

Tectonic and metamorphic record in the Badstub Formation, Carboniferous of Nötsch, Austroalpine

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The Badstub Formation is part of the Carboniferous of Nötsch sedimentary sequence, of the Upper Austroalpine domain. This formation outcrops in Carinthia (Austria), a few kilometres north of the Periadriatic line (Gailtal line), where a sequence of various conglomerates and breccias with interbedded sandstones, siltstones, and fossiliferous carbonatic schists is exposed. These rocks preserve pristine sedimentary features and even an outstanding fossil record, but multi-scale structural analysis revealed a tectonic foliation localized in fine-grained rocks, different sets of mineralized faults and veins, and corona textures. Vein fillings and coronas are characterized by equilibrium mineral assemblages that include prehnite, pumpellyite, chlorite, phengite, winchite, and riebeckite. Chlorite-thermometry and thermodynamic modelling on mineralized veins and coronas revealed PT conditions of 260-310 °C and 0.25-0.50

GPa and testify that the Badstub Formation recorded a metamorphic imprint characterized by a low temperature/depth ratio ($\approx 15 \text{ }^\circ\text{C km}^{-1}$). The comparison between a 2D thermo-mechanical numerical model and the metamorphic conditions inferred with thermodynamic models suggest that the Badstub Formation underwent a thermal state consistent with that of the Alpine subduction. These results provide the first quantitative pressure constraints on Alpine subduction metamorphism on the Austroalpine Carboniferous covers nearby the Periadriatic line. Thus, within the Upper Austroalpine nappe system, pre-Alpine rocks were involved into the Alpine subduction at different structural levels and under metamorphic conditions, which therefore span from eclogitic to prehnite-pumpellyite facies.