

Nowcast of the BeNeLux regional magnetic activity for use in space weather applications

S. Stankov, T. Verhulst

Royal Meteorological Institute (RMI), Ringlaan 3, B-1180 Brussels, Belgium

The planetary Kp index is an established choice among ionosphere/space weather researchers when an estimate of the geomagnetic activity is needed, being for research of the geomagnetic storm impact, developing of services, or as an input parameter for various models. However, the Kp index is deduced from a dozen magnetic observatories that are irregularly distributed around the globe and thus do not necessarily provide an accurate estimate of the local/regional magnetic activity. Moreover, the standard 3-hour time scale of producing the index is much larger than the characteristic time of various phenomena associated with active geomagnetic conditions, some types of ionospheric disturbances in particular. Also, modern space weather applications often require real-time estimation (nowcast) of the magnetic activity which necessitates some modifications in the original procedure for calculating the Kp from ground-based observations or, alternatively, the use of space-based observations (e.g. of the solar wind) for deducing a Kp proxy. This presentation is concerned with the development of a new K-type index nowcast suitable for the BeNeLux region - Belgium, The Netherlands, and Luxembourg. The nowcast is based on real-time measurements from four magnetic observatories, inside or in close proximity to that region: Dourbes (DOU; 50.1N, 4.6E), Manhay (MAB; 50.3N, 5.7E), Chambon la Foret (CLF; 48.0N, 2.3E), and Wingst (WNG; 53.7N, 9.1E). The new index (K_{BLX}) closely resembles the “classical” Kp index in the sense that it is derived from 3-hour ranges estimated at the four stations using common limits of range classes. However, instead of the fixed 3-hour periods used for the Kp, in the new approach, a K_{BLX} value can be derived at any moment of time using data from the most recent three hours. Implementing this approach, a nowcast system was developed based on an automated computer procedure for real-time digital magnetogram data acquisition, data cleaning, removing the regular variation, calculating the K_{BLX} index, and issuing an alert if storm-level activity is indicated. The nominal cadence of index production is envisaged to be one hour. Preliminary results and evaluations will be presented, and possible space weather applications discussed.