The origin of hydrocarbon accumulation in Precambrian of the Eastern Siberia

Petroleum in Precambrian deposits, including giant oil and gas fields are discovered in many parts of the world. In East Siberia, the major petroleum occurrences are related to Lena-Tunguska petroleum province, where the total reserves of gas are estimated to be about 6-7 trillion m³, and that of oil are about 1 billion tons. The most prominent feature of the Precambrian oil is its unusual carbon isotope composition, which varies in the range of the δ13C-values between -32 and -37‰, while the majority of world’s oils occurring in Phanerozoic deposits are characterized by the δ13C-values from -27 to -29‰. Chemical composition of the Siberian Proterozoic oils is also distinctive. The peculiar hydrocarbon chemistry and unusual carbon isotope composition are characteristic of many Precambrian oils in the world. We show that geochemical specificity of the Precambrian oil is related to their origin predominantly from bacterial material, and bacterial kingdom proliferates in periods of intensive volcanism that may explain correlation of oil occurrences in Precambrian with times of active volcanism. We observed two types of Precambrian gases in East Siberia. The first type is gas generated from kerogen at the late stage of its catagenesis. The East Siberian gases with Δ13C-values from -28 to -32‰ may have such origin. The other type of gas, which Δ13C-values from -35 to -43‰ originates from destruction of high molecular hydrocarbons at the end of the “oil window” stage, when formation of gas-condensate begins. We believe that petroleum in Precambrian is most likely to be secondary product of destruction of the initial oil deposits.

Biography

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