Scaling analysis of biogeochemical parameters in coastal waters

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Monitoring data are very useful for rapidly providing quality controlled measurements of many environmental aquatic, and thus understanding the spatio-temporal structure which governs the dynamics. We consider here the long time biogeochemical time series from automatic continuous monitoring. These biogeochemical time series from in Eastern English Channel: coastal waters, estuarine waters and river waters.

In the first analysis, we consider data from the MAREL system (Automatic monitoring network): MAREL Carnot buoy that is situated in the coastal waters of Boulogne-sur-mer with data from the Honfleur MAREL buoy (an estuarine station in the bay of Seine). Marel system is based on the deployment of data buoys having marine water analysis capabilities on an automated mode. It is equipped with high performance technologies for water analysis and real time data transmission and record many parameters at fixed locations: temperature, dissolved Oxygen (DO), pH, chlorophyll a (Chla), salinity with high frequency resolution (10 or 20 minutes).

We consider also the data from Wimereux river off Boulogne-sur mer. Two sets of data were recorded in the river Wimereux in downstream and upstream using a temperature, dissolved oxygen, turbidity and salinity sensors. This monitoring provided an approach of spatial temporal functional dynamism, with these two zones: the first is represented by downstream related to hydrodynamic marine; the second is related to the upstream flow waters.

All these time series reveal large fluctuations at many time scales. The large number of data provided by the sensors enables the estimation of Fourier spectral analysis, in order to consider the dominant frequencies associated to the dynamics. This shows the impact of turbulence and of the tidal cycle on the high variability of these parameters. These spectra show quite nice scaling regimes which are compared to the one of temperature, as a reference turbulent passive scalar.