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Evaluation report of the PhD-thesis entitled:

Localization of deformation in rocks with existing anisotropy: consequences for geodynamic interpretations.

submitted by Zita Bukovská
for defence for the degree of Philosophiae Doctor
at the Univerzita Karlova, Praha

The thesis consists of four separate chapters/manuscripts/papers and one introductory and one concluding part, and a supplementary data appendix. The introductory and concluding parts describe the topic and outline of work and summarize the individual sections and put them into a general context. The topics of the four chapters are closely related and, in part, depend upon each other. The thesis as a whole certainly fulfils the requirement that the work should constitute a thematic unity. One chapter is already published as a paper in regional peer-reviewed journal, one manuscript is accepted in an international peer-reviewed journal, one manuscript is submitted to an international peer-reviewed journal, and one more is in preparation. The whole thesis and the individual chapters are well structured and well written in clear and correct English. The presentation of all figures is clear, instructive, and carried out very neatly and properly.

The contribution of the candidate to all papers clearly is the major intellectual input, because she is always the first author. Her contribution to the papers, the quality of the discussions of the data, and the conclusions are of a very good overall quality, so that the work is regarded as very good in the context of a PhD-thesis.

The first chapter (paper in preparation with first author Bukovská, with Jerabek as second author) describes deformation fabrics zone in the Tauern window. A structural evolution is reconstructed from field work, microstructural descriptions, and garnet and mineral assemblage pseudosection work. A protracted multi-stage deformation history at changing temperature conditions is inferred. The work has combined different analytical methods, which are well integrated. A prograde metamorphic path is concluded, and a kinematic interpretation is given, synthesizing the P,T-development, stretching lineations, and the tectonic framework of other authors.

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The second chapter (paper is already published with first author Bukovská and Jerabek, Lexa, Konopasek, Janak, and Kosler as additional authors) deals with kinematically different foliations, which have been interpreted as S-C fabrics in earlier works of the literature. The results show a difference in obtained metamorphic conditions and a monazite age, both of which result from different structural events, which have produced two distinct mica foliations and quartz fabrics. The paper adds to new tectonic interpretations of the region.

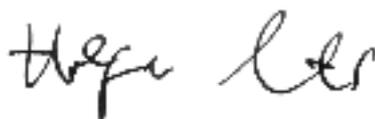
The third chapter (paper submitted with first author Bukovská and Jerabek and Morales as additional authors) represents the central theme and probably the highest quality contribution of the thesis. The work analyzes samples from the same location as those of a seminal work by Berthé et al. (1979), where S-C-fabrics have been first described and interpreted. The new study concludes that micro-cracking is responsible for the formation of shear bands (C and C'-planes), which are unrelated in terms of P,T-conditions to the formation of earlier mica S-fabrics. The approach chosen involves microstructural and textural quartz and mica work as well as pseudosection calculations of the different mica foliations. The interpretation of the fabric development is made in a rheological context of the crust and development of brittle and viscous transition structures. The analytical work and interpretations show that the candidate has a very good insight into the methods and problems of structural, rheological, and petrological work.

The fourth chapter (paper is accepted for publication with first author Bukovská and Wirth and Morales as additional authors) describes the detailed microstructures of quartz and mica interfaces in shear bands of samples of chapter 3. The conclusions, although not uncontroversial, based on SEM, light microscopy, and TEM work, indicate that dynamic porosity develops during pressure solution processes, which are responsible for the formation of these shear bands. The results are using state-of-the art technology at a high and in-depth-level and contribute to our understanding of solution transfer deformation in the earth's crust.

In summary, the dissertation thesis submitted by Zita Bukovská for the degree of Philosophiae Doctor is a very comprehensive, extensive, and original piece of work of high quality. Zita Bukovská has demonstrated that she is capable of applying different structural, petrological, microstructural, and textural analysis techniques with deep insight into data acquisition and interpretation. She has developed a synthesis of all results and an interpretation in a tectonic/structural context. The data set is of very good quality and volume, and represents a very interesting and creative piece of work.

I recommend that the thesis should be accepted for the defence for the degree of Philosophiae Doctor and that it should be forwarded to the Faculty administration with this recommendation.

Tromsø, August 30th, 2015



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