



PhD thesis assessment

Author: Petra Holá

Title: Metamorphism of gabbroic rocks of the Teplá-Barrandian Unit

This PhD thesis presents the results of whole rock geochemical, zircon and titanite geochronological and petrological and micro-structural data from gabbroic rocks that crop-out at the NW and SW margins of the Teplá-Barrandian Unit of the Bohemian Massif. The thesis is structured in the form of a monograph and includes findings that have been published in one peer-reviewed manuscript with the candidate as first author and material that has been either submitted or prepared for submission to other peer-reviewed with the candidate as both first author and co-author.

The thesis begins with a brief introduction on the problematic, identifying the field area and rocks of interest and some background on the interpretation of micro-textures that will be discussed later in the thesis. This section is relatively short and given the later focus of the thesis, particularly as relating to the late Cadomian evolution of the Teplá-Barrandian Unit may have benefitted from more detailed introduction of the Cadomian Orogeny and opening of Rheic Ocean. But otherwise touches the important issues that will be addressed in the thesis.

The following results section is presented logically from sampling strategy to petrography and mineral chemistry data, to geochronology and geochemical data and lastly equilibrium calculations for assessing metamorphic conditions. The petrographic descriptions are excellent and the graphical presentation of the micro-textures is of very high quality. The presentation of the geochemical and geochronological data is good, with some caveats noted in the questions/comments below. The equilibrium calculations are rather brief (considering the title of the thesis) and primarily only address the NW study area.

In the discussion part of the thesis these varied datasets are brought together to present a coherent model for the genesis of the gabbroic rocks their re-equilibration and significance to geodynamic models for the Teplá-Barrandian Unit. The data interpretation is reasonable and the final geodynamic model is built on the foundations of extensive recent research into the Late Neoproterozoic – Early Paleozoic evolution of the

Teplá Barrandina Unit by varied research teams; and although not radically different from these models, does precise the timing of key events in this region.

What follows are some general comments and specific questions to be addressed at the defense:

Language: The thesis is littered with wrong or poor word choice and missing articles that might have been picked up by more careful proof-reading (or simply by use of a grammar checker software). Examples purely from the abstract: 1st line “focuse” should be focus, 2nd line “constrains” should be constraints, 3rd line in the Bohemian Massif, 4th line “at the western margin of the Teplá Barrandian Unit”. 6th line TBU abbreviation not defined.

Why does Table 1 only list samples from SW study area? It may also have been helpful to also mark here which samples have undergone chemical, isotopic and chronological study.

Were any attempts made to better constrain metamorphic conditions in the DCC area? There are some conventional thermo-barometers that could be applied to the presented corona textures.

Interpretation of zircon data

- 1) It is acknowledged that many zircon grains show textural (and chemical) evidence for metamictization or Pb-loss and calculated weighted means often have slightly large MSWD values. Was any attempt made to filter the age data based on the observed textures, U content, or with stricter concordance tests to improve the age? Alternatively, have upper intercept ages been calculated for cases where there appears to be displacement along a discordia (e.g., PJ9 and PJ14).
- 2) It is interpreted that a significant bulk of the zircon was assimilated from the Blovice Accretionary Complex, if that were so, why is there a lack of older (or highly discordant) zircons in any of the samples? Around 20 % of all zircons in Blovice samples are Mesoproterozoic or older. Has discordant data not been included in figures or data tables?
- 3) It is curious that Variscan zircons are only identified in thin section. Were texturally similar zircons mounted but not analysed, observed in separate but not mounted, or not identified in separate?

Nature of the Cambro-Ordovician event

It is never clearly stated what is the interpretation of the Cambro-Ordovician ages, it appears to be implied that this is a thermal pulse that occurs as a late stage in the magmatic evolution of the studied samples. But

given the 20+ myr time gap between the older zircon ages and this event is it not rather a subsequent metamorphic event in line with the data that exists from meta-sedimentary rocks from both study areas? – Supplementary question, what is the evidence for a Cadomian metamorphism in the DCC, is this not constrained by Cambrian ages in felsic intrusives that you now consider suspect?

Relationship to other Cadomian terranes

The proposed geodynamic model is based on extensive contributions on the late Neoproterozoic to early Paleozoic evolution of the Teplá-Barrandian Unit, but since the model makes reference to larger-scale events, i.e., termination of Cadomian subduction and Rheic rifting. Have chemically and/or temporally similar magmatic rocks been identified elsewhere?

The above comments notwithstanding I believe the presented work is of an acceptable standard for a PhD thesis and the student deserves the opportunity to defend their thesis.

In Prague

Stephen Collett PhD.

Czech Geological Survey