

## Habilitation thesis reviewer's report

<b>Masaryk University</b>	Faculty of Science
<b>Faculty</b>	
<b>Field of study</b>	Physical Geography
<b>Applicant</b>	<i>Mgr. Kamil Láska, Ph.D.</i>
<b>Unit</b>	Department of Geography
<b>Habilitation thesis (title)</b>	<i>Response of biotic and abiotic environments on climate variability in the region of the Antarctic Peninsula and Svalbard Archipelago</i>
<b>Reviewer</b>	Prof. Dr. Joachim Reuder
<b>Unit</b>	Geophysical Institute, University of Bergen, Norway

### Reviewer's report (extent of text up to the reviewer)

The presented thesis is cumulative and consists of an introduction and a compilation of 10 papers/manuscripts, where Kamil Laska is the first author on 5 of them. Nine of the manuscripts are published in various journals (3 lower impact, 3 medium impact, 3 higher impact), the last one is submitted to a high impact journal in the field of meteorology (Quarterly Journal of the Royal Meteorological Society).

Thematically, the thesis can be separated in two main research directions, the detailed investigation of solar UV radiation in Polar regions by measurements and model approaches and the effects of weather and climate variability on eco-systems and eco-system components. In particular with the latter, the thesis covers a wide range of research topics and research fields and is thus interdisciplinary motivated and oriented. Focussing on areas where the ongoing and future expected effects of global warming and climate change are most pronounced, and considering the sensibility and vulnerability of the corresponding areas, the thesis is of high relevance. The two main study areas here, the Svalbard archipelago and the Antarctic peninsula are two of the hot-spots to study the effects on and changes in the Arctic eco-system.

The introduction of the thesis gives an excellent summary of the scientific background and creates the general frame in how the different articles contribute in their corresponding research fields and how they are interconnected. It is easy and very informative reading and clearly bridges the physical forcing (as radiation or temperature) towards the eco-system response (as e.g. glacier mass loss or biological activity). The description of the complicated and highly non-linear connections is also the appropriate motivation for exhaustive experimental activities to improve our process understanding. This brings me directly to another strength and importance of the presented thesis I would like to point out, namely its experimental component. The initialization, preparation and realization of both tailored, often shorter-term measurement campaigns and of longer-term measurement programs, in particular in the Polar regions with typically poor data coverage, is of vital importance for the improvement of our understanding of a sensitive and vulnerable environment. Unfortunately this is very often not credited appropriately in our scientific system, but we always should keep in mind that this is the pre-requirement for any deeper scientific analysis afterwards. By

combining both, well-planned and performed experimental activities and a thorough data analysis and interpretation, this thesis is a considerable contribution to Polar Research.

**Reviewer's questions for the habilitation thesis defence** (number of questions up to the reviewer)

- With respect to radiation you have been developing a powerful tool for the prediction of UV radiation in Polar regions that has been extensively tested and validated. Are there any plans or ideas to investigate potential future scenarios for the Arctic/Antarctic region with it?
- Page 20: “..... albedo between 88 and 100 %”; I am curious in which situation(s) the 100 % albedo occurred. Were there specific cloud conditions present that could have caused multiple reflections and photon trapping?
- Page 24, end of section 2.2.1: “...the other meteorological parameters, such as surface temperature and solar radiation have become less important with time...”; Do you think this development will continue or can you foresee situations (or a tipping point in the system) where those parameters get more important/dominating again?
- Page 26: How should I interpret a mean water temperature of -10,4 deg C; is this then a ice temperature or do we deal with supercooled water (which I could not believe)?
- Page 33: What is a “baric col”?
- Page 33: “.... most attention should be paid to the terrain representation in the model and the boundary layer schemes.....”. If you would have to quantify the relative importance of the two factors, what would you say (10%-90%, 50%-50%, 90%-10%)?

## Conclusion

The habilitation thesis submitted by Kamil Láska entitled “Response of biotic and abiotic environments on climate variability in the region of the Antarctic Peninsula and Svalbard Archipelago” *meets* the requirements applicable to habilitation theses in the field of Physical Geography and Meteorology.

In Bergen on 08.07.2016