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Miocene Evaporites in the Intermountain Tuzluca –Iğdır Neogene Basin, Eastern Turkey

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The study area, which continues into Armenia south of Yerevan as Aras/Araxes or Hoktemberian Basin, is located within the Eastern Turkish High Plateau lying east of the intersection point of the North and East Anatolian faults at Karlıova, where folds, thrust and strike-slip faults, and large-scale extensional fractures related to a shortening regime have been developing as a result of continent–continent collision during the Neotectonic episode. Simultaneously with the shortening phase, structural basins developed such as intermountane. Detailed mapping of the Neogene deposits (Early Oligocene - Middle to early Late Miocene) in the eastern part of this basin studied allowed the recognition of four successive sedimentary units composed of fluvial, fluvio-deltaic, lake and saline pan. The depositional units were ended by intensive volcanic activity started in the Late Miocene epoch. Pre-evaporitic stage, some levels with siliciclastic and carbonate might be important for petroleum potential, which consists of bituminous mudstone (TOC: % 0.67 – 6.14; Tmax: 422 – 4620C; HI: 37-54). Evaporites are mainly represented by bedded/banded halite that were formed as four separate layers (10-40 m thick) intersected by red siliciclastic deposits with single selenitic gypsum and cubic halite crystals. Bedded gypsum was formed as marginal evaporites, laterally interfingering with the halite layers. On the other hand, it was precipitated as final evaporite deposits on the top of the halite-dominated succession, indicating upward increasing value of SO4 to Cl, probably resulted from a climatic changing leading to transition from saline pan to sulphate lake. As based on the different kinds of precipitation, the evaporite succession includes following 1) evaporitic red mudstone inner-sabkha mud flats; 2) bedded/banded halite and mudstone with organic matter in inner-sabkha salt pan; 3) interdigitated gypsum in marginal sabkha; 4) sealed gypsum in sulphate lake / floodwater sabkha.

Br values of the different kinds of halite are less than 50 ppm (15- 45 ppm). This low bromine ratio can be attributed to non-marine or recycled halite, and also sulphure and strontium isotope values obtained from gypsum crystals (δ34S= ‰ 8-9) and (87Sr/86Sr = 0.7075543-07076024) are lower than inferred Miocene seawater. These isotopic results are another indication of non –marine origin for Tuzluca-Iğdır evaporates.