

The continuation of the Late Cretaceous volcanic arc of the Balkan orogen beneath the Black Sea: implications for hydrocarbon exploration plays

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The Upper Cretaceous volcanics in the Srednogorie Zone of Bulgaria have been already considered in the opening record of the Western Black Sea (GÖRÜR, 1988). Whereas this Turonian to Senonian rifted basin complex is well studied onshore (e.g. GEORGIEV et al., 2012), its offshore continuation in the Burgas embayment of the Western Black Sea is much less known (TARI et al., 2015). Moreover, taking into account the offset of the offshore Srednogorie Zone by about 200 km to the southeast along a poorly constrained West Black Sea Fault, the Upper Cretaceous volcanics can be followed to the East along the entire deepwater Turkish margin as imaged by recently acquired seismic reflection data (NIKISHIN et al., 2015). The undrilled Cretaceous volcanics, presently located in the deepwater, correspond to two distinct reflection seismic sequences, interpreted as the offshore equivalents of the Turonian Dereköy and the Campanian Cambu Formations known from the onshore part of the Pontides in Turkey. On a regional scale, the volcanics are part of a Late Cretaceous magmatic arc extending over 1000 km in length from the Apuseni Mts of Romania, through Serbia and Bulgaria to the Black Sea (GALLHOFER et al., 2015). This arc represents the westernmost segment in the Alpine-Himalayan orogenic system related to the northward subduction of the Neotethys.

The numerous Cretaceous paleo-volcanoes along the Turkish margin of the Black Sea do have an impact on the hydrocarbon exploration efforts in the basin. Many of these very large cone-shaped paleo-volcanoes have large detachment faults on their flanks compensating for the pronounced differential compaction above them in the locally very thick (6-8 km) post-Senonian basin fill. These extensional faults, propagating very high up into the Oligocene and Miocene sedimentary strata above the Cretaceous volcanoes, can have 3-way closure traps in their footwall blocks. This somewhat unusual speculative trap style remains untested in the deepwater of the Turkish Black Sea. A deeper trap type, unlikely to be tested any time soon, is provided by roll-over structures on the volcano flank detachment faults.

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