

Basement Composition and Pre-Mesozoic Sedimentary Succession of Northern Barents Sea Revealed by New Data on Franz Josef Land Jurassic Conglomerates

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ABSTRACT

Franz Josef Land archipelago (FJL) located in the northern part of Barents Sea is a key in understanding the geology of the Barents Sea northern margin. Triassic, Jurassic and Cretaceous sedimentary successions crop out across the FJL archipelago. The pre-Mesozoic strata and basement of the northern Barents Sea margin was studied only by seismic data and is penetrated by a single well (Nagurskaya) on the Alexandra Land Island (FJL). There, Lower Triassic mudstones are underlain by Upper Carboniferous limestones and Lower Carboniferous clastic with stratigraphic unconformity. The Carboniferous rocks lie with angular unconformity on metasedimentary rocks presumably Neoproterozoic in age. Jurassic strata across FJL contain beds of matrix supported conglomerates. Here, we present a detailed study of petrography, geochemistry and isotopic dating of pebbles collected from the Jurassic rocks sampled on Hall and Graham-Bell Islands. The pebbles are very diverse in composition including metamorphic, magmatic and sedimentary rocks. The pebbles are composed of carbonates mainly significantly silicified, often with numerous cracks filled in by secondary calcite. Few studied carbonate pebbles contain moderately preserved foraminifera fauna of Late Carboniferous age. The magmatic rocks found in the studied pebbles are andesites and rhyolites with subordinate granites. Igneous pebbles experienced cataclastic metamorphism. The U-Pb dating of zircons from the 3 granitic pebbles obtained concordant age of 328.4 ± 1.1 , 345.3 ± 0.81 and 363 ± 1.1 Ma, which corresponds to the Famennian (Late Devonian) - Early Carboniferous age. U-Pb dating of another pebble fixed 2 concordant age of 282 ± 2 and 265 ± 2 Ma (Early and Middle Permian). Within the pebbles composed of terrigenous and metasedimentary rocks the most abundant are quartzite. The U-Pb dating of detrital zircons from the 3 pebbles of quartzite points on their maximum depositional age as latest Neoproterozoic - Early Cambrian. Based on our study we can assume that the Mesozoic succession of FJL lies on two different structural units as following: 1) Late Neoproterozoic – Cambrian metasedimentary rocks penetrated by Late Devonian –Early Carboniferous granites which can be considered as a basement, and 2) Weakly altered sedimentary cover (Carboniferous and possibly younger in age). This research was supported by RFBR grant 16-55-20012 & The Research Council of Norway grant 254962/H30.