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The reliability of radon as seismic precursor

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Our multidisciplinary network (AeroSolSys) located in Vrancea (Curvature Carpathian Mountains) includes radon concentration monitoring in five stations. We focus on lithosphere and near surface low atmosphere phenomena using real-time information about seismicity, + / - ions, clouds, solar radiation, temperature (air, ground), humidity, atmospheric pressure, wind speed and direction, telluric currents, variations of the local magnetic field, infrasound, variations of the atmospheric electrostatic field, variations in the earth crust with inclinometers, electromagnetic activity, CO_2 concentration, ULF radio wave propagation, seismo-acoustic emission, animal behavior. The main purpose is to inform the authorities about risk situation and update hazard scenarios. The radon concentration monitoring is continuously with 1 hour or 3 hours sample rate in locations near to faults in an active seismic zone characterized by intermediate depth earthquakes. Trigger algorithms include standard deviation, mean and derivative methods. We correlate radon concentration measurements with humidity, temperature and atmospheric pressure from the same equipment. In few stations we have meteorological information, too. Sometime the radon concentration has very high variations (maxim 4535 Bq/m3 from 106 Bq/m3) in short time (1 – 2 days) without being accompanied by an important earthquake. Generally the cause is the high humidity that could be generated by tectonic stress. Correlation with seismicity needs information from minimum 6 month in our case. For 10605 hours, 618 earthquakes with maxim magnitude 4.9 R, we have got radon average 38 Bq/m3 and exposure 408111 Bqh/m3 in one station. In two cases we have correlation between seismicity and radon concentration. In other one we recorded high variation because the location was in an area with multiple faults and a river. Radon can be a seismic precursor but only in a multidisciplinary network. The anomalies for short or long period of time should be correlated with local environment factors.