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T1.3-P15. Topographical effects on surface detection of underground nuclear explosion with gases

Monitoring conducted at the Roselend Natural Laboratory (France) as well as during CTBTO field exercises raised questions about the influence of topographical effects on gas dynamics in the subsurface and at the surface. This would have to be taken into account when designing the sampling strategy to detect radioactive noble gases, and in particular radioxenon, during OSI operations, below a tarp or in a borehole. The possible use of radon as a co-tracer to improve detection of radioactive xenon can also be affected by topographical effects. Numerical simulations of gas flow and transport in fractured porous media are performed using the NUFT code. The effects of a cliff or a gentler slope on radioxenon and radon migration in the subsurface are identified, and the related uncertainties are quantified. Wind pumping has a limited influence on gas migration and possible detection. The most influencing parameters, among topography, sampling depth and location, are identified and discussed.

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