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WAVELET ANALYSIS AND FORECASTING OF VTEC OBTAINED WITH GPS OBSERVATIONS OVER EUROPEAN LATITUDES

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In this paper the TEC time series of ionospheric quiet and disturbed conditions at different European stations: Onsala (57N, 12E), Metsahovi (60N, 24E) Hailsham (51N, 0E), Lamkowko (54N, 21E), Borowa Gora (52N, 21E), Borowiec (52N, 17E) and Matera (40N, 16E) for the half of the solar cycle period from 1995 to 2000 years were analysed.

The wavelet analysis enables detection of disturbances in the TEC during the considered period as well as coherences and time delays between Fourier coefficients of the TEC corresponding to different stations located near the same meridian. Information about the time delay between different GPS stations could be useful for the prediction purposes.

The forecasts of the TEC time series for the considered stations were computed by the autoregressive moving average (ARMA) and similar pattern prediction methods for one and two hours ahead at a single location and compared with the corresponding future values of the TEC data. Sample of the results for representative periods are presented.

The accuracy of the prediction depends on the starting prediction epochs and the ionospheric conditions and for a few hours in the future it is of the order of 5 percent of the real TEC values over the GPS station.