



Geomagnetic Kp index forecast using historical values and real-time observations

Ruggero Vasile (1), Yuri Shprits (1,2,3), Irina Zhelavskaya (1,2)

(1) GFZ German Research Centre for Geoscience, (2) University of Potsdam, (3) University of California Los Angeles

The geomagnetic Kp index is one of the most widely used measures of geomagnetic activity. The long and continuous Kp record starting in 1932 makes this index most useful for climatological studies and for comparison with historical values. Current algorithms for the real-time forecast of Kp index use a combination of models driven by solar wind measurements at L1 Lagrange point as well as historical values of the index. In this study, we explore the limitations of this approach, examining the forecast for short and long lead times using only measurements at L1 and Kp time series as inputs to artificial neural networks. We investigate the relative efficiency of the solar wind-based predictions and predictions based on recurrence and persistence. Moreover, we explore the model performance during various parts of the solar cycle as well as data re-balancing techniques to improve the accuracy of predictions during disturbed geomagnetic conditions.