Remote Sensing & Image Processing group (REMSENS)

Web: remsens.edi.lv

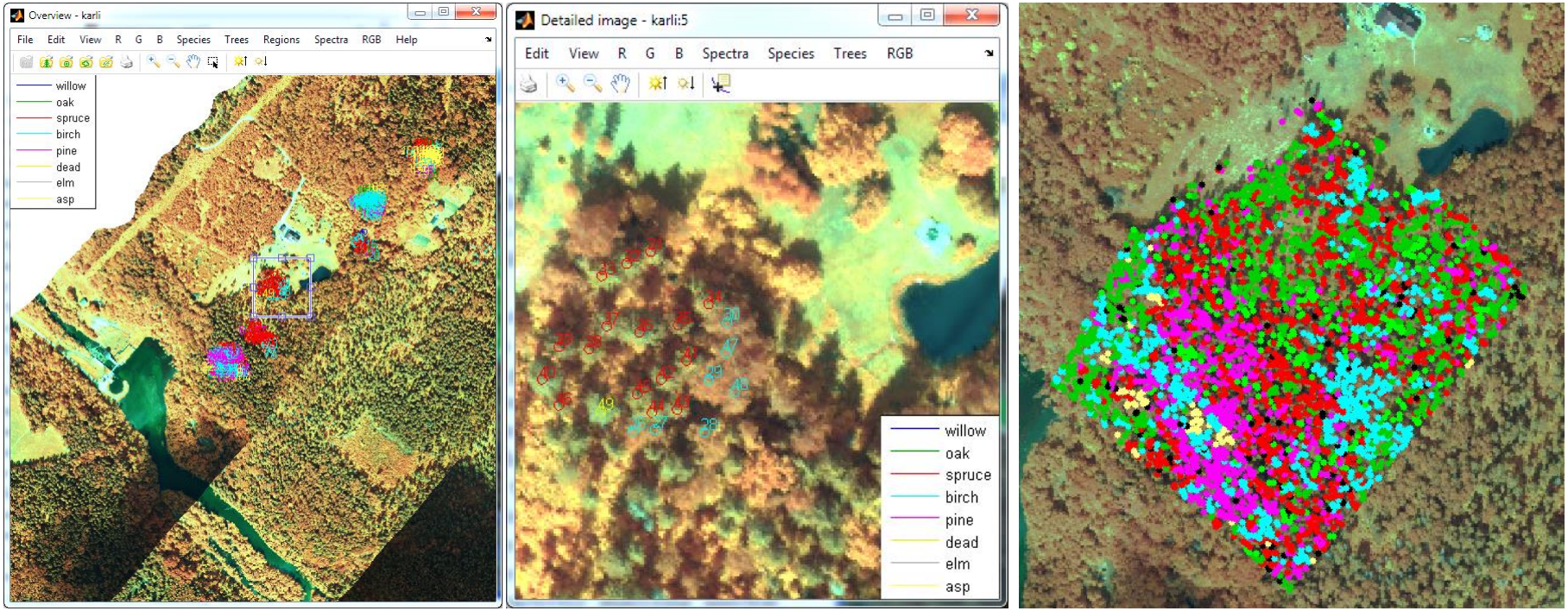
Institute of Electronics and Computer Science (IECS)
Riga, Latvia

Projects related to Earth Observation

- Development and software implementation of custom methods for image processing
- Finished projects
  - Identification of tree species by processing multispectral and LiDAR data
    International and national contracts with industry (2009-2011)
  - **Dviete** - Discrimination between meadow habitats (finding diversity of plants)
    EU LIFE+ project subcontractors (2011-2012)
  - **GudPils** – remote sensing image processing for smart cities (2014-2017)
  - **DynLand** - Dynamic land use monitoring by fusion of satellite data (2016-2019)
    European Space Agency project
- Ongoing projects
  - **WoodStock** - Satellite remote sensing- based forest stock estimation technology (2019-2022) **ERDF**
  - **MireClass** - Automated identification of mires and peatlands using multi-temporal satellite data (2019-2021) **European Space Agency project**

Identification of individual tree species (2010-2011)

(contract with Forest Owners Consulting Centre, Latvia)

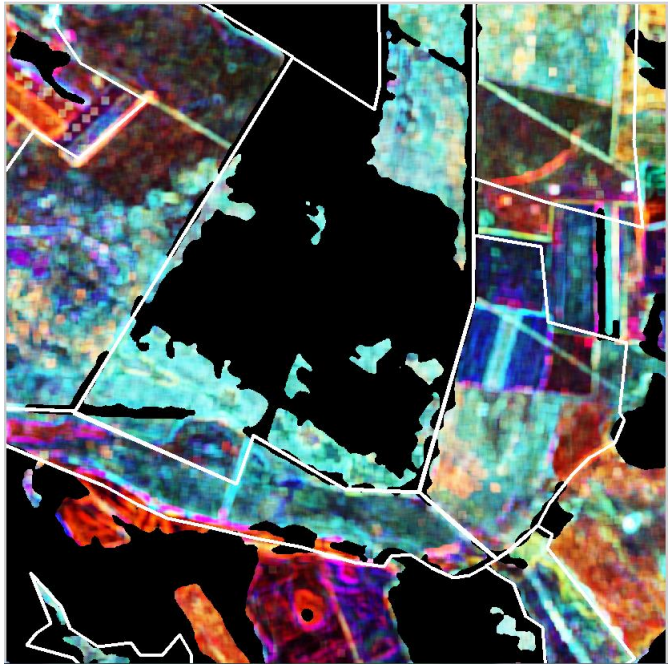


R. Dinuls, G. Erins, A. Lorencs, I. Mednieks, and J. Sinica-Sinavskis, "Tree species identification in mixed Baltic forest using LiDAR and multispectral data," IEEE J. Sel. Topics Appl. Earth Observ. Remote Sens., vol. 5, no. 2, pp. 594–603, 2012.

Analysis of meadow habitats in Dviete floodplain (2011-2012)

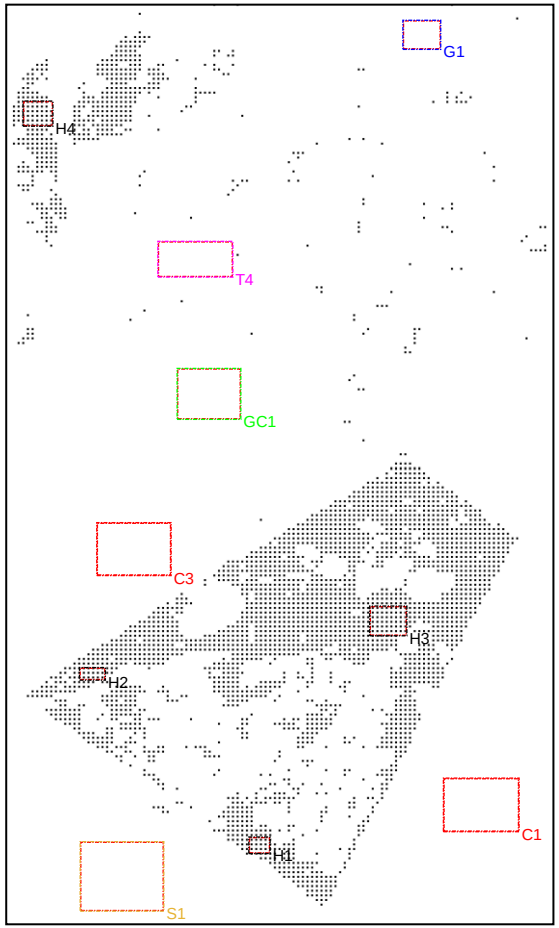
(subcontractor for EU LIFE+ project DVIETE)

Detecting biodiversity



R. Dinuls, A. Lorencs, I. Mednieks. "Using Consolidated Covariance Image for Discrimination of Habitats," Proceedings of the 13th Biennial Baltic Electronics Conference, Tallinn, Estonia, pp.299-302, 2012.

Detecting invasive species (Hogweed) in multispectral image

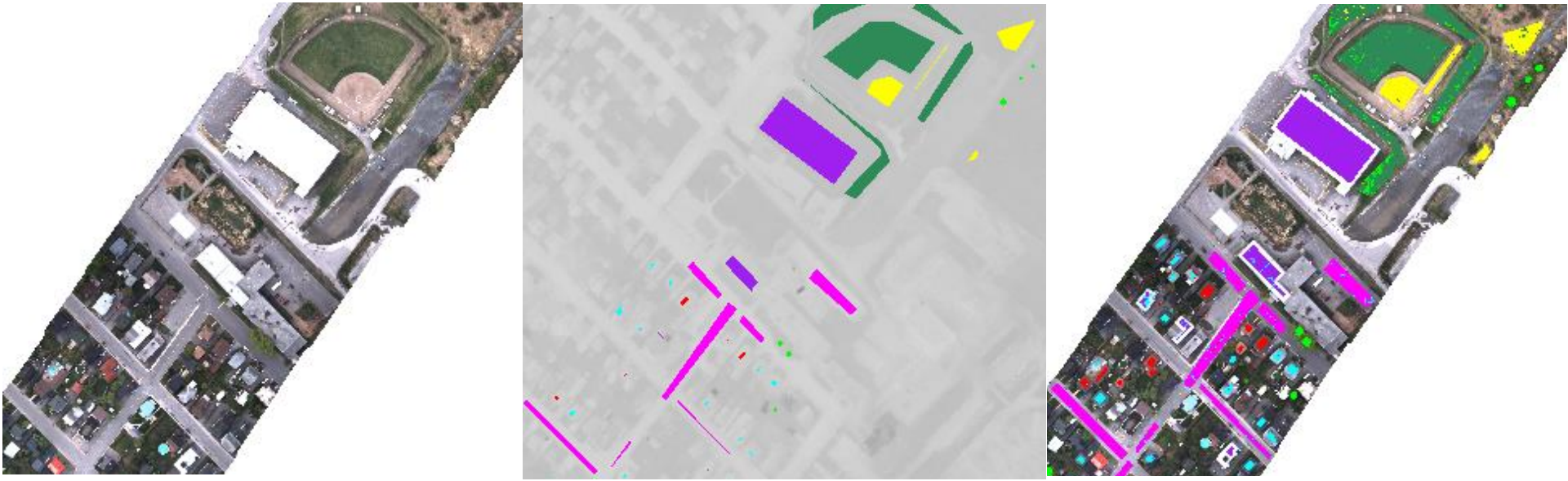


Lorencs, A., Mednieks, I., Sinica-Sinavskis, J. 2014. Simplified Classification of Multispectral Image Fragments. Electronics and Electrical Engineering. Kaunas: Technologija, 20(6), pp. 136–139.

GUDPILS - Development of technologies for secure and reliable smart city (2014-2017)

(National Research Programme SOPHIS)

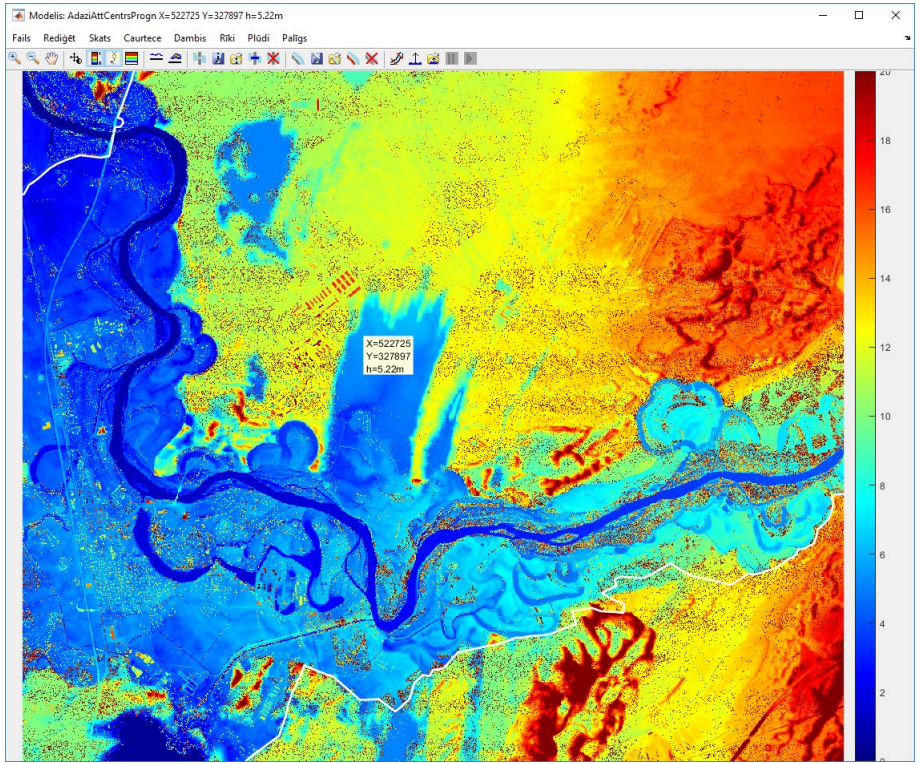
Data fusion

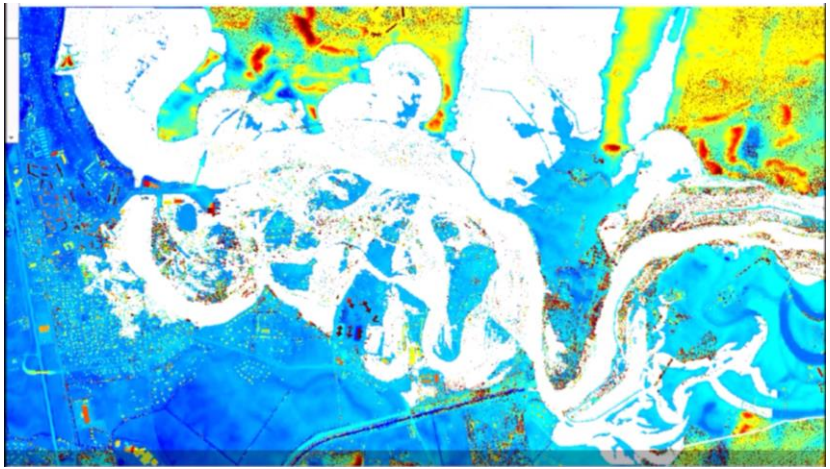


Lorencs, A., Mednieks, I., Sinica-Sinavskis, J., 2015. Classification of Multisensor Images with Different Spatial Resolution, Electronics and Electrical Engineering, Vol. 21, No. 5, pp.81-85.

GUDPILS - Development of technologies for secure and reliable smart city (2014-2017)

Simulation of flooding from LIDAR data

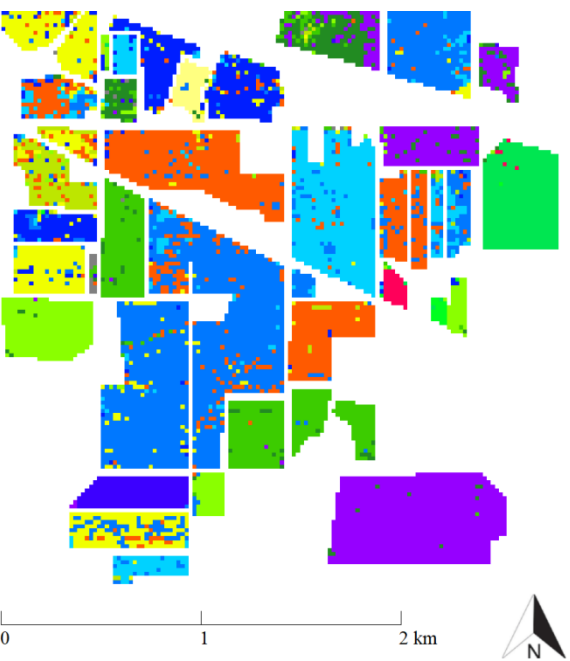


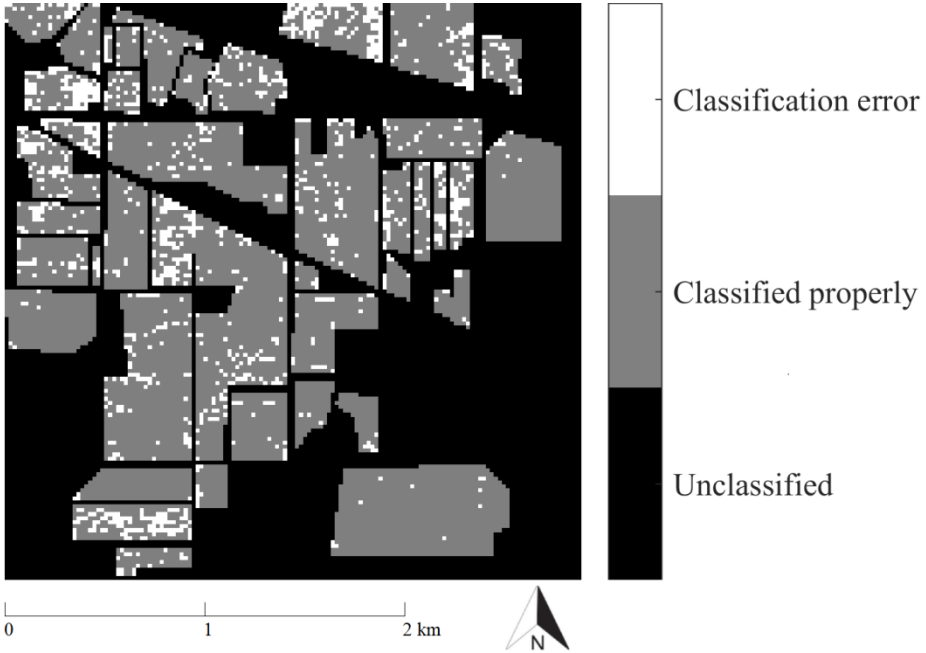


Building terrain height model from LIDAR data (1m resolution)

GUDPILS - Development of technologies for secure and reliable smart city (2014-2017)

Selection of informative hyperspectral image bands

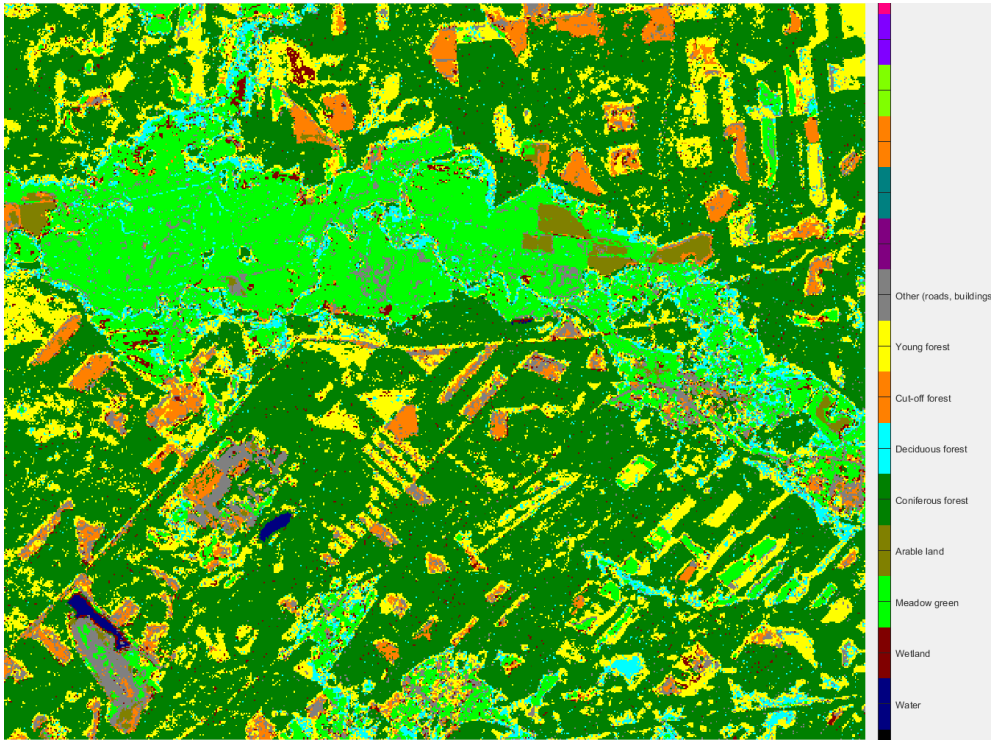




Lorencs, A., Mednieks, I., Sinica-Sinavskis, J., 2018. Selection of Informative Hyperspectral Band Subsets Based on Entropy and Correlation, International Journal of Remote Sensing (accepted, in print).

European Space Agency

Dynland - Dynamic land use monitoring by fusion of satellite data (2016-2019)



Classification of land cover/ land use from satellite data

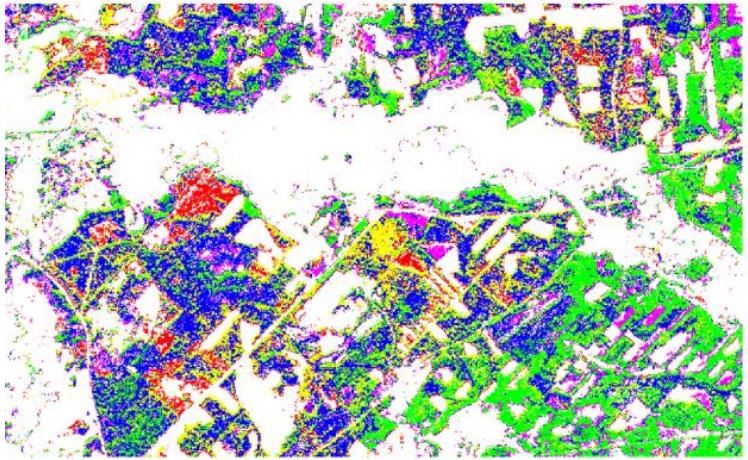
European Space Agency

Dynland classification

Step 1
Non-parametric iterative clustering of multidimensional data

Step 2
Automatic assignment of classes to clusters based on reference data or rules

Detailed classification of coniferous forest



White:
no coniferous forest

Coniferous forest:
- Spruces
- Pines
- Young coniferous trees
- Sparsely growing coniferous trees
- Sparsely growing pines with young forest underneath

Publication: R.Dinuls, I.Mednieks “Nonparametric Classification of Satellite Images.” Proceedings of the 2018 International Conference on Mathematics and Statistics. ACM, New York, NY, USA, 2018, pp. 64-68. DOI:10.1145/3274250.3274260.

WoodStock –

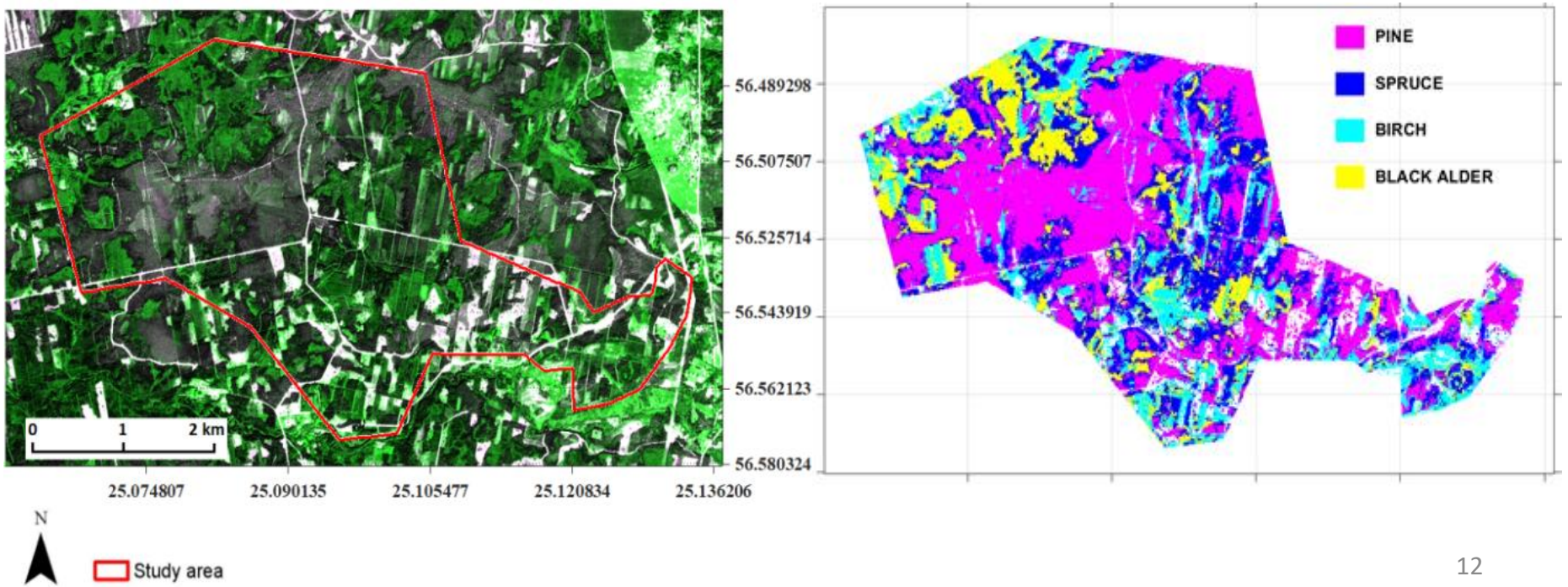
Satellite remote sensing- based forest stock estimation technology (2019-2022) *(ERDF project)*

The project is focused on the development of the prototype technology for estimation of forest stock volume from high-resolution satellite data, including methods for:

- identification of tree species
- estimation of tree height
- estimation of forest density

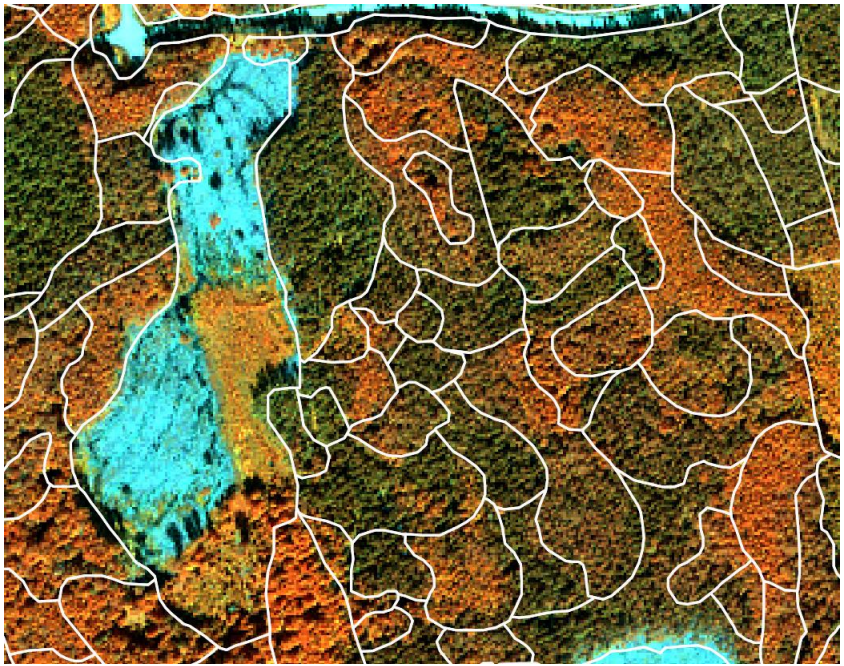
WoodStock

Tree species classification from Sentinel-2 data using deficient (sparse, outdated) inventory data

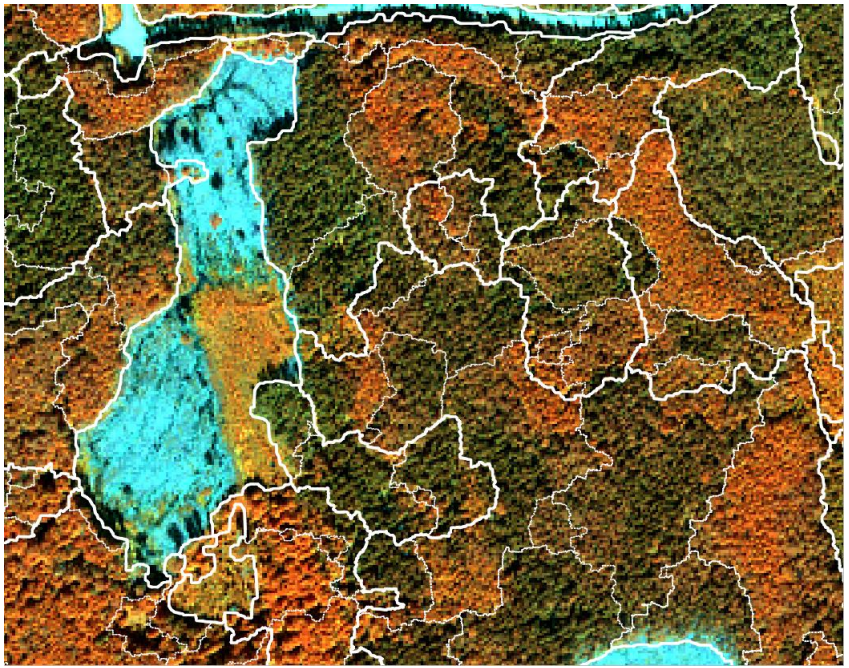


WoodStock

Automated delineation of microstands in hemiboreal mixed forests using GeoEye-1 data and a JSEG-based workflow



Manual delineation by an expert using orthophoto



Automatic delineation in 2 stages (CHM, MS data)

European Space Agency

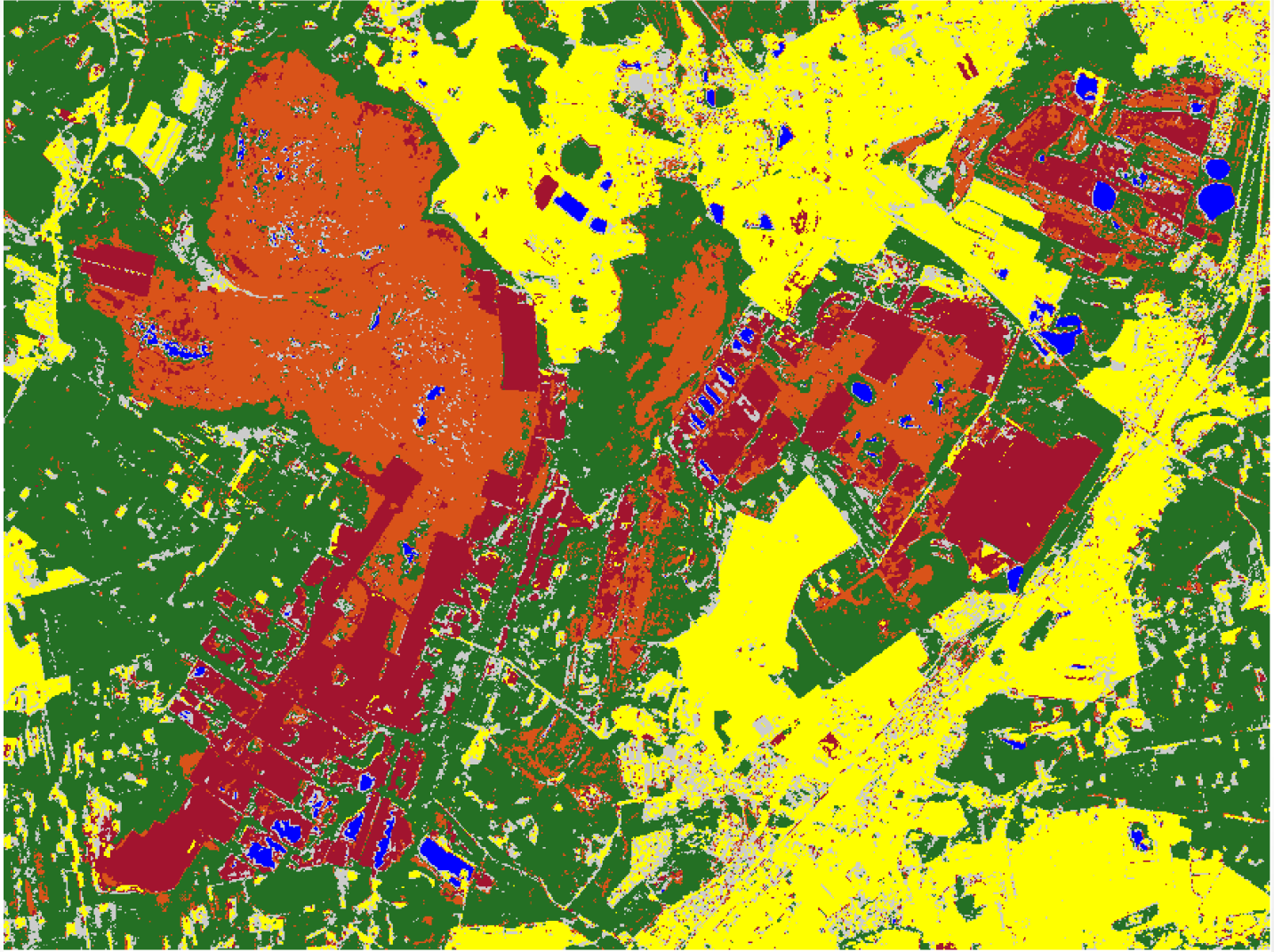
Automated identification of mires and peatlands using multi-temporal satellite data (MireClass)

Prime contractor: Institute of Electronics and Computer Science (IECS)

Subcontractor: SIA «SWH SETS» (SETS)

SETS

Project manager: Ints Mednieks (IECS), e-mail: mednieks@edi.lv
Subcontract project manager: Ilze Dzelme-Bērziņa , e-mail: Ilze.Dzelme-Berzina@sets.lv



Our competence

1. **Object detection and classification in images**
2. **Processing data from various sensors including fusion (RGB, multspectral, hyperspectral, LIDAR)**
3. **Custom solutions based on dedicated remote sensing data processing methods and software**

Contacts: **Ints Mednieks**

E-mail: mednieks@edi.lv

Web: http://remsens.edi.lv/