

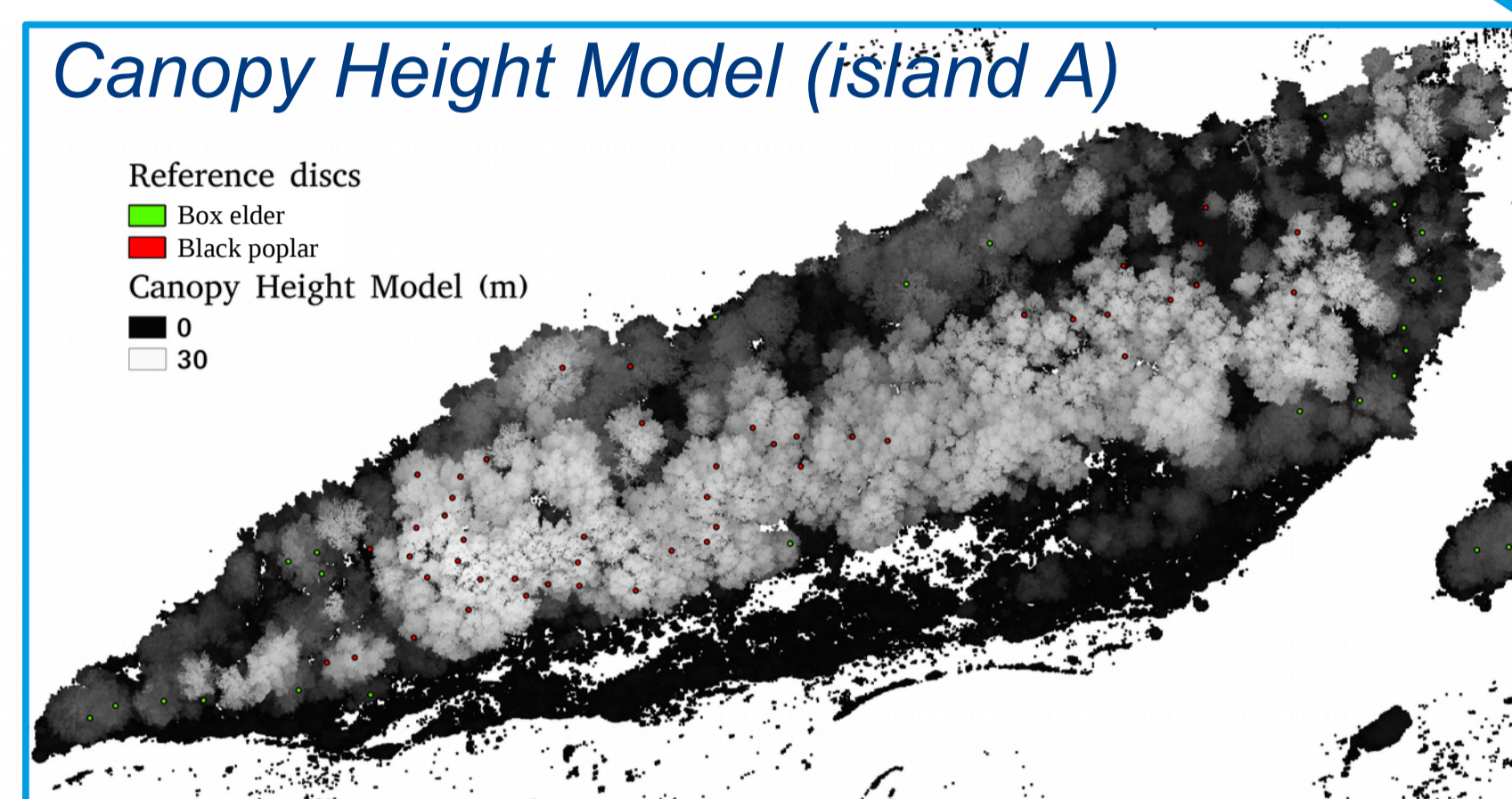
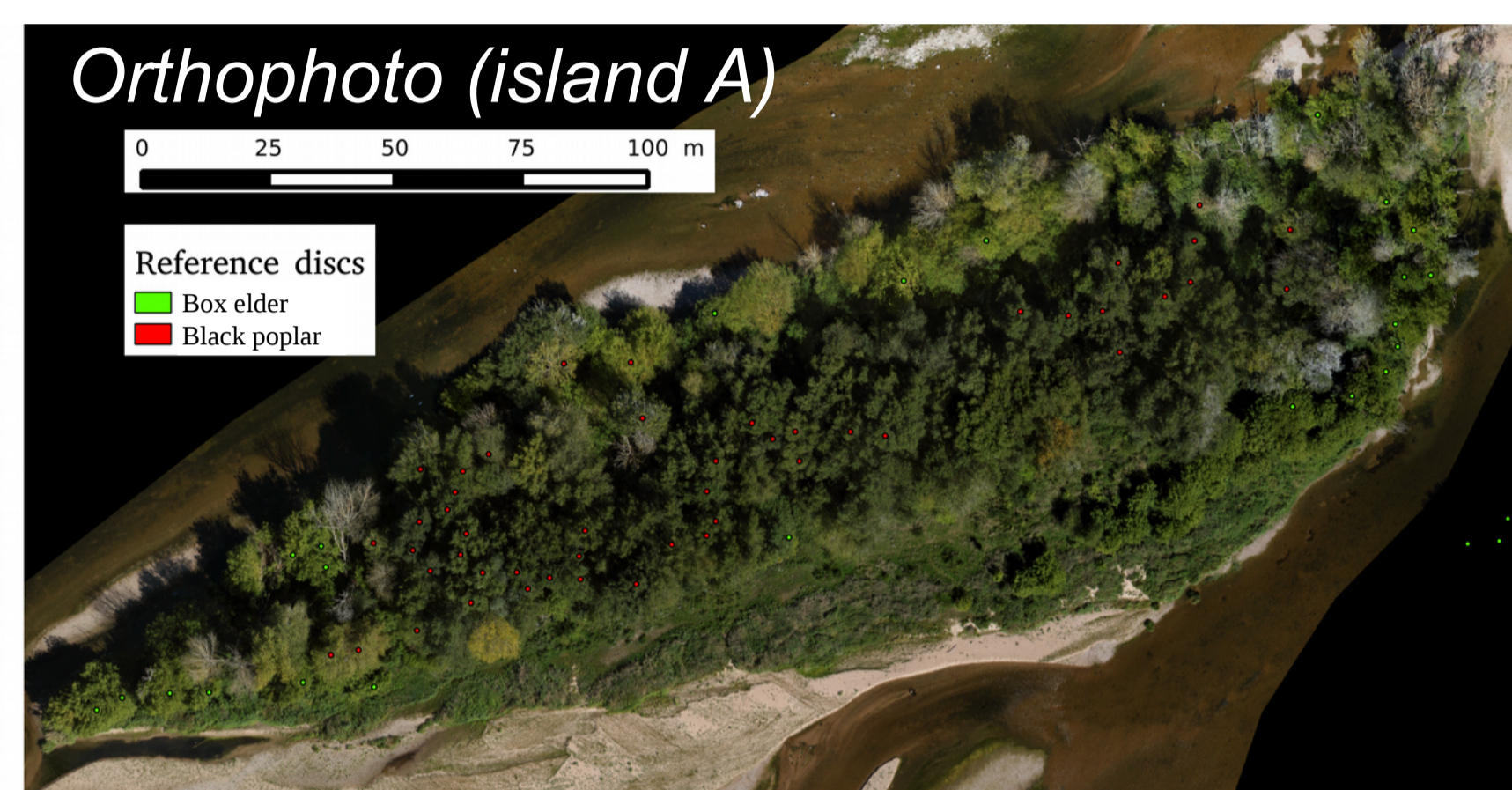
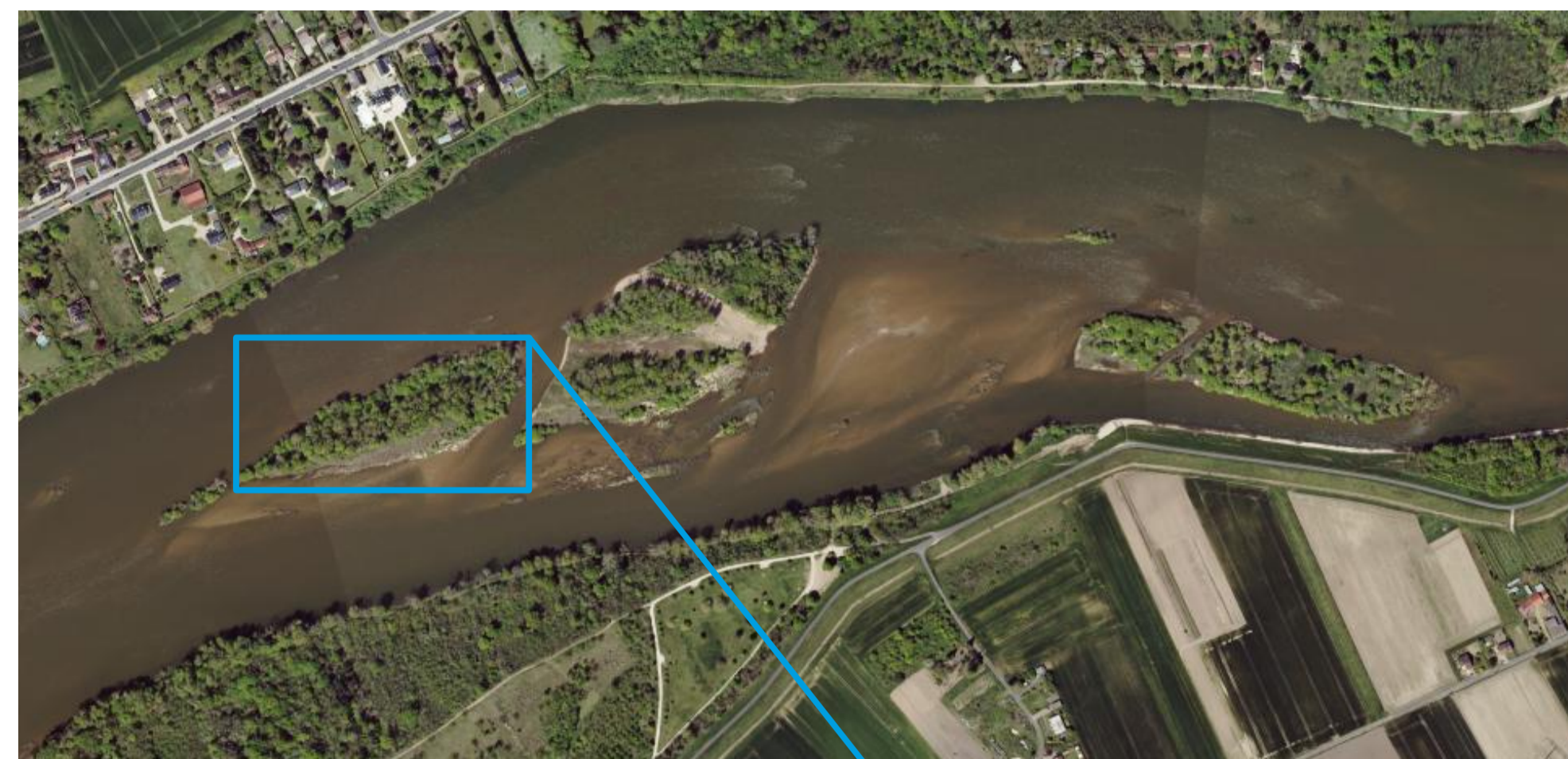
Detection of an Introduced Tree Species in Protected River Islands with UAV Remote Sensing



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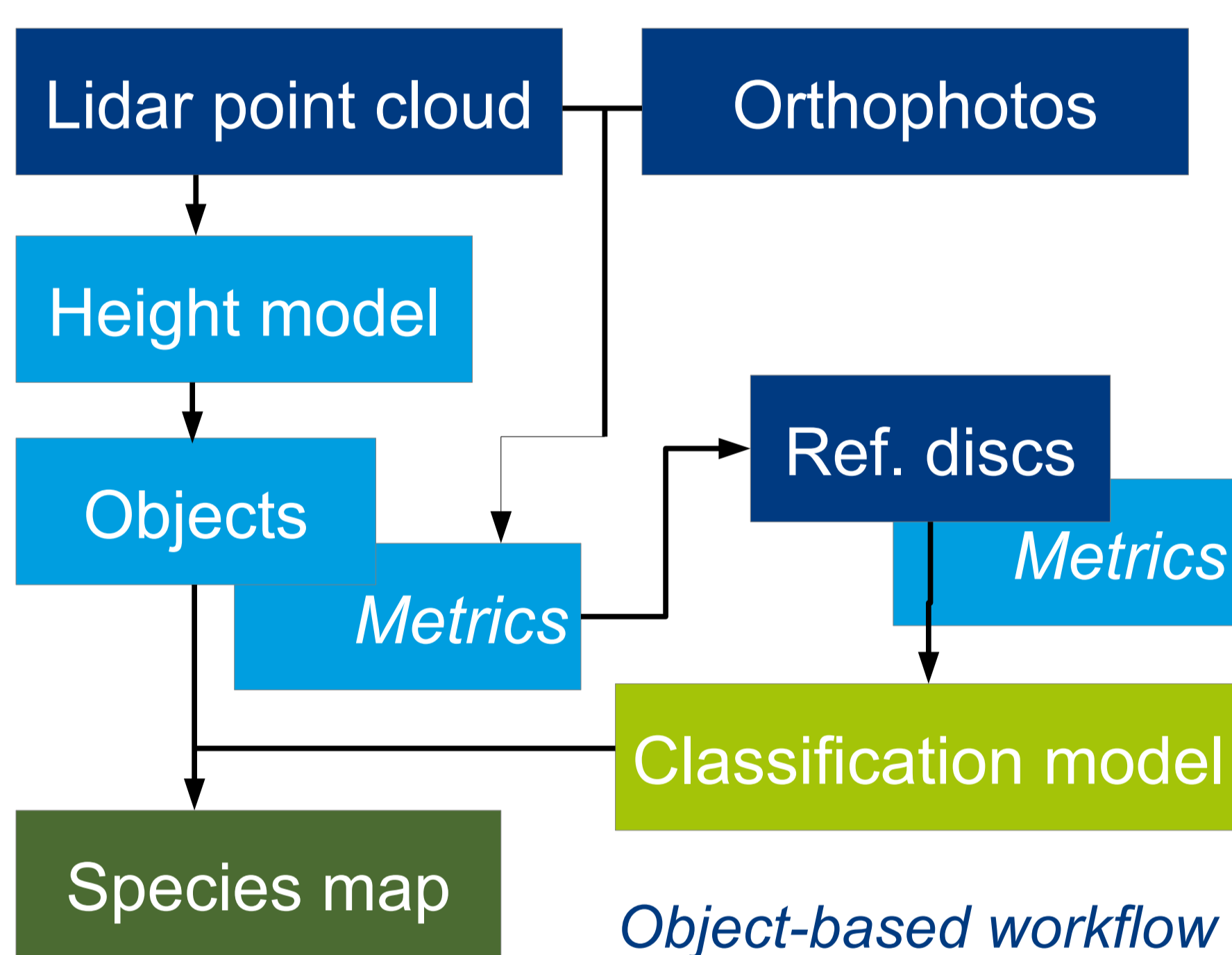
Study area

- Island mosaic of Mareau-aux-Prés on the Loire river (France)
 - Four islands dominated by black poplar (*Populus nigra*)
 - Beaver presence favors an introduced species: box elder (*Acer negundo*)



Material

- Lidar data acquired with a YellowScan surveyor (mean density 193 points/m²)
- Orthophotos: RGB+NIR, 2 cm resolution resampled at 10 cm
- 300 discs of 1 m diameter are sampled and manually classified as poplar or elder

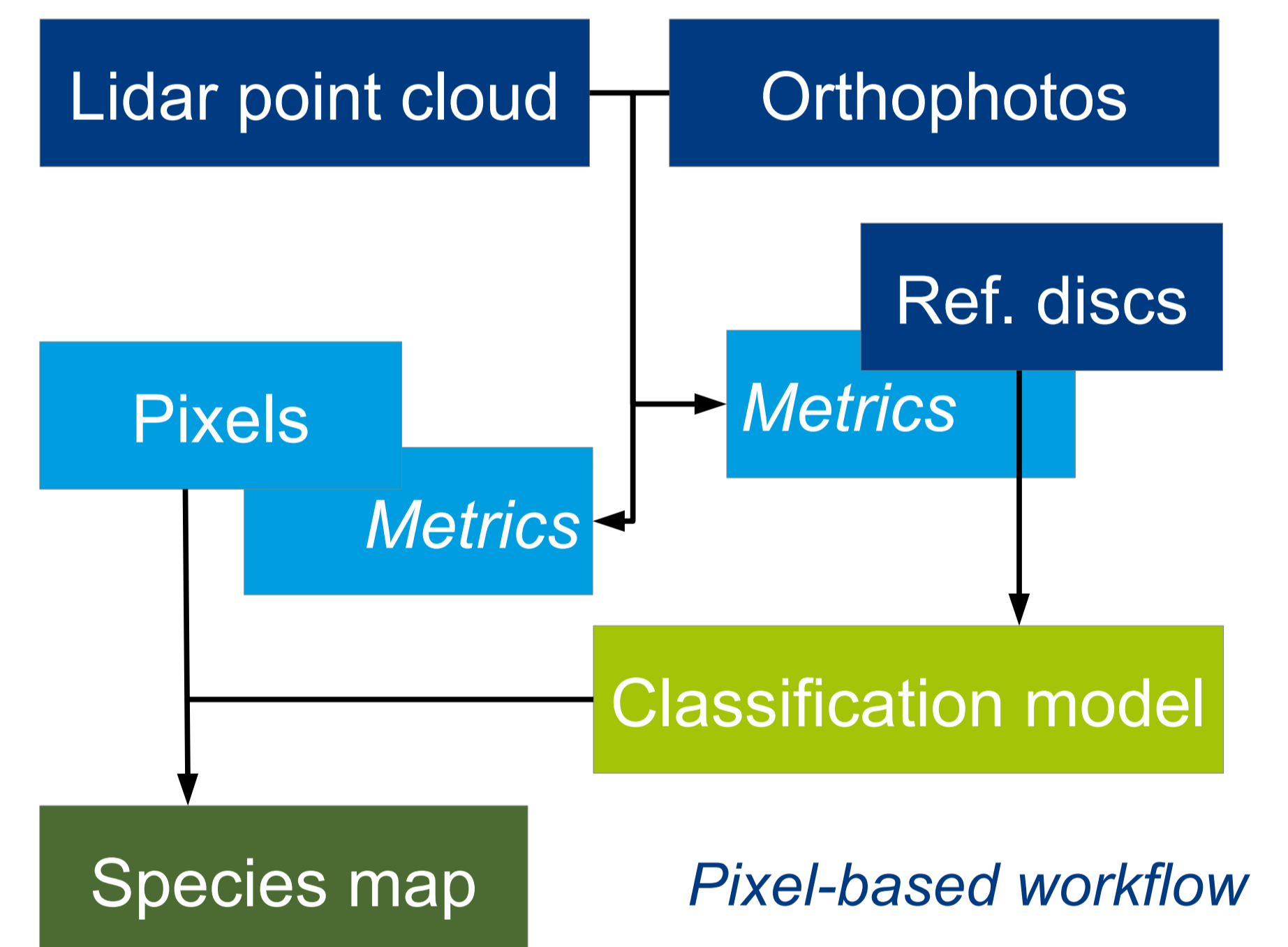


Object-based workflow

- Object segmentation is performed by applying a watershed algorithm to the canopy height model (0.5 m)

Methods

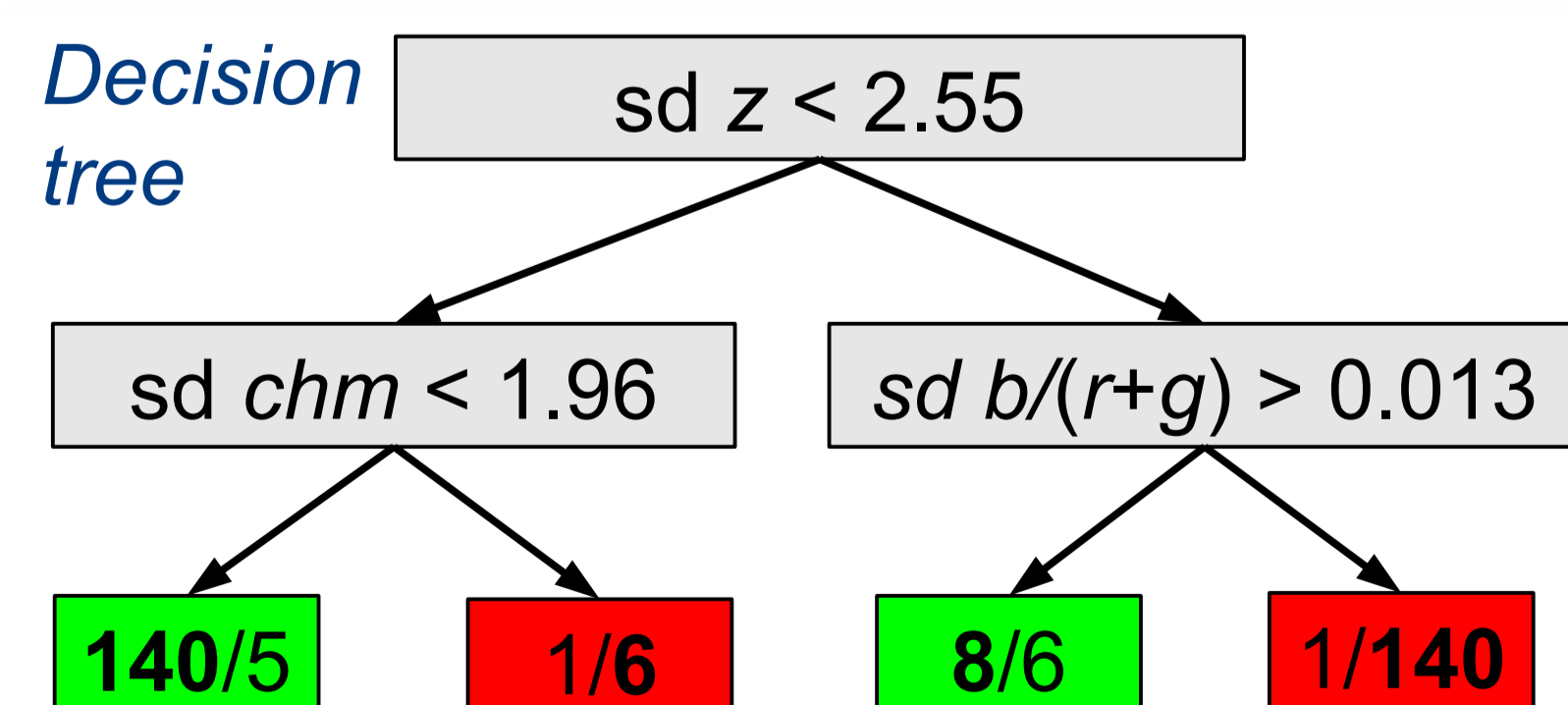
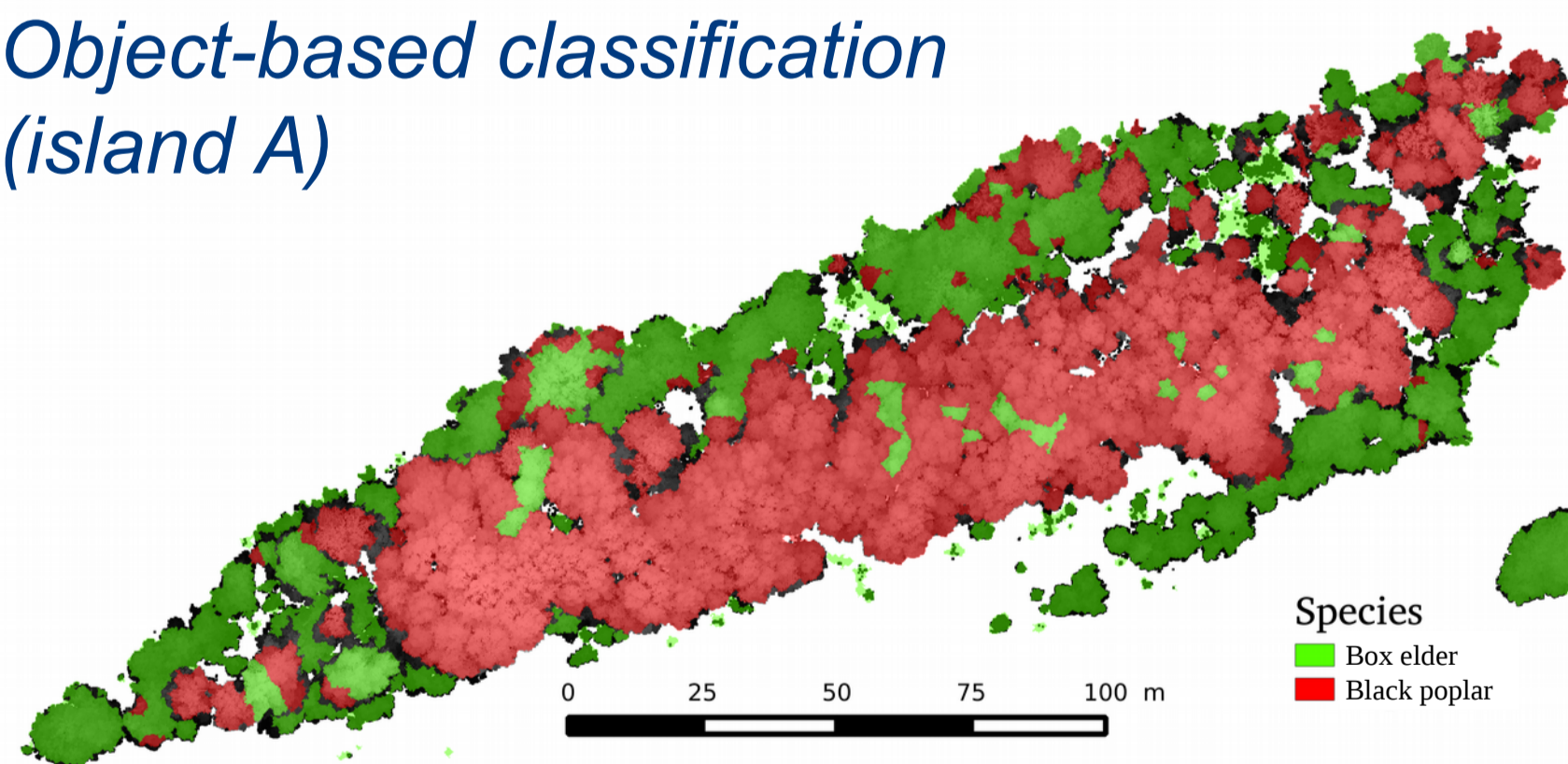
- Two classification workflows are compared: pixel- and object-based
- Derived metrics are computed in each object/pixel:
 - mean and standard deviation of band ratios ($r/(g+b)$, $g/(r+b)$, $b/(r+g)$, $ndvi$, $grvi$, nir/r)
 - standard deviation of Lidar heights (point cloud and canopy height model)
- Tested classifiers are linear discriminant analysis (LDA), support vector machines (SVM) and partition trees



Pixel-based workflow

- Metrics are computed for pixels at 1 m resolution

Object-based classification (island A)



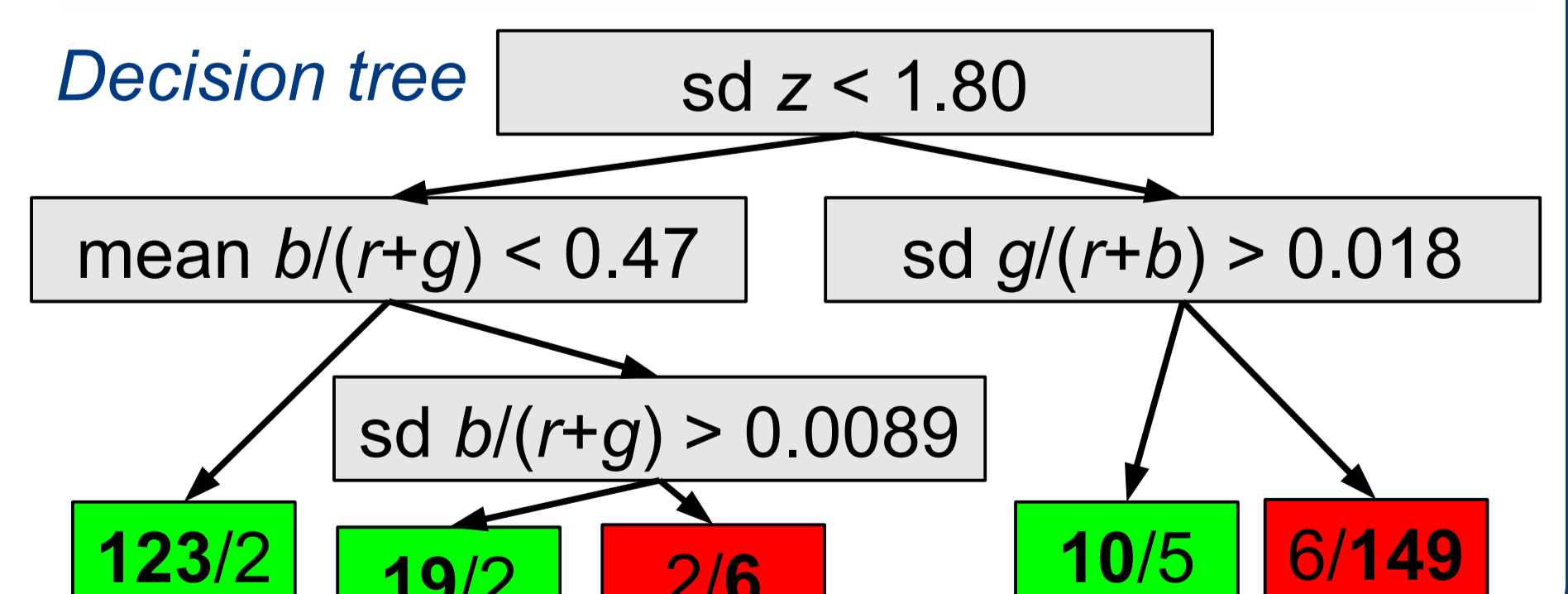
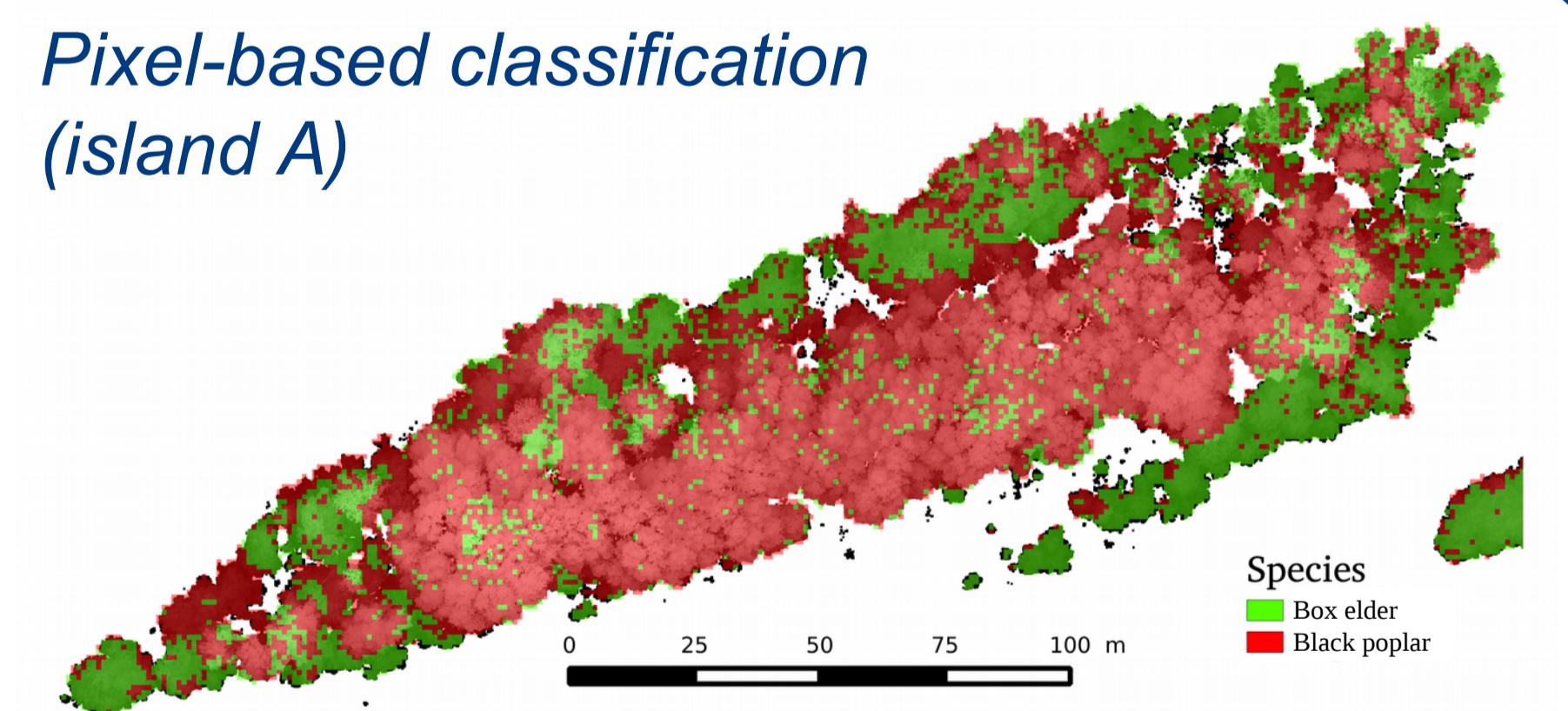
Results

- Classification accuracy is similar in both workflows. LDA and SVM perform better than partition trees classifier.
- Noise in pixel-based maps could be reduced by regularization, with specific case of shadows.

Classification accuracy (%) for workflows and classifiers

Workflow	AFD	SVM	Partition tree
Object	96.2	95.7	92.1
Pixel	96.2	94.7	91.0

Pixel-based classification (island A)



Radiometric and geometric metrics derived from UAV remote sensing were efficient in classifying two tree species in a riparian environment. Further research has yet to investigate how to make the most of UAV high resolution data, e.g. for tree mortality or regeneration monitoring.



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