




Emergence of Biodiversity Research and main progress from Ifremer

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From institutional context to research programming….

- RIO Conference 1992 – Convention on Biological Diversity CBD (2010 targets –'Halt the loss of biodiversity'…)
- Millenium Ecosystem Assessment (2001) – Economic value of biodiversity (TEEB, 2008)
- International expertise : the Paris Declaration – 2005 *IMOSEB ;* MA II + IMOSEB = IPBES (2008), ICES
- National Strategy for Biodiversity (SNB) – IFRECOR, MPAs' National Agency – IFB, BRG then FRB – 'Grenelle Mer' process
- European structuring - MARBEF, Marine genomics ; ERANET Biodiversa, Marinera, Marifish ; ESFRI ; European (EPBRS) & international (Census of Marine Life) Platforms
- Research Calls: European projects FP6, FP7 ; ANR 2005 to 2009…MEEDDAT (IFB-GICC)…

2010 International Year of Biodiversity

Exploration & characterization of the marine biodiversity: from coastal zone to deep seas....

- Atlas & Habitat mapping – CHARM II
- REBENT project: collect and organize, benthic habitat and biocenotic data in coastal zone at the national level (referentials, database & interactive mapping...) – information spreading
- Coordination with MESH project – 'Mapping European Seabed Habitats' aiming to an harmonized methodology in habitat mapping …

MESH MAPPING EUROPEAN SEABED HABITATS

This project has received European Regional Development Funding through the INTERREG III B Community Initiative

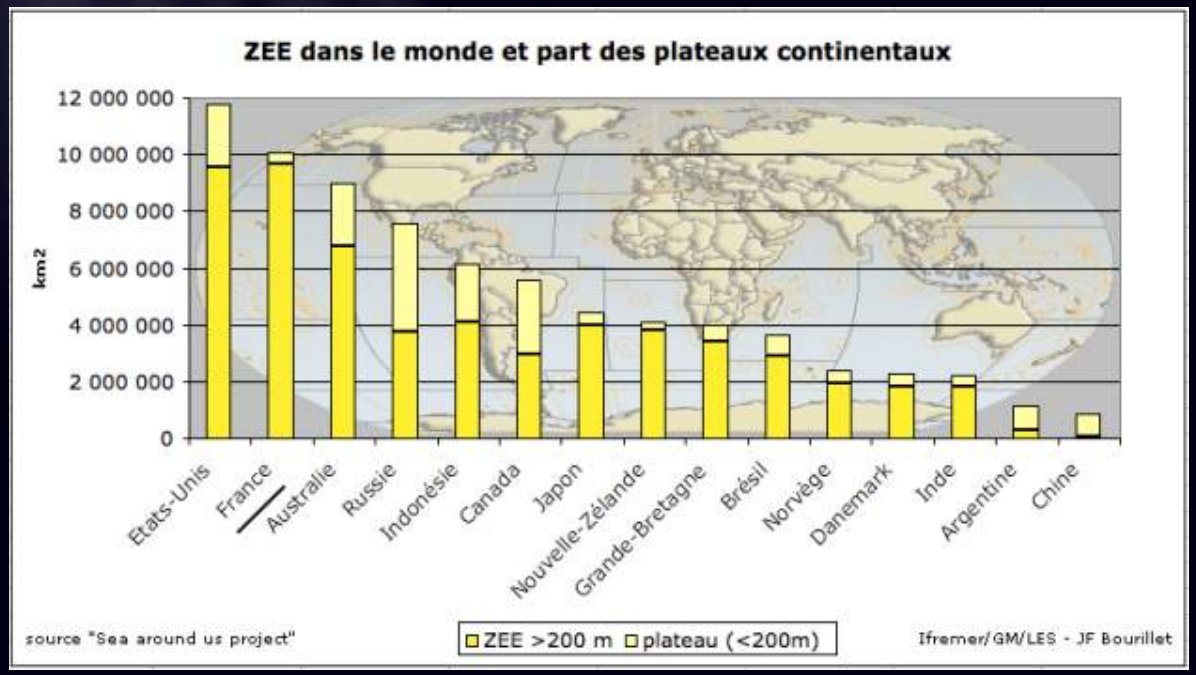
NWE ENO INTERREG IIIB NORTH WEST EUROPE

L'alliance des sciences de la mer : du réseau national au réseau mondial

Alliance of marine science : from national to global network

A Marine Biosphere mainly located in deep areas

- 307 millions km² are located into the 'eternal darkness' (600 times the French acreage which EEZ reaches more than 10 millions km²)
- The deep seas represent ~ 1 billion km³ , the equivalent of 10 times the volume of emerged grounds.



The deep sea ecosystem : a diversified environment characterized by fragmented habitats, focus for exploration

- Over the last 25 years, 35 oceanographic campaigns using Ifremer fleet and submersibles in Atlantic and Pacific oceans
- Hydrothermal ecosystem, cold seeps from continental slopes (margins), abyssal flatbeds, nodule environment, deep recifal structures
- Complex habitat requiring the development of suitable instrumentation designed for specific research on biodiversity /environnement interactions
- 614 fauna species described from those oceanographic campaigns (treatment center, 'Biocéan' database), 41 new micro-organismes species (Bacteria & Archaea) including several extremophils.






Dynamic of deep seas biodiversity

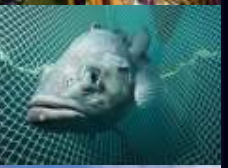
- At a local scale: Interactions among habitat and organisms, biological interactions (food web, symbiotic process, colonization patterns, population dynamic) [MOMAR research program]
  - Contribution of the deep seas biodiversity to carbon cycle (Eumeli, Bengal, Hermes in Eastern Atlantic research programs)
- Definition & modelling of the deep coral reefs distributed along the French margins (A-AMP cooperation) [CoralFish program] to facilitate conservation decision making for those ecosystems impacted by deepwater fisheries

Detritic Deep Sea Ecosystems

- At a regional scale: resistance & resilience capacity towards mineral and energy resources exploitation, food web contamination by pollutants, connectivity
  - Ex. Total Sa cooperation regarding oil drilling in deep sea areas & within the ISBA framework for mineral resources…





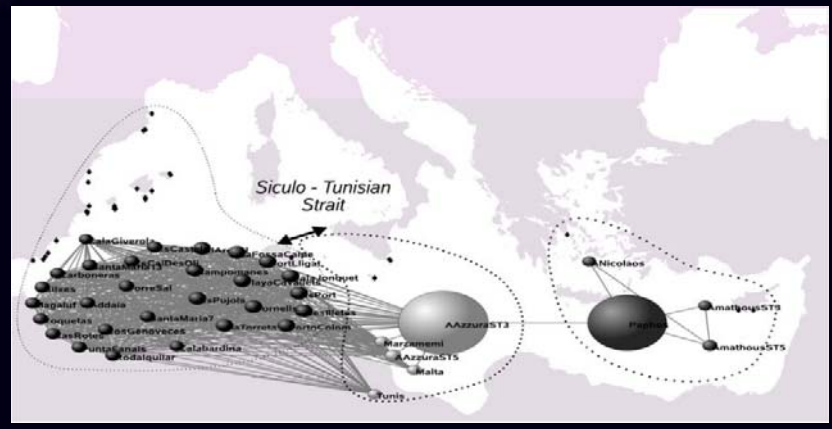


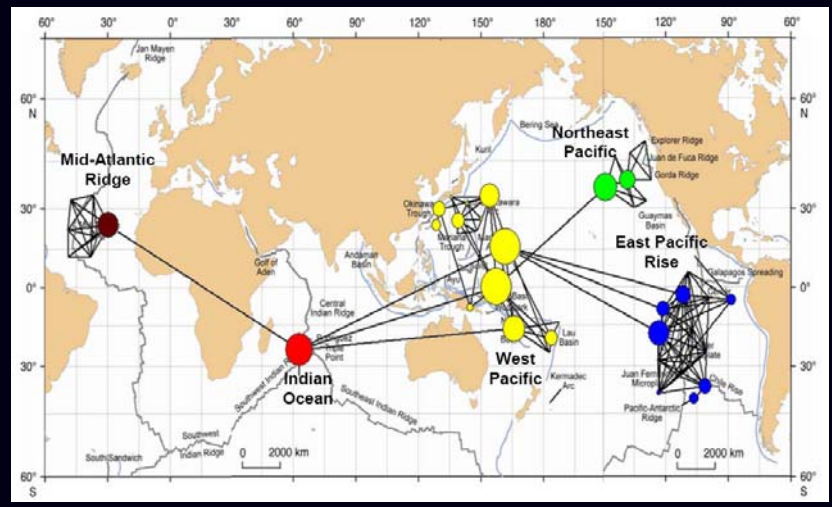

An exploration of the deep sea domain carried out within a context of national and international cooperation

- An integrated research team within the national scientific community (UMR 6197, GDR « Ecchis », ANR « Deep Oases », Europôle mer) : CNRS, Paris VI, UBO, MNHN
- European cooperation throughout the research projects [AMORES, VENTOX, EXOCET/D, BENGAL, HERMES, HERMIONE, CORALFISH, MOMARNET], research excellence network REX [ESONET, MARBEF, MarineGenomics] & ESF Eurocores [Euromargins].
- International research programs InterRidge, Census of Marine Life (ChEss & CoMarge), Kaplan (ISBA), OSPAR & CIEM
- Bilateral cooperations (JAMSTEC, NOAA …)

Habitat connectivity and Marine Protected Areas (MPAs)….

- Development of a significant & coherent worldwide MPA network (CBD, Targets 2010) requires a deep understanding of the areas interconnectivity (e.g., metapopulations genetic assessment)





Connectivity & neuronal networks, (Rozenfeld et al., PNAS 2008)

Dynamic of Biodiversity Exploitation within the context of global change…

- **Global change, dynamic of exploited marine biodiversity & fisheries sustainability in the Bay of Biscaye – the Morocco Upwelling & French Guyana plateau ecosystems** *(CHALOUPE, ANR Biodiversité 2005)*
  - Overall trends regarding the relationships between demersal communities and fishing activities over the last decades
    - Key process and constraints for sustainable fisheries
    - 3 eco–social systems comparison
  - Communities' modifications throughout combined interactions between fishing activities & climate change (T° increase) - Fisheries showed positive adaptation towards those driving changes
  - Integrated modelling approach of impacts resulting from management options (fct. Climate changes projections and/or economic constraints) – Modelling fishing fleet interactions – Co-viability approach (decision making/conciliation of interest among resource viability - biodiversity & fishery economics).

Several Ifremer projects developed in partnership related to marine biodiversity…

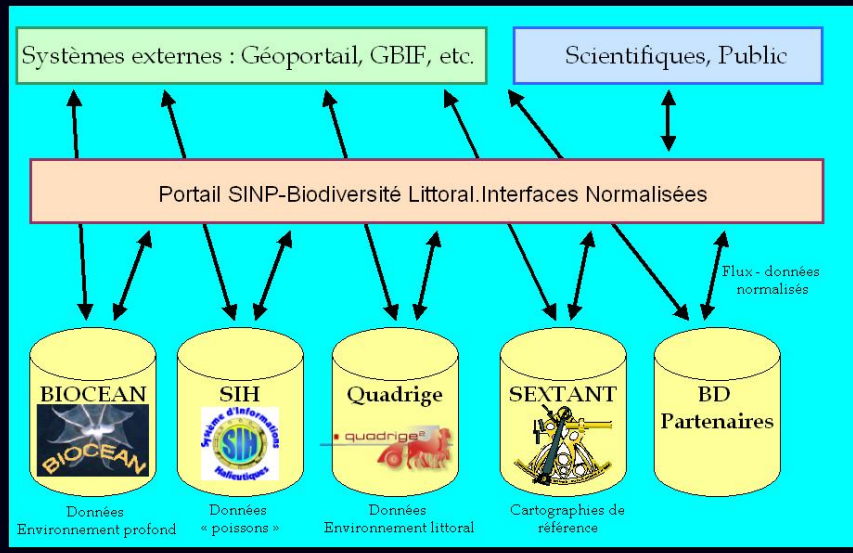
- Analysis of phyplanktonic communities (toxic microalgae) (ALTOX) & overall trends since 1984 (REPHY national network) & contribution to SAHFOS international project (*Continuous Plankton Recorder CPR*)
- Biodiversity of pathogens and their phylogeny associated to mollusc and shrimp culture
- Fishery impacts on ecosystems and their biocenosis
- Remediation to:
  - Fishing gear impacts – gear selectivity towards marine turtles, mammals…
  - Impacts of marine aggregate extraction on biocenosis and fishery nurseries of commercial interest …
- Development of indicators to assess MPAs efficiency (PAMPA) useful for coastal and resource management …

Key research issues on marine biodiversity…

- Biodiversity exploration & characterization at various scales (landscapes, habitats, communities)
- Metagenomic development (microbiology & microfauna) using molecular biology & bio-computing technics
- Operational monitoring
- Functional modelling of biodiversity & understanding of ecosystem resilience in response to new trends of impact vectors

Biodiversity observatory and monitoring networks…

- Development of a comprehensive background of hydrographic data (systematic bathymetry…)
- Data organization to address the increasing & urgent demand in biodiversity inventories, indicators for legislation implementation (SEBI, CBD, Natura 2000 Sea, WFD, MFSD, ZNIEFFs, SINP, MPAs, TBMF) as well as research – from national to international levels (LifeWatch, EMODNET, GBIF, OBIS, GEO-BON …)
- Convergence for information system, observatories & mapping (RNSM, REBENT) to facilitate operational monitoring & decision-making
- Development of cooperative structure regarding transversal issues (taxonomy – MNHN mapping – AAMP…)



L'alliance des sciences de la mer : du réseau national au réseau mondial

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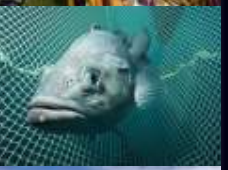
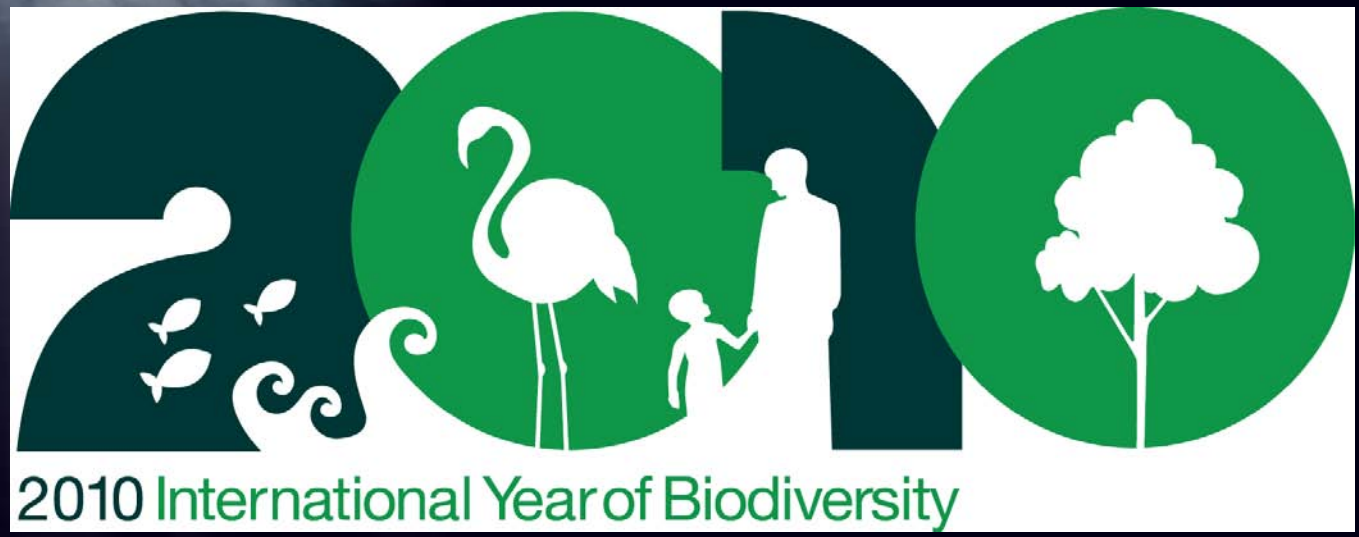
Improve the cooperation among research structures involved in marine biodiversity research….

- Establishing the scientific priorities at the « Fondation de Coopération Scientifique Biodiversité (FRB) »
- Development of a National Research Program focused on Marine Biodiversity *(including the deep seas domain cf POSEIDON report)*
- Development of the overseas territories cooperation through the B2C3I structure and initiatives such as IFRECOR & the « Grand Observatoire Pacifique Sud » (GOPS), Gdri Coral reefs…
- Strenghten the coordination at the European scale (Biodiversa….)
- Facilitate the international independant expertise at the national & international levels (IMOSEB-CBD-MEA France, PNUE-MEA II…)





Thank you for your attention….