Contribution ID : **117** Type : **Poster**

SWIR spectroscopy for the exploration of hydrothermal alteration in crystalline geothermal reservoirs (Alsace, France).

Wednesday, 9 October 2019 17:40 (20)

In the granitic basement of the Upper Rhine Graben (URG), fracture zones (FZs) are bearing the major permeability. The investigation of permeable hydrothermally altered FZs and their distribution in the well is a key issue for the understanding of fluid circulation in granitic rocks. Hence, it is crucial for the optimization of the fluid flow in existing geothermal wells and for the target of new geothermal projects. The innovative use of the short-wave infrared (SWIR) spectroscopy on drill cuttings is applied to Rittershoffen and Soultz-sous-Forêts wells for the investigation of the clay signature of FZs in crystalline rocks. SWIR spectra were acquired for more than 3000 cuttings samples in the granitic sections of the Rittershoffen and Soultz-sous-Forêts wells (GRT-1, 2 and GPK-1, 2, 3, 4 respectively). In this study several selected sections of those geothermal wells will be presented. The FZs of these wells were first characterized by mineralogical studies. Binocular loupe observations enabled to distinguish the several grades of hydrothermal alteration encountered by the granite. X-ray diffraction (XRD) analyses enabled to identify the secondary clay mineralogy corresponding to poorly crystallized illite (PCI) and illite-smectite mixed layers (I/S ML) which generally takes place within (FZs). The SWIR results correlate with the XRD results and the former binocular magnifier observations. For all wells studied, the area of the 2200 nm absorption band area correlates with the illitic minerals proportion and yields specific values for the several hydrothermal alteration facies in the granite: larger the 2200 nm absorption band area, higher the hydrothermal alteration. SWIR spectroscopy is therefore a promising tool to estimate the hydrothermal alteration intensity and to understand the FZ architecture. Beyond, SWIR spectroscopy helps to identify the extent of rock affected by past or present hydrothermal circulations around FZs. Using routinely field SWIR spectroscopy on crystalline cuttings could be a pioneer method to characterize FZs in the recent geothermal well drilled at 3.8 km deep in Illkirch (Strasbourg area).

Primary author(s) : GLAAS, Carole (Université de Strasbourg / ES-Géothermie)

Co-author(s) : VIDAL, Jeanne (University of Chile); Prof. PATRIER, Patricia (Université de Poitiers); BEAUFORT, Daniel (Université de Poitiers); GENTER, Albert (ES-Géothermie)

Presenter(s) : GLAAS, Carole (Université de Strasbourg / ES-Géothermie)

Session Classification : Poster Session