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Application of High-Resolution Aeromagnetic Data for Sedimentary Cover Studies in Hydrocarbon Exploration

It is well known that the sources of airborne magnetic anomalies are nearly always from local relief on the basement surface or from inhomogeneities in the magnetic rocks of the basement. However, modern high-resolution magnetometers certainly are able to measure magnetic signal reflecting magnetic variations in sediments. Information about magnetic properties of sedimentary cover could lead to mapping geological structures prospective for hydrocarbon exploration. This work presents new data processing and interpretation technique and example of its successful application within Volga-Ural petroleum province, Russia.

Volga-Ural petroleum province is located just to the north from Caspian Sea and is the second largest province of Russia. The area of research covers both producing oil fields and adjacent prospects in Tatarstan region. Most of known oil accumulations is in Devonian and Carboniferous sediments and related to structural and lithological traps.

The new data processing and interpretation approach is based on lateral variability of magnetic properties. Mapping of prospective structures is performed by the analysis of effective magnetization distribution in a sedimentary part of geologic section.

Most of known structures have been mapped and few new prospects outlined.

Thus, this work presents new approach in processing and interpretation of magnetic data and the case history of its successful application for hydrocarbon exploration. It contributes in better understanding of magnetic data and sort of information they carry.