Archean evolution of Volgo-Uralia – isotopic constraints

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Volgo-Uralia, which forms the eastern part of Baltica, is buried beneath a thick sedimentary cover, and the knowledge about its basement is based on geophysical data and drill core materials alone. Neoarchean granulite- and high amphibolite facies rocks of supracrustal and plutonic origins apparently dominate this complex high-grade crustal terrain. They compose separate domains and belts that were more or less reworked in the Paleoproterozoic.

Combining U-Pb, Hf and O isotope investigations of zircon from metasedimentary rocks and the textures of individual zircon crystals, we found several groups of detrital zircon with ages from 3.8 to 2.7 Ga; the latter indicating the maximum age of sediment deposition. Major metamorphic reworking is constrained to 2.6-2.5 Ga, which age is similar to that of a period of extensive bimodal magmatism in the region. The Hf crustal provenance ages of the zircons are dominantly Mesoarchean, while a minority has an older, up to Eoarchean crustal provenance. Much of the zircon has mantle-like δ^{18}O compositions, demonstrating a dominantly juvenile nature of their host rocks.

Further work will shed more light on the architecture and evolution of Volgo-Uralia, and its relation to Fennoscandia and other crustal segments.

References:

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