Geophysical Research Abstracts
Vol. 20, EGU2018-14353-1, 2018
EGU General Assembly 2018

GEYSER: 3D thermo-hydrodynamic reactive transport numerical simulator considering porosity and permeability evolution on multi-GPU technology

Reza Sohrabi (1), Samuel Omlin (2), and Stephen A. Miller (1)

(1) University of Neuchâtel, CHYN - Center for Hydrogeology and Geothermics, Laboratory of Geothermics and Geodynamics, Neuchâtel, Switzerland (reza.sohrabi@unine.ch), (2) ISTE – Institute of Earth Sciences, Scientific Computing Group, University of Lausanne, Switzerland

Short for (G)PU cluster computing for (E)nhanced h(Y)drothermal (S)yst(E)ms with (R)eactif transport. GEYSER is a 3D simulator considering porosity and permeability evolution in time for fluid and thermodynamic physical processes in fractured geological media. The simulator considers mass and heat transport with porosity and permeability changes in response to dehydration of hydrous minerals. GEYSER utilizes a finite difference scheme to solve the governing PDEs associated within 3D large-scale hydrothermal systems or geothermal reservoirs. This tool is a high performance code using Graphic Processing Units (GPU) workstations or clusters technology. The physical processes implemented into the code are those associated with deep hydrogeological complexes where high fluid pressures generated by dehydration reactions can be sufficient to induce hydro-fractures that significantly influences the porosity and permeability structures within geological formation. The conceptual and numerical model couple the hydromechanical and thermodynamic effects of fluid pressure in 3D space and time dependent, with application to understanding mass and heat transport through fractured networks. Possible applications include geothermal resource or CO_2 sequestration.