



The Vendian – Early Paleozoic tectonic evolution of the Southern Urals

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The earliest convergent events in the Southern Urals have been documented as Vendian ones. In particular, in the Ebeta antiform, granites were dated as 590 ± 4 Ma; they associate with differentiated subduction related volcanic series of Lushnikovka Fm [4]. We have newly dated (zircons, U/Pb SHRIMP) the granite bodies located in the southern part of the Uraltau pericline as 543 ± 4.6 Ma. These granite bodies are included into serpentinite mélangé which contains blocks of dismembered ophiolites, glaucophane schists and Tremadocian sandstones.

Lower Cambrian archaeocyatha limestones and basalts mark the beginning of the next tectonic stage. In the Sakmara zone, they occur as olistoliths in olistostrome lenses in Lower Devonian basalt-rhyolitic sequences.

The Upper Cambrian, Ordovician and Silurian sediments include various facies and indicate the beginning of the new geodynamic regime. Arkose sandstone and siltstone of the Kidryas Fm. of Upper Cambrian to Lower Ordovician (Arenig) are interpreted to have been deposited in rift-related grabens. Basalts layered with siltstones with the Upper Cambrian conodonts were also formed in rift-setting. In present-day structures they occur as olistopacks in the Devonian olistostrome. The Arenigian-Lanvirnian limestones with interlayers of cherts of the Karakol-Mikhailovka unit can be attributed to the uplifted areas of the continental margin.

Volcanic and volcanic-sedimentary rocks assemblages that can be attributed to the different parts of a transition zone between volcanic arc and oceanic basin consist of basalts, rhyolites and tuffites of the Guberlya Fm. (O_{2-3}), basalts, andesites, dacites, rhyolites and VMS deposits of the Baulus Fm. (O_3), basalts, tuffites and teffroids of

the Kuragan Fm. (O₁a-O₃aš), basalts of Polyakovka (O₁a-O₃aš) and Dergaish (S₁ln) Fms. [e.g. 1].

In the Sakmara zone, near Ramazanovo village, serpentinite mélangé contains blocks of ophiolites including plagiogranites dated (zircons, U/Pb SHRIMP) as 459.3±9.9 Ma. We believe that this ophiolites can be attributed to the back-arc setting.

Lower Silurian basalts of the Dergaish Fm. and Upper Silurian to Lower Devonian cherty black shales and cherts of the Sakmara Fm. form continuous stratigraphic succession. They indicate period of volcanism cessation from the Upper Silurian to Lochkovian which can be probably caused by the destruction of subducted slab and mantle diapir. Two zircon ages of 410±5 and 414±4 Ma were determined from HP-HT Mindyak garnet pyroxenites (metagabbro) [3] constrain the mantle diapirism age. Our recent field studies allowed us to trace a chain of ~120 km length of garnet pyroxenites that crops out along the west edge of Sakmara-Voznesenka zone. Garnet pyroxenites are associated with Ihercolite ophiolite massifs. We dated the zircons from body of garnet pyroxenites located near the south tip of Tatlambetovo Iherzolite massive, which yielded ages (U/Pb SHRIMP) of 416.1±6.1 Ma. In the Sakmara allochthon, the amphibolites from the “foot nappe” of the Khabarny ophiolite massive yielded a similar age – 415±8 Ma [2 (references therein)]. The convergent tectonic evolution of the Southern Urals continued as the Magnitogorsk island arc formed in the middle part of the Early Devonian.

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