



## **Characterization of fluid micro-structures in porous media of mixed wettability**

**Z. Karpyn** (1), M. Piri (2)

(1) The Pennsylvania State University, Pennsylvania, USA, (2) University of Wyoming, Wyoming, USA (ZKarpyn@psu.edu / Fax: +1 814-8653248)

Uncertainties in the quantification of transport properties associated with porous soil systems often make the prediction of fluid residence and migration a difficult task. Movement and trapping of immiscible fluids in permeable formations respond to a complex combination of fluid properties, rock properties, the interactions between these fluids and the solid surface, and boundary conditions. This work consists of implementing a sophisticated experimental approach using x-rays and visualization techniques to map the distribution of immiscible liquids as they move inside porous samples. We investigate the effect of flowing conditions and wettability on the evolution of fluid micro-structures in porous media using high-resolution x-ray computed tomography. Core flood experiments are conducted to monitor fluid distribution in artificial permeable samples made of solid spherical beads (0.43-0.60mm in diameter). Glass beads and polyethylene beads represent a hydrophilic and hydrophobic media, respectively. Fluid injection rates and wetting characteristics were found to affect the mobilization and trapping of fluid phases in these porous systems. The degree of sensitivity to various flowing conditions and rock-fluid interactions is of crucial importance to understand immiscible transport mechanisms in natural soil environments. Results from this work are expected to provide a powerful calibration mechanism for multi-phase flow models, which will in turn help in the generalization and extrapolation of experimental observations.