3D geological model of the Baku Archipelago, Azerbaijan

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Baku oil- and gas-bearing region represents an extension of the Prikura and Djeyrankechmez depressions and covers the territory of western shelf of South Caspian Sea. The main oil field development is mainly connected with horizons of Productive Series.

A 3-D geologic system model of the Baku Archipelago region was created by using GOCAD software package. The database from March of 8th, Sangachal-deniz, Duvany-deniz, Khara-Zirya and Bulla-deniz oil fields was used. The zone of interest is Balakhany, "Pereryv" and NKG horizons of Lower section of Productive Series.

Selected stratigraphic intervals for construction of 3-D model were chosen on the petroleum system basis, the quality and spatial distribution of wells and properties data. The study incorporates well logs, seismic data, petrophysical data into the analysis.

A 3-D geological model is built which consists of the fault model and the horizon model of the research area within the Baku Archipelago region. The model was constructed taking into account regional longitudinal faults with amplitudes up to 1000m, the main feature of tectonic of the Baku Archipelago. An accurate structural framework integrates complex surfaces VIII, "Pereryv" and NKG horizons and more than 10 main faults.

The 3-D structural model of oil fields within the Baku Archipelago was used as a base to build an accurate high resolution grid. The model is subsequently used to define a coarser grid adapted for up-scaling different parameters (lithology and petrophysical properties). A 3-D facies model of each zone (horizon) is constructed through the analysis and integration of core and log data from about 20 wells in the research area. Synthesized lithology model reflects a facial zonality within the region. In the next step, the model was populated with petrophysical properties.

A set of cross-sections across the study area was constructed to examine inconsistencies, mismatches between geologic data and the 3-D model. Using the core and loggic data analysis allowed also evaluating lateral variability of the geological and lithological properties between wells.