

UM5MRM32 METHODS FOR THE EXPLOITATION OF DATA IN OCEANOGRAPHY		
6 ECTS	<i>Keywords</i>	data processing and flow, data analysis: multivariate, spatial, series, data interpretation
M2	<i>Managers</i>	Jean-Olivier IRISSON, Stéphane GASPARINI (LOV, Villefranche)
Villefranche	<i>Professors</i>	Laurent COPPOLA, Christophe MIGON, Laure MOUSSEAU, Lars STEM-MANN (LOV, Villefranche)
	<i>Tracks</i>	Marine Ecosystems Functioning and Global Change AND Biodiversity and Conservation of marine ecosystems

Description

Format

Teaching

30 hours of lessons, 30 hours of computer labs, some focused on the application of the lessons and others for a tutored project (processing of data collected as part of the UE MU5MRM31 - IADO).

Evaluation

The theoretical courses are evaluated by a written exam (2 hours). The project, carried out in pairs, consists of analysing data from a campaign. It is delivered in the form of a poster and an oral defence (~10 min).

Summary

The MEDO teaching unit confronts you with the processing of samples and the exploitation of data from a real oceanographic campaign, with their share of imperfections and difficulties. You use laboratory instruments, including plankton imaging ones, and various digital tools, including a programming language, to set up a fast and automated flow between the raw data and your final analyses, in order to answer a scientific question.

Its principles and organization are described here: <https://www.youtube.com/watch?v=tcFrfx-sImc>



Learning objectives

At the end of this course, you will know how to:

1. use quantitative imagery to process and taxonomically classify plankton samples;
2. choose and implement statistical techniques for interpolation, multivariate ordination and clustering, and machine learning;
3. program data processing workflows using the R language and visualize data using Ocean Data View software;
4. use physics, biogeochemistry and biology data to answer a specific scientific question;
5. present your results graphically and synthetically.

Prerequisites

General knowledge of oceanography (physical, biogeochemical and biological), mostly offshore.

Knowledge of classical inferential statistics (variance, ANOVA, regression, correlation).

To make the best use of the data, it is advisable to have followed the teaching unit during which they were collected (IADO - UM5MRM31).

Bibliography

N/A

Organisation details

During the first two weeks, you carry out three activities in parallel:

1. You process samples collected during the IADO campaign (MU5MRM31). You mainly focus on plankton samples (because the chemical assays were done during the previous course). This involves: (i) measuring chlorophyll content by spectrophotometry, (ii) sorting zooplankton samples under a binocular magnifying glass, (iii) digitizing zooplankton samples using the ZooScan and sorting the images generated on EcoTaxa, using artificial intelligence.
2. You learn to use tools to digitally process data: (i) the R programming language, (ii) the Ocean Data View software. The objective is to build, at the end of the two weeks, a completely automated and controlled flow of raw data to their analysable version.
3. You become familiar with various data analysis techniques: signal processing, multivariate ordinations (ACP, AFC), supervised and unsupervised classification, mapping and interpolation, etc. Each technique is seen in class and then practiced during computer labs.

As a result, you have various reformatted and cleaned datasets and the knowledge and tools to analyse them.

The third week of the class is dedicated to a tutored project, carried out in pairs. A list of topics based on the available data is proposed to you; they cover various fields: coastal or offshore oceanography; physics, biogeochemistry, biology or technology; etc. You choose a topic, define a precise question and carry out the analyses necessary to make the best use of the data and answer it. You finally present your results in the form of a poster and orally.

Note: This document is for informational purposes. The details of the content and format of the courses and evaluations may change from year to year.