
Review of the PhD. thesis “The origin of compositional and textural zoning in shallow-level granitoid plutons” submitted by Jakub Trubač (Charles University in Prague, Faculty of Science, Institute of Petrology and Structural Geology)

With the thesis “The origin of compositional and textural zoning in shallow-level granitoid plutons”, Jakub Trubač did application for granting him the title Doctor Philosophiae. The main research topic of the thesis focuses on unravelling the zonality of selected small shallow level granitoid plutons in the Bohemian Massif. The research of emplacement of granitic rocks has been, and still is, an enormously interesting and important field. But the solution of the problem by combination of geochemical, geophysical and petrophysical methods as was shown in the thesis is not common in literature. Thus, the results of Jakub Trubač are important also from point of view of methodology in the area of granite research and, of course, for understanding their sources, timing and development. His results shed new light on the fabric of selected plutons joined with their genesis which consequently importantly contributes to principal geodynamic and geotectonic problems of the Bohemian Massif.

The manuscript is well edited and carefully prepared. The whole work, except summary of the main conclusions and enclosed 7 published articles, contains 397 pages including the references. The manuscript is organised into 3 chapters after introductory part with topics, classifications and aims. The summary conclusions are after presentation of articles. All used original articles with authorship or co-authorship of Jakub Trubač are presented in appendix but it is necessary to point out that main text body of work was completely taken from the original articles (exception is the first submitted article). In this sense the original text of thesis is very limited. The articles have collective authorship and therefore they particularly rise the problem of recognition of the own contribution of applicant although the part “methodology” indicates the types of used researched activities. First of all there is presented petrophysical work, gravimetry and afterward textural and geochemical evaluation. Does it mean that Jakub Trubač sampled and in this manner analysed all 7 plutons? Such work volume would be impressive. The second weakly presented item is the characteristics of magnetic minerals which is in articles partly discussed but according to me insufficiently. We need to know much on character of “magnetic contributors”. For example can subsolidus cooling breakdown of magnetite show any influence on orientation of magnetic fabric or

lineation? Such research requires detail microprobe research. Generally, I would be glad to see more comprehensive text e.g. on Říčany granite. In the thesis the problem of Říčany granite is spread in three articles and two chapters. But according to me the article I-2 is in fact a description of detail mineralogy of Říčany granite, but does not contribute much to the notified theme in running headline “Differentiation and pluton zoning”. The paper I-2 is more devoted to methodology and general aspect of importance of accessory minerals in granites than to solution of pluton zoning. Anyway work and new ideas from Jakub Trubač is very qualified. Keeping under control such different data from geophysical and geochemical research, the field work, and participation in 8 papers in short time is significant. Anyway double presentation of papers in thesis with only short additional comments without owns really comprehensive text is, according to me, the weak point of work. On the other hand, very strong point of thesis is the presented results.

The first chapter is devoted to differentiation and pluton zoning of the Mississippian Říčany granite body within the Central Bohemian massif which is a shallow intrusion between Teplá-Barrandian and Moldanubian units. The article I-1, submitted paper in Journal of Petrology, is very complex work join with geochemical and geophysical research approach. There is presented model of origin showing that central part is weakly porphyritic with abundant enclaves surrounded by porphyritic type and crosscut by small bodies of Jevany granite. Questionable in model is the estimation of the depth of emplacement. How did you from geochemistry estimate the emplacement depth? Or did you use only recent geophysical data? Tourmaline is primarily in the “pegmatitic pockets” of weakly porphyritic type but boron increases also in marginal aplites. Tourmaline analyses have been done from MAL and MAL is derived from WPS? Does exist some geochemical evidence for such connection? Jakub Trubač proposed by his magnetic research based on 71 oriented samples a new very original model of the Říčany granite emplacement. He described and proposed magma ascent along a deep cylindrical conduit to recently eroded volcanic area. It seems a great idea. Faster vertical flow of low-viscosity magma was helical and this phenomenon is visible on AMS record. Did you use all 71 samples for magnetic anisotropy because on map there are not 71 measured points? Why in one erosion level an opposite magmatic lineation appears when the flow was helical?

The second chapter is presentation of internal structure and formation of Pennsylvanian Melechov granite body in the Moldanubian zone which is now a classical diapir emplaced into middle crustal rocks, to migmatites. The results from magnetic study have been directly used for strain calculation. The research on the Melechov is mostly oriented on structural

geology and petrophysics but almost missing the presentation of geochemistry. Is it possible to demonstrate the diapiric character of the intrusion also from geochemistry data or it is exclusively could be done by data from magnetic measurements?

The papers in the third chapter are devoted to small intrusions in various tectonic setting: Teplá-Barrandian zone (Čistá granite) and Moldanubian unit (Ševětín granite). Very important results on Čistá granites, especially the age determination, directly solve the geotectonic situation in the Lower Palaeozoic. I am glad that granite petrology in such manner was involved to solution of geotectonic scenario or to knowledge that of the Teplá-Barrandian block is in the upper plate position.

Formal mistakes:

- Fig. 13 is within part b (b is present as c); the same Fig3c in part III-3
- The headline of chapter II does not correspond to the headline in text and headline
- The second article is with many incorrect word interruptions with disturbing effects.

Queries to applicant in summary:

1. Have you sampled and geophysically and geochemically analysed all 7 plutons?
2. Does subsolidus cooling of magnetite show any influence on the orientation of magnetic fabric or lineation?
3. Are tourmaline analyses from MAL as a differentiate from the WPS? Does exist some geochemical evidence for such connection?
4. Did you use all 71 samples from Říčany body for unravelling of magnetic anisotropy?
5. Why within one erosion level there is opposite magmatic lineation when the flow is supposed to be helical?
6. Is it possible to demonstrate the diapiric character of intrusion also by geochemistry?
7. Does the age of Ševětín granite corresponds to the Deštná or Eisgarn granite? Could the deformation of these granites be Permian due to Permian activity in the Blanice graben? Does the character of the Ševětín granite show I- or A-type characteristics?

In summary, Jakub Trubač showed the ability to use various geophysical and geochemical research styles. His results are important not only for the granite genesis of the Bohemian Massif and the geotectonic position of granites but also for developing the research in mentioned geoscience branches. I strongly recommend that, after successful defence, the scientific degree of Doctor Philosophiae will be granted to Jakub Trubač.

In Bratislava, 24 August 2015.

RNDr. Igor Broska, DrSc.