

The Austroalpine Schladming Nappe – a key area revealing the pre-Alpine evolution of the Eastern Alps

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Pre-alpine remnants of crystalline basement rocks are known from the Schladming Nappe which belongs to the Silvretta-Seckau Nappe System. These basement rocks are a key to the reconstruction of the Variscan and pre-Variscan history of the Eastern Alps and, thus, deserve further inspection. The Schladming Nappe, mainly consisting of variable paragneisses, also comprises several subsequently overprinted intrusions, now recognized as metagranitoids. For this study, information on these metagranitoids was acquired through whole rock geochemistry and LA-MC-ICP-MS U-Pb zircon dating to gain insight into the magmatic emplacement history and to allow a tectono-metamorphic reconstruction of the history of the Schladming Nappe. We were able to distinguish three intrusive events: (1) a Cambrian event yielding $^{206}\text{Pb}/^{238}\text{U}$ zircon mean ages between 480 ± 6.4 and 501 ± 7 Ma in the western part of the Schladming Nappe, (2) a Late Devonian/Early Carboniferous event with zircon mean ages between 350 ± 5 Ma and 370 ± 5 Ma in the north and (3) a Permian event with zircon mean ages between 261 ± 3.5 Ma and 263.4 ± 3.5 Ma in the southeastern part of the nappe. The three age groups can be divided by their age, but also due to their position and their whole rock geochemistry. The metagranitoids are peraluminous, with the Cambrian age group being highly evolved and exhibiting higher SiO_2 values compared to the Late Devonian age group. The northern Late Devonian age group contains higher contents of CaO, MgO, FeO, Al_2O_3 , Sr and Ba. The northern group can further be subdivided, with a northeastern subgroup depicting a distinct negative Eu-anomaly ($\text{EuN}/\text{Eu}^* = 0.44\text{--}0.69$) and a northwestern subgroup lacking one ($\text{EuN}/\text{Eu}^* = 0.82\text{--}1.08$). The southeastern Permian age group contains high amounts of K_2O , Nb and Y. While the early Variscan metagranitoids can be attributed to an active continental margin, associated with the subduction of Paleotethys, the Late Cambrian to Early Ordovician metagranitoids are potentially connected to a magmatic arc system on the northern Gondwana margin. The southeastern Permian granitoids show a mixture of within plate granite affiliations, syn-collision granite and volcanic arc granite signatures and might be related to post-Variscan lithospheric extension.