

The age and origin of volcanics in the Riphean section of the Siberian craton (*western Baikal area*)

D.P. Gladkochub^{a,*}, A.M. Mazukabzov^a, T.V. Donskaya^a,
B. De Waele^b, A.M. Stanevich^a, S.A. Pisarevskii^c

^a *Institute of the Earth's Crust, Siberian Branch of the RAS, 128 ul. Lermontova, Irkutsk, 664033, Russia*

^b *British Geological Survey, Kingsley Dunham Centre, Keyworth, NG5 5GG, UK*

^c *University of Edinburgh, Grant Institute, The King's Buildings, West Mains Road, Edinburgh EH9 3JW, UK*

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Abstract

In the western Baikal area, the structural position, composition, and age of volcanic rocks in the section of the Riphean margin of the Siberian craton were studied. The age of these rocks, earlier assigned to the Khoto Formation, is estimated at 274 ± 3 Ma (concordia constructed over 11 zircon grains, SHRIMP-II). The geochemical and isotope compositions of volcanics evidence that they resulted from the melting of mantle source of EM-I type contaminated by crustal material. The intrusion of volcanics into the upper crustal horizons might have been caused by the evolution of the Permian active margin of the Siberian continent, which took place on the background of the closure of the Mongolo-Okhotsk ocean. Based on the results of studies, a new subvolcanic complex of Early Permian age has been recognized in the region, which includes the above-mentioned volcanics and earlier described porphyrite dikes of close age in the Sharyzhalgai uplift. The data obtained disprove the concept that the studied volcanics are of Riphean age; therefore, the available stratigraphic charts of the Siberian Precambrian must be revised.

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Introduction

On the southern flank of the Siberian craton, volcanic rocks occur mainly in the Paleoproterozoic North Baikal volcanoplutonic belt (Fig. 1). Local exposures of volcanics extend in the southwestern direction from northern Baikal area to central Baikal shore (Bugul'deika River basin) (Fig. 2). Up to now, the age of these volcanics and the formation to which they belong have been unclear.

With lack of isotope-geochronological data, these volcanics were usually assigned to the Khoto Formation (Fig. 3), which was dated at the Paleoproterozoic (Aleksandrov, 1990), Middle Riphean (Maslov, 1983; Maslov and Kichko, 1985; Ryabykh and Ryabykh, 1979), or Late Riphean (Gladkochub et al., 2007; Postnikov, 2001; Stanevich et al., 2007). On paleogeodynamic reconstructions, the volcanics, along with discordantly overlying sedimentary rocks of the Baikalian Group, were interpreted as a section of the Riphean passive

margin of the Siberian craton, which resulted from the breakup of Rodinia (Gladkochub et al., 2001, 2006a; Mazukabzov et al., 2001; Postnikov, 2001; Sklyarov, 2001a; Stanevich et al., 2007). In accordance with correlation schemes (Khomentovsky, 2002; Krasnov, 1983), effusive rocks of the Karagas Group in the Sayan foretrough (adjacent to the western Baikal area) are regarded as analogs of the described volcanics. The Late Riphean age of these rocks (741 ± 4 Ma) was confirmed by $^{39}\text{Ar}/^{40}\text{Ar}$ dating (Gladkochub et al., 2006b).

Since the age and genesis of the above volcanics are ambiguous, we studied these rocks in the area of their abundance (Fig. 3). The results obtained and their interpretation are reported in this paper.

Geologic occurrence of volcanics

Exposures of volcanics of unclear age in the western Baikal area are traceable for ~60 km from the mouth of the Bugul'deika River to the upper reaches of the Anga River, along the zone of tectonic contact of sedimentary strata of the

* Corresponding author.

E-mail address: gladkochub@mail.ru (D.P. Gladkochub)