



New indices derived from Swarm observations to investigate space weather and geomagnetic activity hazards

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The ongoing Swarm mission of the European Space Agency provides an opportunity for a better knowledge of the near-Earth electromagnetic environment, including investigations of ultra-low frequency (ULF) and extremely-low frequency (ELF) wave events. In a recent study, we derived a Swarm orbit-by-orbit Pc3 (20–100 mHz) wave index for the topside ionosphere based on two years of low-resolution (LR) 1 Hz vector field magnetometer (VFM) data and compared its values to the corresponding variations of solar wind variables and geomagnetic activity indices. This was the first attempt, to our knowledge, to derive a ULF wave index from low-Earth orbit (LEO) satellite data. The technique developed for that study could now be used to define a new Level 2 product from the Swarm mission, the Pc3 wave index, which is suitable for space weather applications. In the context of a new ESA Swarm DISC (Data, Innovation, and Science Cluster) pre-study, an open community effort has, thus, been initiated aiming at the recommendation of new Swarm data products, services or tools focusing on the Pc1 (0.2–5 Hz) and Pc3 wave indices using the high-resolution (HR) 50 Hz VFM data and absolute scalar magnetometer (ASM) 250 Hz Burst mode data.

This presentation reports on progress achieved within the context of this initiative, also discussing the possibility of providing a new ELF whistler dispersion index that could be used to improve ionospheric models such as the International Reference Ionosphere (IRI) model. Moreover, we will present a recently introduced Dst-like Swarm-derived index.