

VERTICAL MOVEMENTS OF DIFFERENT TECTONIC BLOCKS ALONG THE CENTRAL PART OF THE TRANSALP – TRAVERSE. CONSTRAINTS FROM THERMOCHRONOLOGICAL DATA

Petra Angelmaier, István Dunkl & Wolfgang Frisch

The aim of the project is to reconstruct the exhumation history of the metamorphic units between Inntal (Austria) and Gadertal (Italy) and to model the vertical motion paths. Therefore we collected 65 samples for geochronological investigations, mainly zircon and apatite fission track dating. At the time of writing 36 zircon ages and 22 apatite ages have been obtained. First track length measurements are in progress.

Penninic units

The Zentralgneisses yield zircon fission track ages between 16 and 11 Ma and apatite fission track ages between 10 and 5 Ma. An increasing fission track age with altitude is visible. Because of the high relief in the Zillertal mountains it is possible to estimate an exhumation rate with the

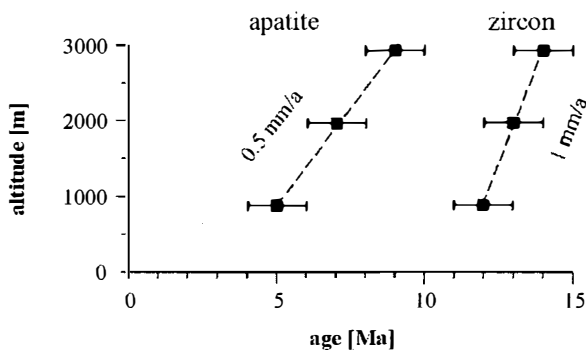


Fig. 1: Exhumation rates, calculated with the altitude dependence method.

altitude dependence method using the same dating method in two rock samples from different heights. With this method we calculated for the Ahornspitze profile (Fig. 1) exhumation rates of 1mm/a for the time between 14 and 12 Ma and 0,5 mm/a for the time between 9 und 5 Ma. To the north, the fission track ages increase. The zircon fission track ages of the Bündnerschiefer are around 20 Ma and the apatite ages are around 14 Ma.

Austroalpine units

First zircon fission track dating of the Kellerjoch gneisses yield ages around 60 Ma. This age is also represented in the Innsbrucker quartzphyllit. The apatite fission track ages are around 13 Ma. A zircon fission track age of 116 Ma and an apatite fission track age of 38 is obtained in the Greywacke zone. In the so called "Altkristallin" between the southern border of the Tauern Window and the Pustertal Line, the zircon fission track ages increase from 20 Ma to 122 Ma towards the south with clear jumps of the ages by crossing the DAV and KV Lines (see also STÖCKHERT et al. 1999). In contrast to the zircon fission track ages the apatite fission track ages shows a uniform age pattern of 9–10 Ma. Fig. 2 and Fig. 3 show the different exhumation history of the metamorphic unit between Tauern Window and DAV Line (northern block) and the metamorphic unit between KV Line and Pustertal Line (southern block).

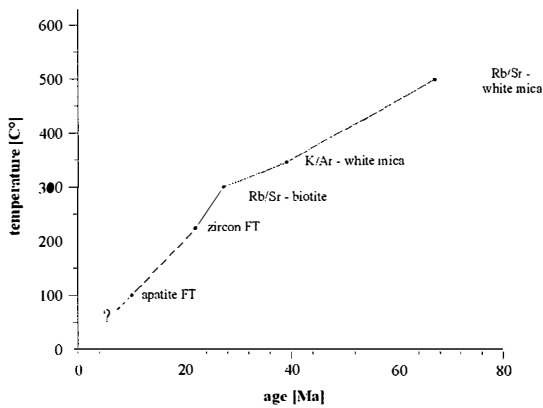


Fig. 2: Tt-path for the northern block, all data except apatite FT, zircon FT and K/Ar-white mica are from BORSI et al. (1973).

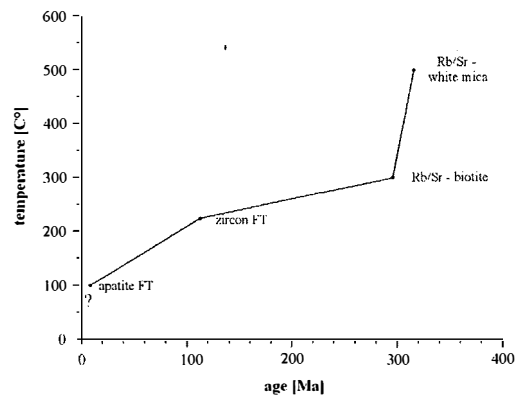


Fig. 3: Tt-path for the southern block, all data except apatite FT and zircon FT are from BORSI et al. (1973).

Southalpine units

First zircon fission track ages of the Brixen Quartzphyllite are around 210 Ma.

References

BORSI, S., DEL MORO, A., SASSI, F.P. & ZIRPOLI, G. (1973): Metamorphic evolution at the Austridic rocks to the south of the Tauern Window (Eastern Alps): radiometric and geopetrologic data. – *Mem. Soc. Geol. Ital.*, **12**, 549–571.

STÖCKHERT, B., BRIX, M.R., KLEINSCHRODT, R., HURFORD, A.J. & WIRTH R. (1999): Thermochronometry and microstructures of quartz; a comparison with experimental flow laws and predictions on the temperature of the brittle-plastic transition. – *J. Struc. Geol.*, **21**, 351–369.

Authors' address:

Petra Angelmaier, Dr. István Dunkl, Prof. Dr. Wolfgang Frisch, Institut für Geologie und Paläontologie, Universität Tübingen, Sigwartstr. 10, D-72076 Tübingen, Deutschland