ID: Type: **Poster**

1.3-P05. Barometric Pumping of a Fractured Porous Medium

Fluctuations in the ambient atmospheric pressure result in motion of air in porous fractured media. This mechanism, known as barometric pumping, transports gaseous species through unsaturated rocks to the atmosphere. A thorough assessment of the efficiency of barometric pumping for any fractured porous medium is lacking. A complete set of equations for the general case is written and solved numerically for realistic 3D geological media and conditions. Fractures modeled as polygonal planes with a given transmissivity are embedded in a permeable matrix. The fluid obeys Darcy's law in these two media with exchanges between them. The solute obeys convection-diffusion equations in both media again with exchanges. With limited numerical dispersion, the solute transfer between the fractures and the porous medium is precisely evaluated. This model is applied to the Roselend Natural Laboratory. At a 55 m depth, a sealed cavity allows for gas release experiments across fractured porous rocks in the unsaturated zone. Precision of the calculations is assessed. The pressure and solute concentration fields as well as the influence of the major parameters (fracture density and aperture, porosity, diffusion coefficients) are discussed. Conclusions are given in terms of amplification of solute transfer to the ground surface by pressure fluctuations.

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