Metamorphosed sources of the Late Cretaceous flysch in the Infratatric Albian-Eocene accretionary wedge: impact on large-scale tectonics

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The Infratatric (IFTA) Unit (Putiš, 1992) of the Central Western Carpathians is exposed in Miocene horst of Považský Inovec Mts. in tectonic window below the Tatric Unit overlain with the Mesozoic Fatric and Hronic Nappes. Plašienka et al. (1994) consider the IFTA Belice Unit Late Cretaceous flysch as a trench flysch above the inferred subducted Vahic (~South-Penninic) Ocean crust. Putiš et al. (2006) consider the Aptian–Cenomanian Klape flysch in trench position, while the IFTA Jurassic to Early Cretaceous succession formed on a thinned passive, and Couches Rouges marls and the Late Cretaceous flysch on an active continental margin wedge due to inferred southward subduction of the Vahic/Penninic crust.

The Alpine evolution of the IFTA Unit is bound to a Variscan micaschist basement as a source of variable sedimentary rocks from the Late Carboniferous to Late Cretaceous. The Permian to Albian *Humienec Succession* was reconstructed from the anchimetamorphosed clasts, olistoliths and olistostromes in the late Santonian to Maastrichtian flysch. Pre-flysch hemipelagic Cenomanian to early Santonian Couches-Rouges type marls and upwards (with a hiatus?) continuing flysch define the *Belice Succession* in our scheme (Putiš et al., 2006).

The IFTA Unit records an inferred Jurassic–Early Cretaceous *Humienec Basin* closure and an accretionary wedge formation in late Early Cretaceous constrained by metamorphic white mica $^{40}Ar/^{39}Ar$ plateau ages between 115 and 100 Ma (Putiš et al., 2009), occasionally older (138±3 Ma and 130±3), found in very low-grade medium-pressure metamorphosed rocks of the higher IFTA *Inovec Nappe* which were the source of the Late Cretaceous flysch. The presence of illite–phengite with (K+Na) values from 0.7 to 0.9 pfu and K_2O from 8 to 10 wt.% in the IFTA accretionary wedge indicates anchimetamorphic conditions of 200–250°C at minimum medium pressure of 5–6 kbar (Sulák et al., 2009) or burial to 16–20 km depth.

The Eocene tectono-metamorphic overprint and subsequent cooling is constrained by the white mica $^{40}Ar/^{39}Ar$ plateau age of 48±2 Ma (Putiš et al., 2009) from the hanging wall blastomylonites of the Tatric Unit, K/Ar age of 46±3 Ma from an olistostrome basalt block in flysch (Putiš et al., 2006) and Zrn FT ages of 47–37 Ma (unpublished). The Cenomanian to Maastrichtian *Belice Basin* closed and the lower IFTA *Belice Nappe* has formed most likely due to *Biele Karpaty (Magura s.l.) Unit* oceanic crust subduction in the foreland. The lower anchimetamorphic conditions (150–200°C) were achieved

in the Belice Nappe underthrust below the higher IFTA Inovec basement/cover and the Tatric Nappes.

The Early Cretaceous metamorphic event is consistent with the Aptian to early Cenomanian Klape flysch formation. The blueschist pebbles (Mišík & Marschalko, 1988) blue amphibole was $^{40}Ar/^{39}Ar$ dated at 155 Ma (Dal Piaz et al., 1995) resembling the Meliatic Bôrka Nappe „phengite" ages of ca. 170 to 150 Ma (Dallmeyer et al., 1996; Faryad and Henjes-Kunst, 1997). Despite some differences in blueschist protoliths and temperature subduction gradients (Faryad, 1997; Ivan et al., 2006), the Meliatic type Late Jurassic–Early Cretaceous subduction zone is inferred along the northern IFTA margin. The remnants of the sheared subducted slab below the Infratatricum and Tatricum at the depths of ca. 15–20 km are recognizable in seismic profiles (Leško et al., 1988; Tomek, 1993; Kytková et al., 2007). The inferred Late Jurassic–Early Cretaceous subduction mélange with HP rocks might have been resedimented in the Klape flysch in Albian during the mid-Cretaceous stage of the wedge formation.

The IFTA wedge formation was controlled by the subduction and slab erosion processes in front of the Infratatric nappes. The younging flysch strata from the Aptian in *Klape Succession* to Santonian up to Maastrichtian in *Belice Succession* may be related to roll-back of the subducted slab. Good evidence of subduction erosion of the upper plate is rare material in the flysch with older white mica ages of ca. 140 and 115 Ma, although the zircon FT ages of ca. 125–90 Ma (Kissová et al., 2005) were determined from the pebbles of A-type Permian granites (274±13 Ma, convential U/Pb method; Uher & Pushkarev, 1994). Plašienka (1995) proposed the north-Veporic (Fatric) origin of the Klape flysch, but the northern Veporicum was in exhumation after Turonian (Ar/Ar ages from 93 to 80 Ma; Putiš et al., 2009).

The South-Veporic–Gemeric–Meliatic accretionary wedge (170–130? Ma) (Putiš et al., 2014 and references therein) is timely overlapping with the northern part of the Infratatric–Tatric–North-Veporic (Fatric) wedge (ca. 150?–50 Ma) before the mid-Cretaceous. Do the Meliatic type fragments of the wedges belong to the same Tethyan Triassic–Jurassic Basin?

Triassic ophiolitic and related deepwater rocks (Ladinian and Lower Carnian red cherts with N-MOR- and E-MOR-type basaltic rocks, respectively) also occur in the Eastern Carpathians in external position to the Central W. Carpathians as blocks ranging from few metres to a few kilometers in size and as centimetre-sized in breccias, similarly embedded in the late Barremian–early Albian Wildflysch formation (Săndulescu, 1984; Höck et al., 2009) tectonically included in the Bucovinian Nappes of the Median Dacides after the pre-Vraconian (pre-105 Ma) orogeny. The Wildflysch Nappe is bordered by the Ceahlău unmetamorphosed Cretaceous flysch of the Outer Dacides (Săndulescu, 2009). Infratatricum may correspond to an enigmatic block derived from continental margin of the Main Tethyan Oceanic Domain rooted in the Main Tethyan Suture traced between

the Pienides (Magura Nappes and the Pieniny Klippen Belt; Maramureş Zone of the Inner East Carpathians) and a Pre-Apulian Domain grouping the Northern Apusenides, Central W. Carpathians and Austroalpine Nappes (Săndulescu, 2009). The HP pebbles in the Infratatric Klape flysch could be a remnant of the same Tethyan Triassic–Jurassic Ocean as detected in the Dacides.

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