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Review of the PhD Thesis "Magmatic and Volcanic Evolution of the Doupovské hory Volcanic Complex" submitted by Mgr. Vladislav Rapprich

I was asked by the Faculty of Science of the Charles University in Prague to evaluate critically the PhD thesis submitted by Mgr. Vladislav Rapprich. It is a great honour and pleasure to fulfill this request.

Mgr. Vladislav Rapprich submitted a cumulative PhD thesis dealing with the magmatic and volcanic evolution of the Doupovské hory Volcanic Complex. The thesis consists of four published and reviewed, one submitted, and one article in progress. Mgr. Rapprich is the first author of four articles.

To avoid a 're-review' of peer-reviewed articles I will organize my report in the following points:

- Mineralogy
- Geochemistry
- Age Determinations
- Volcanology and sedimentology.

Mgr. Rapprich realized his scientific work in the framework of several projects funded by different organizations. Like any project, this meant a chance for Mgr. Rapprich to develop his own ideas and a bundle of restrictions to deal with.

Mineralogy

A main topic of the thesis is the mineral chemistry of clinopyroxenes from the respective volcanic rocks of the Doupovské hory. All analyses were done, using EDX systems of different configurations. The representation of the results is clear and understandable. I missed a detailed description of the analytical conditions and a more intense discussion of possible analytical errors, keeping in mind that the publishing policy of some journals will not allow such discussions. In my opinion such a discussion is imperative, due to the fact that most of the recalculated clinopyroxene analyses suggest an 'oversaturation' of the minerals in Ca. The author used his own recalculation scheme to construct a: "*purified Wo-En-Fs system*", and confirms: "*Such procedure does not follow the IMA recommendations*" on the grounds that such method appeared to be necessary to allow a classification. A more intense weighing of the crystal-chemical and mineralogical consequences of the recalculation scheme applied is desirable. The interpretation of the analytical data follows international standards and is supported by the geochemical and petrographical features of the rocks under study. The author clarified the mineralogical character of the well-known non-disputed *augites*.

Mineralogical studies of other minerals are of subordinate character. One mineral apparently missing in the rocks of the Doupovské hory Complex is apatite. A discussion of this fact and its consequences for some geochemical features seems interesting and necessary.

Geochemistry

The author compiled 'old' published and unpublished geochemical data and new data. Of special interest is the detailed study of the succession of lavas at Úhošť Hill.

In the first place the author describes the compositional variation of the volcanic rocks using the TAS diagram after Le Bas et al. (1986). As in nearly all studies related to volcanic and pyroclastic rocks he has to manage the dilemma of altered and/or contaminated rocks rarely meeting the conditions of using the TAS diagram as a classification scheme. A more profound discussion of this topic seems necessary too. The interpretation of the main element composition in the context of the mineralogical and petrographical data is clear, concise and sufficient. The features and the relations of the cumulate-like lavas are nicely worked out.

The interpretation of the trace element and isotope geochemistry is impeded by a lack of sufficient data, but follows modern standards. In some cases the interpretation seems slightly exaggerated. For example the author interpreted the Nb/U values of ≈ 50 in the tephrite-basanite- and the picrobasalt unit correctly as an indication of nearly missing crustal contamination, but cannot exclude this possibility for the rocks of the lower and upper basalt unit with Nb/U-values of 63 and 33 respectively.

The very interesting geochemical evolution of two elements, potassium and titanium, in many volcanic rocks of the European Cenozoic Rift System is noticed by the author too. The proof of very small intrusions of potassium-rich rocks in the Doupovské hory Complex by air-borne geophysical methods is a valuable contribution to the understanding of the internal structure of such volcanic systems. Unfortunately the results of the geochemical studies gave no new hints to solve the "potassium- and titanium-puzzle", a question clearly far behind the intention of the PhD thesis of Mgr. Rapprich.

Age Determinations

The author reports several new high-quality K-Ar age determinations. The compilation of all available age data (K-Ar ages, stratigraphical ages) in combination with very detailed volcanological and sedimentological studies of the author allowed Mgr. Rapprich the development of a new and convincing model of the evolution of the Doupovské hory Volcanic Complex. This very good result is only very slightly affected by the not very convincing interpretation of the old K-Ar age of the stratigraphically youngest lava flow in the Radechov profile.

Volcanology and sedimentology

I was very impressed by the careful, extensive, and detailed work of Mgr. Rapprich on the complex volcanological and sedimentological features of the different areas in the Doupovské hory Volcanic Complex. A review of this work is far beyond my own experience and knowledge. I like to make the suggestion that after finishing the detailed work the author tries to compile and condense all volcanological, geochemical and petrographical/mineralogical data available to publish a new overview of the evolution of the Doupovské hory Volcanic Complex.

Finally I would like to encourage Mgr. Rapprich to widen his "scientific field of vision" courageously. His suggestions for future research are without any doubt well founded and important, but just as restricted to 'small scale' problems.

I consider the PhD thesis submitted by Mgr. Vladislav Rapprich as suitable for the defence and state without reservation that it fulfills the criteria necessary for obtaining a PhD degree.