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Statistical characterization of Strong and Mid Solar Flares and Sun EUV rate monitoring with GNSS

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The global network of permanent Global Navigation Satellite Systems (GNSS) receivers has become an useful and affordable way of monitoring the Solar EUV flux rate, especially -for the time being- in the context of Major and Mid geoeffective intensity Solar Flares (M. Hernandez-Pajares et al., Space Weather, doi:10.1029/2012SW000826, 2012). In fact the maturity of this technique (GNSS Solar FLAre Indicator, GSFLAI) has allowed to incorporate it in operational real-time (RT) conditions, thanks to the availability of global GNSS datastreams from the RT International GNSS Network (M. Caissy et al, GPS World, June 1, 2012), and performed in the context of the MONITOR and MONITOR2 ESA-funded projects (Y. Beniguel et al., NAVITEC Proc., 978-1-4673-2011-5 IEEE, 2012).

The main goal of this presentation is to summarize a detailed recent study of the statistical properties of Solar Flares (E. Monte and M. Hernandez-Pajares, J. Geophys. Res., doi:10.1002/2014JA020206, 2014) by considering the GNSS proxy of EUV rate (GSFLAI parameter) computed independently each 30 seconds during the whole last solar cycle. An statistical model has been characterized that explains the empirical results such as (a) the persistence and presence of bursts of solar flares and (b) their long tail peak values of the solar flux variation, which can be characterized by: (1) A fractional Brownian model for the long-term dependence, and (2), a power law distribution for the time series extreme values.

Finally, an update of the Solar Flares' occurrence during the recent months of Solar Activity, gathered in RT within MONITOR2 project, will close the paper.