



Multiscale analysis of continuously monitoring data with many missing values: a Marel buoy station in the Seine estuary

F. G. Schmitt, G. Dur, S. Souissi

UMR ELICO 8013, Station Marine de Wimereux, University Lille 1, France
(francois.schmitt@univ-lille1.fr)

Continuous monitoring systems such as the Marel system are very useful for providing continuously quality-controlled measurements of many parameters. Since environmental fields are highly variable at all scales, the main originality of such databases is to provide high frequency operational monitoring of water quality. But since these devices are automatic, they frequently possess many missing values due to maintenance and occasional failures of the system. These missing data prevent the application of many classical data analysis methods. The more obvious way to deal with it would be to average the data in order to remove missing values, but this corresponds to losing many information, and does not exploit the high frequency sampling of the database. Since larger and larger amounts of data are available through monitoring systems, analysis methods to extract relevant information in a systematic and quasi-automatic way are really needed; these methods need to be able to work with missing values. The multi-scale methods developed here consist on a spectral analysis working with missing values, and then a structure functions approach, exploiting all the fluctuations at all scales. Here, we apply this to a high frequency data base (temperature, oxygen, salinity, turbidity, fluorescence) recorded in the macro tidal Seine estuary (Honfleur Marel buoy). Despite the many missing values of the series, a scale invariant (multifractal) behaviour is revealed for the smaller scales. We further characterize the moment functions at all scales between 10 minutes and one year using the moment function $\zeta(q)$ and a scale function containing the scale information. This work was developed in the framework of Seine-Aval programme.