FORECAST OF THE TOTAL SOLAR ACTIVITY CYCLE 24 BY SEVERAL AUTOREGRESSIVE METHODS AND BY THE PRECURSOR METHOD

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Abstract. A considerable difference in maximum amplitude of solar cycle 24 predicted by various methods exists according to conclusion of the Third Official Prediction Panel National Aeronautics and Space Administration (NASA) and National Oceanic and Space Administration (NOAA), and International Environment Service (ISSE).

Aim of our study is to update solar cycle 24 forecast by comparative analysis of this problem using linear autoregressive approaches, nonlinear Neural-based method and method of precursor. As a predictor for construction of the solar cycle 24, we used an idea on dynamics of the solar magnetic fields forming solar spots, being basic for estimations of Wolf numbers *Rz*. For forecasting of variations of predictor – the solar polar field – in solar sycle 24 the singular spectral analysis was used.

Results: Our nonlinear Neural-based prediction gave value 70 for solar cycle 24 amplitude. The proposed forecasting by precursor method based on solar polar field variations allows expanding a horizon of *Rz* prediction on one cycle. The solar cycle 24 maximum is predicted by this method had to happen in April, 2012, and its amplitude can be about 50 Taking into account that this value had been obtained on the basis of averaged data, we can increase obtained amplitude by 20–30 % and have values about 60–70, i.e. closer to the value obtained by Neural-based method. The prolonged minimum of the solar cycle 23 and abnormal predicted values of *Rz* for the maximum of solar cycle 24 remind the scenario of transition of solar activity to the historical Dalton minimum.

Keywords: Wolf numbers, cycle 24 predictions, autoregressive methods, Neural-based approach, precursor.