ID: Type: **Poster**

geomechanics and discrete fracture capabilities into STOMP to understand the first 10-100m of UNE signal transport.

Substantial effort has gone into research on the evolution of underground nuclear explosion (UNE) signatures within the subsurface and above ground environments as a result of natural, relatively slow transport mechanisms. Dynamics of signature evolution in the subsurface just after UNE detonation (e.g. fractionation of volatile noble gas precursors) have been increasingly demonstrated to have critical influence in determining eventual noble gas signatures exploited by monitoring technologies. Traditionally, subsurface transport modeling using the Subsurface Transport Over Multiple Phases (STOMP) code and other similar simulators have largely treated the early-time UNE environment very simplistically as an ill-defined, high temperature and pressure "energy pill" or have even begun simulations with some generic initial distribution of the radionuclides under the assumption that the early time dynamics took place rapidly and have concluded. In an effort to bridge this gap in UNE signature simulation capability, geomechanical and discrete fracture simulation capabilities have been implemented in STOMP to more directly assess the impact of early time rock damage and high temperature and pressure induced transport on UNE signature evolution. An overview of these implementations along with results of initial scenario simulations and projected future work will be presented.

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Track Classification: Theme 2. Events and Nuclear Test Sites