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ULF radio monitoring network in a seismic area

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ULF monitoring is a part of a multidisciplinary network (AeroSolSys) located in Vrancea (Curvature Carpathian Mountains). Four radio receivers (100 kHz – microwave) placed on faults in a high seismic area characterized by deep earthquakes detect fairly weak radio waves. The radio power is recorded in correlation with many other parameters related to near surface low atmosphere phenomena (seismicity, solar radiation, air ionization, electromagnetic activity, radon, CO_2 concentration, atmospheric pressure, telluric currents, infrasound, seismo-acoustic emission, meteorological information). We follow variations in the earth's surface propagate radio waves avoiding reflection on ionosphere. For this reason the distance between stations is less than 60 km and the main source of emission is near (Bod broadcasting transmitter for long- and medium-wave radio, next to Brasov city). In the same time tectonic stress affects the radio propagation in air and it could generates ULF waves in ground (LAI coupling). To reduce the uncertainty is necessary to monitor a location for extended periods of time to outline local and seasonal fluctuations. Solar flares do not affect seismic activity but they produce disturbances in telecommunications networks and power grids. Our ULF monitoring correlated with two local magnetometers does not indicate this so far with our receivers. Our analysis was made during magnetic storms with Kp 7 and 8 according to NOAA satellites. To correlate the results we implemented an application that monitors the satellite EUTELSAT latency compared to WiMAX land communication in the same place. ULF band radio monitoring showed that our receiver is dependent on temperature and that it is necessary to introduce a band pass filter in data analysis. ULF data acquisition is performed by Kinemetrics and National Instruments digitizers with a sampling rate of 100 Hz in Miniseed format and then converted into text files with 1 Hz rate for analysis in very low frequency. In both cases we use spectrum analysis in three bands of frequency with different filters. More results showed that tectonic stress generated by seismicity is more important than effects of solar flares.
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