Towards a new lithostratigraphic and tectonic model for the 'Innsbruck Quartzphyllite Zone' within the Upper Austroalpine nappes (Oberpinzgau, Salzburg, Austria)

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The "Innsbruck Quartzphyllite Zone" (IQZ) extends over 80 km in Austria from Innsbruck (Tirol) in the west to Mittersill (Salzburg) in the east. The IQZ is tectonically bound (1) to the north by Eoalpine (Cretaceous) thrusts, in footwall position below the Staufen-Höllengebirge (Tirolic-Noric Nappe System, including the "Western Greywacke Zone"), (2) to the west by Eoalpine shear zones and faults, in a footwall position below the Ötztal-Bundschuh Nappe System and (3) to the south by a series of Neoalpine thrusts, in a hangingwall position above Penninic, Subpenninic and Lower Austroalpine nappes. These contacts have been partly overprinted or crosscut by Cenozoic faults related to the opening of the Tauern Window and the eastward extrusion of the Eastern Alps (Brenner-Silltal, Engadin-Inntal and Salzach-Ennstal-Mariazell-Puchberg Fault Systems).

Lithologically, the IQZ is dominated by Paleozoic low-grade metamorphic siliciclastic sedimentary rocks intercalated with marble and mafic schist marker horizons as well as Ordovician orthogneisses and Permian metarhyolites. The peak mineral assemblages indicate greenschist facies metamorphic conditions. Additionally, garnet-bearing micaschist, paragneiss and orthogneiss are found as consistent rock units structurally above or within the low-grade units. This includes the hangingwall of the "Patscherkofel Crystalline Complex" (western IQZ, interpreted as an element of the Ötztal-Bundschuh Nappe System), localities of the Tux Alps (central IQZ) and in the vicinity of Mount Steinkogel (eastern IQZ). The internal lithologic and tectonic outline of the IQZ, as well as the correlation of its lower- and higher-grade parts to orogen-scale nappe systems, are still a matter of debate. Furthermore, the limited amount of mapping, structural, petrological and geochronological studies make any attempt for correlating and defining lithostratigraphic and/or tectonic units as well as understanding their deformation and metamorphism uncertain.

In this contribution, we present a new lithological map as well as new structural, petrological and geochronological data for the easternmost part of the IQZ (BMN-map sheet 121 Neukirchen am Großvenediger, Operpinzgau, Salzburg). This data allows us to propose a new lithostratigraphic and tectonic model. We distinguish the lower-grade Kreuzjoch Nappe consisting of rocks of the Gamsbeil Complex and the higher-grade Wildkogel Nappe consisting of the rocks of the Steinkogel Complex. The latter corresponds to the previously defined "Steinkogelschiefer-Komplex", with a wider extent revealed by new mapping. These two nappes are separated by a steep, sinistral, greenschist facies shear zone, which is associated with phyllonitization and retrogression of the Wildkogel Nappe. The contact between the Kreuzjoch Nappe and the Höllengebirge-Staufen Nappe is an Eoalpine top-to-the-WNW thrust. Evidence for both Variscan and relatively early Eoalpine metamorphism in the Wildkogel nappe suggests that this nappe is part of the Ötztal-Bundschuh or Drauzug-Gurktal Nappe System. In absence of significant deformation between the "Western Greywacke Zone" and Kreuzjoch Nappe in the Windau valley, we infer that the Kreuzjoch Nappe is part of the Tirolic-Noric Nappe System, together with the Höllengebirge-Staufen Nappe. This new lithostratigraphic and tectonic model will be tested with field, geochronological, petrological and structural studies, further to the West in the IQZ.