



New geophysical models of Palmer Deep crustal structure

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The 2004 (9th) and 2006 (11th) Ukrainian Antarctic expeditions acquired new geoelectrical data ('short-impulse electromagnetic field formation' – FSPEF, and 'vertical electric-resonance sounding' – VERS) along profiles across Drake Passage and along Bransfield Strait, Antarctic Peninsula, with the aim of studying the crustal structure of these features down to depths of >30 km. The sounding on this depth in Antarctic region was the first experience of deep modification of the VERS method using. Modelling experience of deep crustal structure by geophysical data with VERS method shows that there is a possibility to investigate the fluid regime, tectonic disturbances and crush zones in basement and local places of submarine volcanic activity too. This technology also gives a possibility to efficiently divide the cross-section on separate stratigraphic subsections in the sounding site and to determine its depth with high accuracy (Levashov et al., 2003; Levashov et al., 2007). Geophysical surveys enabled to yield new data set with information about Drake Passage and Palmer Deep inner crustal structure on broad continental margin of Antarctic Peninsula. Palmer Deep is located on continental (Pacific) shelf of the Antarctic Peninsula near Anvers Island and consists of three deep basins with depths from 1200 to 1500. These basins were part of glacial outlet during glaciation's period (Rebesco et al., 1998). Geoelectrical models of Palmer Deep crustal structure along three profiles were built on the sounding data in separate points of continental shelf. Heterogeneity of Palmer Deep earth's crust obtained from VERS data modelling testified to processes of tectonic transformations of internal shelf structures. Tectonic factor explains some conformities of the most recent glaciomarine sediments and glacial streams forming during recent shelf-wide glaciations. New information about sediment distribution and inner crustal structure has an important value for searching and prospecting the hydrocarbon deposits of Palmer Deep region. These geophysical data are of particular importance for understanding of evolution and geodynamic processes at continental margin of Antarctic Peninsula.

References

1. Levashov S.P., Yakymchuk M.A. Korchagin I.N., Pyschaniy Ju.M., Yakymchuk Ju.M. Electric-resonance sounding method and its application for the ecological, geological-geophysical and engineering-geological investigations. 66nd EAGE Conference and Technical Exhibition. Paris, France, 7 – 10 June 2003. Extended Abstracts P035. 4 p.
2. Levashov S.P., Yakymchuk N.A., Korchagin I.N., Solovyov V.D., Kozlenko Yu.V. New data about crustal inhomogeneities and fluid regime features of West Antarctica bottom structures. 69nd EAGE Conference and Technical Exhibition. London, United Kingdom, 11-14 June 2007. Extended Abstracts P013, 4 p.
3. Levashov, S.P., Yakymchuk, N.A., Korchagin, I.N., Bachmutov, V.G., Solovyov, V.D., and Bozhezha, D.N. (2007), Drake Passage and Bransfield Strait – new geophysical data and modelling of the crustal structure, in Antarctica: A Keystone in a Changing World – Online Proceedings of the 10th ISAES X, edited by A. K. Cooper and C. R. Raymond et al., USGS Open-File Report 2007-1047, Extended Abstract 028, 4 p.
4. Rebesco, M., Camerlenghi, A., L. De Santis., Domack, E., Kirby, M. Seismic stratigraphy of Palmer Deep: a fault-bounded late Quaternary sediment trap on the inner continental shelf, Antarctic Peninsula Pacific margin/ Marine geology, 1998,151, 1, P.89-110.