Geophysical Research Abstracts
Vol. 18, EGU2016-5292, 2016
EGU General Assembly 2016

Analysis of Degree of Similarity among Crude Oils, the Upper and the Lower Crust, Organic Matter, Clays, and Different Caustobioliths by the Content of Their Main and Trace Elements

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The goal of this research was to estimate, based on the content of Trace Elements, the level of contribution of the lower and the upper crust as well as the organic matter into ontogenesis of hydrocarbons. The analysis of degree of similarity of the main and trace element (TE) content among the upper and lower continental crust, clays, organic matter, and different caustobioliths (oil, coal, oil-and-black shales) is performed by calculating coefficients of correlation of logarithms of concentrations of a large number of different chemical elements. Different oils from a number of oil bearing provinces in Russia and from the volcanic caldera Uzon (Kamchatka, Russia) were examined. It has been shown that the content of main elements and TEs of coals and oil-and-black shales is better correlated with the chemical composition of the upper crust, while the TE content of oils correlates better with the composition of the lower continental crust. The TE content of oils correlates with the chemical content of living organisms but the correlation in the most cases is weaker than the one with the lower crust. The results of the examination of different samples from the same oil-bearing province were found to be similar. The mean results for different oil-bearing provinces can vary considerably. The results of the examination of young oil from the Uzon volcanic caldera were found to be rather specific and different from the other oils. We also suggest a set of a small number of "characteristic" elements (Cs, Rb, K, U, V, Cr and Ni), which allows to compare the degree of similarity between an oil sample and upper or lower continental crust using only a few chemical elements. Some interpretation of the results is presented.