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Basement Structure and Architecture of the Black Sea Basin

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Black Sea consists of two separate back arc basins which opened at different times during the Cretaceous in response to northward subduction of the Neo-Tethys Ocean. The paucity of well data, complex geometries and seismic imaging challenges mean that questions remain regarding the basement architecture though most authors accept that, at least in part, both these basins are floored by oceanic crust, even though there are no magnetic stripes.
Interpretation of deep, long offset seismic data (imaging to more than 35km) support that the presence of oceanic crust in large parts of Eastern Black Sea basin while oceanic crust is present only in the northeastern part of the western Black Sea Basin. We investigate the architecture of the transitional zone between continental and oceanic realms and how it changes across the Black Sea. We note the absence of seaward dipping reflectors and only limited areas where there is good evidence for exposure of sub-continental mantle and discuss the implications this may have on the nature of Black Sea opening within the regional tectonic framework.
The Black Sea is surrounded by fold and thrust belts mainly in its eastern and northern parts while extensional and strike-slip faults dominate in the west and southwest respectively. There is well-imaged evidence that suggest that the beginnings of subduction of the western Black Sea oceanic crust beneath a part of the mid Black Sea high, and that the original oblique outer marginal detachment on which the ocean opened is beginning to be inverted as a subduction zone with contractional deformation of the volcano-sedimentary pile in the outer marginal trough.
The most recent structures along the Black Sea basin characterized by small extensional faults developed along the southern margin and the western margin is dominated by extensional structures and gravity tectonics related to the Danube Delta. Except along its western margin, the eastern Black sea is dominated by an actively developing fold-thrust belts and piggy-back basins almost parallel to the coastline (Tuapse and Sorokin troughs). Compressional structures are generally thin-skinned and constrained to a narrow belt close to shore line. No major recent compressional structures are observed in the deeper parts of basin, implying that Black Sea crust is stronger than the surrounding continental blocks and behaves as a rigid block constraining deformation along its margins.

Key Words: Black Sea Basin, Black Sea SPAN, Incipient Subduction, exhumed mantle, hyper extension, oceanic crust