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Orientation: Ocean Observation and Global Change
Specialization Area: Ocean Observation
Research Area: 1.4 Biological Oceanography

PhD project: Detection and characterization of photosynthetic pigments in marine phytoplankton

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Summary: Phytoplankton present a complex set of photosynthetic pigments (chlorophylls, carotenoids and phycobilins) that, selectively distributed in different taxa of eukaryotes and bacteria, play a physiological role which reaches a global importance. The determination of pigments in oceanic waters has to face several difficulties, resulting in analytical needs repeatedly emphasized: (1) the description of the marine ecosystem need large number of samples; (2) the samples may contain variety of species with pigment endowments of great complexity which complicate their analysis (3) in extensive oceanic areas photosynthetic organisms occur in very low cell densities, compromising pigment detection with the currently available techniques and (4) many pigments of high biological significance are difficult to ascertain due to analytical interferences with structurally similar ones. The need for the best techniques to describe populations of the phytoplankton of oligotrophic ecosystems and the knowledge of the analytical possibilities of new techniques lead to propose the following objectives for this thesis:

1. To develop methodologies for the preconcentration of pigment extracts, aimed at increasing the sensitivity of the analysis.
2. Design new chromatographic methods with innovative selectivities, able to discriminate a greater number of pigments and, therefore, increase the capacity of classification and distinction among taxonomic entities in phytoplankton populations.
3. Characterization the structures of new chlorophylls and carotenoids (chemotaxonomic biomarkers).
4. Study, using all the methodologies previously designed, the pigment distribution of populations of phytoplankton in the Mediterranean Sea.