



Noise characteristics in GPS sub-diurnal coordinates: maximum likelihood estimation approach

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The aim of this study is to evaluate the noises appearing in the changes of coordinates of Polish permanent stations belonging to EPN (EUREF Permanent Network). The analysis was made on the topocentric coordinates, but calculated with the sampling interval of 3-hours to determine changes in the sub-diurnal frequencies. The data covered the period of 2 years from 2008 to 2010. The time series are characterized not only by the trend, but seasonal, cyclic and random variations as well. In the analyzed data the systematic component, which interests us the most and the random noise, which is a kind of disturbance that does not bring any significant information were isolated using CATS (Create and Analyze Time Series) software. It allows to fit the multi-parameter models in time series and to analyze the noise component with the use of the maximum likelihood estimation. The procedure which is used ensures the simultaneous solutions' searching for all the parameters. As the result of the calculations, the chosen software provides the noise parameters as well as their errors. The noise parameters include: the spectrum index value of coloured noise, the amplitudes of both white and coloured noises that appear in data, the amplitudes of sine and cosine functions corresponding to determined frequencies and the trend model. The noise model occurring in the geodetic time series was presented for each of the topocentric coordinates: North, East and Up for each station and compared with the white noise model. The presentation also deals with the character of the noise existing in the sub-daily GPS solutions.