

The Börön volcanic suite and the initial closure of the Bothnian Basin

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The supracrustal rocks of the Bothnian Basin in the Bothnia-Skellefte Lithotectonic Unit, central Sweden, are dominated by a several km thick sequence of metasedimentary rocks, mostly greywackes possibly originally formed as turbidites. The bedrock is deformed and metamorphosed at high grade, and intruded by younger rock units, e.g. c. 1.82 Ga old Härnö-type anatectic granites and 1.85–1.80 Ga Revsund suite granites. The latter also intrude the metasedimentary units along most of the western border of the basin. To the south the Bothnian Basin borders the 1.86–1.84 Ga Ljusdal batholith.

Within the sedimentary rocks of the basin there are volcanic units, mostly amphibolites, but less common also intermediate and felsic volcanic sequences. One of these is the Börön volcanic suite in the southwestern corner of the basin, in an area dominated by varieties of Revsund granites and partly covered by nappes of the Scandinavian Caledonides and units originating from the mid-Ordovician Lockne meteorite impact.

The Börön volcanic suite comprises locally well-preserved units where volcanic features such as agglomerates, layered ashes and pumice fragments can be recognized. In the east the rocks are affected by shear zones that probably are part of the Forsaån Shear Zone, which is a continuation of the regional-scale Storsjön-Edsbyn shear zone (Högdahl & Sjöström 2001). The suite ranges from basalt to rhyodacite in composition, with a weak trend of more felsic units towards the northwest. Major, minor and trace elements suggest formation in an island arc setting with continuous fractionation trends for most elements between 47 and 69 wt% SiO₂.

An ion probe U–Pb zircon age determination of a rhyodacite unit in the southeastern part of the suite yielded an age of 1882±3 Ma, which is within errors similar to a 1888±6 Ma age of a calc-alkaline volcanic unit in the tectonically emplaced Hamrånge syncline to the southeast of the Ljusdal Lithotectonic Unit (Högdahl & Bergman 2020).

The 1.88 Ga age and calc-alkaline island arc signature of the Börön volcanic suite in the southwest of the Bothnian Basin, together with the similar aged rocks of the Hamrånge syncline in the southeast suggest a common origin of the units, and we suggest that they represent remnants of an island arc formed during early convergence in the Bothnian Basin, which eventually led to the closure of the basin c. 20–30 m.y. later.

References

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