



Detecting a jump in long-period sea level records

M. Becker (1), M. Karpytchev (1), M. Davy (2), K. Doekes (3)

(1) Centre Littoral de Geophysique, University of La Rochelle, FRANCE
(mbecker@univ-lr.fr), (2) LAGIS, Villeneuve d'Ascq, FRANCE, (3) Rijkswaterstaat ,
RIKZ/ZDI, DEN HAAG, NETHERLANDS

The long-period sea level records have attracted significant attention as principal indicators of global sea level rise and associated climate change. The tide gauges data used to reveal the signatures of global sea level variations are affected by an extremely broad range of diverse local processes (natural, anthropogenic, instrumental failures) and are often excluded from the analysis. In this paper, we develop a systematic approach for detecting sudden and persistent jump-like perturbations in monthly sea level records. First, we try to detect the perturbations that can be expressed by a Heaviside's step function. Such a Heaviside-like jump can be provoked by different causes like an earthquake or urbanization effects. Even of small amplitude, the jump can significantly affect the estimates of long-term sea level trends. The method used is based on Empirical Orthogonal Function (EOF) decomposition in order to filter the modes of large-scale simultaneous variability in a given set of tide gauge data. The Generalized Likelihood Ratio approach is applied to recognize a jump in the residual sea level signal. The method reveals to be successful in analysing four long-term tidal stations in the Netherlands operating since the 19th century.