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Modes of sedimentary basin formation in the north-eastern Black Sea

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The Greater Caucasus and Black Sea sedimentary basins developed in a Mesozoic back-arc setting, the former older than the latter (Jurassic v. Cretaceous). Compressional shortening of the former and accompanying ongoing development of marginal basin depocentres in the north-eastern Black Sea – which is closely tied to the formation of the Crimea-Greater Caucasus orogen – is a Cenozoic phenomenon, starting in the Eocene and proceeding until the present day. Recently, the sedimentary basin/crust/lithosphere geometry of the study area has been characterised across a range of scales using regional seismic reflection profiling, long-offset refraction/wide-angle reflection profiling and local earthquake tomography. These provide a new integrated image of the present-day crustal structure and sedimentary basin architecture of the northern margin of the eastern Black Sea, north across the Azov Sea and provide evidence of the deeper expression of sedimentary basins and the processes controlling the geometry of their inversion during the Cenozoic. It is inferred that the Greater Caucasus paleo-Basin, lying stratigraphically below the Black Sea and younger sedimentary successions, extends further to the west than previously known. This basin has significant thickness in the area between the Azov and Black seas and probably forms the deeper core of the Crimea-Caucasus inversion zone. The Crimea-Greater Caucasus orogenic belt is the expression of "basin inversion" of the Jurassic Greater Caucasus paleo-Basin, the degree of inversion of which varies along strike. The Greater Caucasus foredeep basins – Indolo-Kuban and Sorokin-Tuapse troughs –represent syn-inversional marginal troughs to the main inversion zone. The Shatsky Ridge – the northern flank of the main East Black Sea Basin – may also be mainly a syn-inversional structure, underlain by a blind thrust zone expressed as a northward dipping zone of seismicity on the northern margin of the eastern Black Sea.