

Towards improved characterization of northern wetlands (or other landscapes) by remote sensing – a rapid approach to collect ground truth data

Magnus Gålfalk (1), Martin Karlson (1), Patrick Crill (2), and David Bastviken (1)

(1) Department of Thematic Studies - Environmental Change, Linköping University (magnus.galfalk@liu.se), (2) Department of Geological Sciences, Stockholm University

The calibration and validation of remote sensing land cover products is highly dependent on accurate ground truth data, which are costly and practically challenging to collect. This study evaluates a novel and efficient alternative to field surveys and UAV imaging commonly applied for this task. The method consists of i) a light weight, water proof, remote controlled RGB-camera mounted on an extendable monopod used for acquiring wide-field images of the ground from a height of 4.5 meters, and ii) a script for semi-automatic image classification.

In the post-processing, the wide-field images are corrected for optical distortion and geometrically rectified so that the spatial resolution is the same over the surface area used for classification. The script distinguishes land surface components by color, brightness and spatial variability. The method was evaluated in wetland areas located around Abisko, northern Sweden. Proportional estimates of the six main surface components in the wetlands (wet and dry Sphagnum, shrub, grass, water, rock) were derived for 200 images, equivalent to 10×10 m field plots. These photo plots were then used as calibration data for a regional scale satellite based classification which separates the six wetland surface components using a Sentinel-1 time series. The method presented in this study is accurate, rapid, robust and cost efficient in comparison to field surveys (time consuming) and drone mapping (which require low wind speeds and no rain, suffer from battery limited flight times, have potential GPS/compass errors far north, and in some areas are prohibited by law).