Mapping Snowfields in the High Arctic by UAV

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Plant habitats are often influenced by small scale factors of substrate composition, topography and water sources that influence the availability of water and nutrients. In our lomg-term study to investigate the the distribution and dispersal strategies as well as the life cycle of psychrophilic algae (snow algae) it was necessary to get a better understanding of the structure of the snowfields where these algae live. Previous attempts to map snowfields using tethered platforms, such as kites or balloons, had proven to be difficult due to the very unstable weather conditions in the extreme environment of the High Arctic. The inherent problems of tethered platforms could be overcome with unmanned aerial vehicles (UAV).

During the August 2013 field campaign on the Svalbard archipelago we used an Asctec Falcon 8 UAV to map snowfields and glacier surfaces in the visible and thermal infra-red spectrum. The georeferenced images were assembled into photo mosaic maps which were also converted into digital elevation models. The photo mosaic maps and digital elevation models gave new insights into small-scale factors that influence the physical and chemical conditions of the snow algae habitat.

This presentation gives an overview of our results from the use of UAV for the mapping of snowfields in the High Arctic and discusses the risks and limitations of UAV in this extreme environment.