



NES Colloquium

Wednesday, 23 September 2015, 11:00 - 12:00,
OSGA/EG06

Evolution of Icelandic hydrothermal systems: Implications for radioactive waste management

Dr. B. Thien, LES

Mineralogical alteration of reservoir rocks, driven by fluid circulation in natural or enhanced hydrothermal systems, is likely to influence the long-term performance of geothermal power generation. A key factor is the change of porosity due to dissolution of primary minerals and precipitation of secondary phases. Porosity changes will affect fluid circulation and solute transport, which, in turn, influence mineralogical alteration.

Field observations suggest that active and fossil volcanic hydrothermal systems in Iceland reside in an intercalation of completely altered and almost unaltered basaltic rock layers. With help of reactive transport models (GEM-Selektor and OpenGeoSys-GEM codes), we investigated the causes for this finding, by studying the mineralogical evolution upon water-rock interaction.

We conclude that the initial porosity of primary minerals and volume-porosity changes due to their transformation into secondary minerals are key factors to explain the different alteration extents observed in field studies. We also discuss how precipitation and dissolution kinetics can influence the alteration time scales. The concepts developed in this study can be directly applied to various water/rock interaction systems, including those of interest for radioactive waste disposal.