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## Reviewer's Report

on the PhD thesis

### **Mechanisms and time scales of formation of ribbon continents**

by Reza Syahputra

The present PhD thesis deals with the origin and further development of ribbon microcontinents on the example of three terranes of the Bohemian Massif, detached from the original Avalonian-Cadomian orogenic zone on the northern edge of the Gondwana during younger Neoproterozoic to Lower Ordovician. These are the Kdyně pluton in the southwestern part of the Teplá–Barrandian unit, the Příbram–Jince basin in the central part of the Teplá–Barrandian unit, and metagranites and orthogneisses in the Moldanubian unit. These units represent different stages of initial extension and microplate formation, and they also represent different crustal levels. These units were investigated using a variety of field and analytical methods, which included structural mapping, stratigraphic and sedimentological analysis, and in particular anisotropy of magnetic susceptibility. Metagranites and orthogneisses were dated using the U–Pb method on zircons by ICP-MS. The work is a contribution to the knowledge of the development of ribbon microcontinents even on a global scale because the published papers by the other authors have mainly dealt with the accretion of microcontinents and their collision with continental margins.

Considering that the work is focused on the structural aspects of the creation of ribbon microcontinents, it must be stated that the working methods were chosen very fortunately, as they enable the given goals to be met almost completely.

Comparison of the author's work results with other Avalon terranes show the key role of the thermal and rheological structure of the lithosphere in the formation of ribbon microcontinents. In the case of Avalonia, a pre-existing suture controlled its complete separation from Gondwana, while the Cadomian terranes, including the Teplá–Barrandian and Moldanubian units, recorded a complex evolution of lithospheric extension lasting several tens of millions of years and probably remained part of the Peri-Gondwanan shelf throughout the Lower Palaeozoic.

The thesis is very well written, both from a factual and a formal point of view. It is logically built and has a corresponding structure. It is written in good English, at least as far as I can tell as I am not a native speaker. The work contains very few typing errors and other formal imperfections.

Since the author is not a specialist in either magnetic anisotropy or rock magnetism, the work contains minor shortcomings in these fields, which, however, do not reduce the overall high level of the work. If the author decides to publish the work or parts of it, it would be desirable to avoid them. They are listed below.

Page 20

The sentence “*The magnetic minerals in rocks will be aligned parallel to the Earth’s magnetic field as the temperature decrease below Curie temperature*” is not quite true. The magnetic minerals are mostly oriented by other mechanisms like recrystallization, deformation, etc., the sentence is true only in the case of very fine-grained sediments.

The Curie temperature of magnetite is about 585 °C, not 520-560 °C.

Page 38

There are several specimens having mean susceptibility about  $-5 \times 10^{-3}$ , which seems me highly unlikely. Namely, so strong diamagnetism is not known, it is mostly in the order of  $10^{-5}$ . Please, check whether this is not mistyping.

Page 46

Curie temperatures between 483 °C and 538 °C suggest strong admixture of Ti in the spinel lattice. It would be better to call this mineral titanomagnetite rather than magnetite. I realize that some orthodox mineralogists do not accept the term titanomagnetite, but I can assure you that this term is quite common the in rock magnetic literature.

Nevertheless, the find of the Curie temperatures between 483°C and 538 °C is extremely interesting, because such low Curie temperatures are rare in plutonic rocks. They probably suggest existence of an original, magmatic mineral.

The author has convincingly shown that he is capable of independent creative scientific work and therefore meets the criteria for the award of the PhD degree. I recommend the thesis to be passed to the defense and after its successful defense I recommend awarding him the PhD degree.

February 22, 2023

Prof. RNDr. František Hrouda, CSc.