

Sorption of Noble Gases in Porous Media and the Impact on Nuclear Explosion Signatures

Radioactive isotopes of the noble gases xenon and argon are the “smoking gun” of an underground nuclear explosion in that detection of these isotopes is nearly unequivocal proof that a nuclear explosion occurred, especially if they are detected in the predicted ratios. Traditionally in the context of large-scale environmental transport, such as in the aftermath of a nuclear explosion, the noble gases are largely assumed to be non-reactive. However, results of past tracer experiments have illuminated the possibility that small pore-scale noble gas interactions in geologic media can have a significant aggregate effect on migration behavior over large distances. Presented here are ongoing efforts to understand the potential impact of noble gas sorption in porous geologic media on underground nuclear explosion signatures.

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