



In the establishment of the IGBP (International Geosphere-Biosphere Programme) and JGOFS (Joint Global Ocean Flux Studies) programmes, it has been realized that the systematic long-term observation of key biogeochemical parameters is an essential tool for the study of biogeochemical processes at the seasonal and decadal scale, as well as of short-term episodic events that are not easily investigated by "classical" oceanographic cruises. Under the auspices of JGOFS-France and thanks to the input given by P. Buat-Ménard, the French research community implemented in 1987 the time-series program DYFAMED (Dynamics of atmospheric fluxes in the Mediterranean Sea) in the western Mediterranean Sea (Ligurian Sea) with the aim to

study the response of the ocean to climate variability and anthropogenic inputs. Like US stations BATS and HOT, DYFAMED has both a physical and biogeochemical focus.

The selected site is of particular interest: (i) The central part of the basin is protected from coastal inputs by the presence of a coastal current; continental inputs are through the atmosphere; (ii) the area is close to industrialized zones, and anthropogenic changes are likely to have a rapid response; (iii) it is an open-sea site (2350 m depth) close to the Oceanographic Observatory of Villefranche (OOV) (3-h steam) which in the past has conducted many observations in the Ligurian sea. Systematic monthly cruises were established in 1991, and the CNRS/INSU (Centre National de la Recherche Scientifique/Institut National des Sciences de l'Univers) decided to fund the DYFAMED time-series measurement of core parameters independently from programs in 1995, giving the final impulse for this long-term study.

The DYFAMED time-series station has been the site for numerous activities and ancillary programs that have increased our knowledge of the biogeochemistry of the Mediterranean sea. These investigations contribute to our understanding of the processes of the ocean, in general, since the Mediterranean Sea can be considered as a model for many open-ocean processes. Our work has contributed to emerging understanding of the response of the ocean to climate variability and impact on the carbon cycle and revision of our knowledge of the functioning of the ocean. After 10 years of systematic monthly measurements at DYFAMED, it was important to collect, in the same issue, representative recent or synthetic samples of the results of our work. These contributions come from the core time-series measurements and from ancillary projects, and cover a large range of scientific questions. All aspects of our research could not be included in this special issue. We plan to have other grouped papers on sediment trap experiments together with the continuation of the exploitation of the data set on sediment (benthos) in a very near future. The core data acquired since the beginning of the time series and links to related projects are available via the world-wide web at <http://www.obs-vlfr.fr/jgoofs2/sodyf/home.htm>.

Jean-Claude Marty -- The DYFAMED time-series program (French-JGOFS) -- 1963-1964

Jean-Claude Marty, Jacques Chiavérini, Marie-Dominique Pizay and Bernard Avril -- Seasonal and interannual dynamics of nutrients and phytoplankton pigments in the western Mediterranean Sea at the DYFAMED time-series station (1991-1999) -- 1965-1985

Philippe Cuny et al. -- One-year seasonal survey of the chlorophyll photodegradation process in the northwestern Mediterranean Sea -- 1987-2005

Jean P. Béthoux, Pascal Morin and Diana P. Ruiz-Pino -- Temporal trends in nutrient ratios: chemical evidence of Mediterranean ecosystem changes driven by human activity -- 2007-2016

Jean-Claude Marty and Jacques Chiavérini -- Seasonal and interannual variations in phytoplankton production at DYFAMED time-series station, northwestern Mediterranean Sea -- 2017-2030

Miléna Bégovic and Claire Copin-Montégut -- Processes controlling annual variations in the partial pressure of CO<sub>2</sub> in surface waters of the central northwestern Mediterranean Sea (Dyfamed site) -- 2031-2047

Claire Copin-Montégut and Milena Bégovic -- Distributions of carbonate properties and oxygen along the water column (0-2000m) in the central part of the NW Mediterranean Sea (Dyfamed site): influence of winter vertical mixing on air-sea CO<sub>2</sub> and O<sub>2</sub> exchanges -- 2049-2066

Laurent Mémerly, Marina Lévy, Sylvie Vérant and Liliane Merlivat -- The relevant time scales in estimating the air-sea CO<sub>2</sub> exchange in a mid-latitude region -- 2067-2092

Tsuneo Tanaka and Fereidoun Rassoulzadegan -- Full-depth profile (0-2000m) of bacteria, heterotrophic nanoflagellates and ciliates in the NW Mediterranean Sea: Vertical partitioning of microbial trophic structures -- 2093-2107

Christian Tamburini, Jean Garcin, Michel Ragot and Armand Bianchi -- Biopolymer hydrolysis and bacterial production under ambient hydrostatic pressure through a 2000m water column in the NW Mediterranean -- 2109-2123

Christophe Migon, Valérie Sandroni, Jean-Claude Marty, Beat Gasser and Juan-Carlos Miquel -- Transfer of atmospheric matter through the euphotic layer in the northwestern Mediterranean: seasonal pattern and driving forces -- 2125-2141

Lars Stemmann, Gabriel Gorsky, Jean-Claude Marty, Marc Picheral and Juan-Carlos Miquel -- Four-year study of large-particle vertical distribution (0-1000m) in the NW Mediterranean in relation to hydrology, phytoplankton, and vertical flux -- 2143-2162

Bernard Avril -- DOC dynamics in the northwestern Mediterranean Sea (DYFAMED site) -- 2163-2182

Laurence D. Guidi-Guilvard -- DYFAMED-BENTHOS, a long time-series benthic survey at 2347-m depth in the northwestern Mediterranean: general introduction