Geophysical Research Abstracts
Vol. 15, EGU2013-680, 2013
EGU General Assembly 2013

ELF signals from the Central Italy Electromagnetic Network (CIEN) at the time of the 2012 Emilia-Romagna earthquakes

Cristiano Fidani
Central Italy Electromagnetic Network, Earthquake Physics, 63900 Fermo, Italy (c.fidani@virgilio.it)

A network devoted to a continuous monitoring of LF, VLF transmitters and ELF signals was set up in Central Italy, and has been operating since 2006, which is currently composed of 9 stations in 9 different Italian cities. From the beginning of 2012, improvements have been carried out on the stability of CIEN by updating all the stations with UPS and web connections. Moreover, a reduction in the amount of data stored was performed so to permit a real time monitoring of the network by web. Specifically, a 100kb/day was fixed to record the VLF power spectra intervals around the transmitter frequencies every 5 minutes. Similarly, a 600kb/day was fixed to record the ELF power spectra intervals, which was logarithmic spaced in frequency every 5 seconds. Furthermore, different physical measurements at each CIEN site have been recently initiated to better understand the sources of some signals. In order to do so, the Fermo and Torre Pellice stations have been equipped with Geiger counters to monitor atmospheric radioactivity, underground thermometers, as well as meteorological stations to record atmospheric temperature, humidity, wind speed and direction, along with atmospheric pressure and rainfall. The Torre Pellice Station had already been equipped with a magnetometer, a Radon-meter and a compass to check the direction of the geomagnetic field. The Chieti station had already been equipped with a magnetometer and an underground current detector. The Perugia and Rieti stations had already been equipped with seismometers and a network to capture transient luminous phenomena in the atmosphere. On May 20th and 29th 2012, two strong earthquakes struck the Emilia-Romagna Region with a magnitude M=5.9 and M=5.8, respectively. The earthquakes caused 27 fatal causalities and significant ground failures. The observations relative to this seismic period were investigated relative to their ELF band electric fields. Observations were thoroughly analysed from the Zocca station, the closest (50km) CIEN monitoring station to the Emilia-Romagna epicenter. Date from other stations were examined to reveal any possible differences. Many horizontal electric oscillations from April 1 - June 30, 2012, were seen. Most of these appeared at the time of rainfalls, which were revealed by the Zocca station on the same days. Electric oscillations under 100 Hz appeared from May 10 - 11, 2012, when there was no recorded meteorological activity. On May 26, 2012, strong ELF oscillations occurred at the Zocca station. This station had not detected ELF horizontal oscillations for many years prior to Emilia-Romagna seismic events in May 2012. Whereas, signals were revealed in mid-April 2012 and increased in number and intensity around the dates of the quakes.