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Cretaceous-Cenozoic tectonic evolution of Odessa Shelf and Azov Sea from 1-D subsidence modelling (Ukrainian Black Sea)

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One-dimensional backstripping and forward subsidence modelling studies of 49 (pseudo)wells in the Ukrainian offshore (Odessa Shelf and Azov Sea) have been carried out in order to determine the tectonic history of this area. Constraints were provided by regional seismic data. Three major tectonic stages for Odessa shelf can be identified as follows: (1) rifting due to extension (late Early Cretaceous - beginning of Late Cretaceous); (2) post-rift thermal subsidence (middle of Late Cretaceous - Middle Eocene); and (3) inversion tectonics comprising four compressional events at the end of the Middle Eocene, the Late Eocene, the Early Miocene and the Middle Miocene. The subsidence modelling has strongly confirmed this general picture (also seen in the regional seismic data) and has allowed the specification of the ages of these stages and their characterisation as follows: (1) at least since latest Early Cretaceous until Santonian (˜112-83 Ma), with stretching (â) factors in the range of 1.08-1.13; (2) Campanian - Middle Eocene (83-38,6 Ma); and (3) Late Eocene - Middle Miocene (38,6-10.4 Ma), with a (compressional) "stretching" factor of 0.9. Subsidence modelling results demonstrate two stages of tectonic evolution for the Azov Sea: (1) rifting during the Albian (112-97 Ma) with stretching (â) factors in the range of 1.03-1.05 and (2) post-rift thermal subsidence since the Late Cretaceous. The tectonic evolution of the Odessa shelf is therefore similar to that of the Azov Sea in Cretaceous - Eocene times, with the same tectonic stages being recognisable. However, rifting in the Azov Sea appears to have ceased earlier (by the Late Cretaceous) than for the Odessa shelf (by the Campanian). The discrete (Eocene-Miocene) compressional events observable

on the Odessa shelf are not seen in the Azov Sea. However, accelerated subsidence within the southern part of the Azov Sea during Oligocene - Early Miocene times and in the south-eastern part of the Azov Sea during Middle Miocene - Quaternary times inferred from the subsidence data is interpreted to be most likely connected with the development of Indolo-Kuban Foreland Basin of the Great Caucasus. This research was done in the framework of the Ukrainian scientific project of NAK “Naftogaz of Ukraine” and the international MEBE project.