Multiscales analysis of biogeochemical time series in the coastal waters of the English Channel

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Coastal waters can be considered as a complex system with many components interacting nonlinearly on many different scales. In order to install and develop integrated coastal zone managements, a better understanding of this complex system in needed.

We consider here data from SOMLIT monitoring program (Service d'Observation en Milieu Littoral). This monitoring program regroups 7 marine stations distributed along French coast. The sampling strategy is the same for all stations and all preparations are made according to a protocol implemented by SOMLIT. The data analysed in this study from two coastal sites (Wimereux and Roscoff).

This program propose measurements of temperature, dissolved oxygen (DO), pH, nitrogen, chlorophyll a, particulate organic carbon (POC), salinity, particulate organic nitrogen (PON), phosphorus and silicates. The measurements were made once every two weeks on a fixed station, the fist sampling point is coastal and second is offshore.

We apply to these data several analyses techniques in order to characterize the dynamics of their fluctuations on a wide range of scales. We consider first the covariation between some parameters couples ((pH, DO), (DO, Chla), (Chla, N)) using some regression using a kernel estimator [Wand and Jones, 1995] in order to consider conditional averages. This method provides quantitative graphical interpretations and the regression function reveals concentrations values showing dependence levels and phytoplankton species succession. We also consider the probability density function of some ratios (N:P, Si:N, Si:P, COP:Chla, COP:NOP) that reveal in all cases a "wild" behaviour with an hyperbolic tail. Roscoff and Wimereux waters have been compared using this methodology.

With these results we wish to show some examples of applications of new methodology, which can be applied on long-term monitoring and high resolution time series in order to provide quantitative and qualitative information on the state of coastal ecosystems.