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New petrological insights from the Tavşanlı zone (Izmir-Ankara suture, Western Anatolia)

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Our understanding of subduction zone processes is crucial in terms of rheology and coupling between plates as well as in terms of risk assessment and fluid budget. The present work focuses on *P–T–*T_{max} estimates as a way to understand the processes acting along deep portions of the subduction channel (∼40-80 km). For this, we study the İzmir-Ankara suture zone, Western Anatolia, which separates the Pontides and the Anatolide-Tauride Block. We focus more specifically on the blueschists of the Tavşanlı zone, that represents the northern continental passive margin of the Anatolide-Tauride block subducted below an oceanic plate (whose remains are found as ubiquitous, non-metamorphic klippen on top of the blueschists; eg. the Burhan ophiolite) during the late Cretaceous. The Tavşanlı zone is an ideal target to study a large exposure of the plate interface and one of the best-preserved fossil subduction channels. It has also been described as one of the lowest geotherms (∼5 °C.km^{-1}) ever recorded (with *P–T* conditions ∼430 ± 30 °C – 22 ± 2 kbar; Okay & Kelley, 1994; Okay, 2002). Samples were collected in the three units identified on the basis of previous works, in order to evaluate the *P–T–*T_{max} conditions. These are, from bottom to top: (1) the greyschist (meta-greywackes and meta-shales) and marbles of the Orhaneli region (blueschist to eclogite facies conditions); (2) the Devlez formation, made of metabasites and metacherts (essentially blueschist facies); (3) an accretionary complex, sandwiched between continental units 1 and 2 below and the ophiolite on top, which comprises slices of metabasalt and metacherts with different metamorphic grades. The latter unit reveals *P–T* conditions ranging from incipient metamorphism to blueschist facies, with some samples containing high-pressure overprints after amphibolite relics. Raman spectroscopy on carbonaceous material (RSCM geothermometer; Beyssac et al., 2002) yield to T_{max} between 500–570°C for the greyschists of the continental lawsonite-glaucophane-jadeite-chloritoid-phengite bearing unit. Those T_{max} are significantly higher than previous *P–T* estimates, which could be accounted for by an underestimation of maximum *P–T* conditions so far or by the transformation of a markedly different organic precursor (thus leading to a bias in RSCM temperatures). Pseudosections in the system NaCaKFMASH using Perple_X are in progress in order to explain the difference between the two sets of estimates and to shed light on the tectonometamorphic evolution of the plate interface in the Tavşanlı zone.

References:

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