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Local Variability of Radon Backgrounds in the Subsurface Using High Density Field Measurements

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Radon is a naturally occurring radioactive gas produced as a decay product of uranium and thorium in geologic media. Radon is therefore a nearly ubiquitous gas background in the subsurface environment, as well as in many building materials derived from earth materials. In the context of nuclear explosion monitoring, radon as a background influences radiation detector sensitivities as an interfering signal and its presence in whole air gas samples is also an indicator of atmospheric and subsurface air mixing. In recent years, radon has been of increased interest as a signature of underground explosions with the notion that earth damaging activity is likely to release trapped geogenic gases. Pacific Northwest National Laboratory scientists have utilized a mesoscale geologic testbed in New Mexico outfitted with eight multi-interval gas sampling boreholes to study subsurface gas migration. As part of this work, multiple series of radon measurements have been made within the more than 50 sampling locations before and after small chemical explosive detonations. In conjunction with other measurement and characterization techniques employed at the site, field results were used to assess the local variability of radon gas in the testbed as well as quantify changes in radon background levels resulting from explosively generated damage.

E-mail

justin.lowrey@pnnl.gov

Promotional text

This work contributes an assessment of both natural radon spatial variability within a small testbed as well as the effects of explosive activity on radon levels. Evaluation is made of radon as an indicator of subsurface conditions in the context of nuclear explosion monitoring.

Oral preference format

in-person

Primary author: LOWREY, Justin (Pacific Northwest National Laboratory (PNNL))

Co-authors: Ms JOHNSON, Christine (Pacific Northwest National Laboratory (PNNL)); Mr FELDMAN, Joshua (Pacific Northwest National Laboratory (PNNL)); ROCKHOLD, Mark (Pacific Northwest National Laboratory (PNNL)); LUO, Xiao (Pacific Northwest National Laboratory (PNNL))

Presenter: LOWREY, Justin (Pacific Northwest National Laboratory (PNNL))

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