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1.3-P03. Argon-37 background in fractured porous media: a numerical study of production- and transport-induced variability

Argon-37, with a longer half-life than radioxenons, is an excellent candidate for On-Site Inspection with a prolonged detection time window. However the natural background of argon-37 in the subsurface, due to cosmic ray and in situ produced neutron fluxes, can be up to several hundreds of mBq/m3, and varies spatially and temporally due to transport and production changes, especially in fractured rocks. This could mask or feign the detection of an excess of argon-37 produced by an underground nuclear explosion, especially in the first meters of soil. The influence of barometric pumping on argon-37 variability in porous as well as fractured media is investigated using numerical simulations of gas flow and transport with the NUFT code. The sensitivity of argon-37 background to uncertainty in natural production and emanation as well as rock parameters is determined. Not only atmospheric pressure but also other meteorological variables, such as water infiltration, are discussed as controlling factors for argon-37 dynamics in the subsurface.

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