Review

of the *member* of the dissertation council for the dissertation of Brusnitsyna Ekaterina Alekseevna on the topic: «Reconstruction of provenance for the Riphean clastic succession in Middle Timan: constraints from integrated analytical studies», submitted for the degree of *Candidate of Geological and Mineralogical Sciences* in scientific speciality 1.6.1. General and regional geology. Geotectonics and geodynamics.

TEXT OF THE REVIEW

The research represented by the thesis uses U-Pb and Lu-Hf dating of detrital zircon grains, sandstone petrography and U-Pb dating of detrital rutile from 40 samples, collected from the Precambrian clastic rocks within the Middle Timan area of Russia, to determine the age of the Precambrian sedimentary sequences within this region, reconstruct the provenance area sourcing the clastic materials during the Late Mesoproterozoic-Neoproterozoic, and refine the existing paleogeographic models for the eastern margin of Baltica during this time.

The thesis is both well-organized and well-written, and appears to fulfill the objectives required by the planned thesis research proposal.

The followings are some comments which may improve the quality of the thesis.

1. The thesis needs an Abstract or Summary.

2. The maps like Fig. 1.1 require coordinates.

3. Thrust faults on the map require symbols to indicate thrust vergence. I guess these are further clarified by your own work along the thesis.

4. All important geographical names in the text have to be introduced on a detailed geological map.

5. A major deficiency of the thesis is a lack of field evidences, including field photos and field sketches showing geological sceneries, as well as stratigraphic, lithological and structural information and relationships. This is while in the introduction the author informs the reader about her field work during a mapping project. There is also no sign of the maps to show such detailed effort to support the geological context of the thesis.

6. A section on access roads, morphology, climate and filed seasons would help the readers interested in the study area.

7. The Grenville orogeny occurred in Late Mesoproterozoic to Early Neoproterozoic (ca. 1250-980 Ma). Figure 4.9 (modified after Rivers, 2012, 2015) almost covers the whole period of this orogeny, while it shows separation of Laurentia and Baltic until ca. 950 Ma, and apparently the Grenville starts in 1100 Ma.

8. The Vizingskaya and Lunvozskaya Formations respectively show 867 and 885 Ma youngest grain cluster (maximum depositional ages) for rutile samples. These ages do not correlate with age constraints in the stratigraphic columns of Fig. 1.4 of thesis and Fig. 4 of the paper. Shouldn't you refine the ages for these Formations on stratigraphic charts?

9. As indicated in the thesis, the rocks have undergone greenschist facies metamorphism. Some of the samples from these rocks also indicate obvious deformation (see Fig. 3.2e, Fig. 3.3 and Figs. 3.8d, e). How would such metamorphosis and recrystallization had not affected the original sedimentary texture of the sediments and the resulting sedimentological interpretations?

10. I understand that the thesis is about provenance analysis and dating of a Precambrian terrane, however a short section on regional tectonics and structural geology compiled from the published knowledge would help the reader to have a better understanding about the geology of the study area.

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11. How do you explain the complete clastic material route change between “before 1300 Ma” and “900-1000 Ma” (Fig. 4.10)? What are your evidences for the earlier phase? Do you compare or correlate this earlier phase with a sedimentation gap in your study area?

12. For the sedimentary environments of the Formations you refer to other researchers; does your study confirm or disprove these suggestions?

Considering the above, I believe that

Brusnitsyna Ekaterina Alekseevna`s dissertation on the topic: «Reconstruction of provenance for the Riphean clastic succession in Middle Timan: constraints from integrated analytical studies» meets the requirements of speciality 1.6.1. General and regional geology. Geotectonics and geodynamics.

Her scientific qualification work resolves a scientific problem important for the development of the relevant field of science.

No violations of paragraphs 9 and 11 of the Order No.11181/1 as of November 19, 2021 "On the Procedure for Awarding Academic Degrees at St. Petersburg State University" have been detected.

The dissertation meets the criteria of dissertations for the academic degree of candidate, established by the specified Order. The dissertation is recommended for the defense at St. Petersburg State University.

Member of the dissertation council
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Mohammad R. Ghassemi,
May 18, 2024