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Inverted eo-Alpine metamorphism in the southeastern part of the Paleozoic of Graz (Austroalpine Unit/Eastern Alps)

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The southeastern corner of the Paleozoic of Graz in the area of Raasberg and Hoher Zetz is formed by two nappes. The lower Schöckel nappe consists of the Passail Group (Ordovician-Silurian), Peggau Group (Silurian-Middle Devonian) and overlying phyllites with quartzitic and carbonatic intercalations (Middle to Upper Devonian?) at Hirschkogel. The overlying Gschnaidt nappe is formed by the Gösselhof Lithodem (Ordovician-Early Devonian?) consisting of mica schists with intercalations of marbles and calcareous schists, overlain by the Peggau Group (Silurian-Middle Devonian).

Within the Peggau Group facies transitions can be observed. The Raasberg Formation with dolomites and dolomitic marbles gets thicker towards Raasberg in the southeast. At Hoher Zetz the overlying Schöckel Formation shows a succession with dark gray calcitic marbles, massive white marbles and finally impure pinkish, yellowish and greyish marbles. Sr, C and O isotopic signatures argue for a continuous upright section.

Within phyllites of the Schöckel nappe chloritoid occurs throughout the stratigraphic section. Hypidiomorphic crystals up to 2 cm in diameter together with tiny staurolite have been found in loose blocks, most probably derived from the transition of the Raasberg to the Schöckel Formation. Thermobarometric calculations yield temperatures of about 500°C. The overlying Gschnaidt nappe is characterised by fine grained garnet-bearing mica schists, quartzites, dolomitic marbles and calcitic marbles. Temperatures calculated for garnet bearing rocks are about 570°C (at 0.4 GPa). Rb-Sr and Ar-Ar ages on muscovite and biotite in the range of 107-119 Ma indicate a Cretaceous age of metamorphism. Consequently the inversion of the metamorphic field gradient is due to thrusting during the eo-Alpine tectonometamorphic event.