The Tauern window – the missing link of the Variscan internal zone between Corsica, the External Massifs, Bohemian Massif and the Tisia Terrane (Hungary)

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The Tauern window represents an uplifted part of European basement within the Alps. Until the Alpine orogeny the area belonged to the European continental margin and formed the southern flank of the Variscan orogen. The Late Variscan magmatites of the Tauern window (the gneiss massifs) are geochemically and temporally equivalent with the Variscan magmatic belt stretching from Corsica and External Massifs northward to Bohemian Massif and to the displaced Tisia basement block in the eastern Europe.
Two main magmatic pulses can be subdivided: **1 -** A phase of Lower Carboniferous high-K plutonism is documented in the Ahorn gneiss core. LA-ICP-MS based U-Pb zircon dating provided a formation age of 347 ± 3 Ma for the most widespread augen-gneiss type. This relatively mafic granitoid rock bears similarities to the Visean durbachitic plutons, which are known from several regions of the European Variscides. Like, for instance, the durbachites of the Central and Southern Bohemian pluton or the Mecsek durbachites in the Tisia terrane, the rock has unusually high potassium content at intermediate SiO_2, combined with metaluminous to feebly peraluminous A/CNK values, and low Fe/Mg ratios. The trace element pattern yields a strong enrichment of Ba (1000-2000 ppm) and Cr (30-100 ppm), which is another typical feature of durbachitic magmas. **2 –** The Stephanian/Early Permian magmatism (widespread in the External Massifs) is in the Tauern window represented by large volumes of medium-K, I-type, tonalitic and granodioritic gneisses in the Tux-Venediger core and coeval meta-volcanites. New LA-ICP-MS U-Pb zircon ages from the Tux gneiss indicate a formation age of 292 ± 2 Ma and confirm earlier geochronological data[(1,2)], showing that most of these magmas intruded within a fairly short time span (300-290 Ma incl. errors). In the southern Bohemian Massif, Variscan plutonism culminated in Visean/Namurian times, possibly in conjunction with post-collisional delamination of mantle lithosphere[(3)]. The Tauern Window shows no synchronous magmatic record: the interval Visean-Westphalian was obviously a period of magmatic quiescence or erosion in this region. However, as the granites in the Southern Bohemian Massif become successively younger towards south, one may speculate that the detachment front of lithospheric mantle might have moved from the Bohemian Massif to the south and reached in Stephanian times the area below the future Tauern window. The particular intensity and short duration of Stephanian magmatism in the western Tauern Window is a strong argument for the development of a powerful heat anomaly below this area. The coeval formation of volcano-sedimentary basins requires fast uplift and exhumation of the basement, which would be also consistent with a delamination model. Field evidence suggests that Late Variscan extensional processes induced in the area of the future Tauern window a successive fragmentation of the relief into grabens and horsts.

References

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