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SELF and VLF electromagnetic emissions that preceded the M6.2 Central Italy earthquake occurred on August 24, 2016

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On August 24, 2016 at 01:36:32 UTC a destructive earthquake hit Central Italy with a magnitude of M6.2. The authors of this study have recorded some electromagnetic signals that have preceded this strong earthquake. These signals were recorded through two electromagnetic monitoring stations realized by Gabriele Cataldi and Daniele Cataldi, located near the town of Albano Laziale (Rome, Italy) and near the city of Lariano (Rome, Italy) and can monitor the radio spectrum 24h7 between 0.001 Hz and 96 kHz (SELF-LF band). The electromagnetic monitoring allowed to identify two interesting types of electromagnetic anomalies: the first electromagnetic anomaly was recorded on August 18, 2016 between 02:47 UTC and 06:21 UTC, in the VLF band prevalently between 18kHz and 26kHz; the second electromagnetic anomaly was registered between 08:00 UTC on August 23, 2016 and 05:00 UTC on August 24, 2016, prevalently between 0.01 and 0.7Hz: the most intense signals were recorded at 08:50 UTC on August 23, 2016 and approximately 1 hour before the strong earthquake.
The Earth's electromagnetic background monitoring in the SELF-VLF band (0Hz<f<30kHz) is a methodology of scientific investigation that has allowed to demonstrate the existence of Seismic Electromagnetic Precursors (SEPs). The studies that the authors have realized within this new scientific context (as well as technological) have allowed us to understand that there are actually two families of pre-seismic radio emissions: 1) radio emissions identified as Earth's geomagnetic field disturbances related to "near Earth" solar wind proton density increase variations, and for this reason it can be seen from any point on the Earth (this is "no local" type emissions); 2) radio signals are not connected directly to the solar and geomagnetic activity: these radio signals are probably generated by piezoelectricity phenomena occurring near the focal area of the earthquake and are detectable near earthquake epicenter (this is a "local" type emissions). It is therefore clear that the monitoring of solar activity and Earth's geomagnetic activity is an activity of fundamental importance to be able to have a general understanding of pre-seismic radio signals nature. In fact, as the authors demonstrated that all M6+ earthquakes that occur on a global scale are always preceded by an increase of the solar wind proton density near Earth, the solar and geomagnetic activity monitoring is a seismic prediction method that has proven reliable for understanding when we can expect a recovery of the M6+ global seismic activity and could be used internationally as an indicator of seismic risk in the countries where there are potentially destructive earthquakes and tsunamis.