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Characterization of the geomagnetic field fluctuations during St. Patrick's Day Storm

Lucia Santarelli (1,2), Paola De Michelis (1), and Giuseppe Consolini (3)

(1) Istituto Nazionale di Geofisica e Vulcanologia, Rome, Italy, (2) Università degli Studi dell'Aquila, L'Aquila, Italy, (3) INAF-Istituto di Astrofisica e Planetologia Spaziali, Rome, Italy

We present a preliminary study of the properties of the magnetic field's fluctuations during the St. Patrick's Day geomagnetic storm occurred on 17 March 2015. We analyse the minute values of the geomagnetic field recorded simultaneously by a latitudinal network of 18 geomagnetic observatories located at different latitudes, from the equatorial regions to the northern high-latitude ones. We apply the Empirical Mode Decomposition (EMD) method to the X (North) and Y (East) components of the geomagnetic field recorded during a period (13 - 30 March 2015) covering the whole duration of the storm. This adaptive method, which can be applied to signals originating from nonlinear and non-stationary processes, permits us to separate fast ([U+1D70F]<200 min) and slow ([U+1D70F]>200 min) magnetic fluctuations, which are related to different magnetospheric processes. Indeed, it has been shown that while magnetic fluctuations at long timescales ([U+1D70F] >200 min) show a large degree of correlation between solar wind parameters and magnetospheric dynamics proxies, at short timescales ([U+1D70F] <200 min) they are essentially related to internal magnetospheric processes and seem to be not directly driven by interplanetary changes.
The different energy contribution of the fast and slow fluctuations is investigated as a function of latitude during the development of the selected geomagnetic storm. The weight of the signal related to the fluctuations on a short time scale shows a dependence on the latitude and geomagnetic activity level.