



Architecture of Neo-Proterozoic basement of North-Eastern European margin (Timan-Pechora basin and Northern part of Central Ural Uplifts) as a result of the Arctida - Baltia continental collision

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Timan-Pechora basin is located in the northeast part of East-European platform. The Phanerozoic (post-Cambrian) cover of the basin is composed of mostly slightly deformed sedimentary rocks (thickness reaches several kilometers). The basement of the basin is poorly studied. There are several boreholes reached the basement [Gee et al., 1998]. However, the basement complexes are outcropped in the frame of the Timan-Pechora basin: at south-west -Timan mountains, and at the east - Urals mountains, where they are studied in details. Generally, Neo-Proterozoic complexes of the basement of Timan-Pechora region and adjacent areas consist of various composition rocks dislocated and metamorphosed up to different facieses, sometimes they are intruded by granites.

Usually, Neo-Proterozoic tectonic evolution of the basement of Timan-Pechora region is considered as a part of evolution of Pre-Cambrian paleo-continent Baltia. Tectonic evolution of Baltia is interpreted as a sequence of accretionary episodes, i.e. a growth of the northeast Baltia margin by accretion of various terrains [Scarrow et al., 2001]. In contrary of this concept, we propose a new approach to the interpretation of Neo-Proterozoic tectonic evolution of the region. A key moment of the new tectonic scenario is a collision of Pre-Cambrian continents Baltia and Arctida.

The Neo-Proterozoic complexes of the Timan-Pechora region are subdivided into two

large megablocks: (1) the Timan megablock including the Timan and Izhma blocks, and (2) the Bolshezemel megablock including the Bolshezemel and Pechora blocks. Pripechora-Ilych-Chikshino fault zone (sutura) clearly separates the megablocks.

(1) Timan megablock includes areas with slightly deformed and weakly metamorphosed sedimentary suites. It is commonly believed that such suites are formed at a passive margin of Atlantic type. A north-west prolongation of the Timan megablock is fragmentary traced outside the Timan-Pechora region: Kil'din island, Rybachy, Sredny, and Varanger peninsulas, located at the north margin of the Baltic shield. A south-east prolongation of the Timan megablock is traced in the Central Ural Uplifts structures as a south part of Lyapin anticlinorium, and Kvarkush anticlinorium.

(2) Bolshezemel megablock includes areas with intensively dislocated and metamorphosed volcanic, volcanic-sedimentary complexes, and granitoids. A south-east prolongation of the Bolshezemel megablock is traced in the Central Ural Uplifts as a north part of the Lyapin anticlinorium, and all others northward structural elements of the Central Ural Uplifts. We investigated in details the granitoids [Kouznetsov et al., 2004]. Our results testify that the granites were formed at an active continental margin of West-Pacific or volcanic island arc type, and in the collision zone.

Thus, we believe that Neo-Proterozoic sedimentary complexes of Timan megablock, and south part of Lyapin anticlinorium, and Kvarkush anticlinorium were formed on the passive Baltic margin, named as Timan margin, whereas the volcanic-sedimentary complexes of Bolshezemel megablock, and the northern part of the Lyapin anticlinorium, and all others northward structural elements of the Central Ural Uplifts were formed on an active margin of another continent. We believe it was Bolshezemel active margin of paleo-continent Arctida. This continent is restored [Borisova et al., 2003; Kouznetsov et al., 2005] on the base of the geological [Egorov et al., 2002], paleomagnetic [Metelkin et al., 2000], and other geophysical [Magnetic anomalies É, 1995] data. The following terrains of continental crust (scattering now in the Arctic sector) were the parts of Neo-Proterozoic paleo-continent Arctida: Barents terrain (including Bolshezemel megablock of basement of Timan-Pechora basin), Kara terrain (north part of Taymyr peninsula, Severnaja Zemlja archipelago and Franz Joseph Land archipelago), north part of Alaska, Chukchi terrain, Novosibirsky terrain (Novosibirskiye islands together their shelves), several fragments northward to the Innuitian orogen (north parts of Peary Land and Ellesmere Island), and Lomonosov ridges terrain.

A collision of the paleo-continent Baltica and Arctida occurred about the time boundary between the Vendian and the Cambrian and resulted in a divergent collision intercontinental Timan-Pechora orogen. The complexes of Bolshezemel active margin

of Arctida were napped over the complexes of passive Timan margin of Baltia on the south-west flank of the orogen, whereas on the north-east flank of the orogen they were napped inside Arctida, and they tectonically overlapped the complexes of a backarc basin.

Later, in the Cambrian time, Timan-Pechora orogen was tectonically reworked and eroded. The northeast flank of the orogen been formed by complexes of an active Arctida margin was fragmented. Now the fragments are observed as elongated zones of melanocratic (basic/ultrabasic) and differentiated volcanic and volcanic-sedimentary, and sedimentary complexes. They are large synforms in structural sense. They are (from south-west to north-east): Nizhne-Pechora and Kozhim-Vangyr synforms of the basement of Timan-Pechora basin, and a zone of development of allochthonic Late Precambrian ophiolites and differentiated volcanic and associated sedimentary formations, and granitoids of the Enganepe hills - a polar part of Central Ural Uplifts. In the present-day structure of the basement of the Timan-Pechora region the synforms and antiforms are alternated. The antiforms are Kolguev, Khareiver, Novaya Zemlya and other similar smaller uplifts. In the core parts of these antiforms the Neo-Proterozoic complexes of a backarc basin of the Bolshezemel margin of Arctida and older rocks are exposed.

The similar evolutionary episodes and nappes/thrust-folded structures have been recognized in the Alps (Cenozoic collisional belt between European and Adriatic plate, [Pfiffner et al., 1997; 2002; Schmid et al., 1996] and in the Southern Urals (Late Paleozoic collisional belt between Baltia and Caledonian composed Siberia-Kazakhstan-Kyrgyz continent, [Kouznetsov, 2004a and b]).

It is necessary to note, that in such treatment of a structure of the basement of Timan-Pechora basin, the interpretation of Kolguev, Khareiver, and other uplifts are essentially changed. In particular, in an usual accretionary interpretation these structures are considered as exotic tectonic blocks (terrains) bounded by faults (sutures). From our point of view, these structures are large antiform folds.

The synform structures are composed of allochthonic differentiated volcanic and volcanic-sedimentary complexes of frontal parts of the Neo-Proterozoic active margin of Arctida, but autochthonic sedimentary complexes (approximately coeval to allochthonic complexes of the synforms) are exposed in the cores of the conjugated antiforms.

Summary. In general, the structure of Neo-Proterozoic basement of the Bolshezemel megablock of the Timan-Pechora basin has a three-layer architecture. (1) The upper layer consists of the allochthonic Neo-Proterozoic formations of the active Bolshezemel margin of Arctida. (2) The second layer consists of autochthonic mostly

sedimentary complexes of the marginal (backarc) sea. (3) The lower layer consists of Pre-Neo-Proterozoic rocks of the consolidated crust of the paleo-continent Arctida.

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