

Investigation of Atmospheric and Hydrological Loading Signals in the Annual Signal of GPS Station Positions

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SUMMARY

The purpose of the present study is to investigate the potential origin of the annual signal observed in GPS (Global Positioning System) station position time series by studying its correlation with the atmospheric and hydrological pressure loading signals. The data used are the daily position time series of 11 well-distributed GPS stations, referred to ITRF2014 and expressed in the local frame (North, East and Up). For the time series of displacements (North, East and Up) caused by the atmospheric and hydrological pressure loadings at the 11 selected sites, we used those estimated from the atmospheric models ECMWF-IB, ECMWF-TUGO-m barotropic and ERA interim, and from the hydrology models GLDAS/Noah, ERA interim and MERRA2.

The results reveal that the amplitudes average of the extracted annual signal in respectively, North, East and Up components is about of 0.55, 0.54 and 1.70 mm. The computed correlations between the extracted annual signal and the atmospheric and hydrological loading displacements estimated from all used models, are small in the three components (North, East and Up) for all analyzed stations.