



Solar wind proton density variations that preceded the M6+ earthquakes occurring on a global scale between 17 and 20 April 2014

Gabriele Cataldi (1), Daniele Cataldi (2), and Valentino Straser (3)

(1) LTPA Observer Project, Radio Emissions Project, Albano Laziale, Rome, (Italy) – (ltpaobserverproject@gmail.com), (2) LTPA Observer Project, Radio Emissions Project, Lariano, Rome, (Italy) – (daniele77c@gmail.com), (3) International Earthquake and Volcano Prediction Center, Orlando – Florida (USA) – (vstraser@ievpc.org)

Between 17 and 20 April 2014 on Earth were recorded six M6+ earthquakes: Balleny Islands region M6,2 earthquake occurred on 17 April at 15:06 UTC; Solomon Islands M6,1 earthquake occurred on 18 April at 04:13 UTC; Mexico M7,2 earthquake occurred on 18 April at 14:27 UTC; Papua New Guinea M6,6 earthquake occurred on 19 April at 01:04 UTC; Papua New Guinea M7,5 earthquake occurred on 19 April at 13:28 UTC; Papua New Guinea M6,2 earthquake occurred on 20 April at 00:15 UTC. The authors analyzed the modulation of solar wind ion density during the period from 14 to 23 April 2014 to determine whether the six earthquakes were preceded by a variations of the solar wind ion density and for testing a method to be applied in the future also for the prediction of tsunamis. 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 that have these characteristics: differential proton flux 1060-1900 keV (p/cm²-sec-ster-MeV); differential proton flux 761-1220 keV (p/cm²-sec-ster-MeV); differential proton flux 310-580 keV (p/cm²-sec-ster-MeV) and differential proton flux 115-195 keV (p/cm²-sec-ster-MeV). This data set has been marked with the time data (time markers) of M6+ earthquakes occurred on a global scale between 17 and 20 April 2014 (the data on M6+ seismic activity are provided in real time by USGS, INGV and CSEM). The result of the analysis showed that the six M6+ earthquakes occurred on a global scale in the time period taken as a reference, were preceded by a significant variation of the solar wind proton density started on April 17, 2014, approximately at 01:00 UTC. The beginning of this increase preceded the first seismic event taken in reference (Balleny Islands region M6,2 earthquake occurred on April 17 at 15:06 UTC) of about 14 hours.