UAV and satellite data collection, processing and classification.

Summary

UAV data was collected in 6 different research areas and in total 14 different mapping missions were carried out. During mapping missions in some areas also ground survey was conducted using RTK GPS to collect ground control points to improve photogrammetric processing. UAV data was processed using Agisoft Photoscan software and orthophotos and digital surface models (DSM) were put together in Structure-from-Motion Multi View Stereo workflow. During missions different cameras and sensors were used: Sony alpha6000 RGB camera, MicaSense RedEdge multispectral (RGB, NIR, RE) camera and standard camera of Phantom 3 pro. Images collected with multispectral camera were also radiometrically corrected using Agisoft Photoscan and the reflectance panel images taken just before and after the flight.

Collected and processed UAV data was used to create landcover classification maps. Additional data layers were calculated in order to make the classification better. From DSM layers canopy height was calculated and 2 vegetation indices were calculated (tgi and vari when RGB camera was used; NDVI and NDRE when multispectral camera was used). All the data layers were organized in one raster stack for each mapped area. Training data was digitized in Q-GIS and labelled using landcover classes. Classification process was carried out in RStudio and using R language. Pixel information with labels was extracted from raster stack and then split randomly to training and test data. Using training data Random Forest classifier was trained for each area and then the classification was conducted and accuracies were calculated.

Parallel to UAV surveys vegetation mapping was carried out. Inside 10x10m squares very detailed vegetation survey was carried out where coverages by 1x1m squares were estimated in percentages. Comparison between vegetation survey and UAV classification results was done in Soosaare research area where 2 different UAV mapping campaigns took place.

Also satellite data and its usability was tested to monitor long time changes in the research areas. Google Earth Engine was used to search cloud free images for research area. Satellite images were downloaded and further processed in RStudio and R language. Two research areas were in focus and for both 26 different satellite images were used. Training areas were digitized and machine learning and Random Forest algorithm was used to classify the images. From classified images the timeseries was put together and also areas were calculated and respective graphs and trends were plotted.

Edgar Sepp

21.12.2018

Report is compiled within the project “Conservation and Restoration of Mire Habitats” (LIFE Mires Estonia; project no: LIFE14 NAT/EE/000126) which is supported by LIFE financial instrument of the European Community and Estonian Environmental Investment Centre