Geophysical Research Abstracts
Vol. 13, EGU2011-4893, 2011
EGU General Assembly 2011

Investigating the possible relation of electromagnetic signals in the upper VHF and lower UHF bands to earthquakes in Greece

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Earthquakes (EQs) are tectonic events related to large-scale fractures in the Earth's heterogeneous crust. Various signals, which have been recorded prior to significant EQs, have been intensively investigated for their relation to these EQs, in a quest for the so-called precursors of general fracture. Among them, electromagnetic (EM) emissions, in a wide frequency range extending from lower than 1Hz (subHz, ITU band 0) to very high frequencies (VHF, ITU band 8), have been extensively analyzed and important conclusions have resulted. As an example, precursory fracture induced EM emissions, originating from opening cracks and ranging from MHz (in the lower VHF region) to kHz (in the very low frequencies, VLF, ITU band 4), have been produced and detected both at laboratory and geophysical scale.

In this work we investigate the possible relation of EM anomalies in the upper VHF, i.e. 142MHz to 230MHz, and the lower UHF (ultra high frequencies, ITU band 9), i.e. 320MHz to 415MHz, bands to significant earthquakes in Greece. A number of significant surface EQs occurred recently, during 2008, in Greece, on land or near coastline. A series of EM recording stations along the west side of Greece, i.e. the mainland coast of the Ionian Sea and Islands of the Ionian Sea, measuring specific narrowband frequency spectra in the above bands were put into operation during the specific time-period. The selected narrow bands have, according to the official National Frequency Allocation Table, been awarded either to low power, short range applications or to rarely exercised applications, ensuring minimum electromagnetic interference (EMI) sourced from human activities.

We try to locate EM anomalies within the recorded signals, which could be associated to specific seismic events. For this purpose, the correlations among the signals at different frequencies of the same station, the same frequency at different stations and their temporal and spatial placement relevant to the EQs are examined. Moreover, well established analysis methods are applied to reveal the meaningful part of the signals from the background noise and examine their possible origination from a subsequent catastrophic event.