Glacial meltwater in the bedrock – identification and reactions

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More than 10 sites have been investigated by SKB (Svensk Kärnbränslehantering AB) and Posiva Oy over the years, to find a suitable site for a repository for spent nuclear fuel in Sweden and Finland, respectively. At all these sites groundwater has been sampled from different depth in the crystalline bedrock and analysed for chemistry and isotopic composition cf. /SKB, 2008 a, b; Posiva 2013 and references within these reports/. In most of the sites presence of groundwater with lower $\delta^{18}O$ than present recharge has been identified. ^{14}C supports a possible glacial meltwater origin for components in these waters, although the proportion of the glacial water as well as the depth to which it has penetrated varies among the sites. Hydrogeological models support that during deglaciation meltwater can reach to substantial depth in the bedrock and the down-ward flow can be very fast. It has even been suggested that oxygenated water may possibly be transported to great depth. The impact on the hydrogeochemical system in the bedrock (e.g. mineral dissolution/ precipitation) as result of intrusions of glacial meltwater will be discussed as well as how confident we are in the identification of the glacial meltwater and especially its relation to the last deglaciation.

References:

Posiva 2013: Olkiluoto Site Description 2011, Posiva report 11-02.

SKB 2008a: Bedrock hydrogeochemsitry Forsmark, Site descriptive modelling SDM-site Forsmark. Report SKB R-08-47.

SKB 2008b: Bedrock hydrogeochemsitry Laxemar Site descriptive modelling SDM-site Laxemar. Report SKB R-08-93.