

## Magnetic investigations in Carpathian Foredeep of Ukraine

Menshov Oleksandr<sup>1</sup>, Kuderavets Roman<sup>2</sup>, Chobotok Igor<sup>2</sup>

<sup>1</sup> Taras Shevchenko National University of Kyiv

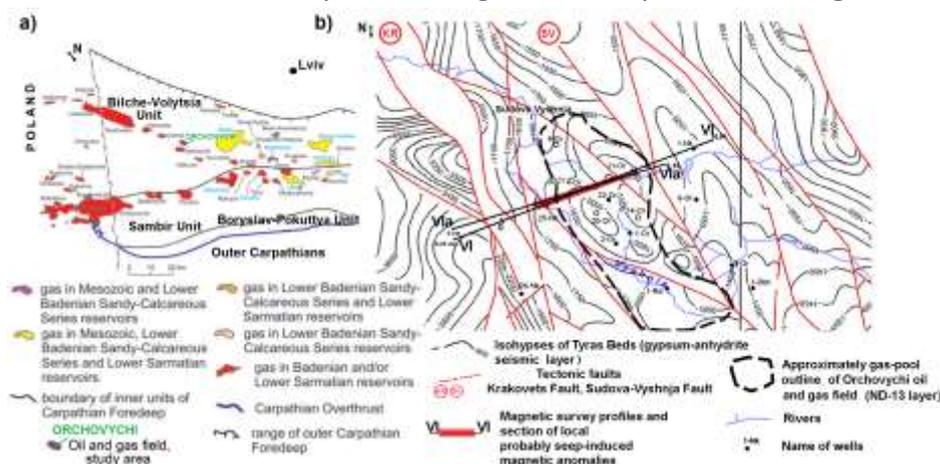
<sup>2</sup> Carpathian Branch of Subbotin Institute of Geophysics of the NAS of Ukraine

Corresponding author: Menshov Oleksandr, [pova@list.ru](mailto:pova@list.ru)

**Keywords:** magnetic field, magnetic susceptibility, soil, hydrocarbons

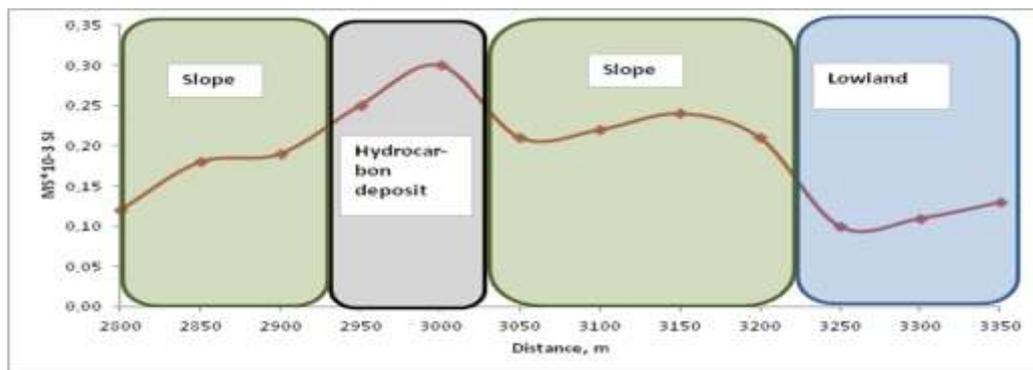
**Abstract:** Existence of local magnetic anomalies with a few nT amplitudes upon oil and gas deposits proportionate with structure contours was approved in practice by magnetic measurements in different hydrocarbon structures (Gadirov and Eppelbaum, 2012). Hydrocarbon migration and microseepage effect change composition of magnetic minerals including nearsurface rocks and soils. This process causes the formation of local magnetic anomalies (Schumacher and Abrams, 1996). Perez-Perez et al., 2011 have verified a positive relationship between anomalous large values of susceptibility and the presence of hydrocarbon by using a statistical analysis of the magnetic susceptibility measurements of a particularly large sample of drill cuts. Venkatachalapathy et al., 2010 concluded that the magnetic susceptibility (MS) measurements in sediments are complementary or alternative means of exploration and assessment of hydrocarbon reservoirs.

The overview of the investigated area (Kotarba et al., 2011) is presented in fig. 1a. The magnetic studies within Orchovychi oil and gas field are presented in fig.1b.



**Figure 1:** Sketch map (a) of oil and gas fields location in NW of the Carpathian Foredeep, Ukraine by Kotarba et al., 2011 and magnetic survey profiles (b) with section of local probably seep-induced magnetic anomalies on the structural map (GA-seismic layer, Tyras Beds) of Orchovychi oil and gas field. The seismic data from “Ukrgeofizyka” West Ukrainian Geophysical Prospecting Expedition, 2008

We have analyzed the soil magnetic susceptibility along the landscape surface. We investigated the soil MS at the hydrocarbon deposit area closely adjacent to the well for deeper interpretation and understanding the MS features and distribution (fig. 2). The local magnetic anomalies with amplitude of 6-8 nT and a width of about 4 km were detected in the structure of the anomalous magnetic field within the Outer zone of the Carpathian Foredeep. The anomalies of soil magnetic susceptibility were marked close to productive hydrocarbon areas. The interpretation of the local magnetic and soil magnetic susceptibility anomalies upon hydrocarbon fields is a complex problem and needs further research, including the integration of other geophysical methods in solving problems of petroleum geology.



**Figure 2:** Magnetic susceptibility of soil near productive well

#### References :

Gadirov, V.G., Eppelbaum, L.V., 2012: Detailed gravity, magnetic successful in exploring Azerbaijan onshore areas. *Oil&Gas Journal*, 5, 60-73.

Kotarba, M.J., Peryt, T.M., Koltun, Y.V., 2011: Microbial gas system and prospectives of hydrocarbon exploration in Miocene strata of the Polish and Ukrainian Carpathian Foredeep. *Annales Societatis Geologorum Poloniae*, 81, 523–548.

Perez-Perez, A., D’Onofrio, L., Bosch, M., Zapata E, 2011: Association between magnetic susceptibilities and hydrocarbon deposits in the Barinas-Apure Basin, Venezuela. *Geophysics*, 76, 6, 35-41.

Schumacher, D., Abrams, M., 1996: Hydrocarbon migration and its near-surface expression. *AAPG Memoir*, 66, 446 p.

Venkatachalapathy, R., Veerasingam, S, Basavaiah, N., Ramkumar, T, 2010: Comparison between petroleum hydrocarbon concentrations and magnetic properties in Chennai coastal sediments, Bay of Bengal, India. *Marine and Petroleum Geology*, 27, 1927-1935.