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Stratigraphy of the Odessa shelf, Ukrainian Black Sea: existing problems and their solution

O. Khriachtchevskaia and S. Stovba

"NaukaNaftoGaz" – Scientific Research Institute of Oil and Gas Industry of National Joint-Stock Company "Naftogaz of Ukraine", Kiev, Ukraine (e-mail: hryaschevska@naukanaftogaz.kiev.ua, chevska2008@yandex.ru / Fax: +38 044 4966418)

The stratification of sedimentary cover within the Odessa Shelf of the Black Sea is traditionally based on biostratigraphy. Data of microfauna began to collect 37 years ago since drilling first wells within the shelf. More than 80 wells have been drilled up to nowadays. The detailed stratigraphy with the determination of biozones developed for adjoining Crimea Peninsula that had been studied in well exposed outcrops was extrapolated on sedimentary sections penetrated by offshore wells. However, there are substantial errors, which are usually caused by limited core data describing only 4-5 percents of well depths and consequently by limited microfaunal variety in core samples. Moreover, the core distribution along boreholes is not regular, and core samples were not taken at all in upper parts of boreholes (< 500-700 m). More complete and continuous information on well sections is given by well-logging records. However, there is a wide well spacing only and thus, correlation of the records does not allow substantially improve a determination of even-aged sedimentary layers. Objective ambiguity of geological and geophysical data obtained from wells has resulted in multichoice stratification over the same subcrops. It has accordingly generated difficulties to interpret seismic data in a crosswell extent as well as it makes problems for oil and gas exploration.

Integrated interpretation of a new dense set of regional seismic reflection profiles, microfauna data and well-logging records has allowed us to eliminate some existing uncertainties in stratigraphy of Odessa Shelf as well as to trace the main even-aged sedimentary units from the shelf to the deep water part of the Ukrainian Black Sea, where no well has been drilled up to nowadays. The main sedimentary units are determined through the tracking of regional lithological marker beds, angular unconformities, sedimentation gaps, changes of lithology. Our results demonstrate that the following stratigraphical units are fixed confidently: 1) Middle Miocene – Quaternary; 2) Lower Miocene – Oligocene; 3) Upper Eocene; 4) Middle Eocene; 5) Lower Eocene; 6) Paleocene; 7) Upper Cretaceous; 8) Cenomanian - Albian; 9) Lower Cretaceous; 10) pre-Cretaceous. The units are well distinguished by microfaunal data, well-logging records and seismic data. They serve as a reliable basis for reconstructions of tectonics and evolution of the Black Sea region.