



Age and provenance of the Mesoproterozoic strata of the Timan Range: Constraints from U-Pb-Hf detrital zircon study

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The Mesoproterozoic rocks of the Timan are subdivided based on their lithology into two units predominantly siliciclastic and carbonate in composition respectively. U-Pb detrital zircon ages from six samples representing the Mesoproterozoic siliciclastic unit were analyzed using LA-ICP MS facility at the Oslo University.

Three major groups of detrital zircons are recognized in all samples: the Archean – Paleoproterozoic, Early Mesoproterozoic, and Late Mesoproterozoic. Around 45% of all detrital zircons are Archean – Paleoproterozoic in age (first group) with predominance of Paleoproterozoic detrital zircons, whereas grains of Archean age are sporadic. The second group, with detrital zircons varying in age from 1600 Ma to 1300 Ma comprises 34% whilst Late Mesoproterozoic detrital zircons (third group) comprises 21% of all dated grains. Ages of dated zircons from the first and second groups correlate well with known igneous and metamorphic rocks of the East European Platform (EEP) basement. Moreover, coeval in age Archean – Paleoproterozoic magmatic and metamorphic complexes widely distributed in the northwestern part of the EEP (in present coordinates) and likely represent one of the source of the studied siliciclastic rocks of the Timan.

The Late Mesoproterozoic zircons (group 3) is difficult to associate with magmatism within the EEP. However, age peaks ranging from 1300 to 1000 Ma are known in the Sveconorwegian orogen and its continuation in the Grenville orogen in North America.

The Lu-Hf isotope-geochemical characteristics demonstrate that most of zircons fall between the evolution lines of the depleted mantle (DM) and chondrite reservoir (CHUR). Several zircons are located close to the DM, pointing to formation mainly from juvenile crust. Some zircons fall below the line of isotope evolution of the chondritic reservoir (CHUR), which indicates their origin from evolved ancient crust.

Our study shows that the clastic rocks of the Meso- to Neoproterozoic succession of the Timan Range had two main provenance areas – EEP basement and Sveconorwegian orogen.

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