

The Black Sea formed (mainly) within old Eurasian continental lithosphere and is (mostly) not a typical back-arc basin

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Reconstructions based on regional tectonic arguments suggest that continental crust on both sides of the modern Black Sea were contiguous parts of the Eurasian plate since at least Early Palaeozoic, if not even Neoproterozoic times. Heat flow data and lithosphere rheology and tomography models suggest that the lithosphere beneath the Black Sea is cold and strong. Comparison of the regional distribution of Black Sea rift structures with other back-arc basins and models of back-arc basins suggest that the lithosphere beneath the Black Sea is cold and strong. Inverse numerical models of tectonic subsidence of the margins of the Black Sea compared to those of other modern and paleo back-arc basins suggest that the lithosphere beneath the Black Sea is cold and strong. From this, it is concluded that the Black Sea formed (mainly) within old Eurasian continental lithosphere. Further, this Eurasian continental lithosphere around the Black Sea has been in a(n) (trans)extensional tectonic environment since at least the Late Palaeozoic, the geological record of which can be found on the margins of the Black Sea and in subsurface data from the shelves of the Black Sea. The back-arc rifting that led to the present configuration of the Black Sea, which occurred in the Cretaceous, was therefore superimposed on the structural consequences of a series of earlier rifting and basin forming events (Late Devonian-Carboniferous, Permo-Carboniferous, Permo-Triassic, Jurassic). The crust that was thinned during Cretaceous rifting was already strongly thinned by these earlier events, which otherwise had been mostly thermally equilibrated on the lithosphere scale. The thin crust underlying the deep basins of the western and eastern Black Sea is not (sub)oceanic crust but is highly thinned continental crust, akin to a lower (continental) crustal metamorphic core complex.