P106 RIFT STRUCTURE IN BARENTS SEA FROM NEW INTERPRETATION OF DEEP SEISMIC SONDING (DSS) DATA

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The traveltime curves along the Barents Sea DSS profile (materials of the Institutes of Oceanology and Earth Physics of the USSR [1]) have been interpreted on the base of two-dimentional velocity model. This profile 680 km long was stretched in the southeastern part of the Barents Sea from the costline to the north of the Rybachiy Peninsula in the direction of the Franz Josef Land and situated within the rear part of passive continental Barents Sea margin.

The crustal cross-section with velocity isolines and seismic boundaries attains the depthes of 55 km. The major feature of the section is a low-angle fault crossing the entire thickness of the Earth crust. In general the picture agrees with the Wernicke model for passive continental margin structure [3]. The Moho discontinuity at the base of the crust expressed at the section as the upper boundary of the wave-guide has been detected at the depth of 45 - 50 km with arising in the central part of the line up to 32 km. The layer of lower velocity and its gradient (possible partially melted rocks) is distinguished beneath the Moho. Velocity gradient inside this layer 8 km thick is reduced about 7 times with respect to over and underlying layers and attains the value of 0.002 c^{-1}.

In the central part of the section a large low-angle fault inclined seaward approximately under the angle of 25° breaks the crustal formation in two absolutely different parts. Southern part adjacent to the Baltic Sheild is characterized by complex tectonic structure. In the upper crust seismic boundaries are sharp, the sediment cover is folded, the foundament is broken in blocks of 50x10 km (zone of brittle deformation) inclined seaward. Northern part adjoining to the Franz Josef Land shows comparatively calm tectonics. Velocity gradient is relatively stable in general, without sharp jumps, the boundaries are smooth and the zone entire is broken in extent blocks with faults of small amplitude.

Within the sedimentary cover the major fault branches off and becomes even more low-angle. In the middle part of the line, near the fault area, the Moho has a break with the amplitude of 10 km. Almost the same amplitude of rupture is observed along upper boundaries with velocities of 6.5 and 7.2 km/s. A ductile deformation zone of lower velocity gradient may be delineated directly beneath the major fault.

The interpretation of traveltime curves was conducted using the simple invertion method for homogeneous velocity functions of two coordinates [2]. Accuracy of interpretation is evaluated for velocity values as ±0.1 km/s, and it is about 1.0 km for depthes. Ray-tracing techniques has been applied to the model of cross-section. The computed times match well the observed ones through the entire length of the profile. Root mean square deviation for the traveltimes is about 0.15 s.

References

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