



$^{40}\text{Ar}/^{39}\text{Ar}$ ages of fracture fillings in crystalline Precambrian bedrock, Sweden.

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Forsmark and Simpevarp are two sites on the Swedish east coast currently being investigated for a potential nuclear waste repository. Both areas are situated in late Paleoproterozoic crystalline rocks. Repeated fracturing and re-activation of existing fractures and shear zones is a common feature in crystalline rocks. Therefore, knowledge of the relative sequence of fracture mineralizations before radiometric dating is carried out is crucial in order to obtain relevant ages. Adularia suitable for $^{40}\text{Ar}/^{39}\text{Ar}$ dating occurs in several fracture mineral generations. Since none of the areas have been exposed to high temperatures during the Phanerozoic, $^{40}\text{Ar}/^{39}\text{Ar}$ ages of adularia can be expected to reveal significant ages of the low-temperature evolution. Although the geological evolution at the two sites differs (especially during the Proterozoic), common features have been recorded by similar fracture filling generations and $^{40}\text{Ar}/^{39}\text{Ar}$ ages of adularia. At the Simpevarp site, $^{40}\text{Ar}/^{39}\text{Ar}$ ages of muscovite in greisen fractures (1424 ± 2 and 1423 ± 3 Ma), altered wall rock (1417 ± 3 Ma) and reactivated mylonite (1406 ± 3 Ma) show that the area has been highly affected by intrusions of two nearby A-type granites with corresponding ages. $^{40}\text{Ar}/^{39}\text{Ar}$ ages of fracture filling adularia show that the fracture systems at both sites have been active during the Sveconorwegian orogeny (Forsmark: 1072 ± 3 and 1032 ± 3 Ma; Simpevarp: 989 ± 2 Ma). Fracture fillings associated with the Paleozoic Caledonian orogeny and its subsequent foreland basin have been recorded by $^{40}\text{Ar}/^{39}\text{Ar}$ ages of adularia. In Simpevarp, these fracture fillings have been dated to 400.9 ± 1.1 , 425.8 ± 1.7 and 443.3 ± 1.2 Ma. In Forsmark, two clearly separated adularia ages (455.9 ± 1.5 and 276.9 ± 1.1 Ma) indicate precipitation during different episodes during the Paleozoic.