Geophysical Research Abstracts
Vol. 17, EGU2015-11813, 2015
EGU General Assembly 2015

Subsurface temporal variation of radon at the Conrad Geophysical Observatory, Austria

Roman Leonhardt (1), Gideon Steinitz (2), and Oksana Piatibratova (2)
(1) ZAMG, Conrad Observatory, Wien, Austria (roman.leonhardt@zamg.ac.at), (2) Geological Survey of Israel, Jerusalem

The Conrad Observatory (COBS) housed the national geophysical observatory of Austria and is located 50 km south west of Vienna within the carbonate sequence of the "Wettersteinkalk". Parameters monitored at the facility comprise environmental data, seismic signals, gravity, geomagnetic components and also natural gamma rays. A subsurface tunnel, 150 meters long and oriented E-W is driven into the calcareous sequence at a depth of 50 meters. The tunnel is lined with a concrete carapace, 20 cm thick. The tunnel observatory is separated from the external atmosphere by 3 tight doors, resulting in a stable temperature of 6.85±0.04°C. A gamma detector (3×3", NaI, SCA) is used measure the variation of the gamma radiation from radon in the air of the tunnel, at a resolution of 1 minute, which is accumulated to form a 15-minute count rate. The sensor is placed on a concrete block at 135 meters. Several SSNTD measurements in the tunnel indicated radon level in the level of 1.5 kBq/m^3. The background gamma radiation, due probably mainly to sources in the concrete is in the order to 2×10^5 counts (per 15-minutes). A long term variation of radon is reflected as an annual radon signal with large amplitude (2×10^5 counts) and a maximum in summer. Small to large (2×10^5 counts) non periodic multi-day signals lasting from two to several tens of days are superimposed. Daily periodic signals of much lower amplitude are observed, with amplitudes generally up to 4×10^4 counts. The amplitude of the non-periodic multi-day is coupled to amplitude of the annual signal, and the amplitude of the periodic daily signal is modulated by the multi-day variation. The source of the radon in the air of the tunnel is from the concrete lining the floor and walls of the tunnel. The variation patterns and their systematic characteristics cannot be ascribed to local variations of pressure and temperature (stable). These limitations indicate that other driver(s), external to the tunnel, are forcing the nuclear radiation from radon in the air of the tunnel. Here we present a comparison of our two year long gamma ray variation record with the time series from other geophysical and environmental records of the Conrad Observatory.