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Eastern Black Sea – Achara-Trialeti Cretaceous –Eocene Intra-arc rift structure: new evidences

Nino Sadradze, Shota Adamia, Tamar Beridze, and Tamar Gavtadze
I.Javakhishvili Tbilisi State University, Tbilisi, Georgia (ninosadradze@gmail.com)

Several tectono-sedimentary units of the Western Caucasus have their submarine prolongations in the Eastern Black Sea basin. The Paleozoic—Mesozoic—Early Cenozoic structural-sedimentary unit of the southern slope of the Great Caucasus (Cavcasioni), back-arc long-developed basin, corresponds with the northern pre-Caucasus (and pre-Crimean) off-shore zone. The Shatsky high, which is the submarine prolongation of the northern branch of the Transcaucasian island-arc (Northtranscaucaian arc), at the north, delineates deep oceanic-suboceanic depression of the Eastern Black Sea.
The oceanic deep depression is at the south confined by the Andrusov and Arkhangelsky highs, which correspond to the subaerial palaeo-island-arc tectono-sedimentary unit of the Eastern Pontides (Turkey) – Southern Transcaucasus (the Artvin—Bolnisi Block, Georgia).
Thus, deep “granite-free” area of the Eastern Black Sea is bounded from the north (the Shatsky high) as well as from the south (the Andrusov and Arkhangelsky highs) by the structures well correlating with palaeo-island-arc units of the Transcaucasus and Eastern Pontides. The Achara-Trialeti trough, the Cretaceous - Early Paleogene rift structure, positioned at the prolongation of the “granite-free” segment of the Eastern Black Sea basin, is also located between the two branches of the earlier undivided Transcaucasian island-arc system: the Northtranscaucasian (the Georgian block) and Southtranscaucasian (Artvin-Bolnisi block) ones. Thus, there are strong grounds to assume that the formation of oceanic-suboceanic crust of this segment of the sea resulted also from the Cretaceous (Albian)—Eocene rifting, which achieved its culmination in the Middle Eocene (Lutetian) after its Senomanian-Danian repose.
The northward subduction of the Tethys oceanic plate under the Eurasian continental plate during the Late Paleozoic - Early Cenozoic is certified by the supra-subduction, arc-type magmatic activity. The Eastern Black Sea-Achara-Trialeti intra-arc rift was initiated in the central part of the Pontian-Transcaucasian paleo islandarc, splitting it into a southern active volcanic arc and a northern remnant nonvolcanic arc, due to the break of the island arc caused by mantle diapir. Intensity of rifting and volcanic activity progressively was increasing from east to west, towards the Black Sea and caused formation of the oceanic-sub-oceanic crust in the central part of the Black Sea basin.
The geophysical data (the characteristics of the Black Sea crustal structure and patterns of anomalous gravitational and magnetic [U+FB01]elds) agree well with the geological data indicating that the Achara–Trialeti trough continues towards the deep marine depression of the Black Sea. Onshore and offshore data from seismic pro[U+FB01]ling of the Black Sea show that the subaerial structures have immediate submarine prolongations. Deep drilling conducted within the onshore zone of the Achara–Trialeti belt in the immediate vicinity of the shoreline, has shown that the Middle Eocene volcanic formation located below the modern sea level is about 3 km thick and extends further into the Black Sea.
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