

Compositional variation in the Finnish rapakivi granites: the Bodom and Obbnäs plutons, southern Finland

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The 1.64 Ga Bodom and Obbnäs plutons represent the westernmost intrusions of the classic Wiborg rapakivi area and occur on opposite sides of a SW-NE trending fault ~20 km apart from each other. Our petrographic, geochemical, and Nd isotopic data reveal important differences between the plutons.

The Bodom pluton comprises three varieties of porphyritic granite (hornblende, hornblende-biotite, and biotite granite) and an even-grained hornblende-biotite granite whereas the Obbnäs pluton is composed of a porphyritic hornblende-biotite granite. Both plutons show the typical mineralogical traits of the Finnish rapakivi granites, save for the presence of accessory titanite in Obbnäs. The Obbnäs pluton is thus more oxidized in character than the Bodom pluton.

Geochemically, both plutons show the typical features of subalkaline A-type granites. Compared to Bodom, Obbnäs is enriched in CaO, TiO₂, MgO, and FeO, and depleted in SiO₂ and K₂O. On average, the Bodom pluton has Fe/(Fe+Mg) of 0.94, Rb/Sr of 3.14, and 844 ppm Ba, whereas the values for Obbnäs are 0.87, 0.89, and 1449 ppm, respectively. Nd isotopic data show subtle, yet probably significant, differences between the two plutons. The mean ϵ_{Nd} (at 1.64 Ga) values are -0.9 ± 0.1 (Bodom, n=4) and -1.7 ± 0.3 (Obbnäs, n=5), and T_{DM} model ages 2.02 ± 0.05 Ga (Bodom) and 2.07 ± 0.03 Ga (Obbnäs).

Our data suggest that the Bodom pluton was crystallized from a magma with a slightly more juvenile and reduced character than that of the Obbnäs pluton. Whether these differences relate to different deep crustal domains juxtaposed at the fault zone, compositional variation in the deep crust, or open-system processes during magma evolution is yet to be determined.