The Prediction of Hemispheric Sunspot Area Using Waldmeier Effect

Zhiqiang Yin, Yanben Han, Bo Wang, and Lili Tian

National Astronomical Observatories, Chinese Academy of Sciences, Beijing, China (yinzhq@nao.cas.cn)

Predicting the activity levels of the Sun is a stimulating topic since it reflects our current understanding of the generation of the magnetic field and the progress in the solar dynamo modeling. Predictions of solar activity are also an essential part of our Space Weather forecast capability. Some authors summarized a variety of methods for the maximum predictions of 22nd, 23rd, 24th solar cycles, the incomplete statistics are 63, 54 and 75 cases respectively, results of the methods, which the difference between forecasting and observed values within the range of $\pm 15\%$, are 27.0%, 25.9% and 24.3% respectively. The predictions formed an almost normal distribution, centered on the average amplitude of hundreds of prediction results. Refer to the results of Li K.J. et al (2014), beside the sunspots, the sunspot area should be recommended to represent the strong magnetic activity of the Sun. Considering the statistical precursor method using Waldmeier effect during solar cycle is one of the effective methods for the predictions of the solar cycles, the present paper introduces our research on test of the simulation prediction of sunspot area for solar cycle 22-24, and the difference behavior between Northern Hemisphere and Southern Hemisphere during the increase of solar cycles. The present results are also compared with those obtained by other researchers using different methods.