



The European Sea Level Service Continuous GPS Coordinate Time Series Analysis Strategy

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The European Sea Level Service (ESEAS) was established in June 2001 and has the objective to provide sea-level and sea-level related information for the European waters to scientific and non-scientific users both from inside and outside Europe. The ESEAS-RI (Research Infrastructure) commenced its work in November 2002 for a three year period, included 25 institutions from 17 countries and aims to provide substantial resources to ESEAS for improving the observational network as well as the tools for exploitation of the data. Within ESEAS-RI, data from continuous GPS (CGPS) stations co-located with tide gauges in Europe are analyzed by six different ESEAS-RI CGPS Analysis Centres and vertical station velocity estimates at the 1 mm/yr accuracy level with uncertainties of < 0.5 mm/yr are envisaged. Therefore, an ESEAS CGPS coordinate time series analysis strategy was developed to improve the signal-to-noise ratio of the time series by separation of real geophysical signals from the underlying noise. This strategy involves coordinate time series pre-processing, identifies outliers and discontinuities, and periodic signals. Maximum Likelihood Estimation determines all parameter estimates plus the magnitudes of different stochastic noise simultaneously. Common mode biases are investigated using a simple regional filtering technique and Empirical Orthogonal Function analysis. The latter allows the discrimination between local, station-specific, deterministic processes and inter-station, correlated transient signals. The ESEAS CGPS coordinate time series analysis strategy is presented. Initial results from the six different ESEAS-RI CGPS Analysis Centres for coordinate time series from CGPS stations in Europe for a five

year test period are compared.