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Evaluation of the Thesis of Peter Brož, submitted for obtaining the Ph.D. degree from the Charles University, Prague, Czech Republic.

The Ph.D. thesis of Peter Brož is entitled "Small-scale volcanoes on Mars: image analysis, numerical modeling, and comparison with terrestrial analogs" and is composed of 6 chapters followed by a conclusion. It is well written, and the quality of illustrations is remarkable and constant throughout the entire manuscript. It is clear from the reading of the preface of the manuscript that the candidate has played a decisive role into the definition on his own research project, which is a rare situation in European universities, where students are often largely oriented on research topics precisely defined by a research team, and prior to the recruitment of the Ph.D. student. This has a particular merit, and reveals in this case an exceptional degree of maturity for a Ph.D. candidate. In addition to this, it is, to my knowledge and at least for the last decades, the first Ph.D. thesis focusing on Mars surface morphology that is defended in Czech republic.

Whereas Mars is well known for its large volcanoes and prominent volcanic provinces, P. Brož has chosen to focus on minor volcanic edifices that are often comparable in size to their terrestrial counterparts, but did not receive much attention. With this investigation, he has clearly extended the knowledge of the volcanic activity of Mars, and documented further its diverse morphological expressions. He has demonstrated the scientific value of this original investigation and has illustrated the role of several parameters (lower gravity and lower atmospheric pressures) that are responsible for fundamental differences in morphology of scoria cones between Earth and Mars. He has also contributed to the emerging view that the igneous compositions at the surface of mars are more diverse than previously thought: there are not limited to tholeiitic or alkali basalts, but include various silica-rich volcanic materials.

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Moreover, the Ph.D. manuscript is based on 5 scientific papers published in major journals in the field. I note that these papers were generally accepted rapidly (with probably minor to moderate revisions), which is also a remarkable achievement for a young Ph.D. student. Peter Brož has relied on significant support for data processing and modeling for some aspects of his research, the contribution of authors and co-authors are very clearly mentioned. He has clearly benefited from these collaborations for his own knowledge and experience. He has set-up a small group of collaborators from other institute in Europe. I also applaud Peter Brož for having successfully involved Ondrej Čadek into the modeling aspects of this research.

This work represents a significant advance in understanding the volcanic activity and its morphological expressions on the silicate bodies in our solar system. The implications of this work will likely receive a great attention in the planetary science and volcanology communities. If one criticism should be formulated, I would have been delighted to see the implications of this work for other planets than Mars (e.g., Moon, Mercury, Venus, Io). What would be the morphology of scoria cones for other surface accelerations due to gravity than on the Earth and Mars? What would be the size of the scoria cone to reach the angle of repose as a function of gravity? Would it be possible to place all scoria cone morphologies in the solar system in a single plot depending only of gravity and volume? These questions will be certainly addressed in future papers, and the work of P. Brož will served as a both a reference and a source of inspiration.

For all these reasons, I consider the manuscript is suitable and siginficantly beyond normal expectations for a Ph.D. candidate. Its therefore fulfills the criteria necessary for obtaining the Ph.D. degree by the candidate.

David Baratoux