PETROCHRONOLOGY OF TEMPERATURE-DOMINATED METAMORPHIC PROCESSES: PETROLOGY AND DATING OF ACCESSORY MINERALS FROM THE IVREA VERBANO ZONE, ITALY

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The emerging field of petrochronology relates absolute ages with petrological information derived from the same minerals. Modern U-Th-Pb in-situ-dating techniques of accessory minerals (AM) allow to gain age information from multiple episodes of crystal growth, dissolution and reprecipitation if these features are preserved within single crystals. Provided that the petrology of these AM, their evolution through metamorphism is well understood, the U-Th-Pb in-situ dating methods can be used to unravel rates of processes in Earth's crust.
Petrological observations and ages are presented for monazites and zircons from migmatic metapelite samples from the Val Strona di Omegna transsect in the Ivrea Zone, Italy.
The Ivrea Zone is part of the pre-Alpine basement located in the Southern Alps of NW Italy and represents an almost complete section from mid- to lower continental crust (e.g. ZINGG, 1980; HANDY et al., 1999). The Val Strona di Omegna shows a 14 km long transect with amphibolite facies in the SE and granulite facies in the NW (REDLER et al., 2012). In all samples monazites exhibit complex zonation patterns. Several monazite-domains from amphibolite to granulite facies samples were dated in-situ by EPMA-CHIME.
A granulite facies metapelite sample (IV 20/05) shows vermicular-shaped metamorphic zircons in proximity to rutile and ilmenite. SIMS in-situ U-Pb dating reveals Permian ages (286.2 ± 2.0 Ma) thus tentatively dating the post-granulite facies peak, Zr-exsolution of rutile or rutile breakdown to ilmenite.
P-T-pseudosections are presented for metapelitic and metabasic rocks from Val Strona di Omegna. P-T-forward modelling was performed in the MnNCKFMASHT-System for metapelites and in the NCKFMASHT-system for metabasites using the Software THERIAK-DOMINO (deCAPITANI & BROWN, 1987; deCAPITANI & PETRAKAKIS, 2010) and the HOLLAND & POWELL (2011) database with updates from WHITE et. al. (2014) and GREEN et al. (2016) for metabasites.

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