MEASO18

Marine Ecosystem Assessment of the Southern Ocean

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Collecte Localisation Satellite

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After his PhD in Marine Biology (1994), Dr Patrick Lehodey joined the Oceanic Fisheries Program (OFP) of the Secretariat of the Pacific Community (Nouméa, New Caledonia) where he became the Principal Fisheries Scientist of the OFP tuna ecology/biology section. In 2006, he joined CLS, a subsidiary of French Institutes CNES and IFREMER, based in Toulouse, France, to lead the Marine Ecosystem Modeling activities. His areas of interests include the modeling of ocean ecosystems and the management of marine resources under the combined impacts of fisheries, climate variability and climate change. He is the main contributor to the development of a spatial numerical model (SEAPODYM), driven by physical-biogeochemical ocean models and integrating knowledge on micronekton and large oceanic predators (e.g. tuna) biology and ecology, with a quantitative approach to estimate key parameters of population dynamics. This model is currently integrated in an operational system to propose real time monitoring of exploited stocks. Patrick Lehodey was a member of the Scientific Steering Committee of GLOBEC (2000-05) and co-chair of the GLOBEC/CLIOTOP (Climate Impacts on Oceanic Top Predators) program until 2010. He is the coordinator of the European project MESOPP (Mesopelagic Southern Ocean Prey and Predators) developing a European-Australian collaborative framework for the collect and standardization of bio-acoustic data for ecosystem modeling. He has participated to many meetings dealing with tuna research, marine ecology, climate variability and climate change. He is author or co-author of more than 60 peer-reviewed scientific articles and book chapters. He has participated to many conferences and meetings dealing with tuna, fish population dynamics, marine ecology, climate variability and climate change.

Modelling habitats, species and ecosystems in the Southern Ocean

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Despite encouraging and continuous progress, modelling ocean ecosystems is still in its infancy. The challenge is huge. Due to its complexity and the multiple scientific and socio-economic associated issues, this task logically encompasses a very large diversity of approaches. Recent results and applications will be used to illustrate progress in habitats, species and ecosystem modeling in the Southern Ocean. When Climate Change and carbon cycle is the focus, a particular strong one for the Southern Ocean, Earth Climate models consider the ocean ecosystem up to the biogeochemical level, with the zooplankton used as a closing term of the system. However, the increasing interest for the so-called biological pump in the storage of carbon (thus CO_2) in the deep ocean highlighted the potential contribution of mesopelagic micronekton species in this process, due to their vertical diel behavior and presumed huge biomass. Improved biogeochemical models including mid-trophic representation are needed to investigate these questions. This will be not sufficient however, if these new developments cannot be confronted to observations, requiring large international collaborative efforts for data sampling, as well as development of data assimilation and parameter estimation methods for models. Testing model outputs against historical databases is a standard and necessary method but rich data collections are generally limited to recent decades and a few variables. The development of operational oceanography, meaning real-

time with data assimilation for realistic high-resolution predictions, has been shown very fruitful to achieve rapid feedback and improvements in both modeling and observation networks of the physical ocean, following the example of meteorological sciences. This approach can be extended to low and mid trophic ecosystem models. It will provide in addition new key variables needed to develop and rapidly evaluate the species habitats and population models that we need for the management of marine resources and the monitoring of protected species.

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