

Solar wind proton density increase that preceded Central Italy earthquakes occurred between 26 and 30 October 2016

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Between 26 and 30 October 2016 in Central Italy were recorded two strong earthquakes: M6.1 occurred on October 26, 2016 at 19:18:08 UTC and M6.6 occurred on October 30, 2016 at 06:40:18 UTC. The authors of this study noted that the two earthquakes were preceded by an increase in the proton density of the interplanetary medium: a phenomenon observed since 2012 and has always preceded the seismic events of high intensity (M6+) occurring on a global scale. To obtain these results the authors have analyzed the conditions of Spaceweather "near Earth" and the characteristics of the Earth's geomagnetic field in the days and in the hours that preceded the two earthquakes. The data relating to the two earthquakes were provided by the United States Geological Survey (USGS). The data on ion density used to realize the 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 ($\text{p}/\text{cm}^2\text{-sec-ster-MeV}$). In addition, the authors were analyzed the Earth's geomagnetic field variations through the geomagnetic data released by Tromsø Geomagnetic Observatory (TGO), Norway; Scoresbysund Geomagnetic Observatory (SCO), Greenland, Denmark; Dikson Geomagnetic Observatory (DIK), Russia and 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 two 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 results of the studies that the three authors lead from 2012 represent a new scientific approach to predict potentially destructive earthquakes that occur on a global scale. This new seismic prediction method has proven reliable to predict a recovery of M6+ global seismic activity and in the future will represent the scientific substrate on which will be possible to develop seismic forecasting methods better than those actual.