

Prediction of maximum amplitude of the next Solar Cycle 24 using modified Precursor Method

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For predicting the maximum amplitude of forthcoming solar cycle number 24, modified precursor method is used. Precursor technique is based on the correlation of geomagnetic indices (disturbances) prior to the minimum of the sunspot cycle with the magnitude of the ensuing solar cycle maximum. In the present study, twelve monthly running average sunspot number (R12) and the number of geomagnetic disturbed days in a month (with Ap values more than or equal to 25) for the periods corresponding to last seven solar cycles number 17 to 23 are considered. Geomagnetic disturbance index (DI) is determined using 12 month moving average of the monthly geomagnetic disturbed days. The technique uses best of the first and second-degree correlations coefficients obtained between DI at ten (equal-spaced) selected times during the decline part of a solar cycle with the R12 maximum of the ensuing solar cycle to predict back the observed R12 peak values for cycles 17-23. In general, second-degree correlation coefficients gives better results, which agree within 5 to 10 percent of the observed R12 peak values. Instead, in each cycle if we take DI average of the best three second degree cases and again determine their second-degree correlation with peak R12 values which gives correlation coefficients as high as 0.99 and predicted values reaches within 2-3 % of the observed R12 peaks for cycles 17-23. The present technique predicted a maximum amplitude of $R12=140$ for the forthcoming solar cycle number 24 which is expected to occur 52 months after the minimum of current cycle.