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Geodynamic Models of the Active Continental Margins of the Sea of Okhotsk

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The deep structure models of the lithosphere on the Okhotsk Sea Region and the region of Neftegorsk earthquake which has occurred on May 28, 1995 in the northern part of Sakhalin, caused victims and destructions are examined. The geodynamic model shows that North Sakhalin consists of the North Sakhalin basin, the Deryugin basin and the ophiolite complex located between them. The Deryugin basin was formed in position of an ancient deep trench after subducting the Okhotsk Sea Plate under Sakhalin in Late Cretaceous-Paleogene. The North Sakhalin basin was formed on a place of back-arc basin at that time. The ophiolite complex combined by the ultrabasic rocks, fixes position of ancient subduction zone acting about 100-60 million years ago.
It is probably that the Deryugin basin and the North Sakhalin basin have been formed in the following way. Approximately 100 million years ago, the oceanic lithosphere of the Sea of Okhotsk subsided under Sakhalin, the eastern part of which was an andesite island arc. Behind it, in western Sakhalin there was a basin where sandy – clayey deposits accumulated in the Late Cretaceous, which subsequently formed the basement of Cenozoic North Sakhalin oil and gas basin. Approximately 10 – 15 million years ago subduction of the lithosphere of the Sea of Okhotsk apparently ceased. The remains of subduction zone, in the form of an ophiolite complex were revealed by geological and geophysical data.
On a surface the subduction zone is shown as deep faults stretched along Sakhalin. It is probable that the manifestation of the Neftegorsk earthquake was a result of activization of this ancient subduction zone. As a result of mobile components along ancient subduction zone under Sakhalin, considerable displacements in earth crust along numerous faults and deformation of an earth surface go on. From a position of the ancient subduction zone under Sakhalin, which is a cause of strong earthquakes here, it follows that the region is one of seismic dangerous in Russia. The work was supported by Russian Foundation for Basic Research. No: 09-05-00406-a