

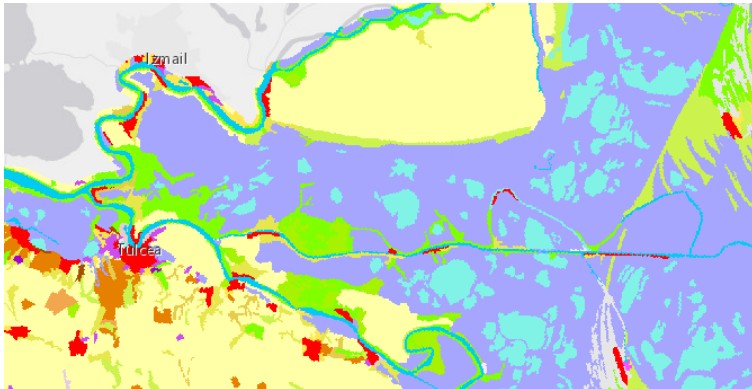


Leveraging Citizen Science and Machine Learning for Improved Land Cover/Land Use maps

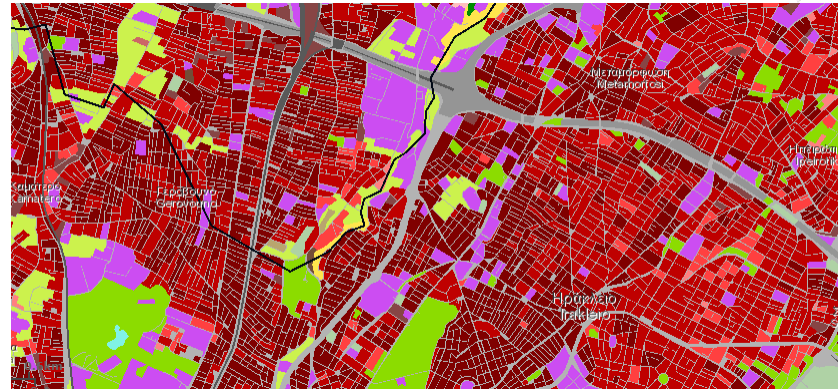
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Tsertou, Angelos Amditis / Institute of
Communication and Computer Systems (ICCS)**

Motivation & need

- Need for automatic assessment and monitoring of LC/LU
- Importance to detect seasonal changes, natural disasters, and human-related area development
- Scarce updates of existing products, timely data validation procedures



Corine Land Cover product of 2012
for Danube Delta-Romania,
[Source: EEA]



Urban Atlas product of 2012
for Kifisos Basin-Greece,
[Source: EEA]



H2020 Scent Citizen Observatory



H2020 Scent Citizen Observatory

Urban Pilot Area:

Kifisos river basin, Attica, Greece



Rural Pilot Area:

Danube Delta, Tulcea, Romania

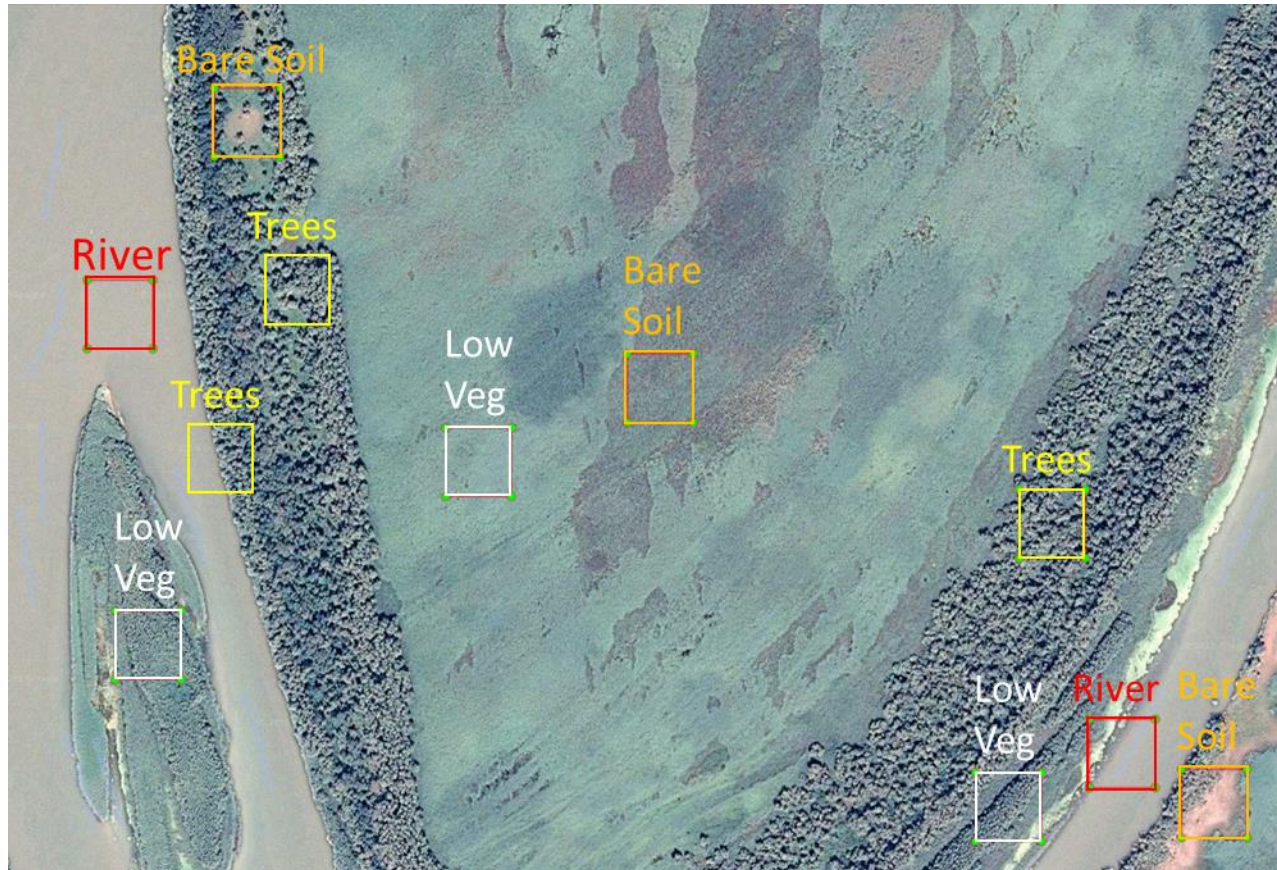


Scent Map Segmentation, Delineation, Characterization and Annotation tool

- Assign a semantic class (Scent taxonomy) to each pixel, (i.e. convert the raw data to a semantically meaningful raster map),
- Convert Scent taxonomy annotated points into annotated areas on the satellite/aerial maps and,
- Characterize whole areas for which a land-cover/use description is not available.



Pixel-wise semantic segmentation



River Bank Segmentation



● Reeds

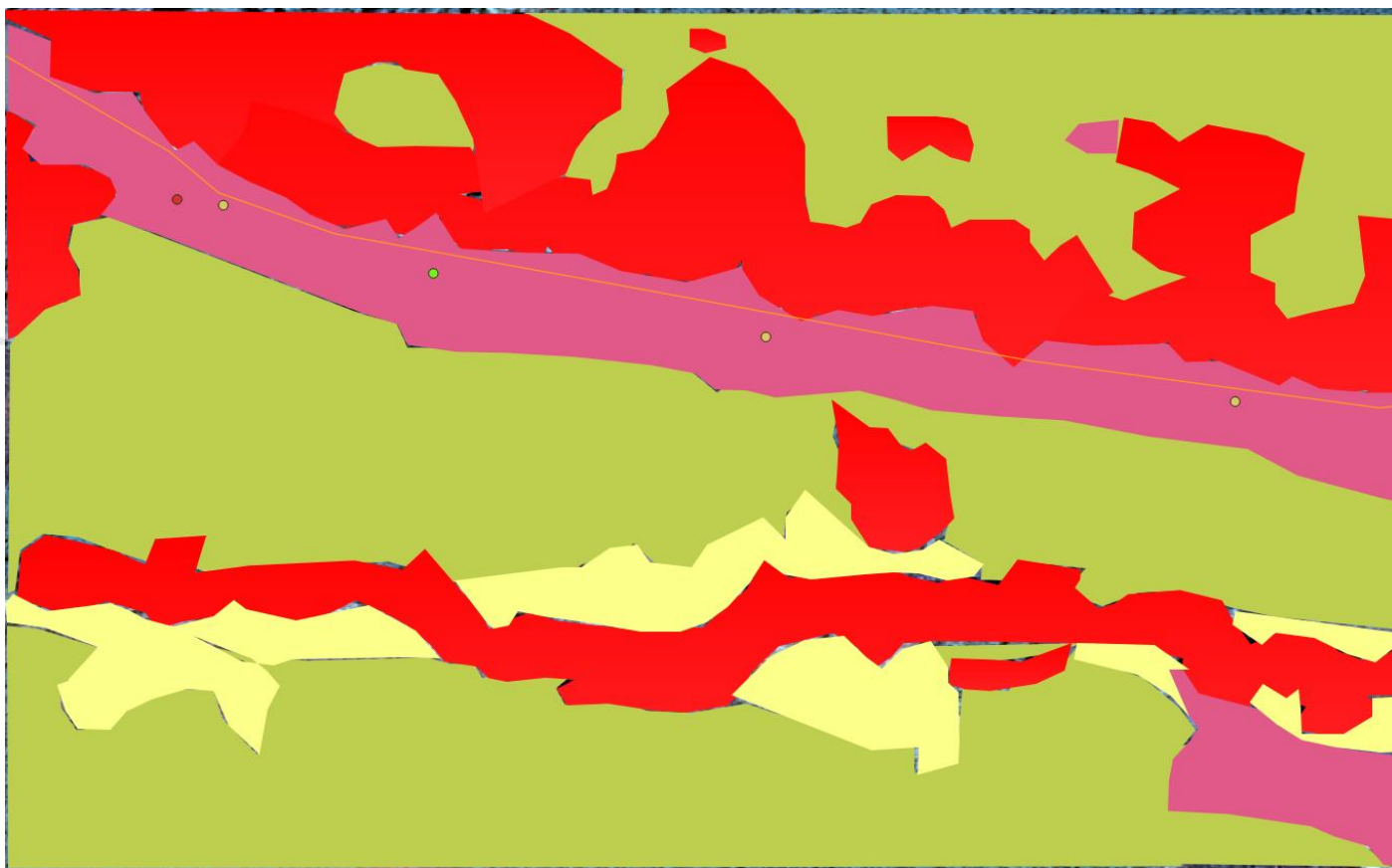
● Forest

● Shrubs

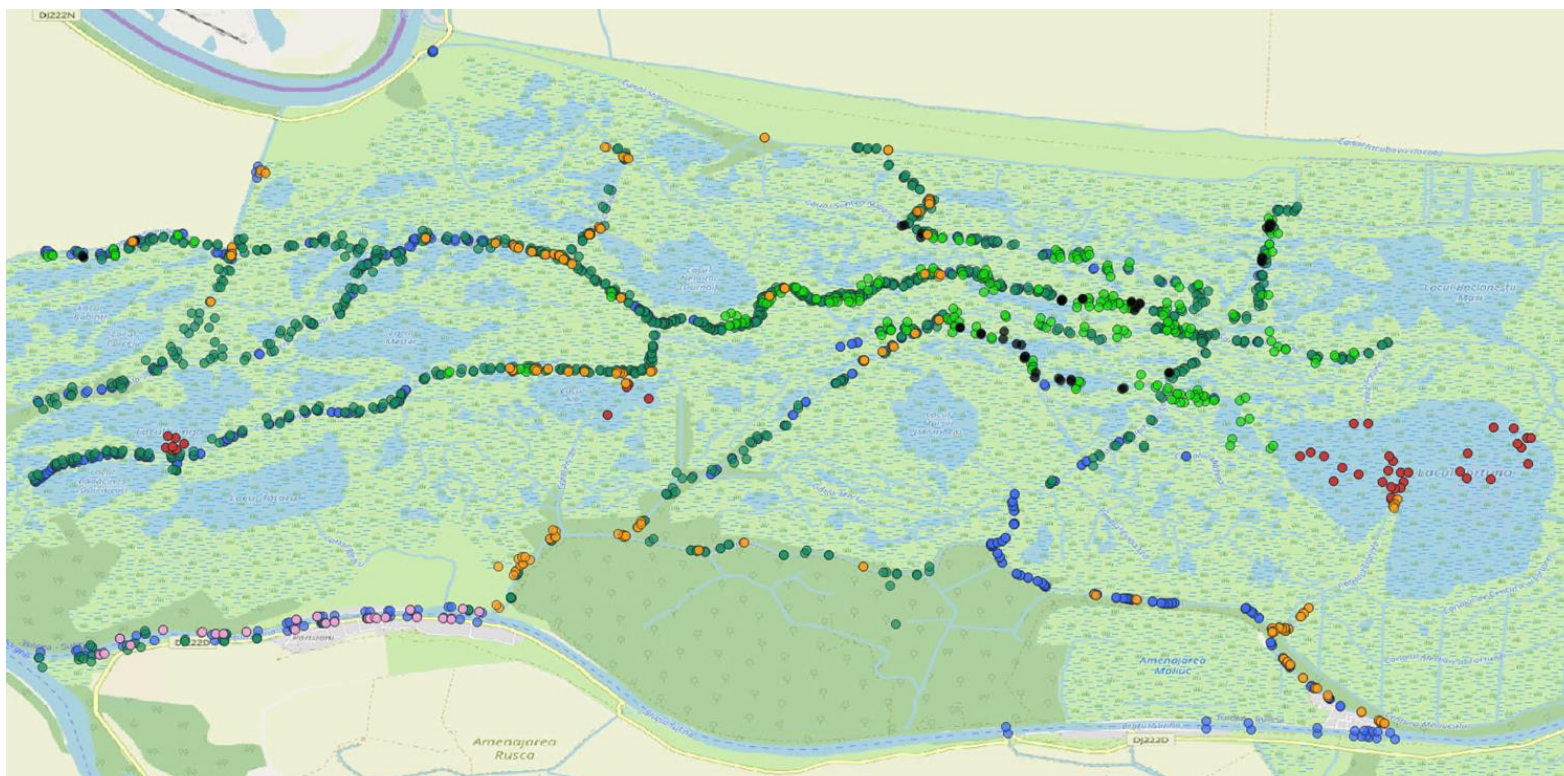
River Bank Segmentation



Satellite Map Segmentation



Crowdsourced data (Danube Delta)



- Bare soil / Low grass
- Forest / Shrubs
- Reeds green
- Reeds dark
- Concrete
- River
- Inland Marsh

Satellite map segmentation challenges

- Limited data for certain taxonomy classes
- Different LC/LU labels corresponding to the volunteers' locations
- High intraclass variability (variability between classes) and low interclass variability (variability within any particular class)



Data propagation



● Reeds

● Forest

● Shrubs

Data propagation



● Reeds

● Forest

● Shrubs

Data samples



Reeds (standard)

Reeds (dark)

Reeds (shiny green)

Shrubs / forest

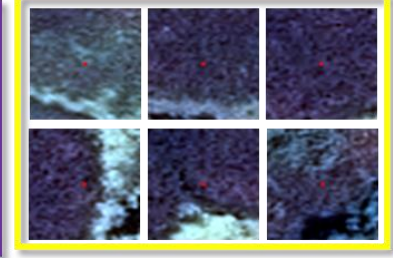
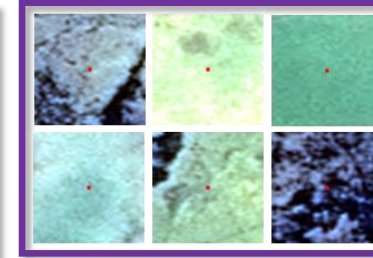
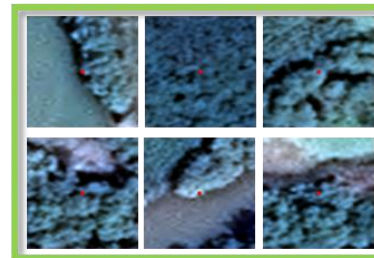
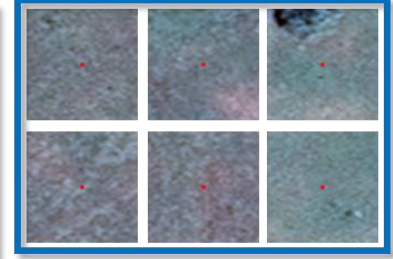
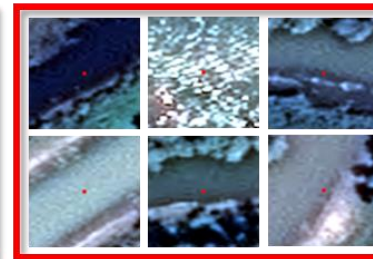
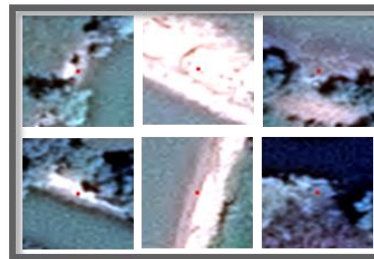
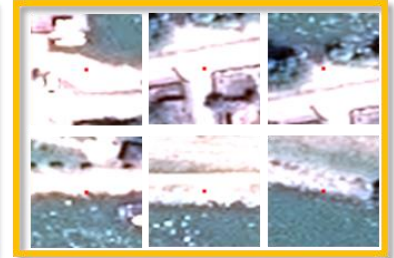
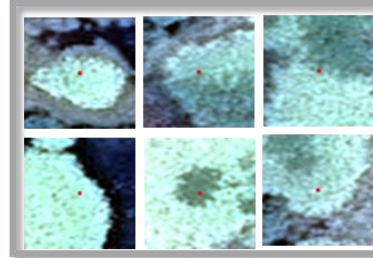
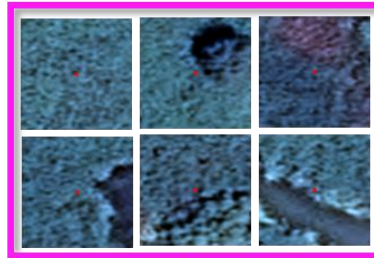
Bare soil

Inland Marsh

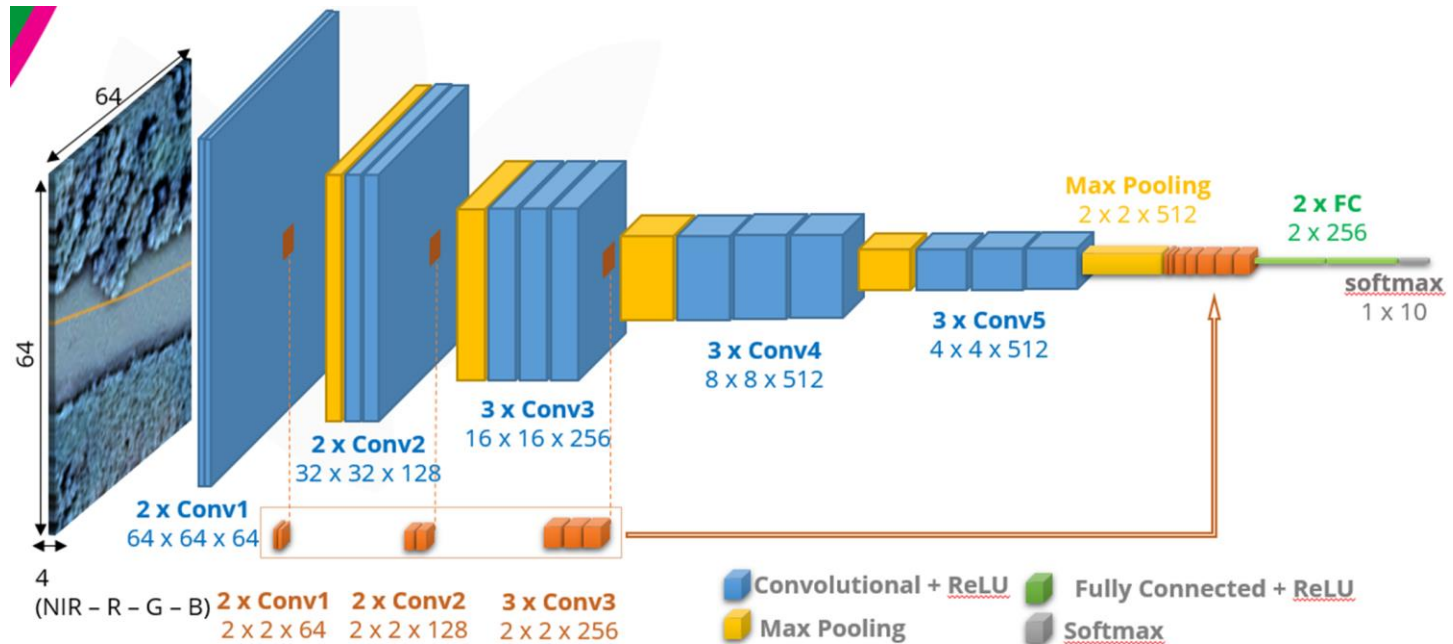
Concrete

Low grass

River



Scent Deep Neural Network Architecture

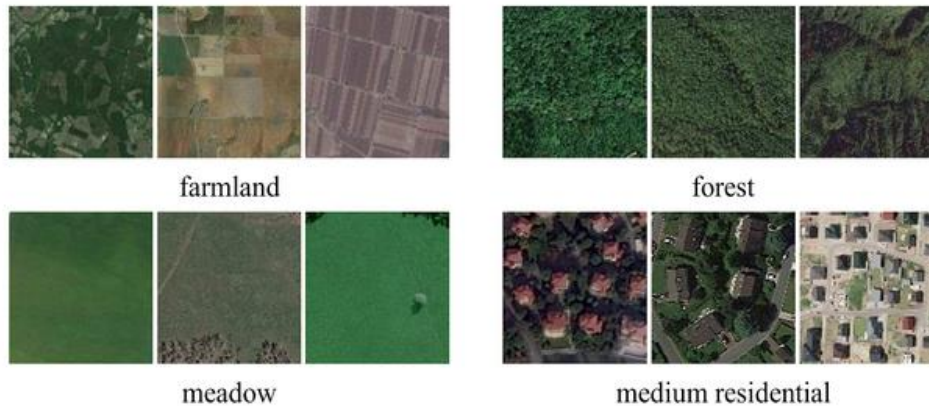


Scent DNN training strategy

Train stage one: Image Net

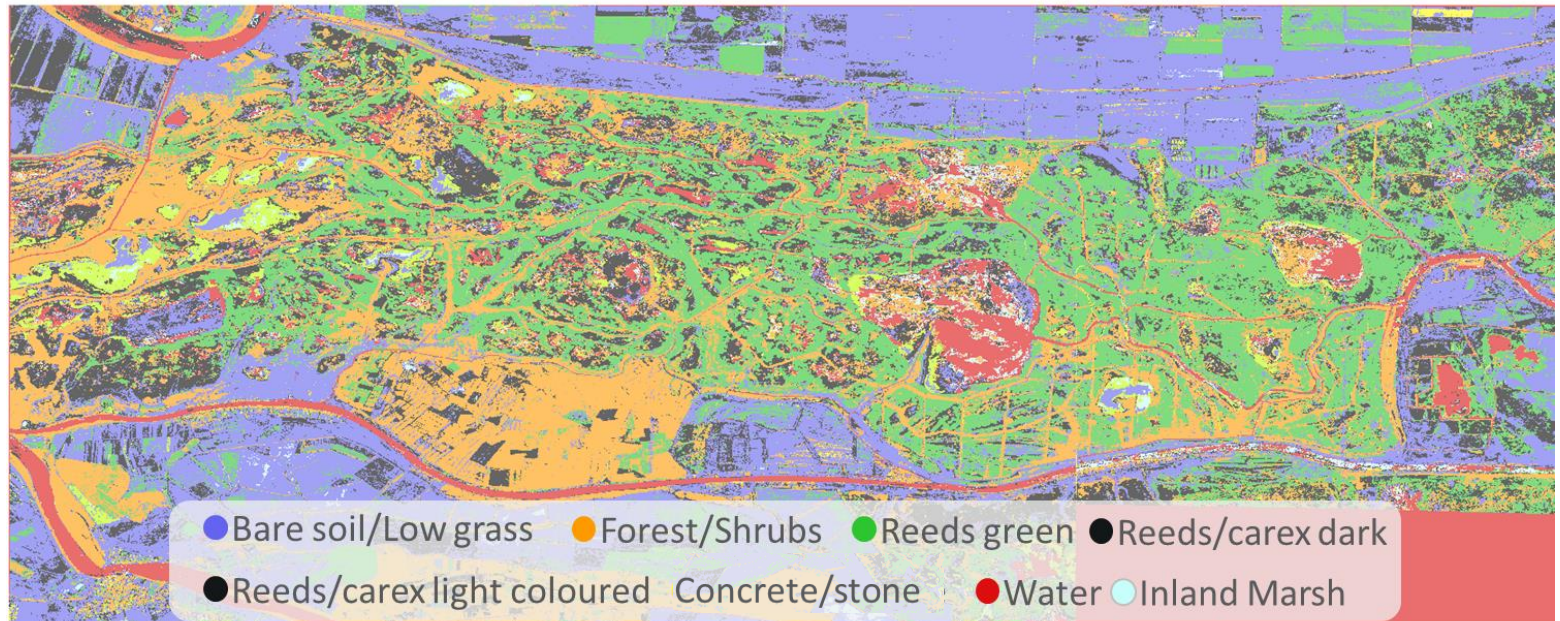


Train stage two: High resolution satellite images

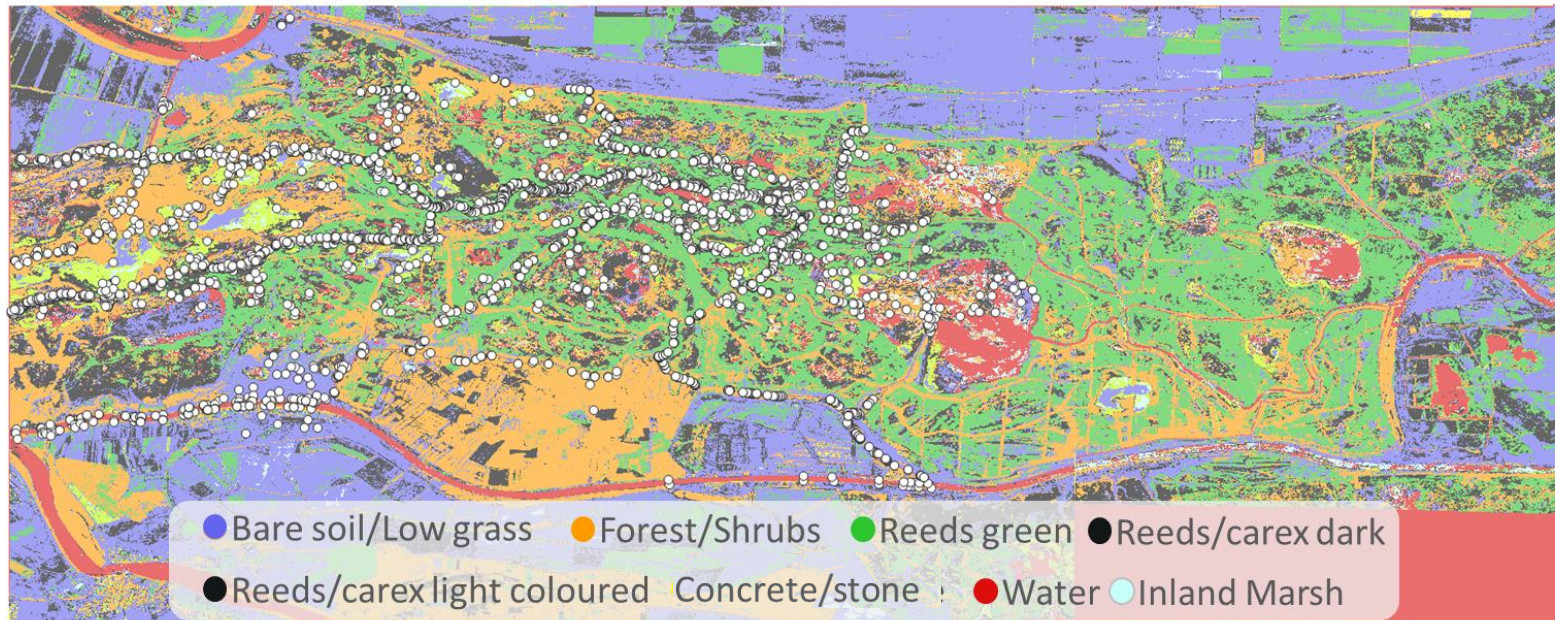


Train stage three: Last 3 layers were trained using augmented SCENT data

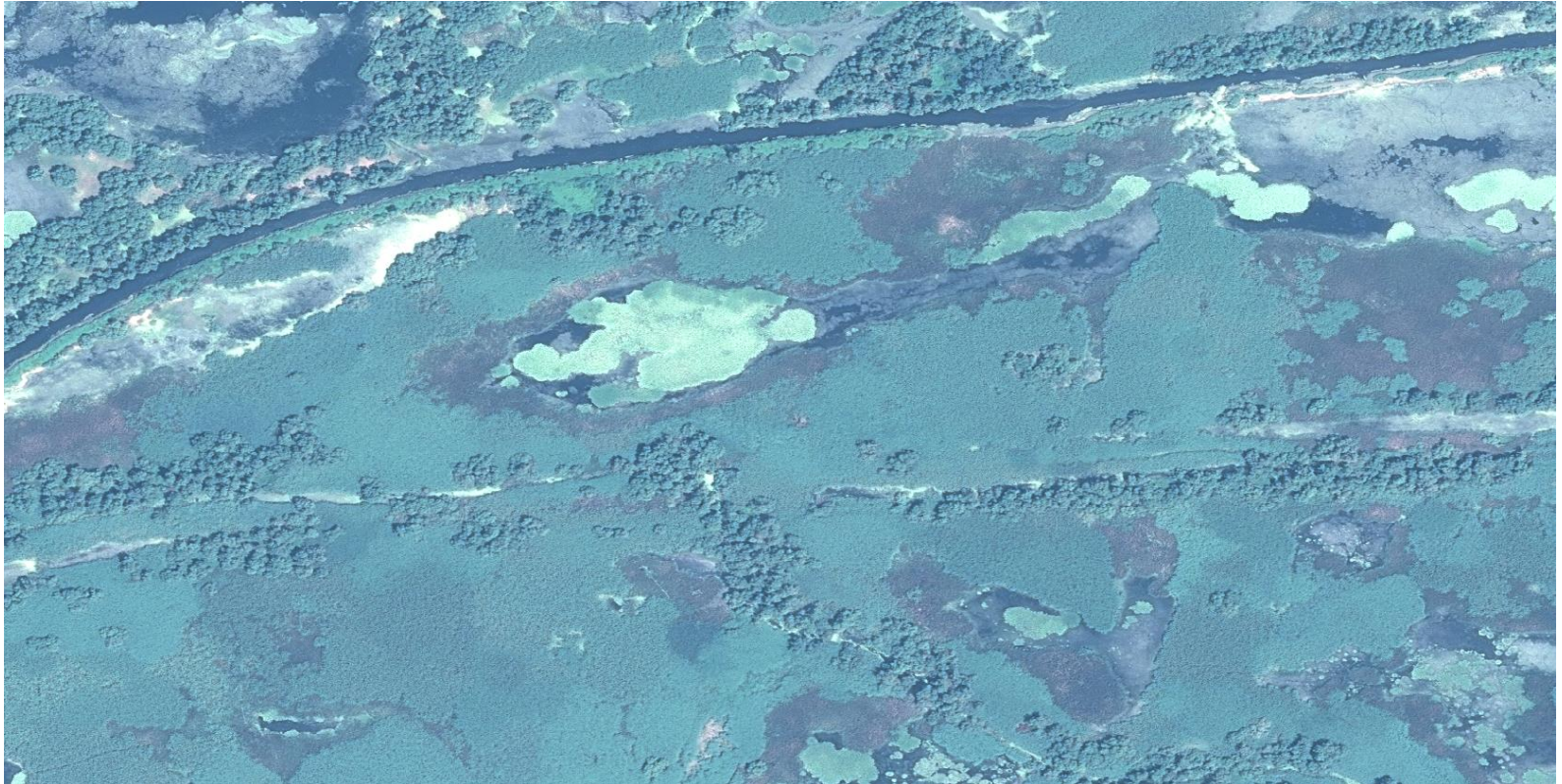
Results



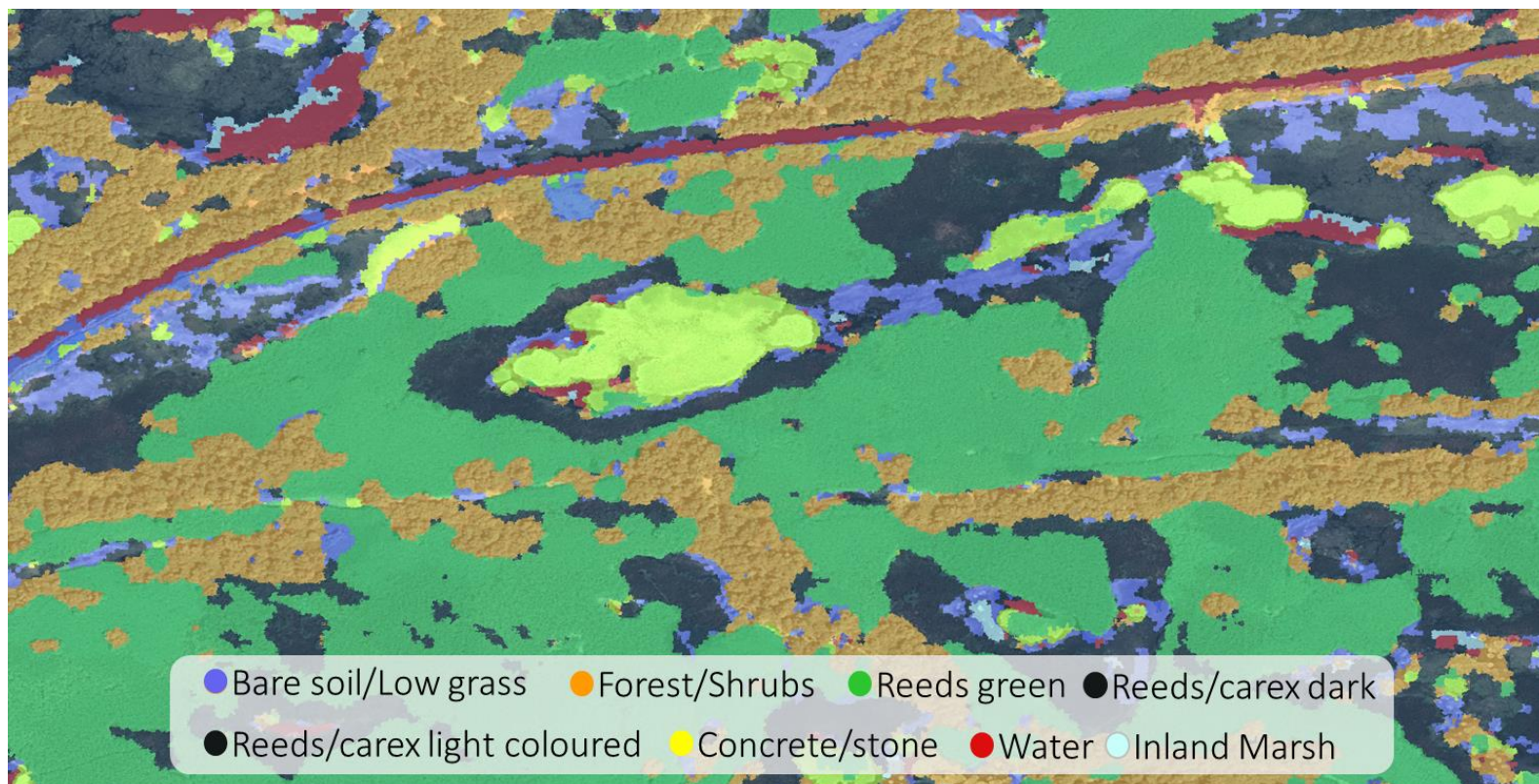
Results



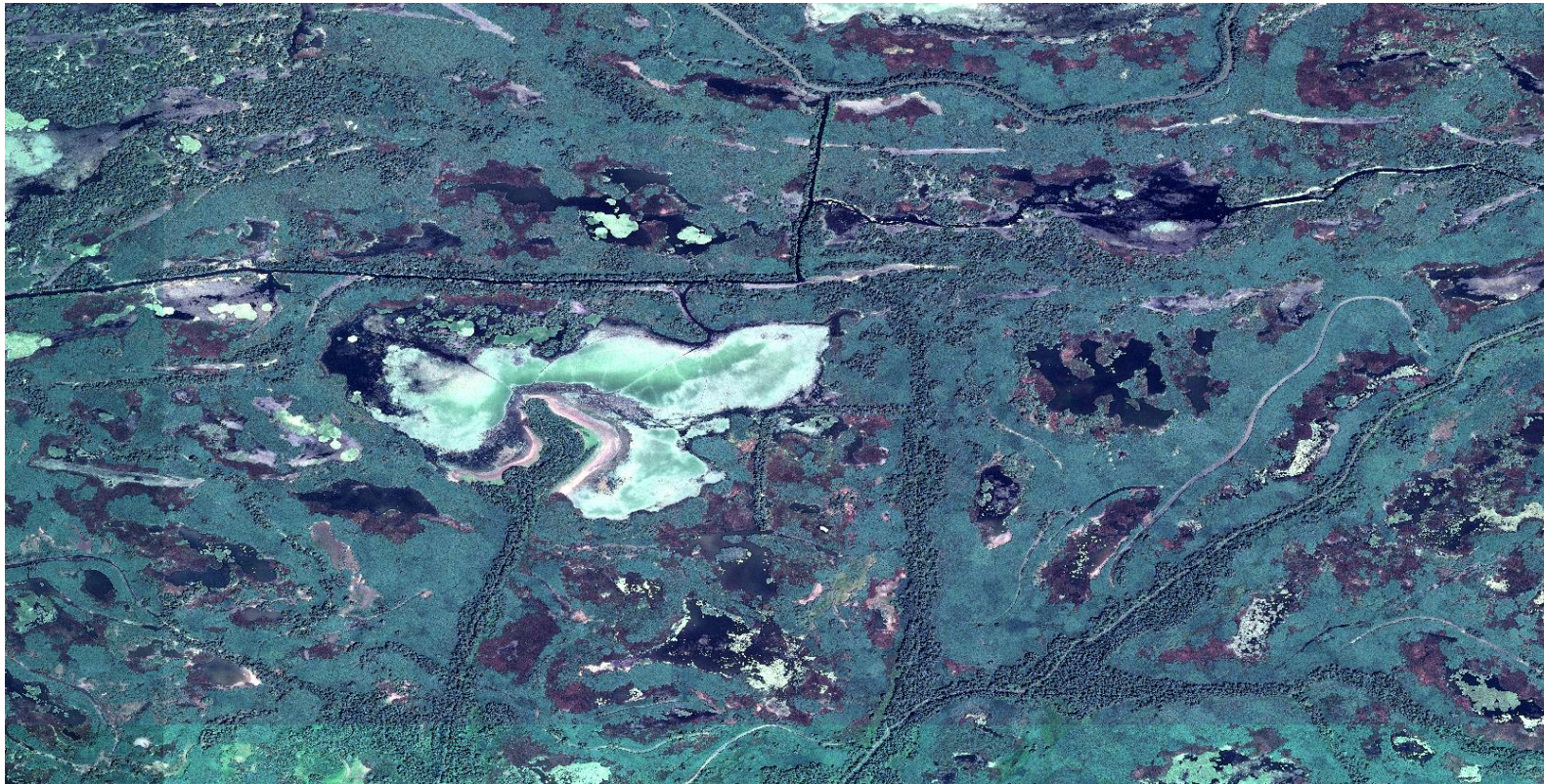
Highlights



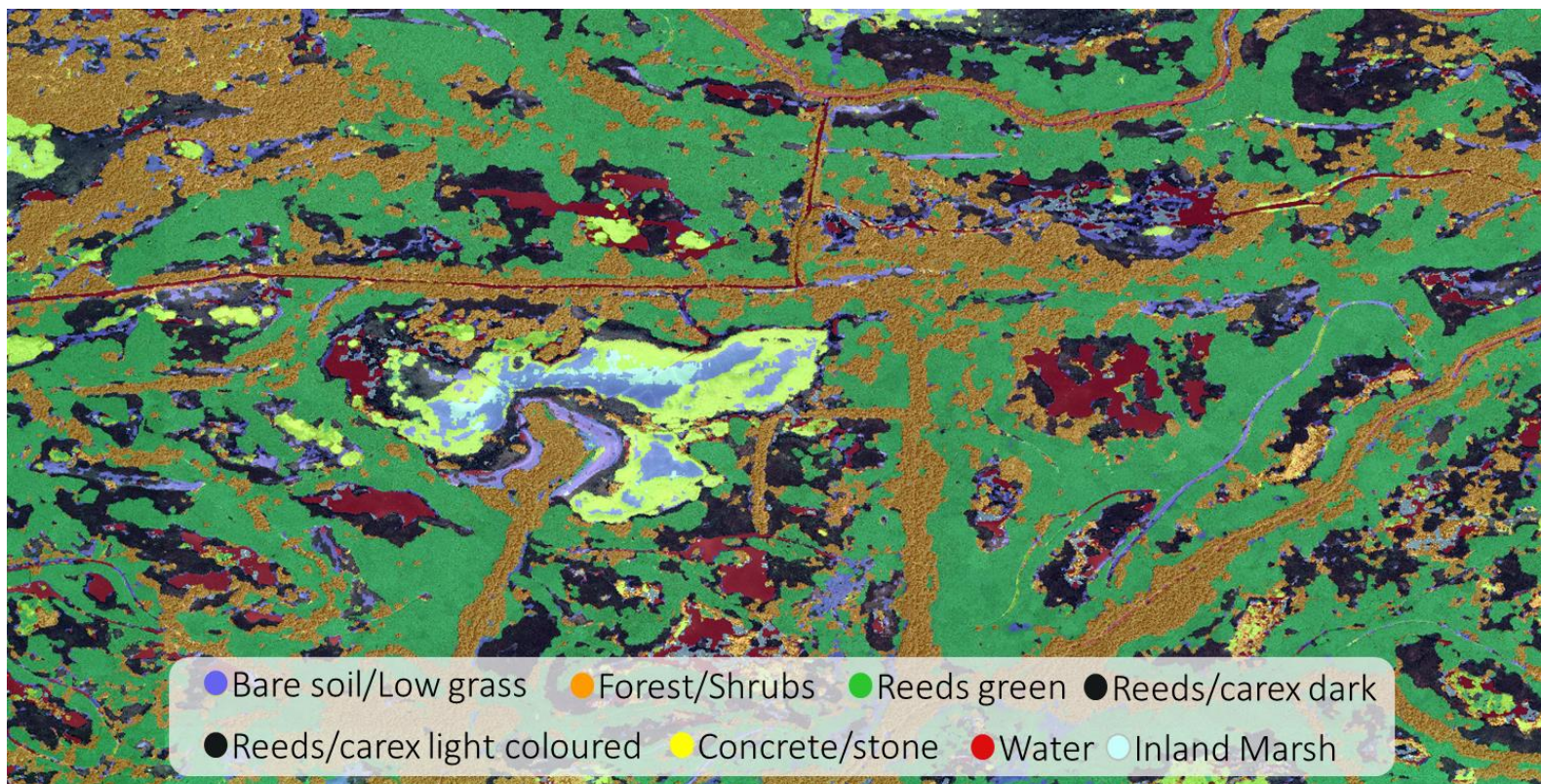
Highlights



Highlights



Highlights





THANK YOU!

Any Questions?

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