DATING ANATECTIC EVENTS USING ZIRCON U-PB AND PB-PB EVAPORATION ANALYSIS: THE WINNEBACH MIGMATITE/ÖTZTAL CRYSTALLINE BASEMENT (AUSTRIA).

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The Ötztal crystalline complex represents a polymetamorphic basement of the Eastern Alps/Austria. Throughout the dominating paragneisses partial anatexis has locally occurred. From one of these migmatite areas, the »Winnebach« near Längenfeld/Ötztal, a Rb-Sr white mica minimum cooling age of the migmatisation of 461 ± 4 Ma has been established previously (CHOWANETZ 1991). To further constrain the exact time of anatexis, the migmatite and its surrounding have been investigated by single zircon Pb–Pb evaporation and conventional U–Pb zircon analysis. In order to distinguish the anatectic event from at least two additional pre-Hercynian metamorphic events, the zircon populations of the migmatite were compared to those of the adjacent paragneiss. Except for one zircon type all other populations exhibit polyphase growth and do not show any specific occurrence. Single zircon evaporation measurements document three metamorphic events with mean ages of 484 ± 6 Ma, around 560 Ma and 635 Ma. Since these data reveal no different pattern between migmatite and paragneiss, none of these ages can be directly assigned to the migmatisation.

Nevertheless one population of roundish, clear and colourless zircon specimens free of cores is found to be characteristic for the migmatite. These anatectically grown zircons were not measurable by means of single zircon evaporation but yielded with the conventional U-Pb analysis a concordant age of 490 ± 9 Ma (KLÖTZLI-CHOWANETZ et al., in prep). This is in good agreement with the regional magmatic and HT-metamorphic event in the Ötztal crystalline basement during the Early Ordovician (SCHMIDT et al., 1967) especially documented in the Kaunertal area (HOINKES et al., 1994; BERNHARD et al., 1996).

The minimum age for some of the inherited zircon cores can be established at 2440 Ma with both methods providing some evidence for the reworking of rocks originally derived from lowermost Proterozoic crust. Additionally conventional U–Pb data suggest an incorporation of Pb components within the paragneisses older than 3600 Ma.

BERNHARD, F., KLÖTZLI, U., THÖNI, M. & HOINKES, G. (1996): Age - origin and geodynamic significance of a polymetamorphic felsic intrusion in the Ötztal crystalline basement, Tirol, Austria. - Mineral.Petrol. in press.

CHOWANETZ, E. (1991): Strukturelle und geochronologische Argumente für eine altpaläozoische Anatexis im Winnebachmigmatit (Ötztal/Tirol, Österreich). - Mitt.Ges.Geol.-Bergbaustud.Ö., 37, 15-35.

HOINKES, G., THÖNI, M., BERNHARD, F., KAINDL, R., LICHEM, Ch., TROPPER, P. (1994): Prealpine magmatic and metamorphic evolution of the Austroalpine Ötztal basement in the Kaunertal Area. - Mitt.Österr.Min.Ges., 139, 59.

KLÖTZLI-CHOWANETZ E., KLÖTZLI U. & KOLLER F. (1996): Linking anatectic events with zircon morphology: An example from the Ötztal crystalline basement/Austria using U-Pb and Pb-Pb evaporation dating. - in prep.

SCHMIDT, K., JÄGER, E., GRÜNENFELDER, M. & GRÖGLER, N. (1967): Rb-Sr- und U-Pb-Altersbestimmungen an Proben des Ötztalkristallins und des Schneeberger Zuges. - Eclogae Geol.Helv., 60/2, 529-536.