

From data to knowledge: integrating observational data to trace phytoplankton dynamics in a changing world

Director of studies: Adriana Zingone
Integrative Marine Ecology Department

Project Summary

Marine observations are fundamental to the understanding of how marine systems respond to occurring and predictable changes in the oceans. Among them, a special role is played by observations performed over the years at a same site, which result in the collection of long-term time-series of data. In the Gulf of Naples (GoN) a long term plankton time series is collected since 1984 at a fixed sampling station, LTER-MC (Long-Term Ecological Research MareChiara, <http://szn.macisteweb.com>), which is part of the international LTER network. The project LTER-MC is also connected with national and international projects and working groups within which data analyses are performed with a comparative approach. In recent years, new advanced technologies in the field of molecular metabarcoding have been experimentally applied. In addition, data from automated systems from two fixed buoys, along with collection of spatial data and modelling activities, concur to integrate the single point observation at the LTER-MC station in a wider spatial framework.

The broad aim of this PhD project is to make better use of traditional and technologically advanced type of data collected at the LTER-MC site in order to increase our knowledge of the planktonic system and contribute to the prediction of future scenarios driven by anthropogenic and climatic changes.

In particular, this project will include:

- The analysis of the mechanism underlying phytoplankton variations in the Gulf of Naples and of the environmental variables driving them at the seasonal, interannual and decadal scale
- The identification and testing of a set of indicators of the status of the planktonic system to be used to assess the general environmental status and the quality of the marine environment in the Gulf of Naples
- The assessment of the possible generalization of the mechanisms and of the indicators identified in the Gulf of Naples through the comparative analysis of long-term datasets from other systems.

The analyses will take advantage of multiple statistical approaches, including standard tools used in ecology, multivariate analyses, ordination and clustering techniques and time-series techniques. The PhD student will have access to the whole phytoplankton dataset from LTER-MC, along with associated environmental and biological variables, and other hydrographic and meteorological datasets from continuous measurements or models. Next generation sequencing meta-barcoding data will also be analyzed in the project. Taxonomic and a-taxonomic data will be considered, the latter including size-spectra, shapes and other morpho-functional traits. In addition the student will have the chance to participate in the IOC-Group Expert on Climate Change and Global Trends of Phytoplankton in the Oceans 'IOC-Trends-PO' and have access to other time-series datasets shared within the group.