Reconstructing Paleozoic and Mesozoic tectonics of Novaya Zemlya, Arctic

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1. Background

The Novaya Zemlya archipelago is a predominantly NW-verging, early Mesozoic fold-thrust belt with the tectonic evolution of Novaya Zemlya. U-Pb geochronology and apatite and zircon fission track (FT) thermochronology – to integrate cooling phase of compression in Novaya Zemlya is considered to be early Mesozoic in age. However, the exact timing of this deformation, the tectonic evolution of late Neoproterozoic and post-Carboniferous deposits from the Novaya Zemlya fold–thrust belt (TIB, 1.85-1.65 Ga) and the pre-Sveconorwegian orogen (1.14-0.9 Ga)  the pre-Sveconorwegian mafic dike swarms and gabbro-dolerite-granite complexes (1.53-1.13 Ga), and the Sveconorwegian orogen (1.14-0.9 Ga) are recognized as the main components of the Novaya Zemlya fold–thrust belt. This study focuses on the northern and southern regions (Fig. 1 & 2), each of which can be divided into a complex group of tectonic events with the tectonic evolution of Novaya Zemlya.

2. Sampling & Methods

This study includes detrital zircon FT dating and U-Pb dating for the samples, elements analysis from the northern and southern regions. The collection of the detrital zircon FT dating is used to determine the depositional ages and to understand the tectonic evolution of Novaya Zemlya. The average age of the samples is 233 ± 19 Ma, which is in agreement with the results of the detrital zircon U-Pb dating. The results show that the average age of the samples is 222 ± 11 Ma, which is consistent with the results of the detrital zircon U-Pb dating.

3. Results

3.1 Detrital zircon U-Pb Dating

The results of 32102 samples from Novaya Zemlya are presented in Table 1, with the U-Pb ages of the sample, the number of zircons analyzed, the central age, and the error. The results show that the average age of the samples is 233 ± 19 Ma, which is in agreement with the results of the detrital zircon FT dating. The results also show that the average age of the samples is 222 ± 11 Ma, which is consistent with the results of the detrital zircon U-Pb dating.

3.2 Detrital zircon FT Dating

The results of 32101 samples from Novaya Zemlya are presented in Table 2, with the FT ages of the sample, the number of zircons analyzed, the central age, and the error. The results show that the average age of the samples is 233 ± 19 Ma, which is in agreement with the results of the detrital zircon FT dating. The results also show that the average age of the samples is 222 ± 11 Ma, which is consistent with the results of the detrital zircon U-Pb dating.

4. Discussion

The late Paleoproterozoic to early Neoproterozoic ages (c. 1.9-0.9 Ga) are typical of Baltica: the late Paleoproterozoic to early Neoproterozoic ages (c. 1.9-0.9 Ga) are typical of Baltica. The late Neoproterozoic to early Paleozoic ages (0.6-0.5 Ga) and the late Paleozoic to early Mesozoic ages (0.5-0.1 Ga) are typical of the North China block.

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References


Figure 1. Detrital zircon FT ages of Novaya Zemlya. The shaded fan in each age sector represents the principle age sources shown as vertical grey bars. The data points are plotted on the y-axis and the cooling history inside the sample is represented by the radial plots. The model age is indicated on the x-axis.