

Supervisor's report on PhD thesis

Title: Evolution of space weathering and its components – effect of solar wind and microimpacts on reflectance spectra of airless planetary surfaces

Author: Kateřina Flanderová

The topic of the Thesis is the space weathering phenomenon, namely the study of how different components of space weathering affect lunar and asteroid reflectance spectra. The work comprises two main parts - (i) the study of lunar swirls and (ii) laboratory experiments simulating space weathering and their interpretation. The Thesis is composed of a theoretical background on how space weathering affects reflectance spectra, a description of methods used in laboratory experiments and their interpretation, and a discussion of results. The three papers are included in the Thesis, together with a summary of their main results.

In the first part of her research, Kateřina studied reflectance spectra of lunar swirls, which are areas on the Moon shielded from the solar wind by a local magnetic field. These areas represent a natural laboratory where the effects of solar wind ions and microimpacts are separated. She studied seven swirls and published her results in Paper I.

From my point of view, the most valuable results come from the second part of her research - laboratory experiments with olivine and pyroxene pellets irradiated with ions and laser to simulate space weathering by solar wind and microimpacts, respectively. Kateřina successfully managed all parts of this complex research - from the design of experiments and sample preparation, through actual laboratory measurements with various instruments, to processing, analysis, and interpretation of results leading to new findings. The outcome of this effort is two peer-reviewed papers. The progress was not always straightforward, sometimes complicated by covid-related logistic issues or technical problems. However, Kateřina managed to overcome these obstacles and finished all measurements. When working on laboratory experiments, she had to cooperate with many researchers in several laboratories, which was also a valuable part of her PhD study.

In my opinion, the scientific results published in three papers and comprehensibly described in the Thesis are significant and demonstrate that the candidate is capable of independent scientific research. Apart from her research-related activities, Kateřina also smoothly fulfilled all study duties at Helsinki University and Charles University. Therefore, I strongly recommend accepting the submitted work as a dissertation thesis and awarding the PhD degree to the candidate.

Prague 24 October 2022

Josef Ďurech