

(U-Th)/He Ages of Detrital Zircons From Paleozoic Strata of the Severnaya Zemlya Archipelago (Russian High Arctic): implication for testing the different tectonic models

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The Severnaya Zemlya archipelago comprises four main islands (Pioneer, October Revolution, Komsomolets and Bol'shevik), along with numerous other small islands, islets and island groups. It contains rocks varying in age from Late Cambrian to Permian and is a key area for understanding the tectonic evolution of the North Kara and Laptev Sea basins.

Various models have been proposed for the Paleozoic history of the Kara Terrane:

- 1) Kara terrane inferred as a part of a larger continent block called Arctida (Zonenshain et al, 1990).
- 2) Lorenz et al. (2008a, 2008b) described the Kara terrane as a marginal part of Baltica.
- 3) The Kara Terrane existed as a separate terrane or microcontinent during the Paleozoic (Bogdanov et al., 1998; Gramberg & Ushakov, 2000; Metelkin et al., 2000, 2005)

Here we present (U-Th)/He ages of detrital zircons collected from Ordovician – Devonian strata of Pioneer and October Revolution islands) along with Sedov Islands. All detrital zircon (U-Th)/He ages are older than age of host rocks indicating the samples were not buried deep enough (less than ~6-8 km) to reset the (U-Th)/He isotopic system. Thus, (U-Th)/He ages indicate the exhumational history of the clastic source region. The (U-Th)/He detrital zircon ages from Ordovician- Silurian strata, with a peak age of ca. 465 Ma, suggest the primary source region was located within the Caledonian Orogen, which is unknown in the modern vicinity of Severnaya Zemlya. The abundance of Caledonian (U-Th)/He zircon ages in the studied samples suggests a continuation of Caledonides northeastward across Barents shelf as previously inferred from pre-Permo-Carboniferous rifting restoration and illustrated by geophysical data. In contrast to older clastic rocks, (U-Th)/He detrital zircon ages from the Devonian deposits show a mixture of Ellesmerian and Caledonian ages with age peaks at ca. 365 Ma and 465 Ma and the youngest grains nearing the depositional age of the strata. The ages suggest the clastic source area of Devonian sandstones likely contained rocks affected by both Caledonian and Ellesmerian orogenies. Our study suggests that throughout the Paleozoic the Severnaya Zemlya Archipelago was likely linked with the margin of Baltica, which supplied it with erosional detritus from the Caledonian Orogen rather than a separate terrane with unknown provenance.