IADAS: project to identify individual tree and tree species based on EO and AI

IADAS

The objective of IADAS is to enable autonomous drones and NewSpace satellites to have large data processing capacities based on Artificial Intelligence.

Partners:

Project funded by Skywin – Walloon Region

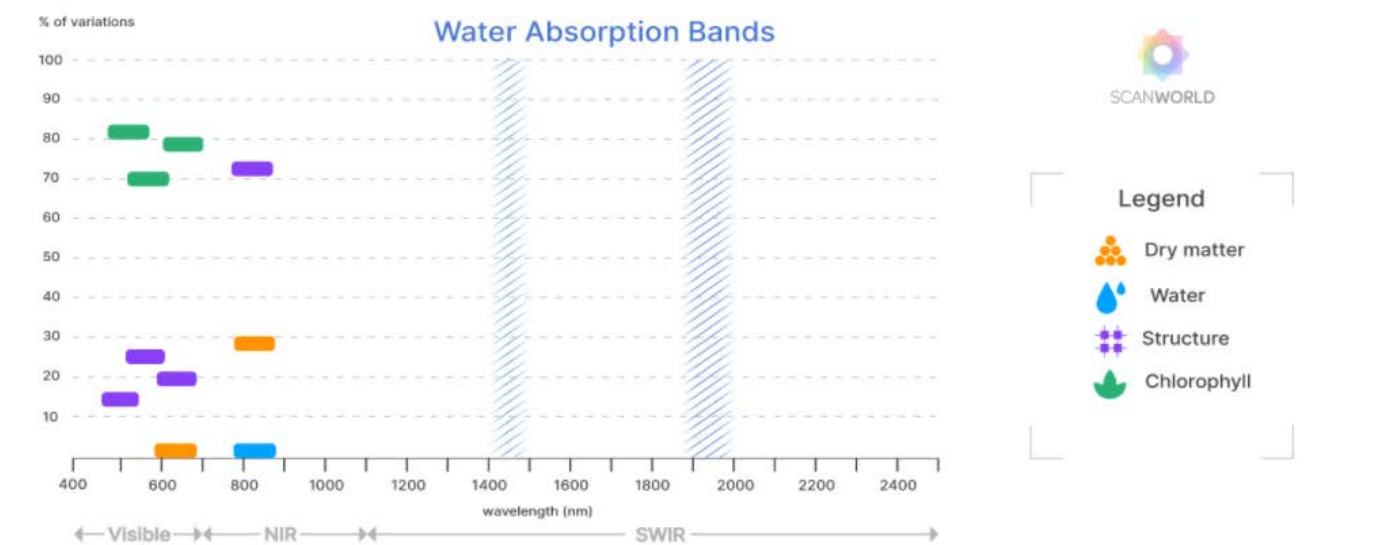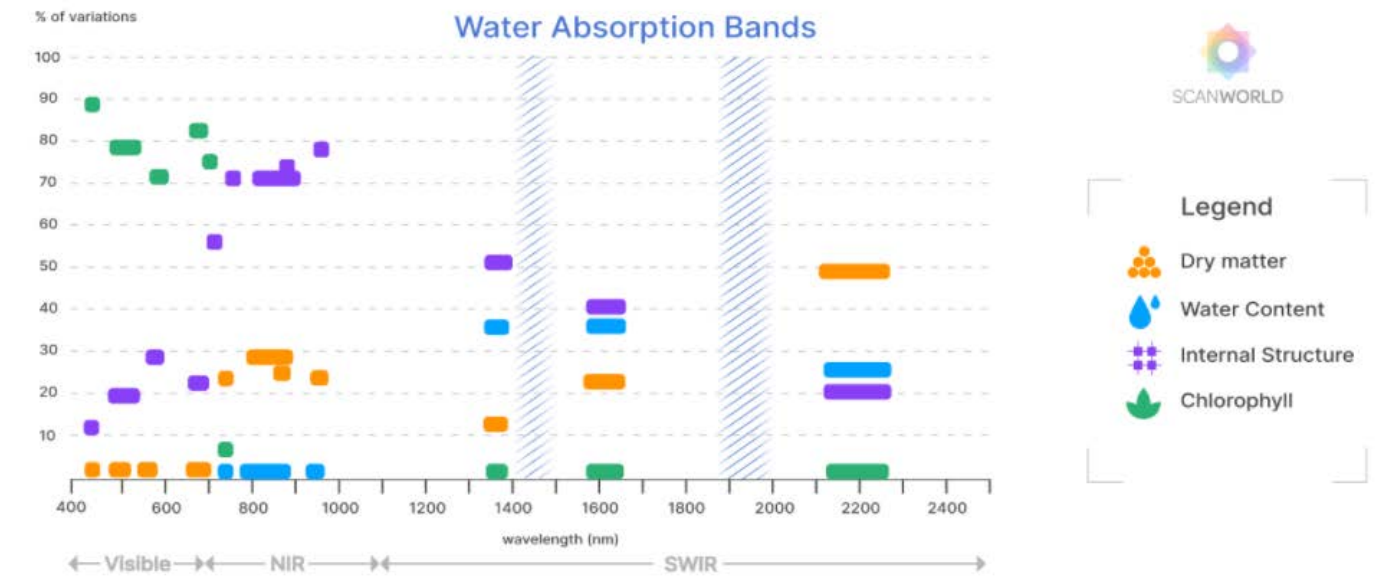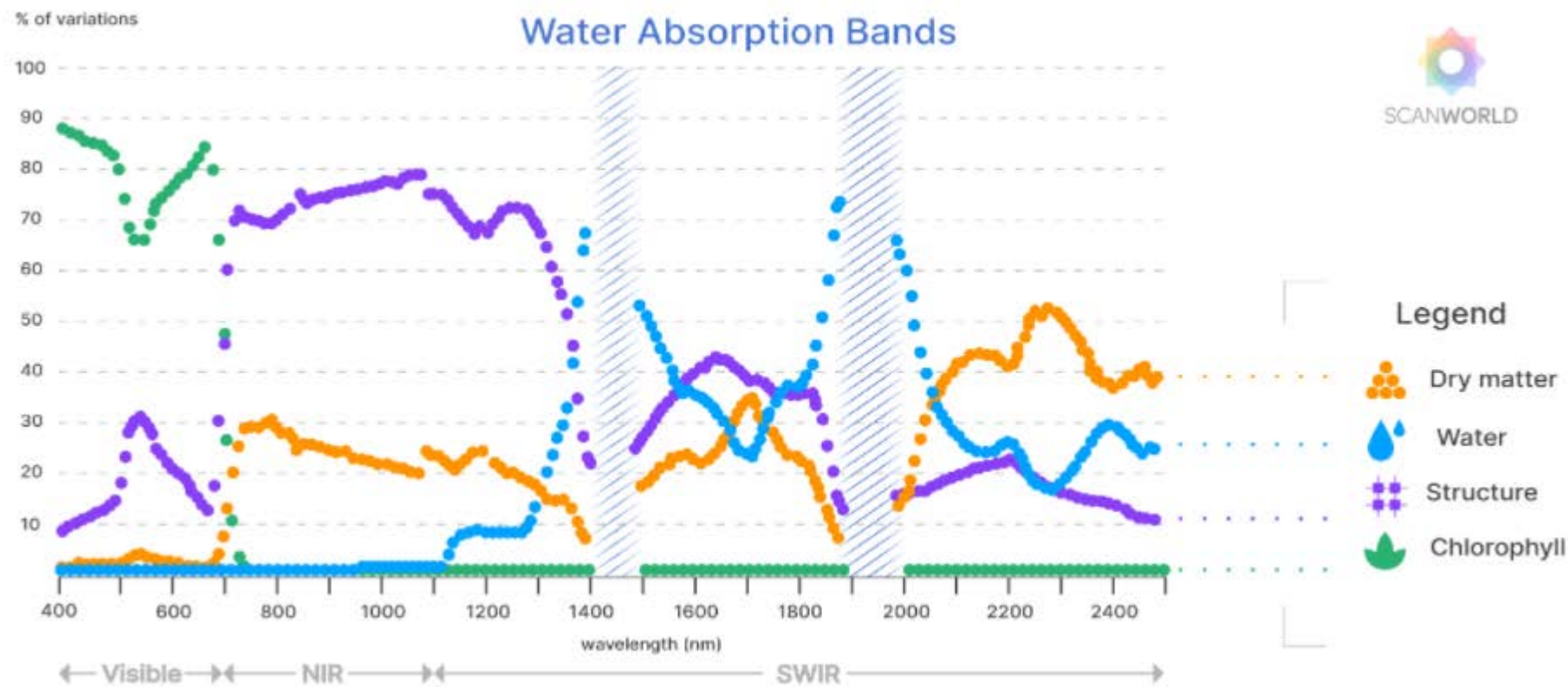# Identify individual tree and tree species based on EO in the optical and multi spectral domains

Forest in Grand-Leez, Belgium

Spectre infrarouge
Bandes : IR, Red, Green

Spectre visible
Bandes : Red Green Blue (RGB)

Identify individual tree and tree species based on EO in the hyperspectral domain

Interest of hyperspectral versus RGB and multispectral

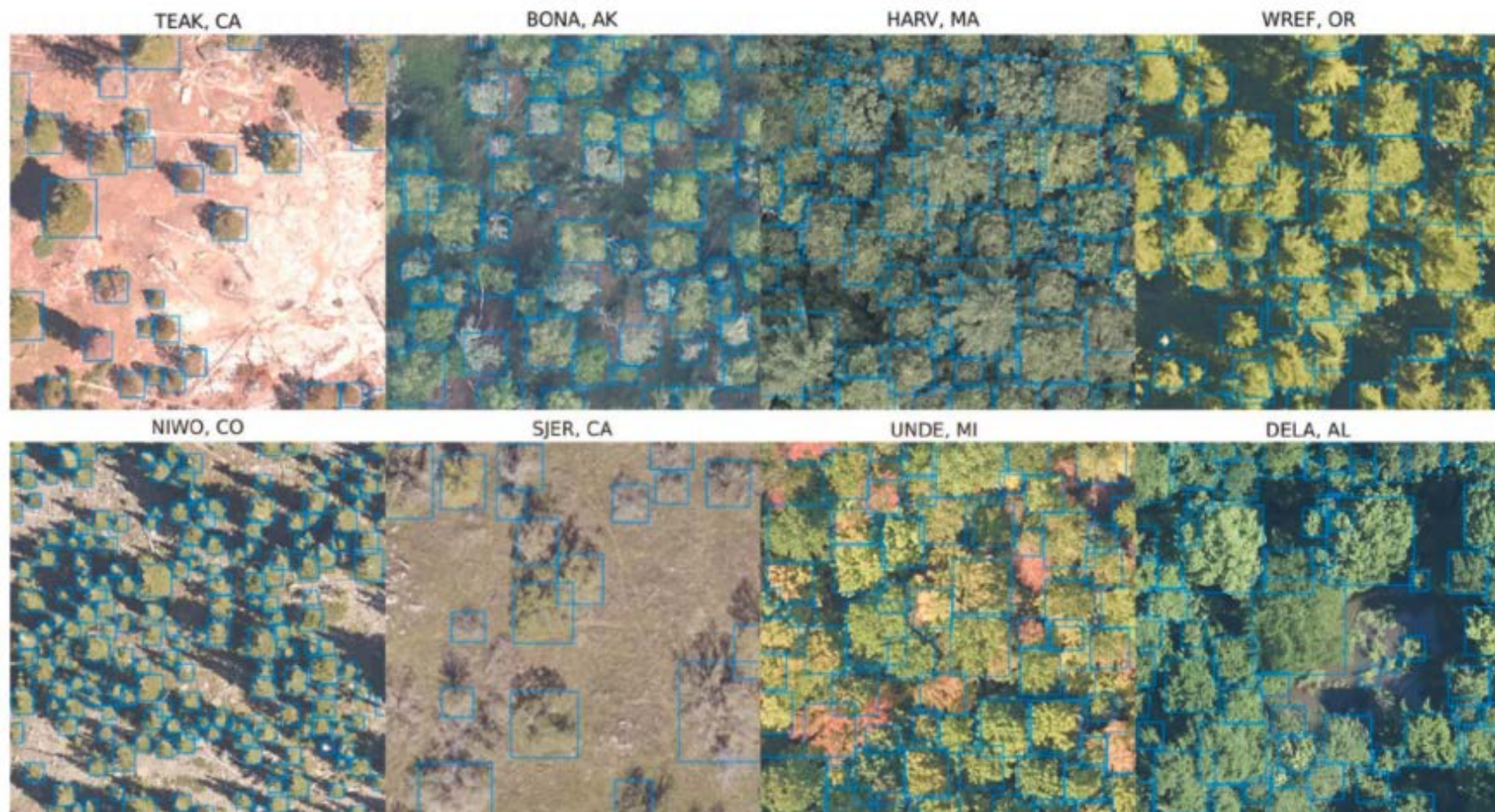Based on Ceccato et al. 2001 and 2002 RSE publications

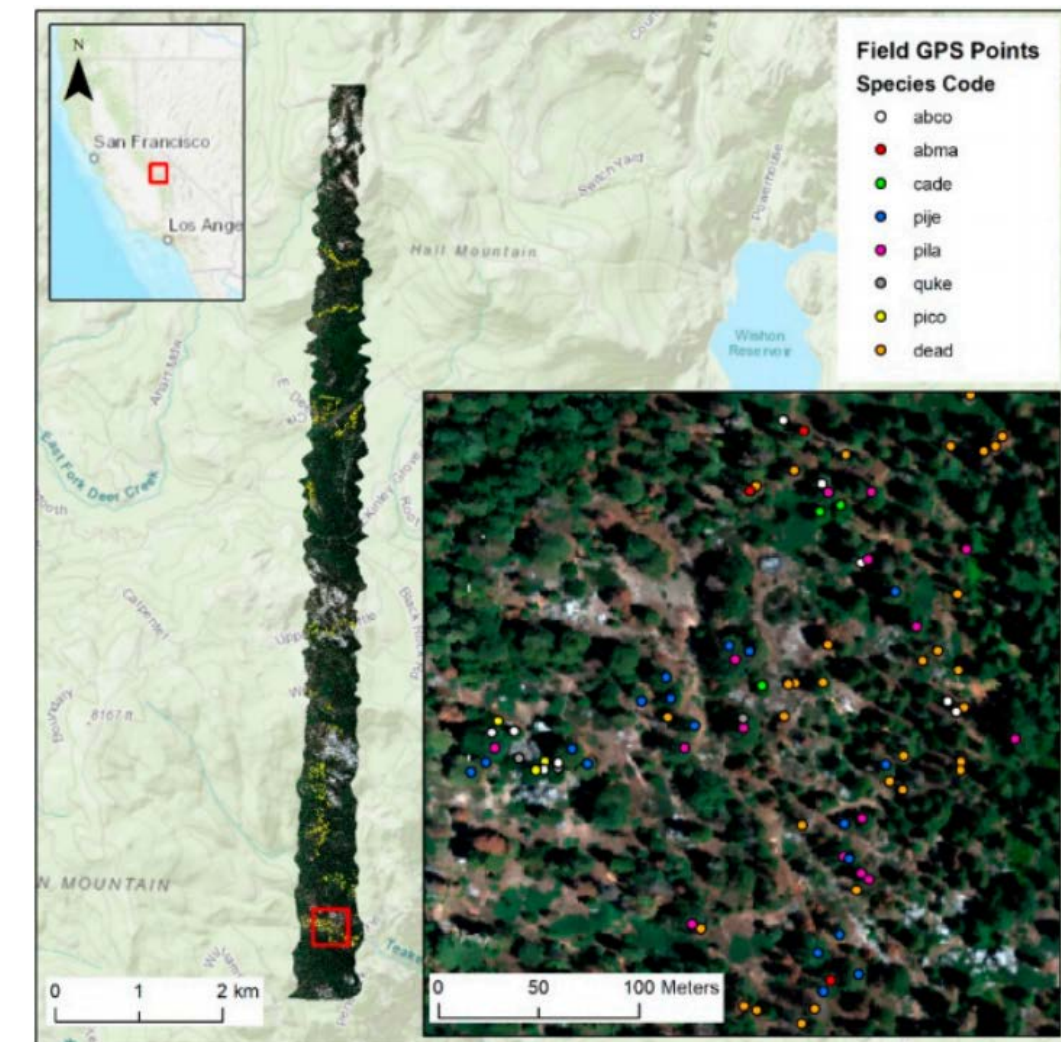# Deep Learning Approach

Algorithms tested

Tree detection

- SOTA deep learning object detection models
- NeonTreeEvaluation dataset

Species classification

- Multiple deep learning architecture (MLP – CNN 2D – CNN 3D), and non deep method
- Neon dataset with 7 species

Results

Tree detection

- Best results : RetinaNet with semi-supervised learning on large dataset

- Better than SOTA on NeonTreeEvaluation

- Poor results for very dense forest (challenging, even for human annotators)

- Huge network : computational complexity, requires large training dataset

- Work in progress : smaller, custom network

Results

Species classification

- Best results : CNN 3D-2D (HybridSN-like) on hyperspectral data

- Poor results with RGB data

- Work in progress : multispectral data

Classification accuracy	CNN2D	CNN3D	CNN3D-1D	CNN3D-2D	MLP	Resnet	Siamese	Random forest
RGB	0.49							
Hypersprectral	0.84	0.88	0.84	0.90	0.86	0.83	0.78	0.75

Contacts

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