



Break up of the lithosphere and the formation of the sedimentary basins in the Eurasia-Pacific transition zone

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The studies of the deep structure of the sedimentary basins were carried out in the frame of the international Geotraverse Project from deep sections of the tectonosphere including the lithosphere and asthenosphere on the basis of combined interpretation of geological and geophysical data. Research subjects are the sedimentary basins of the transition zone from Eurasian continent to the Pacific such as Northern Sakhalin basin, Deryugin basin and Tatar strait trough in the Sea of Okhotsk and sedimentary basins of the North China Plain and Philippine Sea. It was established that the formation of sedimentary basins is associated with the processes going on in the Earth's interior specifically in the asthenosphere. The asthenosphere occurs at depth of 50 - 80 km under the old Paleogene basins and at depth of around 30 km under the Neogene basins. Under the Pliocene-Quaternary inter-arc basins the asthenosphere occurs at depth of 10-20-km. Upwelling of the hot asthenosphere to the crust caused the break-up of the lithosphere, the formation of rifts, basalt magma eruption, and hydrothermal activity. Sedimentary basins are related to ancient and recent subduction zones. They are distinguished for their anomalous deep structure. Their features are rift structures or spreading centers in their basement; active magmatism at the initial stage of formation; hydrothermal processes associated with sulfides formation; high density of the heat flow; the location of the asthenospheric diapirs beneath sedimentary basins. Asthenospheric diapirs are the source of fluids and heat. Mantle fluids comprise both gaseous and liquid hydrocarbons. The asthenospheric diapirs are likely to be channels by which hot mantle fluids penetrate into sedimentary basins, thus providing organic matter transformation and being an additional source of hydrocarbons.