Geophysical Research Abstracts,
Vol. 11, EGU2009-786-1, 2009
EGU General Assembly 2009

Denoising of DORIS Stations Coordinates Time Series by Wavelet and the Singular Spectrum Analysis

S. Khelifa and S. Kahlouche

Centre of Space Techniques, Division of Space Geodesy, Arzew, Algeria (khelifa_sofiane@yahoo.fr)

The purpose of this article is to elaborate an adequate denoising methodology of stations coordinates time series of space geodesy (SLR, GPS and DORIS) in order to recuperate the original signal from the noised data, which allowed to better apprehend the temporal variability of the physical phenomena (deformations of the earth's crust, transfers mass, geodynamic phenomena local, etc.).
The denoising technique used in this study is based on two different approaches, applied to signals affected by a white noise. The wavelet transform in the frequency space, based on the thresholding of the wavelets coefficients, and the Singular Spectrum Analysis (SSA) in the phase space, based on the computation of the eigenvectors of the covariance matrix formed from the time series.
The adopted methodology was applied to weekly time series (solution ignwd05) of the East residual coordinates sets of DORIS stations, provided by IGN/JPL (Institut Géographique National/ Jet Propulsion Laboratory) and expressed in the local geodetic reference frame after removal of ITRF2000 model of positions and velocities. The obtained results show that the optimal method of denoising, based on the minimization of the standard deviation, is the wavelet transform compared to SSA method which presents difficulties at the level of the determination of the eigenvalues number corresponding to the true signal to take into account. However, all studied time series are affected by a significant white noise explained by the diminution of their signal-to-noise ratio (SNR), which probably due to the high DORIS satellites orbit inclinations (SPOT and ENVISAT).