Origin and behaviour of excess argon in the Monte Mucrone metagranitoïd, Sesia Zone, Italy, Western Alps

BASTIEN DARBELLAY[1]*, LUKAS BAUMGARTNER[1], MIKE COSCA[2] AND BENITA PUTLITZ[1]

1Institut de Minéralogie et Géochimie, Université de Lausanne. Anthropole, CH-1015 Lausanne, Suisse (*correspondence: bastien.darbellay@unil.ch)

[2]U.S. Geological Survey, Central Region Mineral Resources Team, Denver, CO 80225, USA

Small high pressure (HP) veins containing omphacite and phengite from the Monte Mucrone metagranitoïd (Sesia Zone) were investigated in a detailed study to understand argon mobility under HP conditions. The Monte Mucrone metagranitoïd (Sesia Zone) crops out in the Eclogitic Micaschist Complex, famous for it's well-preserved eclogitic Alpine facies. Its mineralogy is marked by the presence of relicts of original granitic minerals (biotite, K-feldspar and quartz) overprinted by Alpine HP metamorphism, illustrated by corona textures of garnet and phengite around the biotite crystals and by the replacement of plagioclase by aggregates of zoisite, jadeite and quartz. The age of the granitic intrusion is constrained by U-Pb zircon ages of 286-293 Ma. The timing of peak Alpine high pressure metamorphism is estimated at 65 to 68 Ma (U-Pb zircon, Lu-Hf garnet). K/Ar and $^{40}Ar/^{39}Ar$ geochronology of HP-phengite show large ages variations from 62 to132 Ma, and are frequently attributed to incorporation of excess argon by a presumed argon-rich fluid. Similar conclusions have been reached for biotites, which yield ages between 133 and 198 Ma.

Reactions inside the granite induced by the HP vein are isochemical. Only a small water enrichment of the vein is visible. However, isotope hydrogen ratios on bulk rocks are constant between the vein and the granite. $^{40}Ar/^{39}Ar$ ages obtained on one-to-three single crystals of biotites along a profile perpendicular to the vein show large, systematic age variations. These ages can be modelled by a thermally driven diffusive front, with ages of 800 Ma in the center of the vein converging to 150 Ma in the granite, over a scale of 5 cm. Step-heating spectra are strongly perturbed in the vein while yielding well-defined plateau ages in the granite. We conclude that the mobility of argon occurred over a centimeter scale under Alpine HP conditions. Global excess argon in the granite is improbable and thus the150 Ma age may be geologically significant.

Retention of latex colloids on calcite as a function of surface roughness

G. DARBHA[1], TH. SCHÄFER[2], A. LÜTTGE[3] AND C. FISCHER[1,3]

[1]Georg-August-Universität, Goldschmidtstr. 3, D-37077 Göttingen, GERMANY

[2]Institut für Nukleare Entsorgung, Forschungszentrum Karlsruhe, D-76021 Karlsruhe, GERMANY

[3]Rice University, 6100 Main Street, Houston, TX 77005, USA

Adhesion of colloidal particles to mineral and rock surfaces is an important process in the environment that is crucial to manage effects of contaminant transport, drinking-water quality, nuclear waste management, biofouling of transplants, etc. Here we present results about irreversible adsorption of colloids on calcite as a function of submicron surface roughness, based on surface data over a large field of view of several mm^2. We reacted a freshly cleaved calcite crystal to produce a well-defined surface topography. This surface was exposed to a colloidal suspension. As an analog to natural particles we used a bimodal particle size distribution of polystyrene latex (average diameter 499 and 903 nm). In order to eliminate the charge heterogeneities the experiments were conducted at the point of zero charge of calcite.

Vertical Scanning interferometry [1] was applied to investigate the particle distribution on the surface and to quantify the retention of latex colloids. For both particle types, first experiments showed that an increased adsorption was found for two surface characteristics: Firstly, at surface sections with etch pits of approx. 200 nm in depth, and, secondly, at surface steps heights > 300 nm. On the other hand, the adsorbed number of particles per area is smaller for surface sections dominated by surface steps compared to pitted surface sections. The overall height distribution of the surface has, however, a more important influence on adsorption than the number of etch pits. For a surface topography height range below 100 nm, it was found that the smaller particles were predominantly adsorbed.

[1] Lüttge, Bolton & Lasaga (1999) *American Journal of Science* **299**, 652-678.