de Urquijo, s/n. 48013. Bilbao. Spain.
2. University of the Basque Country (UPV/EHU). Science and Technology Faculty. Bº Sarriena, s/n. 48940. Leioa. Spain.

* miren.martinez@ehu.eus

Metal fluxes intake in river basins due to urban and industrial development is a constant concern due to the effect in river pollution because of their toxicity, persistence and bioaccumulative nature. This study aims to assess the metal pollution in suspended sediment (SS) and study the effect of wastewater treatment plant (WWTP) in the SS metal contamination during flood events in the Deba River catchment. 14 floods were sampling during 4 hydrological years (October 2011 to September 2015). Epele WWTP was started up in September 2013 and in June 2014 a water trap was built to carry the wastewaters from Eibar and Ermua to Apraitz WWTP. Metals (Si, Al, Fe, Mn, Zn, Ni, Cr, Cu and Pb) contents in SS show high variability between flood events and also between samples from the same flood event. Metal content in first two floods was much higher than in the rest, especially Zn, Cr and Cu. It would be because of the dry and long season after these two flood events. At first, metals contents in SS show a peak which could be due to the wash of urban impervious surfaces which transport particulate matter rapidly to the river. In the discharge peak, metals contents show a dilution effect by metal-poor soil-born particles, and finally, it increase during the falling limb. The ERMQ after the WWTP starting up was 1.27, between it and the water trap construction was 1.20, and after booth of them, 1.04. These toxicity reduction is mainly due to the Zn content decrease (EF = 3.03 – 1.52 – 1.13), and in a lesser extent related to the content decrease of Cu (EF = 2.57 – 1.70 – 1.78), Cr (EF = 2.77 – 2.26 – 2.21) and Ni (EF = 1.64 – 1.61 – 1.49). The metal content in SS depends on the water discharge and on the SS concentration and source. Treatment of urban and industrial wastewaters seems to decrease the metal toxicity in SS during flood events.

P75

Survival estimates of deep water sharks based on experimental longline surveys in the Cantabrian Sea (NE Atlantic)

Rodríguez-Cabello C.[1]*, Sánchez F.[1]

1. Instituto Español de Oceanografía. Apdo 240. 39080 Santander. Spain.

* c.cabello@st.ieo.es

Deep-water sharks are considered highly vulnerable species due to their life characteristics and very low recovery capacity against over fishing. Limited information exists on some aspects of their biology and in particular about the survival capacity of these species to fishing gears, which is supposed to be negligible. Recently a tagging project (DEEPCON) has been conducted on deep-water sharks in the North of Spain (Cantabrian Sea, NE Atlantic) aim at studying their behavior and migration patterns. In addition survival estimates were obtained to assess the discard mortality and the feasibility of tagging techniques on these species. During 2013 and 2014 several longlines were set in the El Cachucho MPA (Le Danois Bank). Deep water sharks were caught using bottom longline at depths ranging from 900 to 1,200 m. The mean number of hooks used was approximately 950 in each set and soaking time was restricted to 3 hours maximum. Sharks were carefully removed from the hooks by the crew. Survivorship was qualitatively evaluated according to the fish health condition and response after the capture of the fish and posterior release. Four criteria was chosen: 1) Good 2) Moderate 3) Poor and 4) Dead (or nearly dead). In the last case sharks were obviously not released and kept on board for other studies. Several deep water sharks were caught however 46% of the catch corresponded to the birdbeak *(Deania calcea),* the 27% were leafscale gulper sharks *(Centrophorus squamosus)* and the 15% corresponded to the portuguese dogfish *(Centroscymnus coelolepis).* The species with highest survival rate was *C. squamosus,* nearly 40% of the catch was in good condition and 53% moderate. In the case of *C. coelolepis* only the 14% were in good health and the 64% were moderate. *D. calcea* estimates were approximate 23% good and 50% moderate.

P76

Sex ratio variability in populations of the copepod Acartia clausi from estuaries with different pollution load

Hafez T.[1]*, Ortiz-Zarragoitia M.[1,2], Villate F.[3]

1. Research Center for Marine Biology and Biotechnology (PiE-UPV/EHU), University of the Basque Country, Areatza, z/g, 48620 Plentzia (Bizkaia), Basque Country (Spain).
2. Department of Zoology and Cell Biology, Faculty of Science and Technology, University of the Basque Country (UPV/EHU), pk 644. 48080 Bilbao, Basque Country (Spain).
3. Department of Plant Biology and Ecology, University of the Basque Country (UPV/EHU), pk 644. 48080 Bilbao, Basque Country (Spain).

* tahafez@aucegypt.edu

Estuaries are sensitive and complex ecosystems in the transition between continental (riverine) and marine waters. They are subjected to high anthropogenic pressures such as excessive resource exploitation, habitat degradation and pollution, this include excessive organic loads responsible for dissolved oxygen (DO) depletion. In addition, estuarine populations have to deal with variable natural stress conditions mainly related to salinity variations. Zooplankton constitutes a key group in estuarine ecosystems and in food web, being copepods the major component. This work aims to investigate the sex-ratio dynamics of the neritic copepod *Acartia clausi* from two estuaries of the Basque coast (Bilbao and Urdaibai) showing different contaminant load. A dataset of more than 10 years (1997-2013) was used to analyze sex-ratio variability to spatial and seasonal scales at each estuary in relation to salinity, temperature, DO, chlorophyll concentration and population abundance. A two way ANOVA was used to test the differences of *A. clausi* sex ratio and environmental variables in relation to salinity and between estuaries. The effect of environmental variables and population abundance on the sex ratio was established by using stepwise regression analysis. ANOVA showed that sex ratio decreased with decreasing salinity in both estuaries and DO differed between Bilbao and Urdaibai and decreased with decreasing salinity, but an association of *A. clausi* sex-ratio with DO could not be established. The stepwise regression analysis revealed that *A. clausi* sex ratio was primarily related to temperature in both estuaries, and secondarily to salinity in the Bilbao estuary. In conclusion, the sex ratio of *A.clausi* varied seasonally according to temperature and spatially in relation to salinity. However, no evidence of a negative effect due to organic pollution (DO decrease) could be inferred from our results. Funded by Basque Government (grant to Consolidated research groups IT-810-13) and UPV/EHU (UFI11/37).

P77

Lead incorporation in Platichthys flesus *otoliths along an anthropogenic pressure gradient: validating the use of otolith as natural tracer of contamination*

Selleslagh J.[1]*, Pécheyran C.[2], Baudrimont M.[1], Amara R.[3], Daverat F.[4]

1. Univ. Bordeaux, CNRS, UMR EPOC 5805, Station Marine d'Arcachon, place du docteur Peyneau. 33120 Arcachon France.
2. Université de Pau et des pays de l'Adour, CNRS, LCABIE-IPREM UMR 5254. 64053 Pau, France.
3. Laboratoire d'Océanologie et de Géosciences, Université du Littoral (ULCO). 62930 Wimereux, France.
4. IRSTEA Centre de Bordeaux, unité EABX, 50 avenue de Verdun. 33612 Cestas, France.

* jonathan.selleslagh@u-bordeaux.fr

Estuaries are subjected to increasing anthropogenic pressure and they are natural sinks for a wide range of metal contaminants, lowering their ecosystem quality. In this context the European Union requires member states to monitor metal loads in estuaries, and to develop sustainable tools to assess water quality in those areas. While analysis of metal concentrations in soft tissue and water samples calls for continuous and long-term sampling operations, the use of otoliths to study metal pollution may be an alternative and (cost-) effective way. In this study, we examined the potential use of otoliths as natural tracers of lead contamination by comparing Pb accumulation in otolith of juvenile flounder *Platichthys flesus* from six European estuaries subjected to different and contrasted lead influence levels (the Scheldt, Canche, Seine, Loire, Gironde and Mondego). Otolith microchemistry analyses were performed using a femtosecond laser ablation-high resolution inductively coupled plasma mass spectrometer (fsLA-ICP-MS-HR). Significant differences in [Pb] in otolith were observed between the six estuaries, with lower values (0.75 ± 0.50 and 0.89 ± 0.60 mg/kg for the Mondego and Canche respectively) observed in estuaries relatively low impacted and higher values (4.42 ± 1.53 and 4.95 ± 1.62 mg/kg for the Loire and Gironde respectively) observed for the most contaminated estuaries. Results indicated that [Pb] measured in *P. flesus* otoliths were significantly correlated and proportional with [Pb] in the sediment. This comparative approach study validated the use of *P. flesus* otolith microchemistry as a tool in assessing and retracing lead pollution in estuarine systems.

AUTHOR INDEX


emen ta zabal zazu
Universidad del País Vasco
Euskal Herriko Unibertsitatea


EUSKO JAURLARITZA
GOBIERNO VASCO


ura
ur agentzia
agencia vasca del agua