

Diurnal and semi-diurnal coordinate variations observed in European permanent GPS network: deterministic and stochastic constituents

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Abstract: Regular analysis of network of permanent Global Positioning System (GPS) monitoring stations covering almost the whole European continent is performed at Slovak University of Technology in Bratislava. It allows detecting small short-periodic oscillations of station coordinates. We analyze one-year interval of station time series comprising of coordinates evaluated from 4-hour observing samples. The variations of horizontal coordinates and ellipsoidal height with amplitudes from 0.5 to 2.0 mm are detected at majority of analyzed sites. They can be assigned to unmodelled solid Earth and ocean tides, polar motion effects and satellite orbits biases. After elimination of these deterministic signals still residual diurnal oscillations of stochastic character can be observed in the coordinate series. They can be observed at majority of analyzed stations by means of ARMA process modeling. We suppose that these signals have origin in perturbing effects resulting from atmosphere refraction variations, site monumentation movements, multipath effects and other relevant phenomena with no strict periodic character but with diurnal variability.

Key words: permanent GPS network, coordinate time series, tidal variations of site coordinates, linear stochastic process

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