

Comparison of methods of field mapping and remote sensing in monitoring of invasive species

Kruttová Michaela, Mikita Tomáš, Matoušková Marie, Řepka Radomír

Mendel University in Brno / Faculty of Forestry and Wood Technology

Habitats and types of vegetation with the highest proportion of non-native species in the Czech Republic are generally those with a high level of **disturbance** or with a **fluctuating supply** of nutrients. The dynamics of the river system, frequent spills of water into the landscape and human management enable the spread of invasive species, which create **reproductive and competitive populations** and strongly negatively affect native species and natural habitats.

Timely, regular and accurate monitoring and information on the spatial structure of invasions is an essential tool for effective problem solving, both to target the eradication itself and to control the effectiveness of interventions. In this study, we compare the mapping of invasive plant species in the Poodří Protected Landscape Area by means of field mapping and remote sensing of the Earth. The results of the study will provide information on the applicability of data obtained by an unmanned aircraft in mapping invasive species in the PLA.



The selected area was scanned by a **DJI Mavic 2 Enterprise drone** with a **Parrot Sequoia multispectral camera**. This camera has a 16 MPix RGB camera with 4 separate cameras with a resolution of 1.2 Mpix.

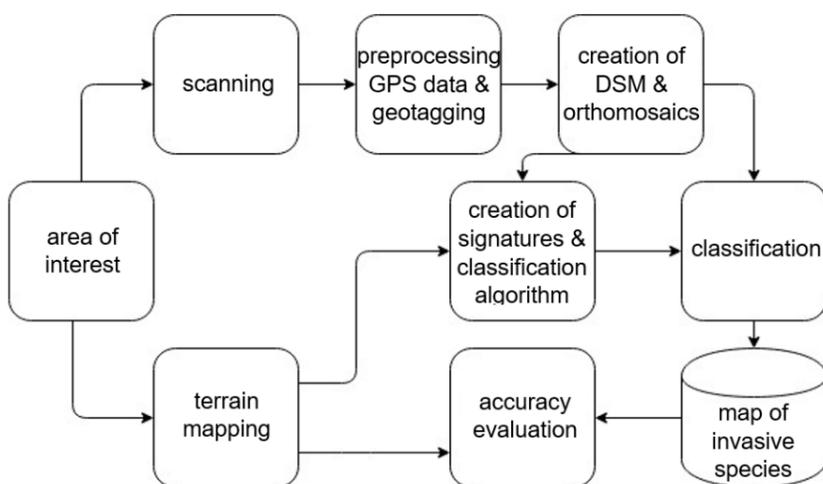
The data were processed in AGISOFT Metashape software into a **multispectral orthophoto** and a **digital surface model (DSM)** with a resolution of 6 cm. Based on the difference between the DSM and the data of the 5th generation digital relief model (DRM 5G), a standardized DSM (nDSM) was created in ArcGIS Pro, which directly expresses the height of vegetation above the bare surface.

Training sets were collected in the field using the Collector for ArcGIS application in a mobile phone. Were recorded polygons of the 3 most widespread invasive neophytes (*Solidago canadensis*, *Impatiens glandulifera* and *Reynoutria japonica*).

Then the images were classified using automatically controlled classifications Random Forest, Support Vector Machine and Maximum Likelihood Classification using the obtained polygons.



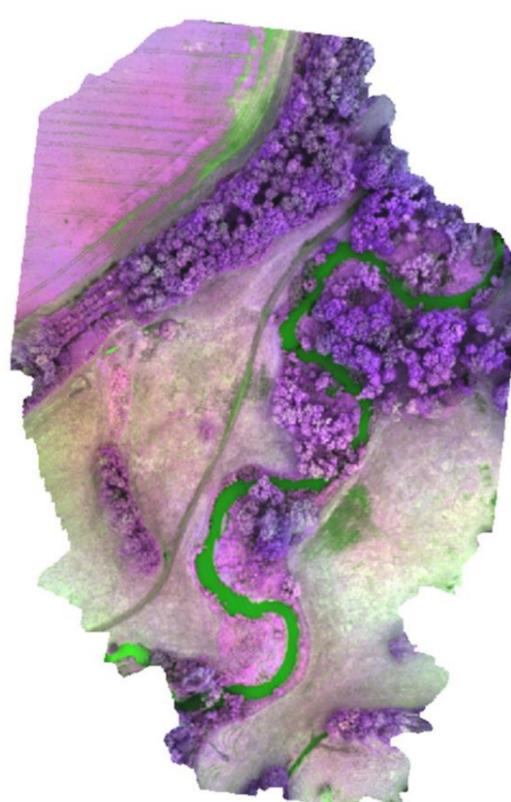
Digital surface model of the interest area.



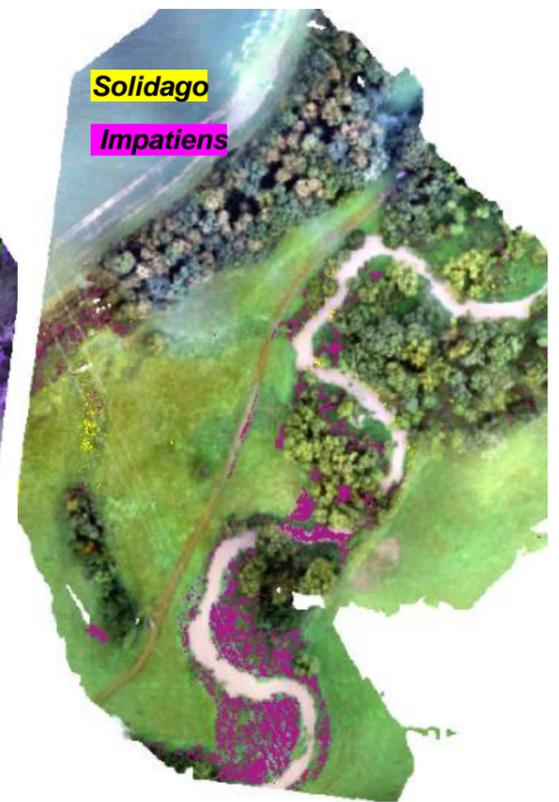
Scheme of the procedure for detection of invasive species using UAS.

The results so far show that automatic identification of invasive species is not very successful. Of the selected species, only the *Solidago canadensis* and the *Impatiens glandulifera* were successfully detected; there were too few training sets to identify the *Reynoutria japonica*. It is possible that in a given period it is only slightly distinguishable from other species of riparian vegetation. The best results were obtained by the **classification algorithm Random Forest**.

Scanning in different phenological phases is needed to obtain better quality results. Data from other campaigns have not been processed yet, so another control survey will be performed in 2021.



Multispectral orthophoto of the interest area.



Result of automatic classification.

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