



Obduction of western Anatolian ophiolites: from birth to steady state of a subduction zone

Alexis Plunder (1), Philippe Agard (1,2), Christian Chopin (3), Hubert Whitechurch (4), and Aral Okay (5)

(1) IStEP UPMC – UMR CNRS 7193, Paris, France (alexis.plunder@upmc.fr), (2) IUF, Paris, France, (3) Laboratoire de géologie, École Normale Supérieure – UMR CNRS 8538, (4) IPGS, Université de Strasbourg – UMR CNRS 7516, (5) Eurasia Institute of Earth Sciences and Department of Geology, Istanbul Technical University

During Cretaceous times, the convergence between the Anatolide Tauride block (following the movement of Africa) and Eurasia lead to the closure of a branch of the Neotethyan ocean and to ophiolite obduction. Obducted ophiolite and their sub-ophiolitic units can be found along a 400 kilometre-long north to south transect in western Anatolia.

The aim of this contribution is twofold: (1) (re)-appraise the metamorphic pressure-temperature (PT) conditions and evolution of the sub-ophiolitic units of western Anatolia, by constraining the formation of the metamorphic sole during the first stages of subduction and the unusual accretion of ocean-derived units along a subduction interface in an evolving, cooling thermal regime, and (2) understand the dynamics of a large-scale and long-lived obduction.

Directly below the ophiolite (mostly made of mantle-derived rocks) lies a metamorphic sole. The upper part of this sole is made of garnet and garnet clinopyroxene amphibolites, the lower part consisting in amphibolite or green-schist facies metapelites and metabasite suggestive of discrete accretion steps. In the northern part of the section the metamorphic sole is characterised by an important blueschist-facies overprint destabilizing the amphibolite paragenesis. This high-pressure overprint is lacking in the southern area. Using field and petrological observations, three units (namely and from top to bottom, OC1, OC2 and OC3) were distinguished in the accretionary complex with PT conditions ranging from incipient metamorphism to blueschist facies conditions. OC1 represents most of the outcropping unit, is found all along the section and shows only low-grade metamorphism. Metamorphic conditions remain hard to establish in this unit made of a stack of hm-thick tectonic slices showing subtle differences in their metamorphic grade (from pristine pillow basalts and hydrothermalized lavas to lawsonite pumpellyite-lawsonite bearing basalts). In OC2, Fe-Mg carpholite-bearing layers were found and attest to high-pressure and low-temperature conditions. As OC2, OC3 exhibit a clear blueschist facies metamorphism, but slightly higher PT conditions. Both OC2 and 3 were only found in the northern area close to the suture zone. Combining these data, available radiometric and palaeogeographic data and recent thermomechanical modelling a tentative reconstruction of the subduction-zone evolution through time during the emplacement of a large-scale ophiolite is presented. We show that the cooling of the subduction must occur very quickly ($\sim <15$ My) after subduction inception and investigate the implications for early subduction and obduction dynamics.