

## **The formation of the North Barents Superdeep Basin by gabbro to eclogite transformation in continental crust**

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Arctic area includes deep basins both water loaded and sediment loaded ones. They are underlain by the attenuated crystalline crust with high P-wave velocities. The nature of the crust in these basins and mechanisms of their formation are debatable. Detailed data on the North Barents superdeep sedimentary Basin can be used to approach the problem. To produce such a basin with 16-18 km of sediments by stretching of continental lithosphere the beta factor should be about 2.5. According to the seismic reflection profiling data the intensity of stretching of the crystalline basement in the basin does not exceed 10%. This could ensure the sediment loaded subsidence of no more than 1 km.

In the deepest part of the basin the crystalline crust is only 14 km thick and has the mean density of 2900 kg/m<sup>3</sup> typical of the oceanic crust. Subsidence of oceanic crust formed at the axis of spreading continues 80 Myr at a rate rapidly decreasing in time. In the North Barents Basin intense subsidence continued 220 Myr since the Late Devonian and until the Late Jurassic. Moreover, about two thirds of the subsidence took place since the beginning of the Triassic while subsidence of oceanic crust would have already ended long ago. These data make rather improbable the existence of oceanic crust in the basin.

The analysis of the seismic refraction profiling data shows that the basin is several kilometers deeper than it would be if the Moho boundary was underlain by mantle peridotites. No large negative isostatic anomalies are however observed above the basin. Abnormally large depth of the basin can be explained by the existence under the Moho of a layer of eclogites 15-20 km thick. These mafic rocks which are denser than mantle peridotites pertain to the crust by their composition. Together with crystalline rocks 14 km thick located above the Moho they form the crystalline crust with the thickness 30-35 km which is typical of many continental regions. The formation of eclogites from gabbro in the lower crust was the main cause of crustal subsidence in the North Barents Basin. The seismic tomography data show that the basin is underlain by a thick lithospheric layer typical of the Precambrian cratons.

According to the seismic and gravity data thick layers of eclogites exist under the Moho boundary in some other deep basins. Among them are the deep-water Gulf of Mexico, the North Caspian and South Caspian Basins, 20 km deep, the North Chukchi superdeep Basin filled with 18 km of sediments and the deep-water basin on the Mendeleev High. According to this feature all these basins are underlain by thick continental crust and their formation was the result of the gabbro to eclogite transformation in the lower crust.