Deepwater Plays in the Western Black Sea: Insight Into Sediment Provenance Within the Maykop Depositional System

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ABSTRACT

The Maykop Suite is the name given to distinctive, often organic carbon-rich sediments deposited during the Oligocene to Middle Miocene within a region that spans the Black Sea and its margins, the Greater Caucasus, and the South Caspian Sea. The Oligocene to Miocene time period encompasses several eustatic and regional changes in sea level, which are recorded within the Maykop Suite by the cyclic deposition of fine-grained organic-rich sediments and sandstone packages. These sandstones have long been considered an exploration target in the deepwater Western Black Sea, with confirmation provided by recent success within the Han Asparuh Block, offshore Bulgaria. To assess the prospectivity of plays within the Maykop sandstones, it is necessary to establish the provenance of the sediment because it is a primary control of reservoir quality. By considering geodynamic history, the topography of the hinterland surrounding the Western Black Sea can be constrained and sediment provenance areas identified. Subsurface and outcrop data can then be used to further recognize sediment pathways within the basin. These elements (provenance and pathway) combined can then be used to assess the prospectivity of deepwater turbidite plays within the Maykop Suite. The presence of widespread Late Cretaceous volcaniclastics related to arc magmatism would provide poor quality sediment in limited volumes. Nonetheless, areas, such as the northeast Moesian Platform, the Strandja Massif, and parts of the Balkanides, contain crystalline basement (gneiss) and Variscan and Late Cretaceous granitic plutons that would yield high-quality quartz-rich sediment when eroded. Particularly, a major axial river system can be envisaged with the Kamchia Foredeep to the north of the Balkanides, formed when the foredeep was underfilled. This river would have been fed by tributaries draining the granite bodies in the Balkanides and Strandja Massif. In its current overfilled state, drainage in the Kamchia Foredeep is dominantly to the north and joins the Danube, but in the Oligocene, drainage would have been west to east and flown out into the Black Sea by means of canyon systems identified on seismic. Granite bodies, such as the Bolu Massif in the western Pontides, also could have provided clean quartz-rich sediments to the basin, although features, such as the Kozlu High offshore, would have trapped or deflected sediment.