Geophysical Research Abstracts
Vol. 21, EGU2019-7144, 2019
EGU General Assembly 2019

Short-term earthquakes forecast based on multi-parametric observations

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We use short-term earthquakes forecast for help organizations specialized in emergencies situation in Romania (Inspectorate for Emergency Situation network). Our case study refers of seismic evolution in Vrancea area (the curving area of the Carpathian Mountains) and analysis the reliability to estimate the seismicity in this active zone characterized by deep earthquakes. The methods are general and they could by applied in any place. National Institute for Earth Physics (NIEP) has a seismic network and multidisciplinary monitoring stations for radon concentration, CO_2, earth radiation, air ionization, telluric currents, ULF radio waves disturbance, magnetic field, temperature in borehole, infrasound and acoustic waves. Geological structure particularities determined the monitoring locations. Seismicity is analyzed using the cumulative energy method. It is divided into areas of release and accumulation of tectonic stress that are evaluated with polynomials permanently updated for the realization of seismicity evolution profiles for periods of maximum 10 years. The results of interpolation over 10 years are not reliable. Next step is to select the periods of analysis of precursors factors using the stress – rupture area diagrams. Every earthquake has particularities (distance between epicenter and faults, depth, possibility to be induced by petroleum exploitation). For this reason seismic precursors and analysis methods differ. Several parameters have the highest success rate few hours before: the micro fracturing noise produced by rocks, borehole temperature and radon. This study highlights the interaction between seismic areas, faults, station locations and monitored parameters. By correlating the measured parameters with the geological particularities of the monitored area, we can obtain a high probability of seismic prognosis. The main goal is to use the experience gained from the analysis of events produced to anticipate the future.

Key words: earthquake forecast, earthquake precursors, multidisciplinary analysis, radon concentration, air ionization, multi-parametric monitoring, seismic energy

Acknowledgements
This work was supported by PN19080101 MULTIRISC program