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Review

Ph.D. thesis
Mgr. Radim Jedlička

The thesis of Mgr. Radim Jedlička “Tracing of the pre-exhumation history of strongly re-equilibrated high-ultrahigh pressure rocks in a collision orogeny” covers a significant part of research related to high- to ultrahigh-pressure (UHP) metamorphic rocks from the Bohemian Massif. Since the eighties of the last century, special attention was drawn to the basic and ultrabasic lithologies recognizing their petrological and geodynamical significance (e.g., Machart, 1984; Medaris et al., 1995). Although a lot of research is done on these exceptional rocks from the Bohemian Massif, the data that R. Jedlička has carried out, using novel techniques and methodologies, are very innovative.

The thesis is subdivided into 7 parts. Part I gives an important overview and an introduction to the studies undertaken. The next parts (2 to 6) refer to five published articles in highly ranked scientific journals, in two of which R. Jedlička appeared as a first author (Jedlička et al., 2015 – Journal of Petrology; Jedlička et al., 2017 – Lithos). Part 7, finally, sums up the compiled papers / studies and represents an integrated picture of the investigations carried out on the different HP and UHP lithologies of the Bohemian Massif.

In order to be upfront with: I was pleasantly surprised by the diligence of the applicant and to learn how careful and accurate he committed himself to this task with numerous “subprojects”, and I would like to recommend the Ph.D.-thesis to become accepted.

In part 1 of the thesis the applicant nicely introduces the reader to the objective target of his studies and illuminates various aspects of the subject. A very minor flaw –

hardly worth mentioning – refers to the writing style which shows some room for improvement; perhaps this part I was written a bit in hurry. Part II which focuses on the prograde history of UHP granulites nicely documents, that careful mineral chemistry studies on garnet and accompanying mineral assemblages and their evaluation are a key-prerequisite for understanding large-scale geodynamic processes, as for instance a complex subduction-related evolution. A special focus is on REE and major element zoning of garnet. In chapter 2.4 (page 18), the correct beam diameter and the step range should be 1 μm and 5-8 μm (instead of 1 mm and 5-8 mm, respectively). Part III focuses on an often controversially discussed question related to in-situ metamorphism; in the current contribution a focus is on eclogite bodies which are emplaced within felsic country rocks. An important component of the studies is pseudosection-modeling, but, in addition, this part of the thesis nicely documents also the importance of traditional PT-estimation methods (e.g., garnet-biotite thermometry, GASP barometry). It could be documented, that a very careful focus on mineral inclusions in garnet and the interpretation of prograde zoning profiles preserved, are a key for understanding the prograde history of the rocks. Only through such an integrated and accurate study it is possible to document that the felsic and mafic rocks from the Rychleby Mountains shared a joint metamorphic history. Some minor flaws: with respect to the mineral constituents of the felsic granulite (page 57), it would have been valuable to mention the respective amounts of plagioclase and K-feldspar as part of the rock volume (and not just mention “feldspars ~ 35%”). The total of the plagioclase analysis (see Tab. 3) especially if used for PT-estimation (GASP), is with 97.76 wt.% very low. Part IV has a special focus on inclusions in garnets and their compositional zoning; different rock types (UHP eclogite, garnet pyroxenite, garnet peridotite) and localities were considered. Only some very minor flaws in this part: omphacite by definition contains appreciable amounts of jadeite-component (e.g., $\text{Jd}_{50}\text{Di}_{50}$); on page 101 a “jadeite-rich omphacite (up to Jd_{44} and Jd_{47})” is mentioned, but this composition refers just to a normal omphacite. A “really jadeite-rich omphacite” would refer to a composition just within the omphacite field and close to jadeite (e.g., in the quad-jadeite-aegirine triangle). It is unclear why the mineral of the last column of Tab. 2 (page 103) is labelled hibschite. The sum is 99.87 wt.% (including 0.29 wt.% F and Cl), but hibschite should contain appreciable amounts of H_2O (as OH-groups), what is not the case. Part V of the thesis refers to a paper on eclogites that form – together with serpentinites – rock inclusions in gneisses. It focuses on four different localities of eclogites, gives a nice geological overview that essentially considers results of the current literature, and provides new insights into “low-geotherm rocks” of the Moldanubian Zone (a suggestion: it would have been advantageous to consider the different compositional fields of the amphiboles shown in the right diagram of Fig. 3). Part VI of the thesis represents an integrated approach of magmatic and metamorphic rocks from the Kutná Hora Complex and includes careful geothermobarometrical as well as geochronological studies. Part VII finally, very nicely, documents the impact of the entire thesis and brings together the different studies. It emphasizes an integrated picture with respect to petrological studies on a highly variable suite of rocks from the Bohemian Massif, from felsic ones on one hand side, to ultrabasic ones on the other. Part 7 concludes with a chapter on the geodynamic implications.

The thesis of Mgr. Radim Jedlička contains a huge amount of interesting and new information and I was really pleased to read it. He unquestionably was able to show that he [knows](#) his [business thoroughly](#). I am particularly pleased that his thesis, especially as documented in part 7, has a focus on interrelated projects and does not represent a compilation of disconnected separate studies. The parts of his thesis are logically structured, the language is clear, and the figures are of high quality. With respect to the tables which contain microprobe analyses, it would have been advantageous to mention the number of oxygens, on which the mineral formula was calculated. It was nicely done in tables 1 and 2 of part 4 (page 103), likewise also in Tab. 1 (page 60); others (e.g., Tab. 2 page 61, Tab. 3 page 78) contain only the information “per ox” or do not contain any information (e.g., page 124, 125, 146, 147).

In order to sum up: I was really impressed to see, that, in such an early stage of his career, R. Jedlička managed to publish five papers (two as first author). Strikingly, the journals chosen are characterized by a very high impact factor which is not easy to achieve.

In my opinion, the thesis of Mgr. Radim Jedlička, without any doubt, meets the high requirements necessary for obtaining a Ph.D. degree.

Ruhr-University Bochum, September 8th 2017
Hans-Peter Schertl