Geophysical Research Abstracts
Vol. 16, EGU2014-4483, 2014
EGU General Assembly 2014
© Author(s) 2014. CC Attribution 3.0 License.

Broadband annual oscillation in sea level anomaly data determined by wavelet technique and its impact on sea level prediction accuracy

Maria Zbylut-Gorska (1), Wieslaw Kosek (1), Tomasz Niedzielski (2), Waldemar Popiński (3), and Agnieszka Wnęk (1)

(1) Agriculture University of Krakow, Environmental Engineering and Land Surveying Department,, Krakow, Poland (kosek@cbk.waw.pl), (2) Institute of Geography and Regional Development, University of Wrocław, Poland , (3) Central Statistical Office of Poland, Warsaw, Poland

Weekly sea level anomaly (SLA) maps are now available courtesy of the Archiving, Validation and Interpretation of Satellite Oceanographic (AVISO) data. Using the wavelet technique it is possible to compute variable broadband annual oscillation in these data as a function of geographic location. The time variable amplitudes and phases of this oscillation can be investigated using the wavelet transform with the modified Morlet wavelet function with different decay parameter σ that controls the transform time and frequency resolution. The maps of the standard deviations of amplitude variations and the products of amplitudes and phase differences were computed to show the ocean areas with the greatest amplitude and phase variability. Comparison of these maps allows to estimate whether amplitude variations are more irregular than phase ones. Additionally, the mean wavelet spectra of the global ocean can be computed with application of the same wavelet function. In these spectra there occur peaks corresponding to integer multiplicity of the annual oscillation frequency which suggests that this oscillation is nonlinear and broadband.
The prediction of SLA time series was computed by a combination of the polynomial-harmonic approach with the autoregressive prediction. In order to detect the contribution of irregular amplitude and phase variations of the broadband annual oscillation on the SLA prediction errors the maps of amplitudes and standard deviations of amplitudes and of products of phase time differences and amplitudes were compared with the mean prediction errors of the SLA data for a few weeks in the future.