

Cretaceous Geodynamic Settings of the Southwestern Margin of the Black Sea, Turkey

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The Western Black Sea Basin (WBSB) possibly opened in two stages. In the first stage, during the Aptian - Albian, the rifting was a wide-rift style and caused thinning of the continental crust. Development of an extensional magmatic arc since middle Turonian in response to the northward subduction of the Northern Tethys was followed by narrow-style back-arc rifting in the north of Istanbul Zone, breaking up the already thinned crust and starting of oceanic spreading. Syn-rift clastic sedimentation on the İstanbul Zone, southern continental margin of the WBSB, started during the early Aptian, following deposition of the Upper Barremian Urgonian type platform carbonates, and lasted until the late Albian in a southward deepening environment. These sediments possibly evolved to a passive margin sedimentary prism facing to the Intra Pontide Ocean to the south. Closing of this ocean and soft(?) collision of the İstanbul and the Sakarya Zones at the end of the Albian caused a low-grade metamorphism along the collision zone and uplifting of the whole İstanbul Zone during the Cenomanian. The Pontide magmatic belt unconformably overlying the Lower Cretaceous and older units developed in two distinct stages. The first stage between the middle Turonian and the early Santonian developed in an extensional arc setting, corresponding to the narrow-style back-arc rifting of the Western Black Sea Basin. During the late Santonian, due to breakup of the continental crust and beginning of oceanic spreading, first stage of the volcanism stopped and a deep-marine environment covered the whole region. The second stage of the arc magmatism started during the Campanian and lasted until the beginning of the Maastrichtian. Geochemical data indicate that lavas derived from a depleted source are abundant in both stages, while lavas derived from an enriched asthenospheric mantle appear towards the end of the second stage. While the first stage clearly displays a subduction signature, alkaline lavas of the second stage may indicate thinning of the lithosphere and upwelling of the asthenospheric mantle in the matured stages of back-arc rifting. We argue that the main cause of both rifting in the Western Black Sea Basin and temporal change in magma generation was the steepening and rollback of the northward subducting slab of the Tethys Ocean.

In this paper, I will present stratigraphic, geochemical and palaeontological properties of the Cretaceous deposits of the İstanbul Zone, NW Turkey, and a tectonic model for two- stages opening of the WBSB.