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A statistical study on the timescales involved into the solar wind-magnetosphere interaction during the March 17, 2015 storm

Tommaso Alberti (1), Giuseppe Consolini (2), Fabio Lepreti (1), Antonio Vecchio (3), and Vincenzo Carbone (1)

(1) University of Calabria, Department of Physics, Rende (CS), Italy (tommasoalberti89@gmail.com), (2) INAF-IAPS, Via del Fosso del Cavaliere 100, 00133, Roma, Italy, (3) LESIA-Observatoire de Paris, 5 place Jules Janssen, 92190 Meudon, France

The magnetospheric dynamics in response to solar wind changes in the course of magnetic substorms and storms can be investigated via a set of geomagnetic indices, which monitor the changes of some of the most important current systems: the Auroral Electrojet indices (AE, AU, AL and AO) and the low latitude geomagnetic ones (Dst, Sym-H, ...). The variations of these indices are, indeed, associated with the changes of the auroral electrojets and ring current systems during geomagnetic substorms and storms. In this work, we present a case study of the relevant timescales responsible for coupling between the solar wind changes and the magnetospheric response during the St. Patrick's Day Geomagnetic Storm of 2015, by investigating the behavior of the IMF-Bz component and the AE, AL and Sym-H indices at different timescales using the Empirical Mode Decomposition (EMD). Indeed, the EMD allows us to extract the intrinsic oscillations (modes) present into the different datasets. The relevance of the different timescales in the solar wind-magnetosphere coupling is further investigated by means of the Delayed Mutual Information (DMI).