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# Multiscale bloom dynamics from a high frequency autonomous measurement system in the Eastern English Channel

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We consider here a dataset from an Eulerian automated system, located on the coastal area of the French side of the English Channel (Boulogne-sur-Mer), called MAREL Carnot, operated by IFREMER (France). This system records more than 15 physico-chemical parameters at 20 minutes intervals, and at the constant depth of -1,5m whatever the tidal range. Our study focuses on the period 2004 to 2011. The objective of this study is to have a better understanding of the bloom fluorescence multiscale dynamics, as regards the coastal area of English Channel and possible influence of temperature on this dynamics.

Annual blooms are visible, superposed to multiscale fluctuations. The probability density function (PDF) of the fluorescence time series very nicely obeys a power law with slope -2. The PDF for annual portions obeys also power laws, with slopes which are related to the annual average. Empirical mode decomposition (EMD) is used to study the dynamics and display the power spectrum, which will be linked with these dynamics. EMD method is also used to extract a trend and isolate the blooms from the high frequency dynamics. We show that the high frequency part of the fluorescence dynamics has a very large variance during bloom events, compared to normal conditions. We also show that there is a link between the mean winter temperature and the strength of bloom next spring.

These results contribute to statistically characterize the bloom dynamics and extract some possible universal relations.

Keywords: English Channel; Autonomous monitoring; Power spectra; EMD method; Probability density functions; Power laws.