

Contents lists available at [ScienceDirect](http://www.sciencedirect.com)

Radiation Measurements

journal homepage: www.elsevier.com/locate/radmeas

Response of Radon in a seismic calibration explosion, Israel

H. Zafrir^{a,*}, G. Steinitz^a, U. Malik^a, G. Haquin^b, N. Gazit-Yaari^b^a Geological Survey of Israel, R&D, Malkhei Israel 30, 95501 Jerusalem, Israel^b Soreq Nuclear Research Center, Yavne, Israel

ARTICLE INFO

Article history:

Received 8 April 2008

Received in revised form

16 August 2008

Accepted 19 January 2009

Keywords:

Radon measurements

Radon transport in porous media

Radon & seismic calibration explosion

Radon & seismic shock

ABSTRACT

Radon measurements were performed at shallow levels during an in-land 20-ton seismic calibration explosion experiment, simulating a 2.6- M_L earthquake, to investigate the influence of the explosive blast and the transitory seismic wave fields on the Radon transport in the country rock, adjacent to the focus of the explosion. The experiment was conducted in a basalt quarry in the northern margin of the Beit Shean valley (Israel). Five gamma-ray sensors were placed, at a depth of about 2 m, along a line located 17–150 m from the edge of the explosion zone. Measurements commenced 4 days before and continued for 9 days after the explosion with 15 min integrations. A 10-s sampling was used in the interval of several hours before and after the explosion itself.

Diurnal variations of Radon, reflecting the typical variation pattern of Radon in the shallow environment, were registered before and after the explosion. No significant change in the overall Radon concentration was observed as a consequence of the main explosion as well as three smaller experimental shots (0.5–2 tons) in the 2 h prior to the calibration blast. The seismological data indicate that the transient excess pressure at the farthest Radon sensor was above 5 bar m^{-1} during 0.2–0.4 s, and evidently much higher at the nearest sensors, but none of the sensors responded by recording any exceptional change in the Radon concentration. Moreover the hypothesis that additional Radon may emanate from solid grains as a result of the excess local pressure exerted by the blast is also not observed.

In contrast to a real earthquake event an explosion experiment has neither eventual preceding nor following geodynamic activity. Therefore the absence of significant Radon anomalies during or after the blast does not contradict assumptions, observations or conclusions as the occurrence of Radon anomalies prior or after an earthquake event due to associated long-term geodynamic processes. [The Full Article....](#)

© 2009 Elsevier Ltd. All rights reserved.