

Geology, correlations, and geodynamic evolution of the Biga Peninsula (NW Turkey)

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The purpose of this study is to unravel the geodynamic evolution of the Biga Peninsula (NW Turkey) through the detailed study of two poorly known areas, the Çetmi mélange and the Ezine zone (i.e. the Ezine Group and the Denizgören ophiolite). The methodology was based on a detailed field work and a multidisciplinary approach.

The accretion-related Çetmi mélange is mainly cropping out north and south of the Biga Peninsula; the main results of its study can be summarized as follows:

- Its present-day structural aspect (type of contacts, tectonic organisation) is largely inherited from the Tertiary extensional regime in the region.
- It is made of blocks of various natures: Han Bulog limestones with a Scythian to Ladinian age, common carbonate ramp Norian-Rhaetian limestones (biggest blocks of the mélange), red radolarite with a Bajocian to Aptian age; the most common lithology of the mélange is made by block/slices of spilitic magmatic rocks (basalt to andesite); they have volcanic arc or within plate basalt geochemical signatures.
- The matrix of the mélange is made of a greywacke-shale association of Early-Middle Albian age.
- The mélange stopped its activity before the Cenomanian (no younger blocks than the matrix, and Cenomanian unconformity).
- If compared to the regional geology, the Çetmi mélange shares some characteristics with the Izmir-Ankara mélanges (less), and with the mélanges from allochthonous nappes found in eastern Rhodope (more); it appears finally that its emplacement is related to a Balkanic logic (ante-Cenomanian northward thrusting).

The Ezine Group and the overlying Denizgören ophiolite are cropping out in the western part of the Biga Peninsula. The Ezine Group is a thick sedimentary sequence interpreted as a syn-rift deposit of Middle Permian-Early Triassic age. It represents a part of the south Rhodopian passive margin, following the opening of the Maliac/Meliata oceanic domain. The Denizgören ophiolite has been emplaced northward on the Ezine Group in the Barremian (125 Ma, age of the amphibolitic sole); this age is unique in the Aegean domain, but here again, it may be related to a Balkan logic.

All the previous units (Çetmi mélange, Ezine Group and Denizgören ophiolite) have passively suffered two extensional regimes during the Tertiary. In the Ezine and northern Çetmi mélange area, the underlying HP Çamlıca micaschists were exhumed before the Middle Eocene. As for the southern mélange, it was strongly eroded following the Late Oligocene to Quaternary uplift of the underlying Kazdağlı Massif. This uplift was characterized by the development of a low-angle detachment fault controlling a part of the exhumation, as well as the development of a supra-detachment basin.

Based on the previous results, and on the data from the regional geology, one can propose a scenario for the geodynamic evolution of the Biga Peninsula. Its key points are:

- The Biga Peninsula is belonging to the Rhodope margin.
- The Ezine Group is a remnant of the northern Maliac/Meliata passive margin.
- Both the Denizgören ophiolite and the Çetmi mélange have been emplaced northward on the previous margin, respectively in the Barremian and in the Late Albian-Early Cenomanian times.
- The preservation of the remnants of the Rhodope margin, as well as the absence of metamorphism in the lower plate suggest a strong strike-slip component during the emplacements.
- All the previous events are (at least) partly obliterated by the Tertiary extensional regime.