

Possible use in Space Weather of new geomagnetic activity indices based on minute values

Michel Menvielle¹, Chantal Lathuillère², and Annick Blusson³

1. Centre d'études des Environnements Terrestre et Planétaires, 4, Avenue de Neptune, F-94100 Saint Maur des Fossés, France

2. Laboratoire de Planétologie de Grenoble, Bâtiment D de Physique, BP 53, F-38041 Grenoble Cedex 9, France

3. CLS, Parc Technologique du Canal, 8-10, rue Hermes, F-31526 Ramonville Saint-Agne France

K-indices characterize the irregular transient magnetic activity over 3-hour intervals. For each magnetic field component, the so-called K-variations are the difference between the observed magnetic variations and the estimated diurnal variation. It is shown that the K-derived planetary geomagnetic indices therefore monitor the magnetic energy density embedded in the K-variations, as predicted from semi-quantitative arguments (Menvielle, *Ann. Géophys.*, 35, 189, 1979), with a time resolution of 3 hours.

One of the by-products of the FMI algorithm for computer determination of K indices is the series of K-variations minute values. This makes it possible to derive quantities such as the rms of the K-variations in H and D components - that monitor the magnetic energy density with a time resolution better than 3-hours. Planetary geomagnetic indices based on the rms over different time intervals are presented, and their statistical relation with K-derived planetary indices is discussed.

Using in atmosphere modelling such indices computed over time intervals significantly shorter than 3 hours (typically few tens of minutes), is likely to make it possible to achieve a better description of the magnetic activity effects on the Earth's thermosphere behaviour.

As a solar and geomagnetic activity forecast service, CLS will be interested in providing these new geomagnetic indices on an operational basis. These new indices may be of great interest especially for LEO orbit determination. An evaluation of these indices for Argos system orbit determination is under consideration."