The westernmost end of the Pieniny Klippen Belt in Austria - the St. Veit Klippenzone and its correlation into the Carpathians

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The Pieniny Klippen Belt (PKB), a significant feature of the Carpathian mountain chain, ends at the eastern margin of the Neogene Vienna Basin in western Slovakia as a continuous and undisputed zone of distinct klippencore rocks. Starting in the 19th century, several correlations of the PKB to units of the Austrian (Eastern) Alps were put forward, i.e. correlations with the Gresten Klippenzone or the St. Veit Klippenzone (SVK) of eastern Austria. Recently, due to a large railroad tunnel ("Lainzer Tunnel"), unique exposures of the SVK and adjacent flyschs were available for a detailed study of this unit.

The SVK and its overlying flysch units build a major tectonic unit within the nappe pile of the Eastern Alps in the Wienerwald area west of Vienna. Coming from the Vienna valley (Auhof), going SE, the tunnel hit first rocks of the Kahlenberg Nappe, up to 2165.5 m, then followed by rocks of the SVK. The SVK was found in a 1097 m long section within the Lainz tunnel. It comprises largely a block in matrix structure, partly tectonically mixed with flysch units (Hütteldorf Formation, Kahlenberg Formation). Tectonic blocks of hard klippencore rocks show sizes from cm to several tens of meters. The matrix consists of strongly deformed fine-grained rocks such as Jurassic and Lower Cretaceous shales and marls. No primary sedimentary content of the flysch formations onto the SVK could be detected.

The composite Klippenzone succession recorded within the tunnel and reported from additional outcrops in the area of the Lainzer Tiergarten (Vienna) includes the following stratigraphy: 1) coarse quartz sandstones (Norian/Keuper), 2) fossiliferous grey limestones (Rhaetian), 3) sandy-silty grey marls and limestones with crinoids (Liassic/Doggerian), 4) red chert and red shale (Bajocian-Oxfordian), 5) grey marl to argillaceous limestone (Tithonian-Valanginian), 6) aptechus limestones (Neocomian), 7) white silicified limestone (Berriasian), 8) green chert (Valanginian).

Geochemistry, heavy mineral data, isotope geochemistry and microfacies studies are used to describe and interpret the strata. Biostratigraphic results include data by macrofossils (rare ammonites) radiolaria, calcinellids and nanofossils.

The geotectonic position of the St. Veit Klippenzone can be discussed based on our results and comparison samples from the PKB. Neither the Gresten Klippenzone (Helvetic units) nor the Ybbsitz Zone (Penninic units) provide similar successions. In contrast to former interpretations, a more reasonable correlation can be done with Austroalpine units, i.e. Lower Austroalpine facies successions, and the northernmost marginal units of the Northern Calcareous Alps, based on the occurrences of Keuper sandstones and Rhaetian limestones, and middle/upper Jurassic cherts and radiolitites. Thus, a "northern" Austroalpine derivation seems to be reasonable for the SVK. Comparing with the Western Carpathians we find strong similarities with the Drietoma unit, a unit which has affinities to Lower Austroalpine-Fatric elements such as the Krizná Nappe (i.e. Keuper strata), but was lateron affected by Klippen-style tectonism and incorporated into the PKB. Thus, the St. Veit Klippenzone can be seen as the westernmost extension of the Pieniny Klippen Belt (in a tectonic sense) in Austria and neither belongs to the Helvetic nor to the Penninic realms.

Acknowledgement: This presentation resulted from the Austrian-Slovakian bilateral project APVV SK-AT-0006-10.