

U-PB DATING OF MAFIC AND INTERMEDIATE ORTHOGNEISSES OF THE SILVRETTA NAPPE: A LATE PROTEROZOIC TO CAMBRIAN ISLAND ARC

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Polymetamorphic gneisses of dioritic, tonalitic and gabbroic compositions occur in the southern part of the Austroalpine Silvretta nappe (Switzerland) and have traditionally been called »Older orthogneisses«. Previous geochemical studies revealed that the three gneiss types are genetically unrelated, but altogether compatible with a formation in an island arc setting (MAGGETTI et al., 1990). The age information available so far was highly conflicting: a Rb-Sr whole-rock reference line of gabbros and tonalites by MAGGETTI & FLISCH (1993) defined an age of 895 Ma, whereas U-Pb and Pb-Pb evaporation ages of MÜLLER et al. (1995) for a tonalite and a granite ranged between 519 and 533 Ma.

New more detailed and precise U-Pb zircon ages presented in this paper, evidence the heterogeneous composition of the »Older Orthogneiss« group: Dioritic hornblende-gneisses of the Val Lavinuoz constitute the oldest rocks of this suite; their protolithic magmas intruded at 604 ± 4 Ma into an active margin environment. The association of these diorites with paragneisses, MORB-type amphibolites and eclogites of the Silvretta nappe suggests that these sedimentary and intrusive assemblages formed before 604 Ma. Tonalitic biotite-gneisses yielded an intrusion age of ca. 530 to 540 Ma and contain a minor inherited Pb component. They were closely followed at 522 to 517 Ma by the emplacement of coarse-grained gabbros with locally still preserved magmatic fabrics. These gabbros were subsequently deformed under high-pressure conditions to highly strained flasergabbros. Gabbroic pegmatites contain an older generation of ca. 520 Ma zircon, overgrown by a pink high-U zircon phase ca. 470–480 Ma old. This younger zircon generation is either metamorphic, or more likely, might indicate intrusion of a first generation of anatectic melts during an early phase of the »Caledonian« magmatic and metamorphic cycle of the Silvretta.

The preliminary interpretation of these new results is the following: The isotopic ages confirm that the group of the »Older Orthogneisses« is not only heterogeneous in terms of geochemical composition, but also in age. The various rocks formed at different times in an oceanic island-arc environment that evolved at the northern margin of Gondwana during a phase of fragmentation into a number of microcontinents. The various slices of oceanic crust and ancient island arcs may have been accreted along an active oceanic margin and were subsequently intruded by gabbroic, tonalitic and granitoid melts ca. 520 Ma ago.

Is this the birth of the first Japan-type »European« continental crust?

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