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Measuring of sea bottom subsidence: how Wavelets can help.

I. Mancero Mosquera, M. Gacic

Istituto Nazionale di Oceanografia e di Geofisica Sperimentale – INOGS, Trieste, Italy
(imancero@ogs.trieste.it / Fax: +39 040-327307 Phone: +39 040-2140371)

The problem of detecting changes in long term behaviour of time series is faced with a new wavelet-based technique within an INOGS project for monitoring of pressure in the North Adriatic shelf using Paroscientific sensors. Two phenomena have been considered: Trends, as a low frequency variation. And “ruptures”, defined as sudden changes in long term variability. Hence zero-mean oscillations as tides and seiches are considered nuisances.

Traditional filters are not well adapted to remove those nuisances due to unwanted phase shifts and smoothing of transient signals associated to ruptures. A filtering with Daubechies wavelet filters, of 1 upto 4 vanishing moments, allows to study polynomial trends upto degree three as well as not to remove the ruptures. Sudden changes in the order of millimetres could be detected in laboratory experiments. From real data came out that 1.4 signal-to-noise ratio is needed for a good performance, which was also confirmed from Monte Carlo experiments. Possibilities of applications are not bounded to our project.