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Heating rate in the northern Lepontine dome (Central Alps) from *in-situ* isotopic dating of allanite and monazite

E. Janots (1), M. Engi (1), A. Berger (1), D. Rubatto (2) and C. Gregory (2)

(1) Institute of Geological Sciences, University of Bern, Switzerland, ejanots@geo.unibe.ch
(2) Research School of Earth Sciences, The Australian National University, Canberra, Australia

In the northern Lepontine domain (Central Alps), the age pattern remains controversial: credible geochronological data range from 16 to 42 Ma, with discrepancies resulting from the difficulty to obtain and properly interpret ages at low metamorphic conditions. In order to find well resolved U-Th-Pb geochronometers, we have addressed the Rare Earth (REE) mineralogy along the well-constrained metamorphic transect between the Helvetic Prealps and the northern margin of the Lepontine dome, recording conditions from diagenesis up to lower amphibolite facies. Our strategy has been to characterize the succession of REE-minerals and to relate it to the evolution of metamorphic conditions. The most promising samples with newly formed REE-minerals have been then selected for U-Th-Pb isotopic measurements with SHRIMP and LA-ICPMS.

The sequence of REE minerals reveals a series of irreversible reactions among silicates and phosphates. At diagenetic and low metamorphic conditions, detrital and newly formed monazite grains occur. Around 400˚C, monazite disappears to form allanite. Up to lower amphibolite facies conditions, allanite is preserved with two distinct rims of epidote, acquired prior to or during the main foliation. At temperatures higher than 570˚C, allanite is replaced by metamorphic monazite. In many samples of metapelite, the partial *in-situ* breakdown of allanite into monazite is observed, with relic allanite retaining its growth zoning. The close spatial proximity of the two REE-phases offers the unique possibility to derive ages representative of prograde metamorphism and thermal peak conditions. Th-Pb and U-Pb dating on allanite and monazite yields ages

of 31.5±1.3 Ma and 18.0±0.1 Ma, respectively. Considering that the difference of 13.5 Ma between the two ages represents the time elapsed between 400˚C and 570˚C, an average heating rate of 12-13˚C/Ma is proposed. Given the tectonic complexity of the area, the interpretation of this low heating rate remains to be investigated. The monazite age, the youngest one yet in the Lepontine domain, confirms the heating diachronism from south to north to the northern margin of the belt.