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Evidence for a ca 1.86 Ga continental margin in the Baltic Sea region: rock chemistry, U-Pb ages, and Nd and Sr isotopic data

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The concealed basement of the Mid-Lithuanian domain (MLD) is considered to be part of a larger Precambrian unit within the western East European Craton (EEC), the Mid-Baltic belt (MBB), established by Bogdanova et al. (2015). New data on rock chemistry, U-Pb ages, and the Sm-Nd and Rb-Sr isotopic systems allow to subdivide the MLD into distinct parts, discuss their origin and correlate them with similar units on the Swedish side.

The MLD can be subdivided into two parts: NW and SE. The NW MLD magmatic rocks crystallized from 1.86 to 1.83 Ga and were subsequently intruded by 1.81-1.80 Ga granitoids and charnockitoids. The NW MLD samples have SiO₂ contents between 48 and 71 wt.% but have similar initial ϵ_{Nd} values at -1 to -2, while their initial Sr isotope ratios scatter. Nd isotope data suggest either an enriched mantle source, or a mantle magma that was mixed with older crustal material.

The SE MLD magmatic rocks originated from a slightly depleted mantle source from 1.87 to 1.82 Ga. At 1792±9 Ma, they were intruded by gabbro-norites which in turn were crosscut by thin veinlets of microgabbro-norite at 1758±11 Ma. The SE MLD rocks have positive ϵ_{Nd} (+1 to +3) and undisturbed Rb/Sr systems suggesting mantle-derivation, with the variation in composition (mafic to felsic) due to fractionation rather than crustal contributions.

The SE MLD magmatic series with oceanic island arc affinity correlate well with the ca 1.85 Ga Fröderyd metavolcanics of the Vetlanda-Oskarshamn belt (Salin et al., 2021) in SE Sweden, while the NW MLD rocks are similar to the TIB-0 (1.86-1.85 Ga) Askersund granitoids (cf. Salin et al., 2021) in the southern Bergslagen area. The younger (1.81-1.79 Ga) intrusives in both areas are time-equivalents of the TIB-1 magmatism on the Swedish side. Thus, the MLD as well as its counterparts on the Swedish side of the Baltic Sea, the TIB-0 magmatism in the southern Bergslagen area and the Vetlanda-Oskarshamn belt, may be assigned to the same Mid-Baltic Belt, representing an active, south-facing continental margin established at ca. 1.86 Ga. The shape and outline of the Belt was affected by the Fennoscandia-Sarmatia collision at ca. 1.82-1.80 Ga, the 1.81-1.76 Ga TIB-1 magmatism, as well as by later Mesoproterozoic intraplate magmatism.

Bogdanova, S. et al., 2015. *Precambrian Research* 259, 5–33.

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