



## **Solar and Geomagnetic Activity Variations Correlated to Italian M6+ Earthquakes Occurred in 2016**

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Between August 2016 and October 2016 in Italy were recorded three strong earthquakes: M6.2 on August 2016 at 01:36:32 UTC; M6.1 on October 26, 2016 at 19:18:08 UTC and M6.6 on October 30, 2016 at 06:40:18 UTC. The authors of this study wanted to verify the existence of a correlation between these earthquakes and solar/geomagnetic activity.

To confirming or not the presence of this kind of correlation, the authors analyzed the conditions of Spaceweather "near Earth" and the characteristics of the Earth's geomagnetic field in the hours that preceded the three earthquakes. The data relating to the three earthquakes were provided by the United States Geological Survey (USGS). The data on ion density used to realize the correlation study are represented by: solar wind ion density variation detected by ACE (Advanced Composition Explorer) Satellite, in orbit near the L1 Lagrange point, at 1.5 million of km from Earth, in direction of the Sun. The instrument used to perform the measurement of the solar wind ion density is the Electron, Proton, and Alpha Monitor (EPAM) instrument, equipped on the ACE Satellite.

To conduct the study, the authors have taken in consideration the variation of the solar wind protons density of three different energy fractions: differential proton flux 1060-1900 keV ( $\text{p}/\text{cm}^2\text{-sec-ster-MeV}$ ); differential proton flux 761-1220 keV ( $\text{p}/\text{cm}^2\text{-sec-ster-MeV}$ ); differential proton flux 310-580 keV ( $\text{p}/\text{cm}^2\text{-sec-ster-MeV}$ ). Geomagnetic activity data were provided by Tromsø Geomagnetic Observatory (TGO), Norway; by Scoresbysund Geomagnetic Observatory (SCO), Greenland, Denmark; Dikson Geomagnetic Observatory (DIK), Russia and by Pushkov Institute of terrestrial magnetism, ionosphere and radio wave propagation (IZMIRAN), Troitsk, Moscow Region. The results of the study, in agreement with what already ascertained by authors from 2012, have confirmed that the three strong Italian earthquakes were preceded by a clear increase of the solar wind proton density which subsequently generated perturbation of the Earth's geomagnetic field. The characteristics of ionic variation of the interplanetary medium and the subsequent perturbations of the Earth's geomagnetic field could be used as a global seismic trigger indicator to understand when it's possible expect a resumption of M6+ seismic activity.