

Mapping Invasive Alien Plants using Imaging Spectroscopy and Deep Learning

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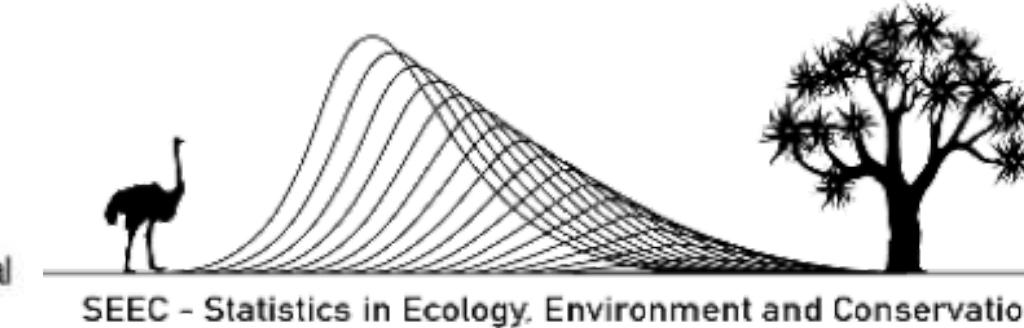
glenncriff@saeon.ac.za

 @glenncriff

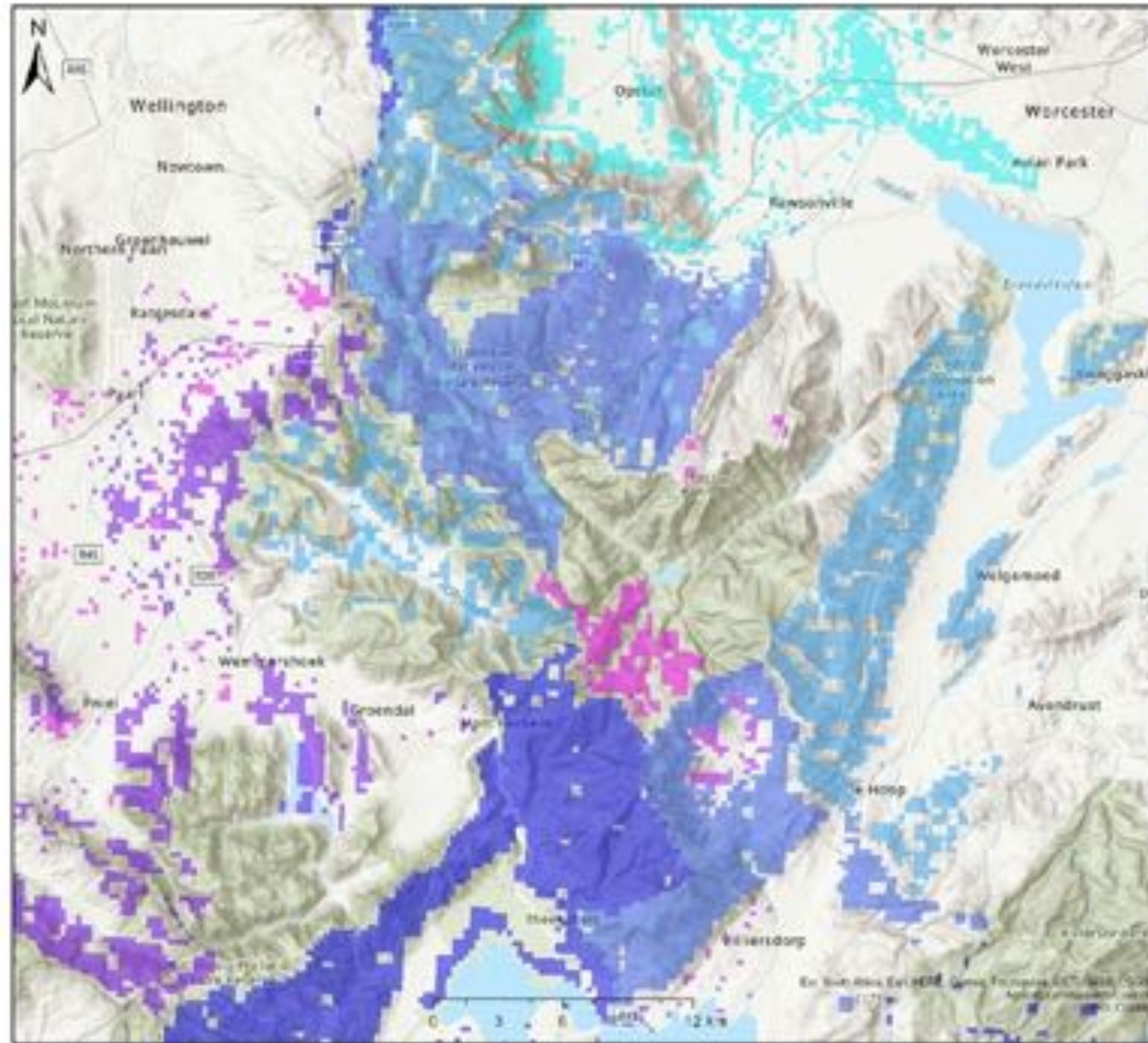
 GMoncrieff



SAEON
South African Environmental
Observation Network



science & innovation
Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA



NIAPS - 2010

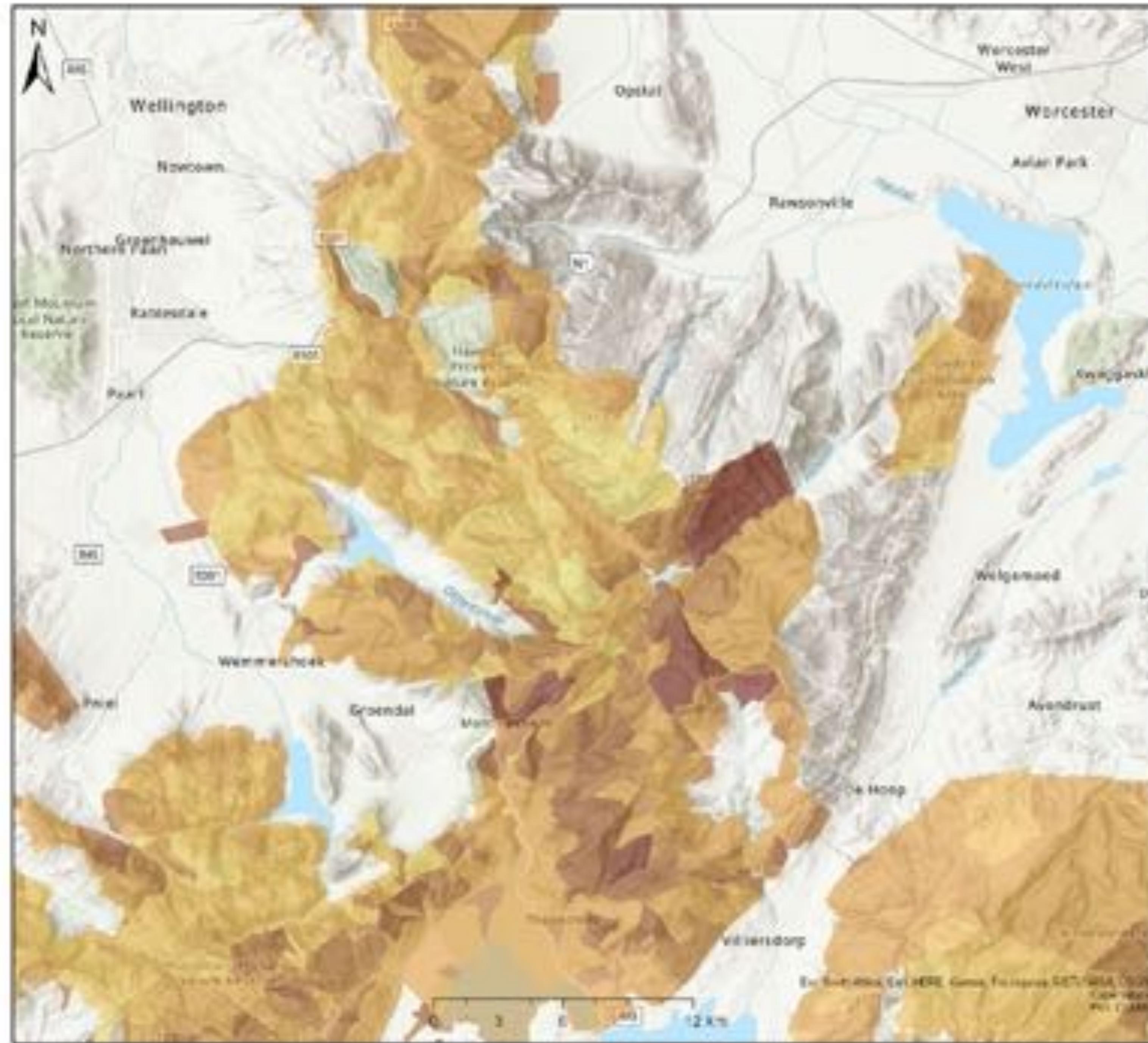
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Scale: 1:286 895

Date created: August 14, 2023



Western Cape
Government
FOR YOU



NBALs - CapeNature

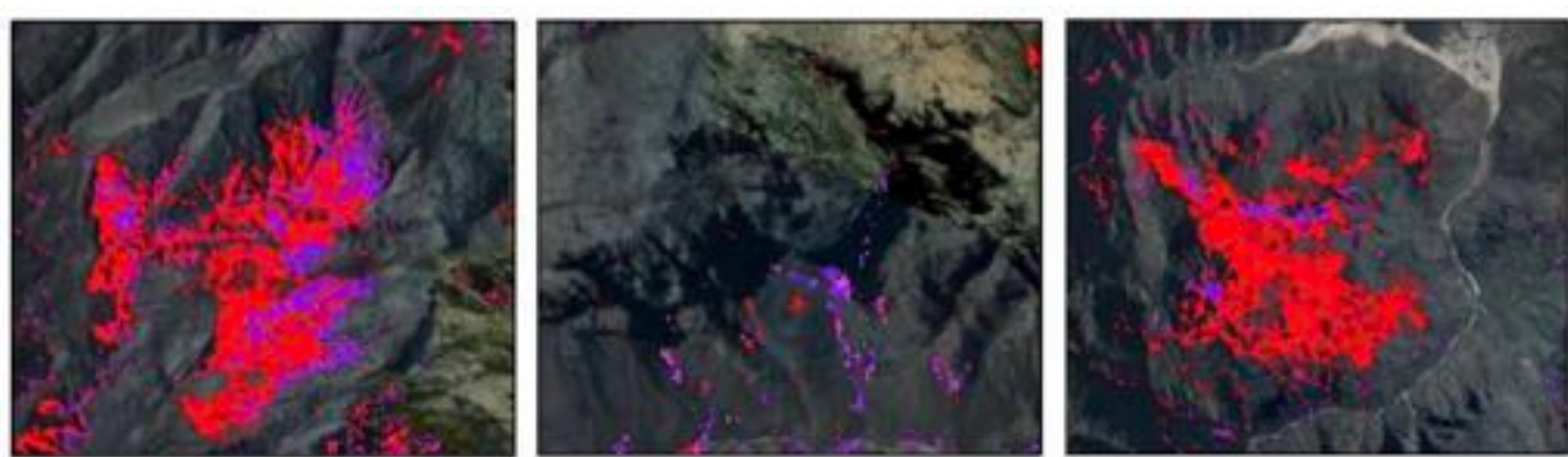


Western Cape
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Mapping invasive alien trees in water towers: A combined approach using satellite data fusion, drone technology and expert engagement

Petra B. Holden^{a,1} , Alanna J. Rebelo^{b,1} , Mark G. New^a 

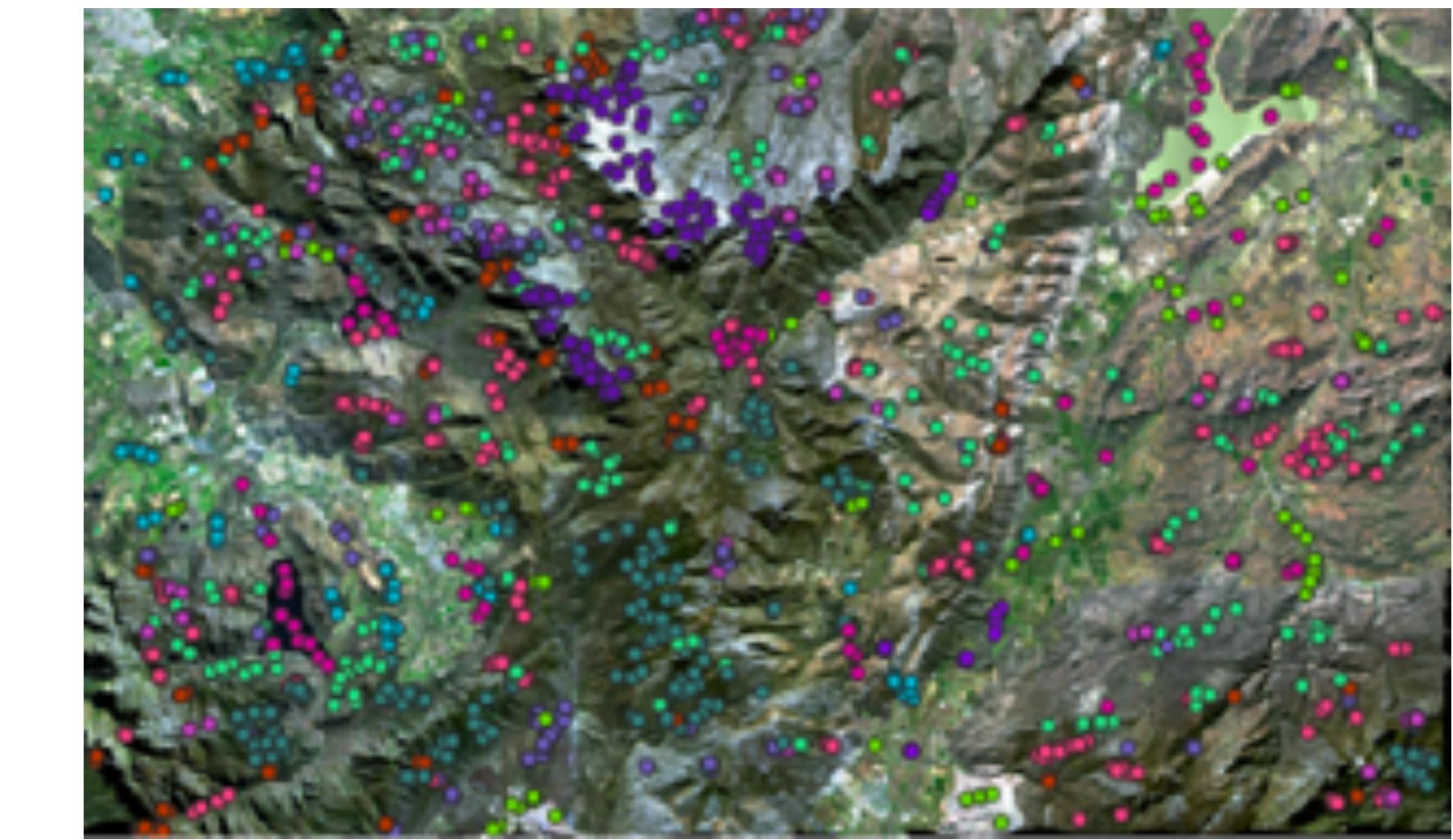


- Pine
- Black Wattle
- Alien Tree Other
- Gum

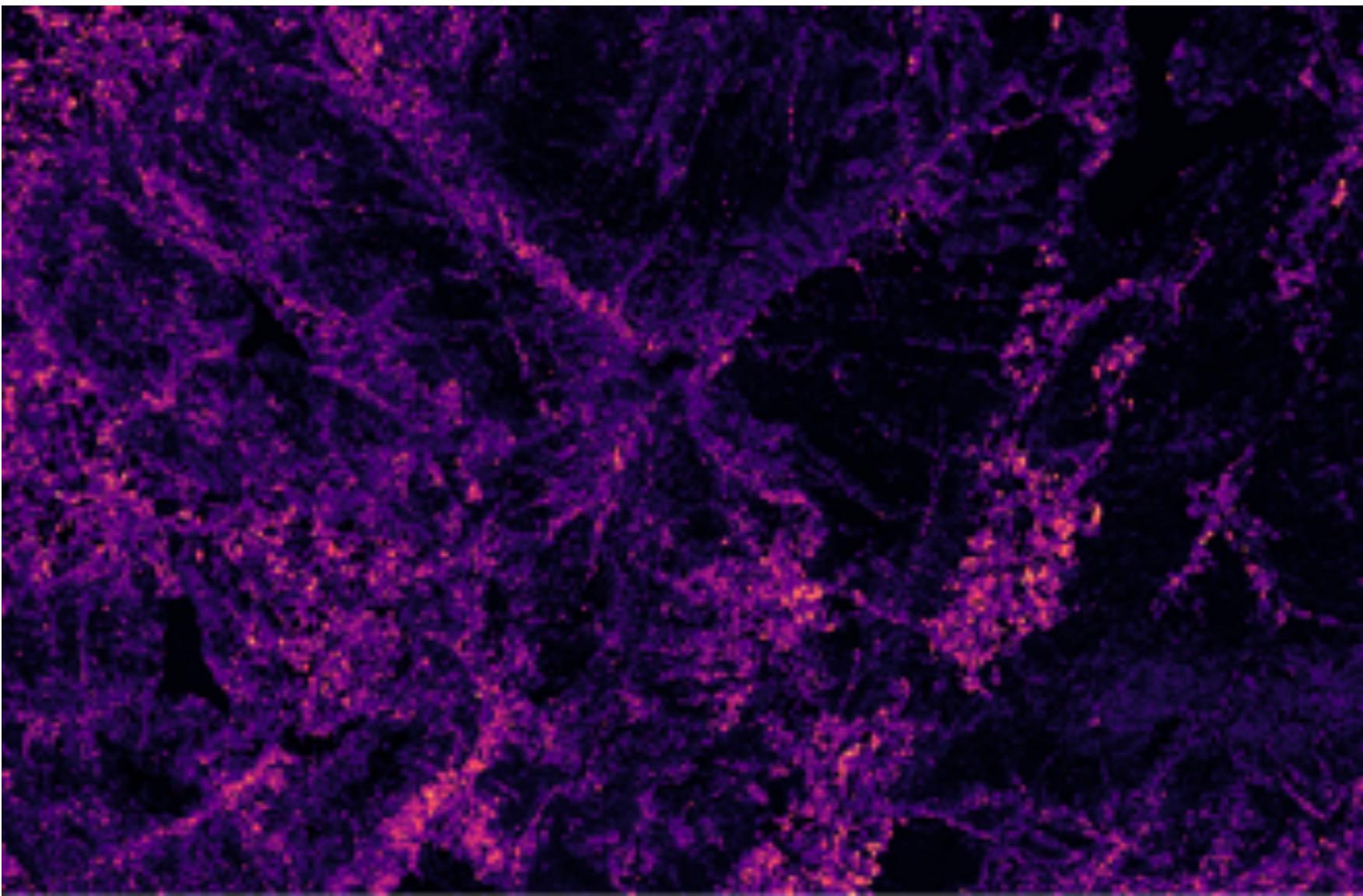
Remote Sensing



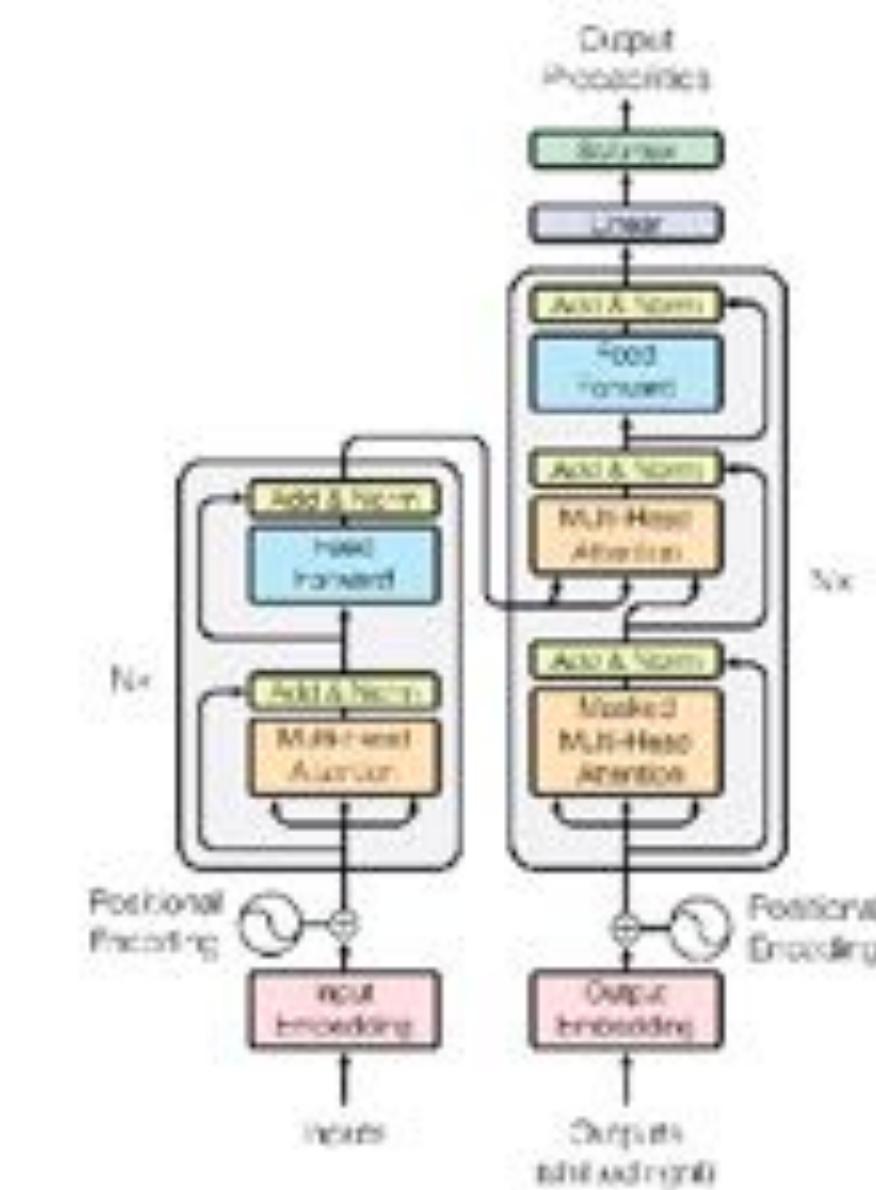
Labels



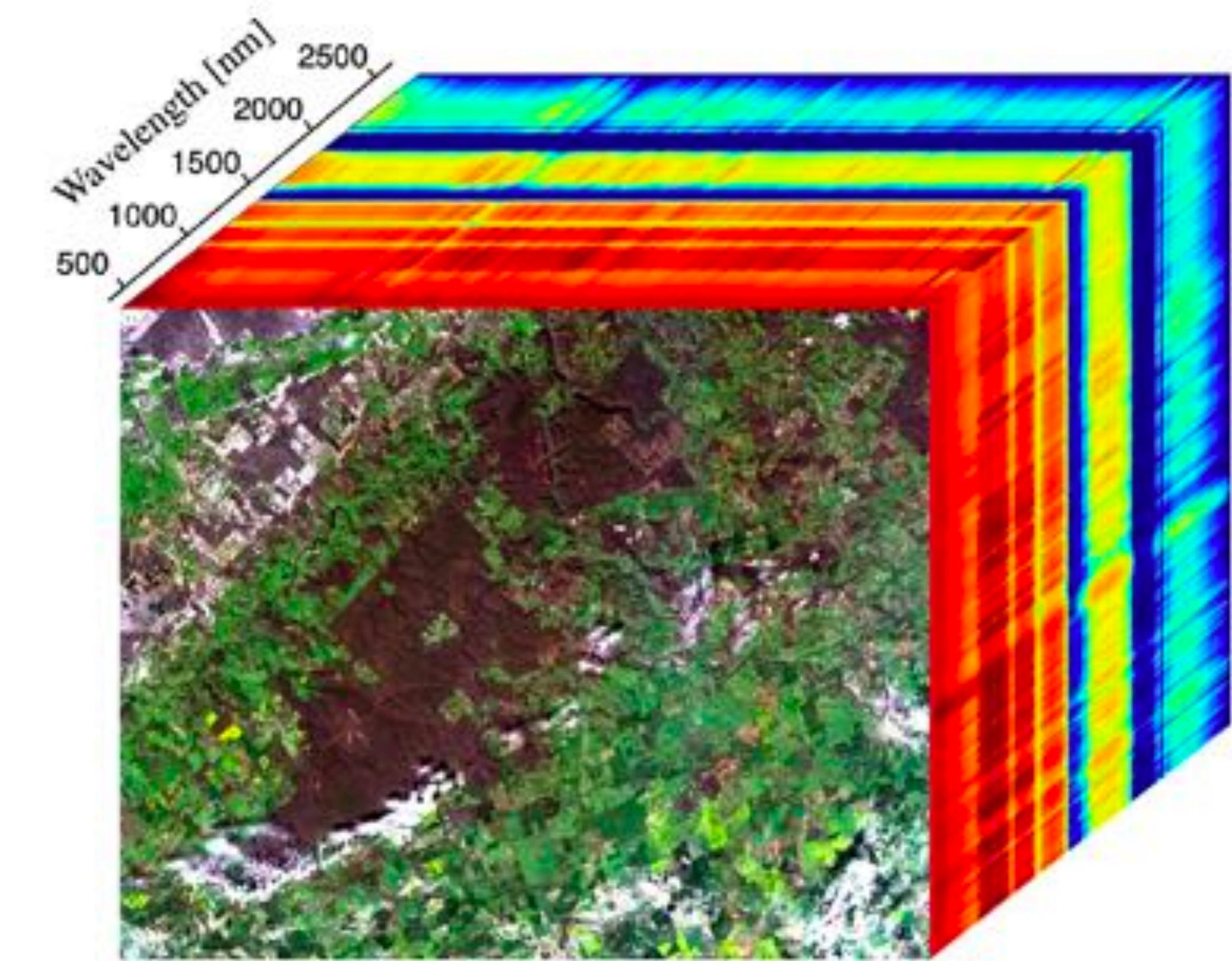
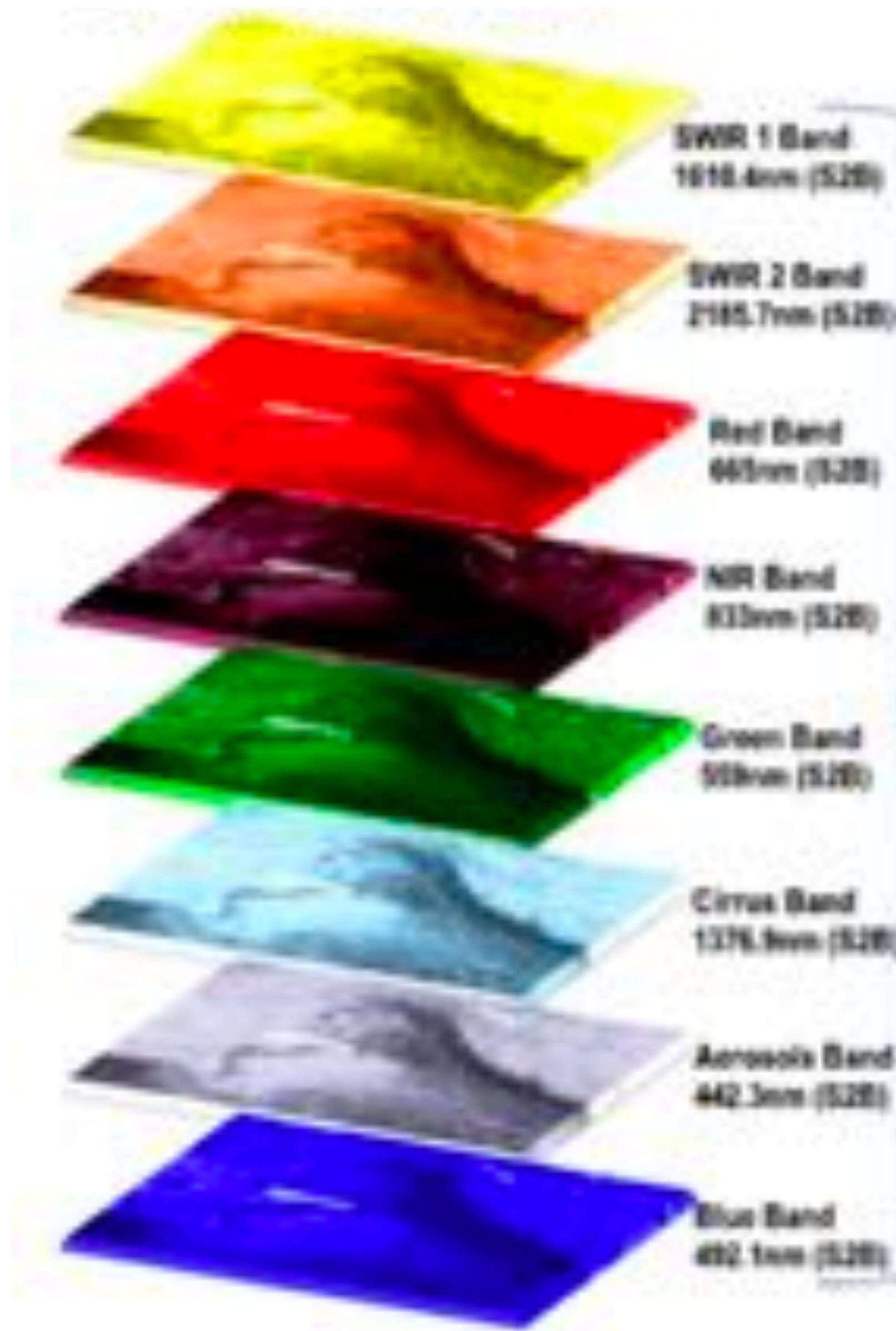
Predictions



Machine learning models

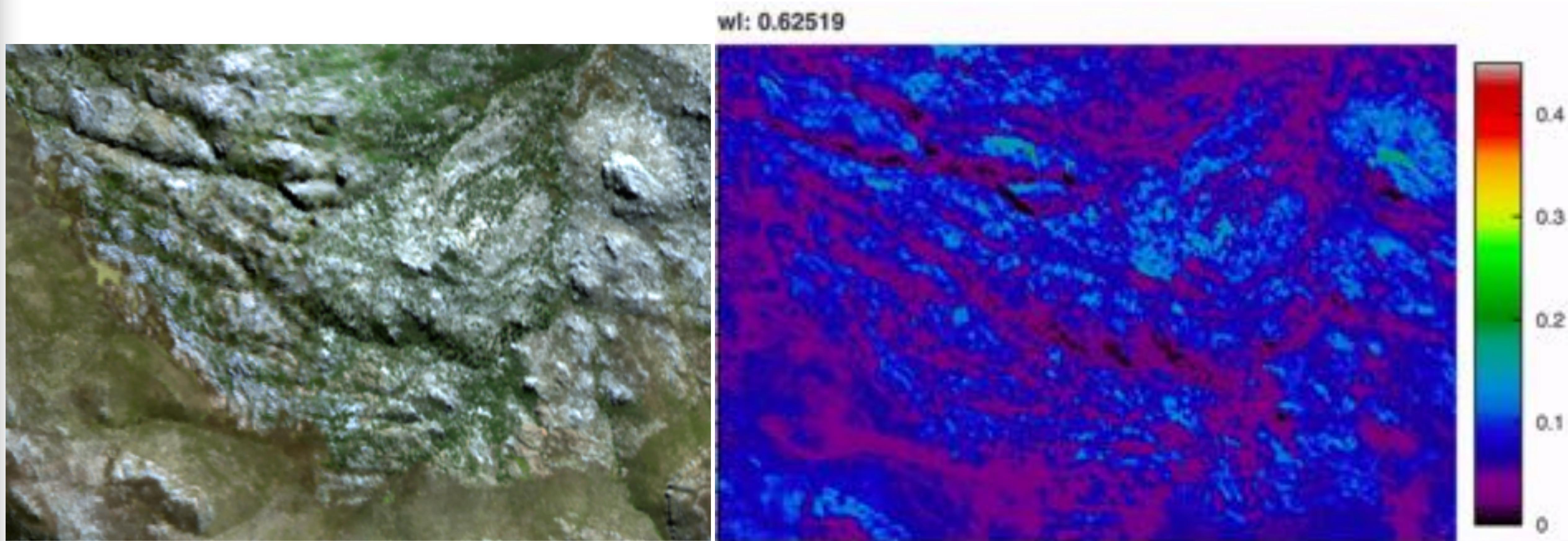


Remote Sensing

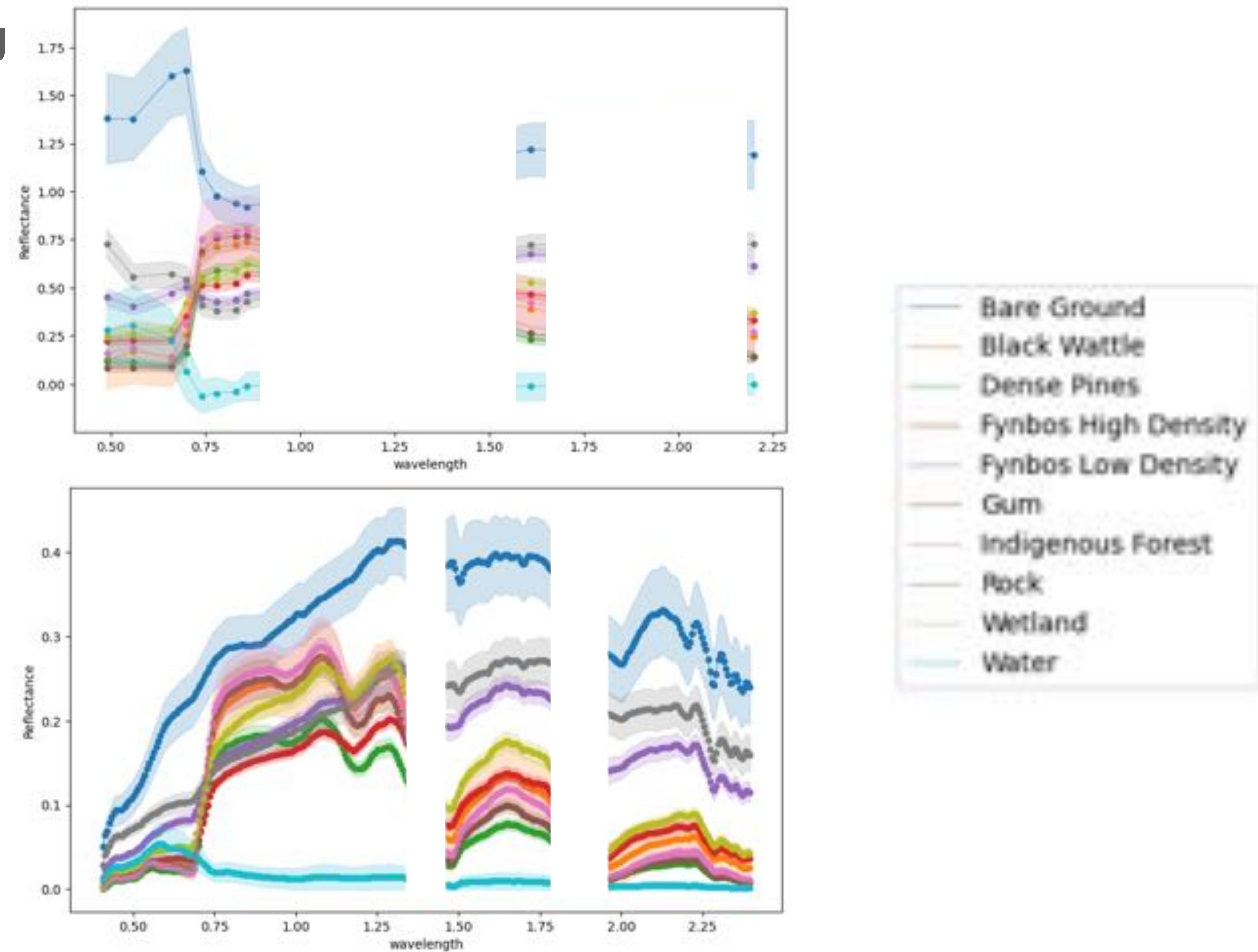


NASA/JPL

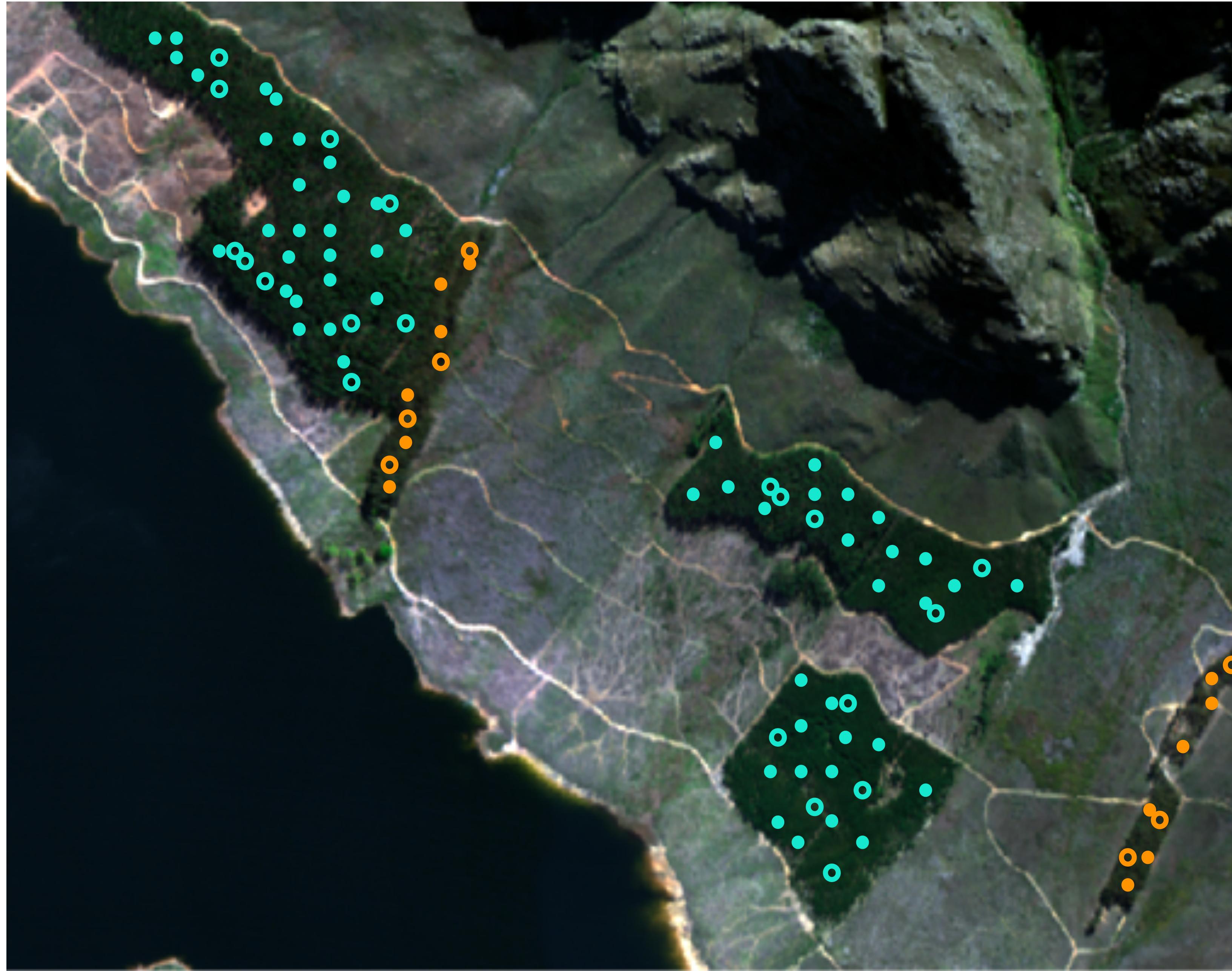
Remote Sensing



Remote Sensing

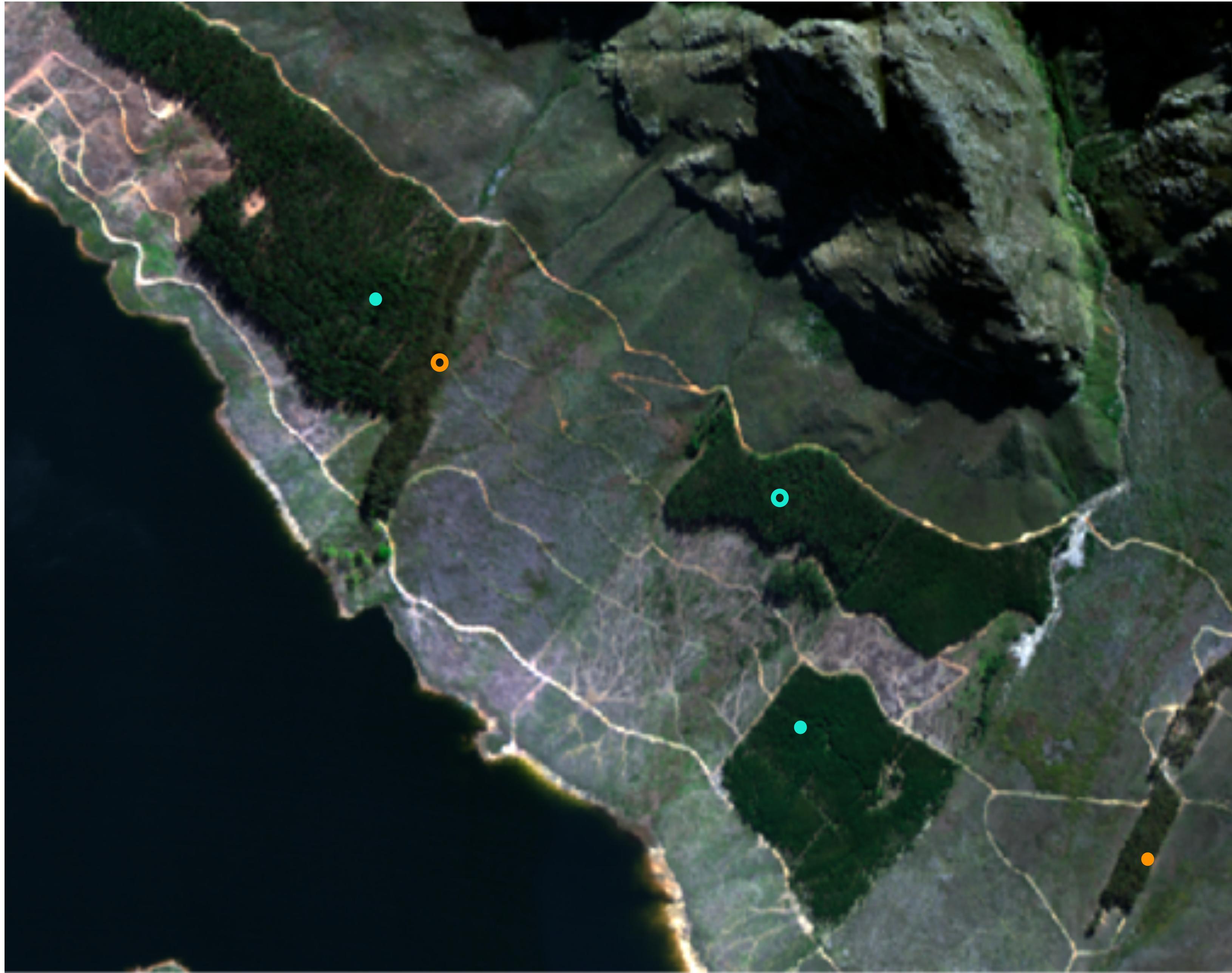


Labels



- Gum
- Pines
- Train
- Test

Labels



- Gum
- Pines
- Train
- Test

Machine learning models

Attention Is All You Need

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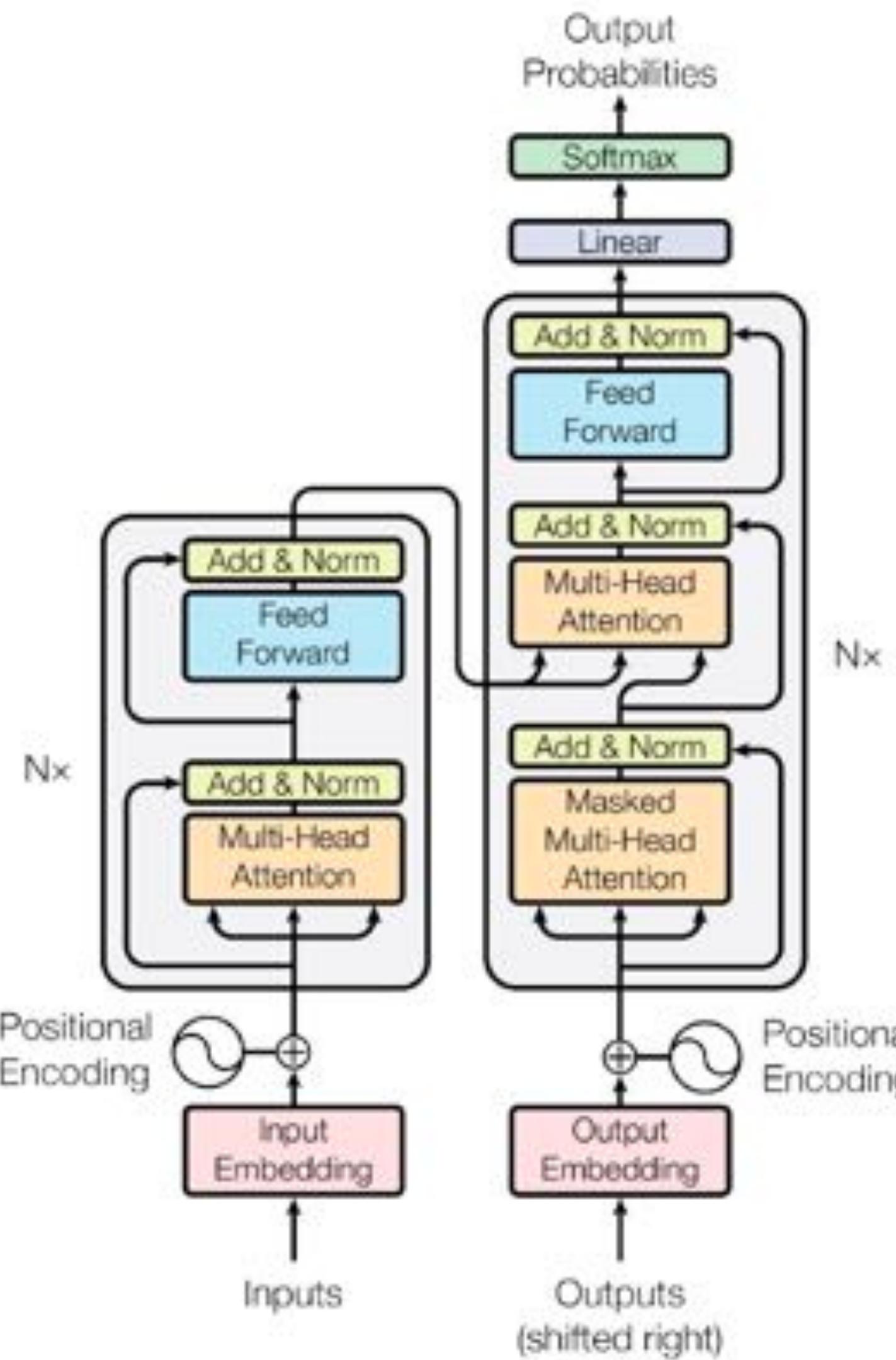
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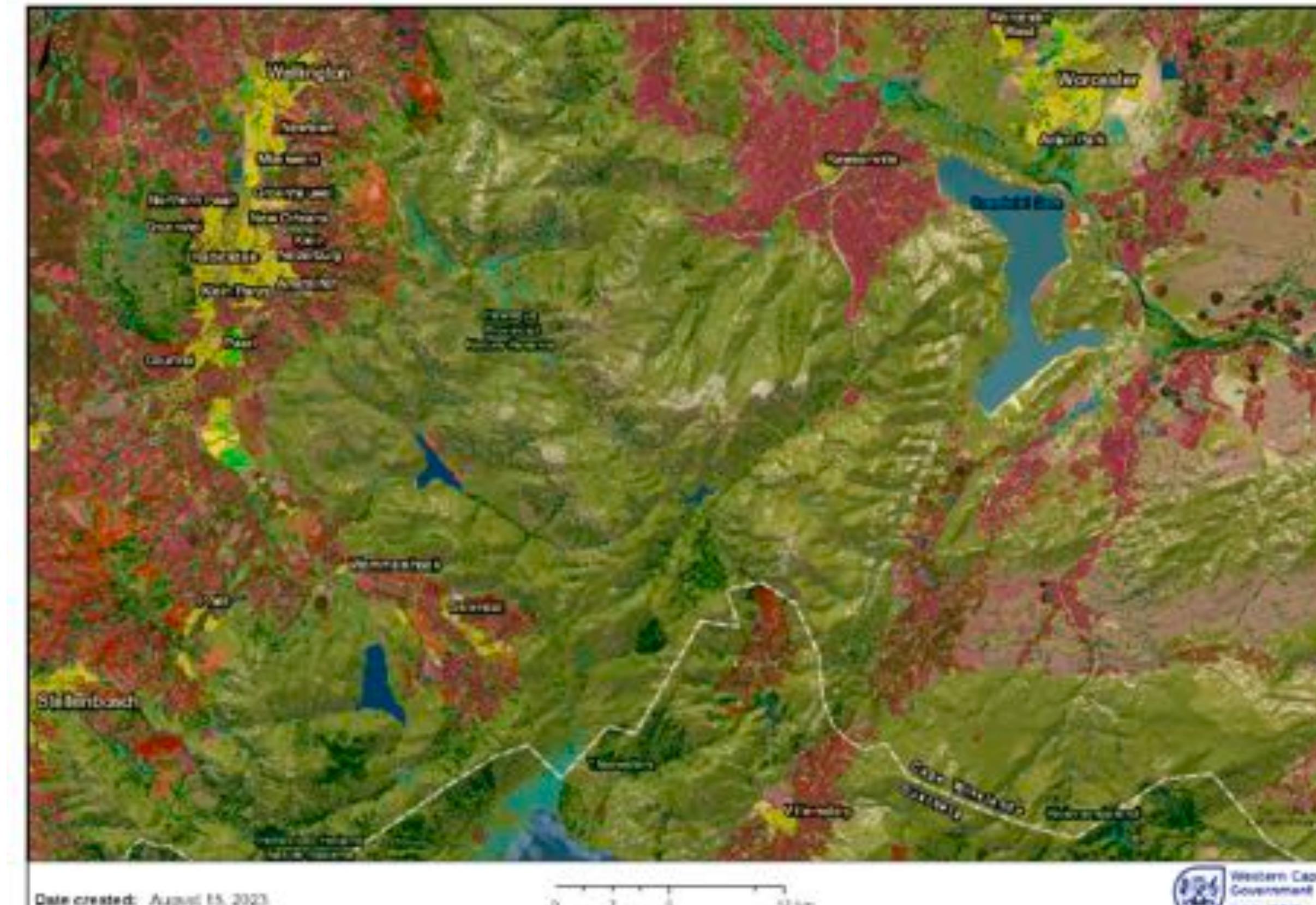
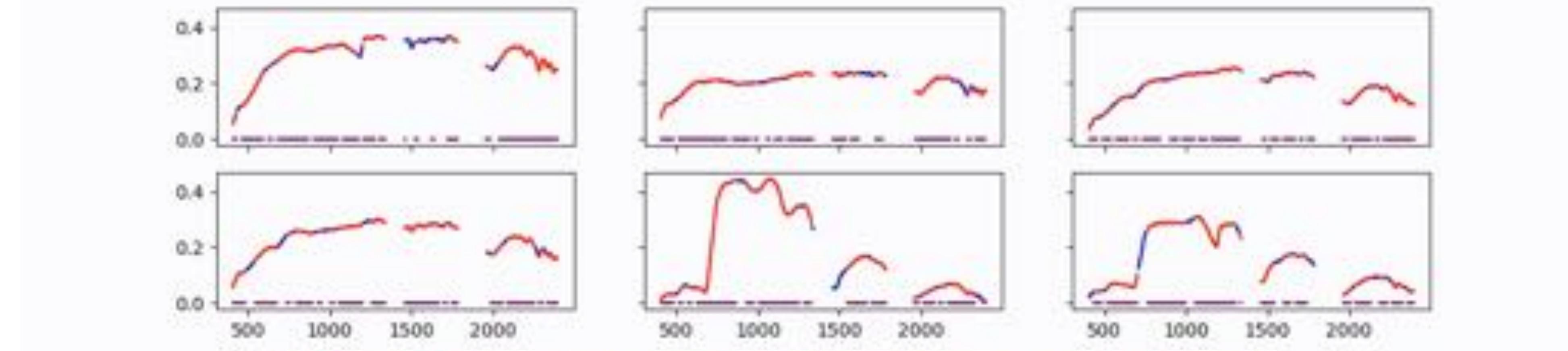
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Abstract

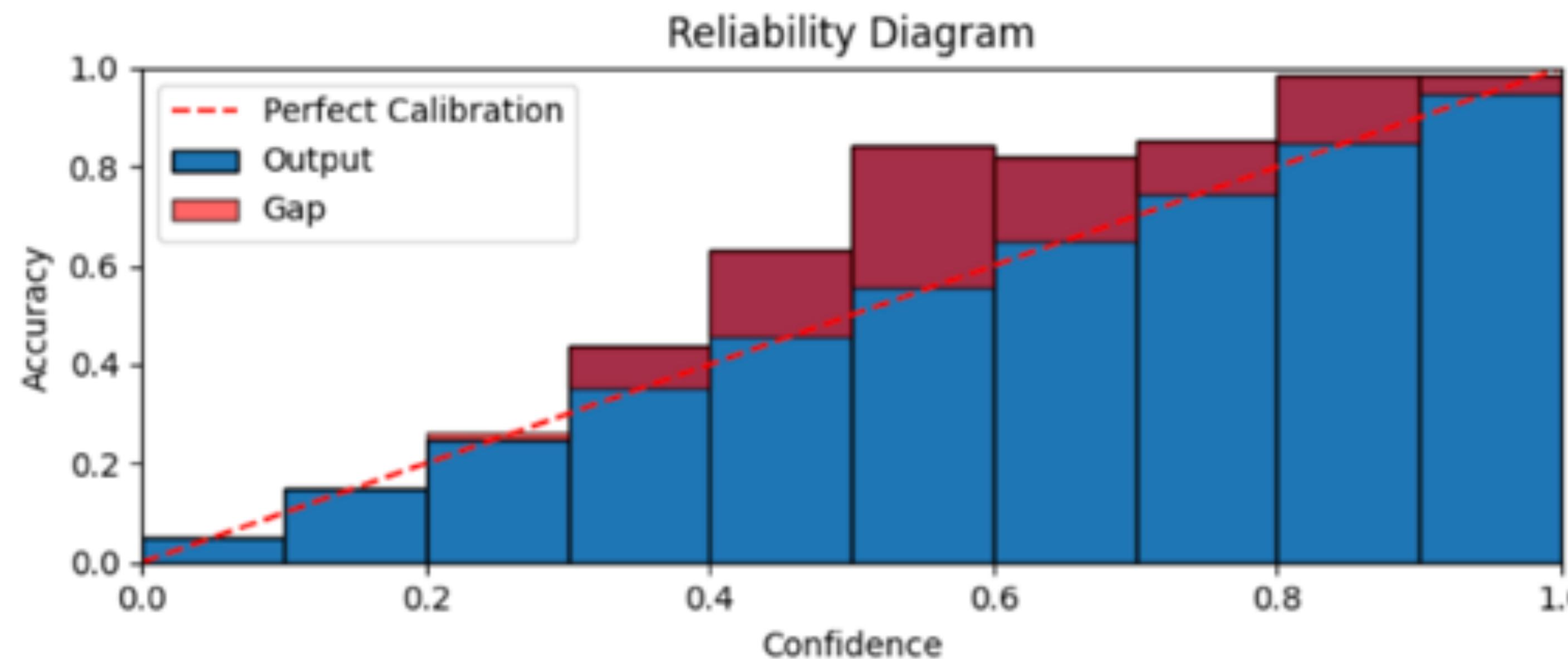
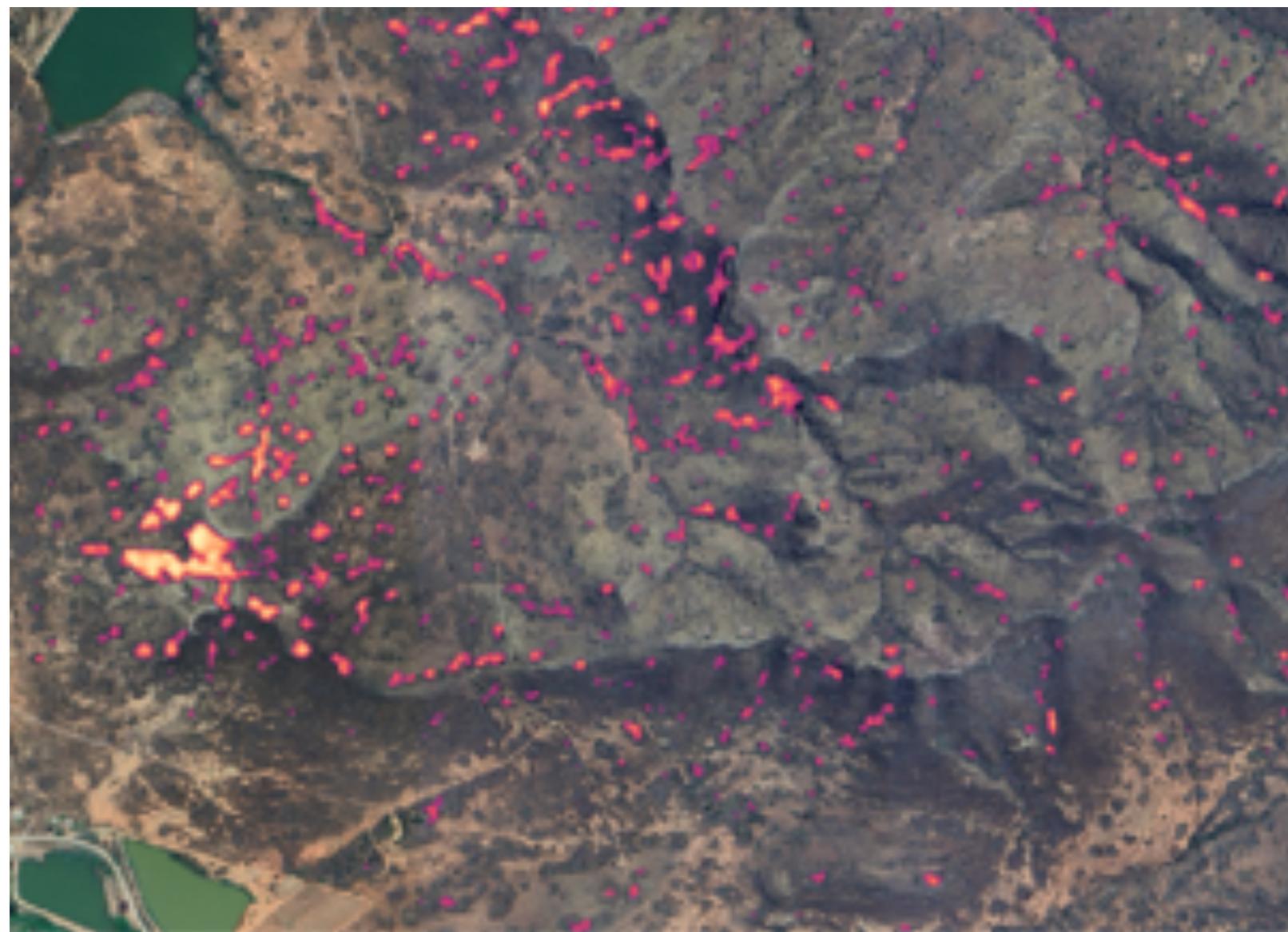
The dominant sequence transduction models are based on complex recurrent or convolutional neural networks that include an encoder and a decoder. The best performing models also connect the encoder and decoder through an attention mechanism. We propose a new simple network architecture, the Transformer, based solely on attention mechanisms, dispensing with recurrence and convolutions entirely. Experiments on two machine translation tasks show these models to be superior in quality while being more parallelizable and requiring significantly less time to train. Our model achieves 28.4 BLEU on the WMT 2014 English-to-German translation task, improving over the existing best results, including ensembles, by over 2 BLEU. On the WMT 2014 English-to-French translation task, our model establishes a new single-model state-of-the-art BLEU score of 41.8 after training for 3.5 days on eight GPUs, a small fraction of the training costs of the best models from the literature. We show that the Transformer generalizes well to other tasks by applying it successfully to English constituency parsing both with large and limited training data.



Machine learning models

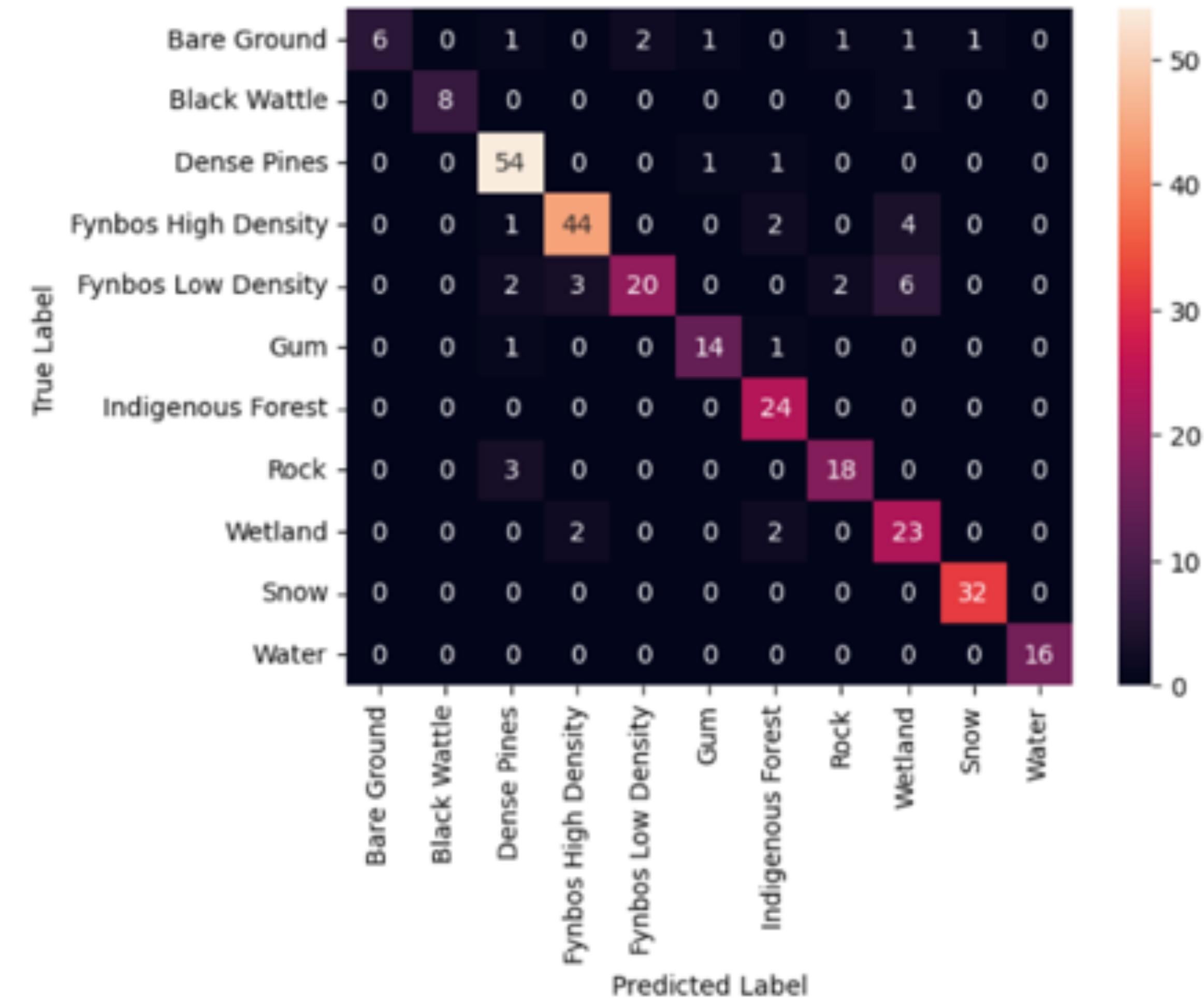


Machine learning models



Predictions

Sensor	Accuracy	Pine Precision	Pine Recall	Gum Precision	Gum Recall
IS	0.87	0.87	0.96	0.88	0.88
Sentinel 2	0.68	0.83	0.79	0.5	0.44



Predictions:

Pines



Predictions:

Gums



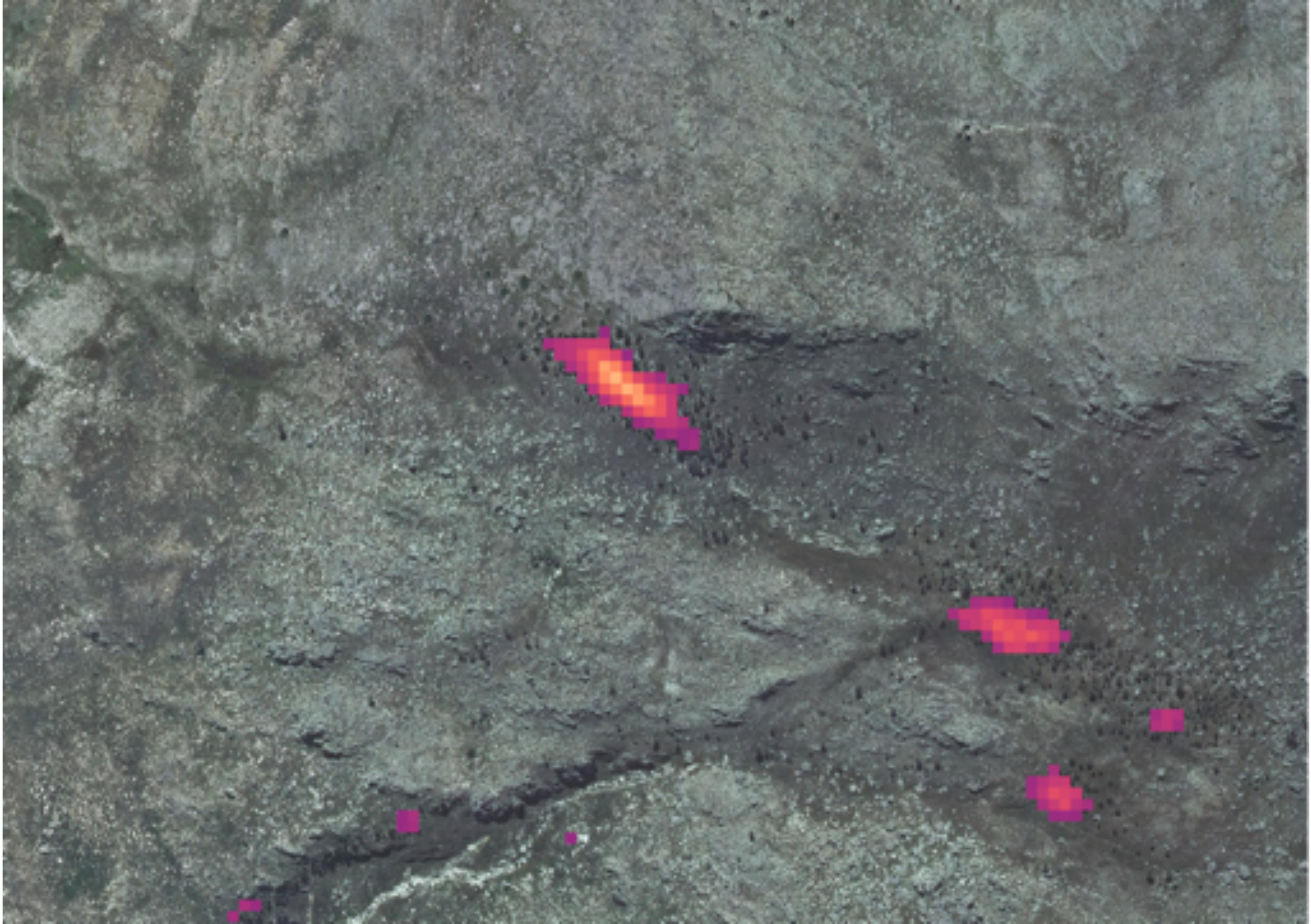
Predictions:

Scattered
Pines



Predictions:

Scattered
Pines



Predictions:

Scattered
Pines

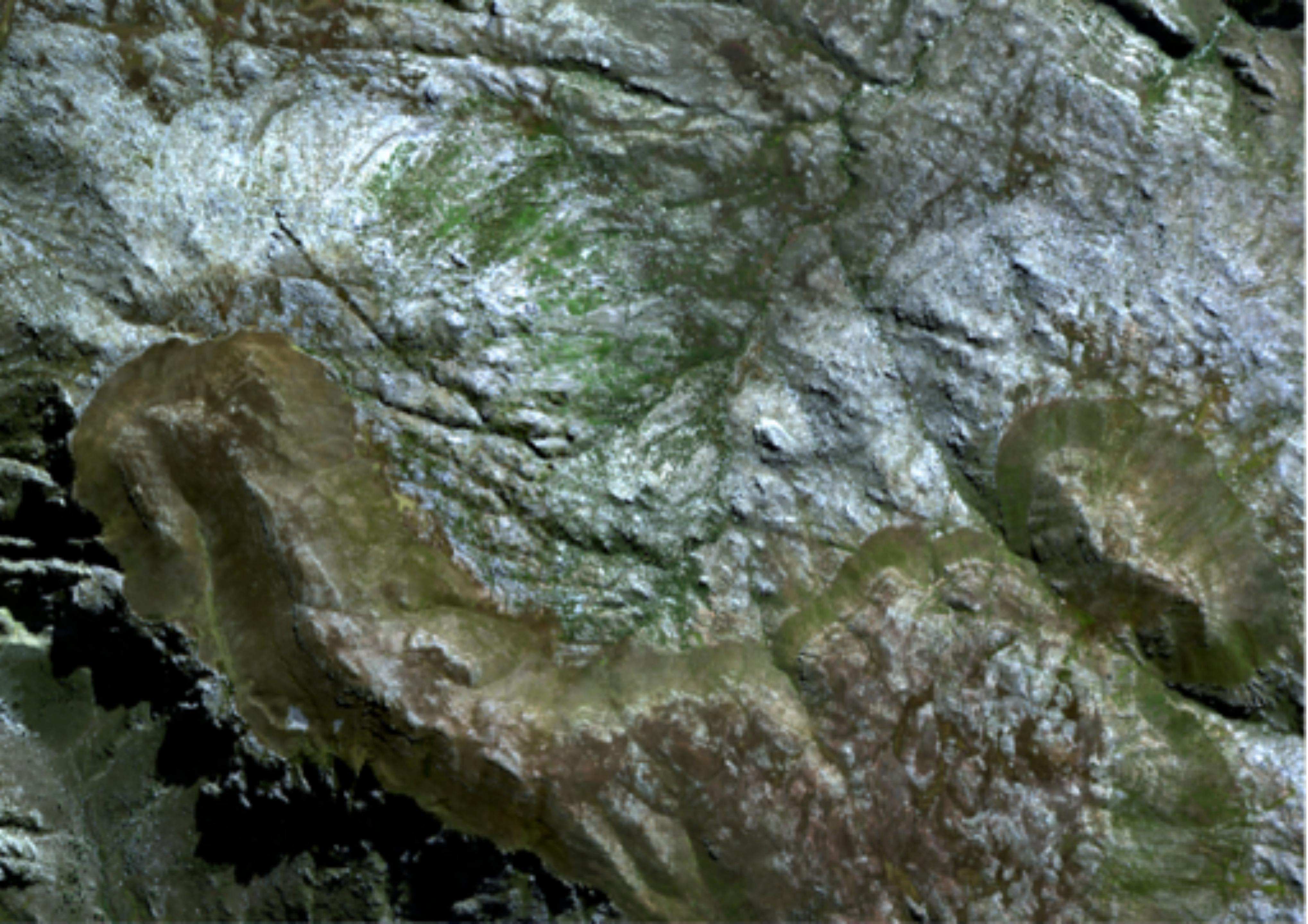


Predictions:

Pines

Gums

Wetland

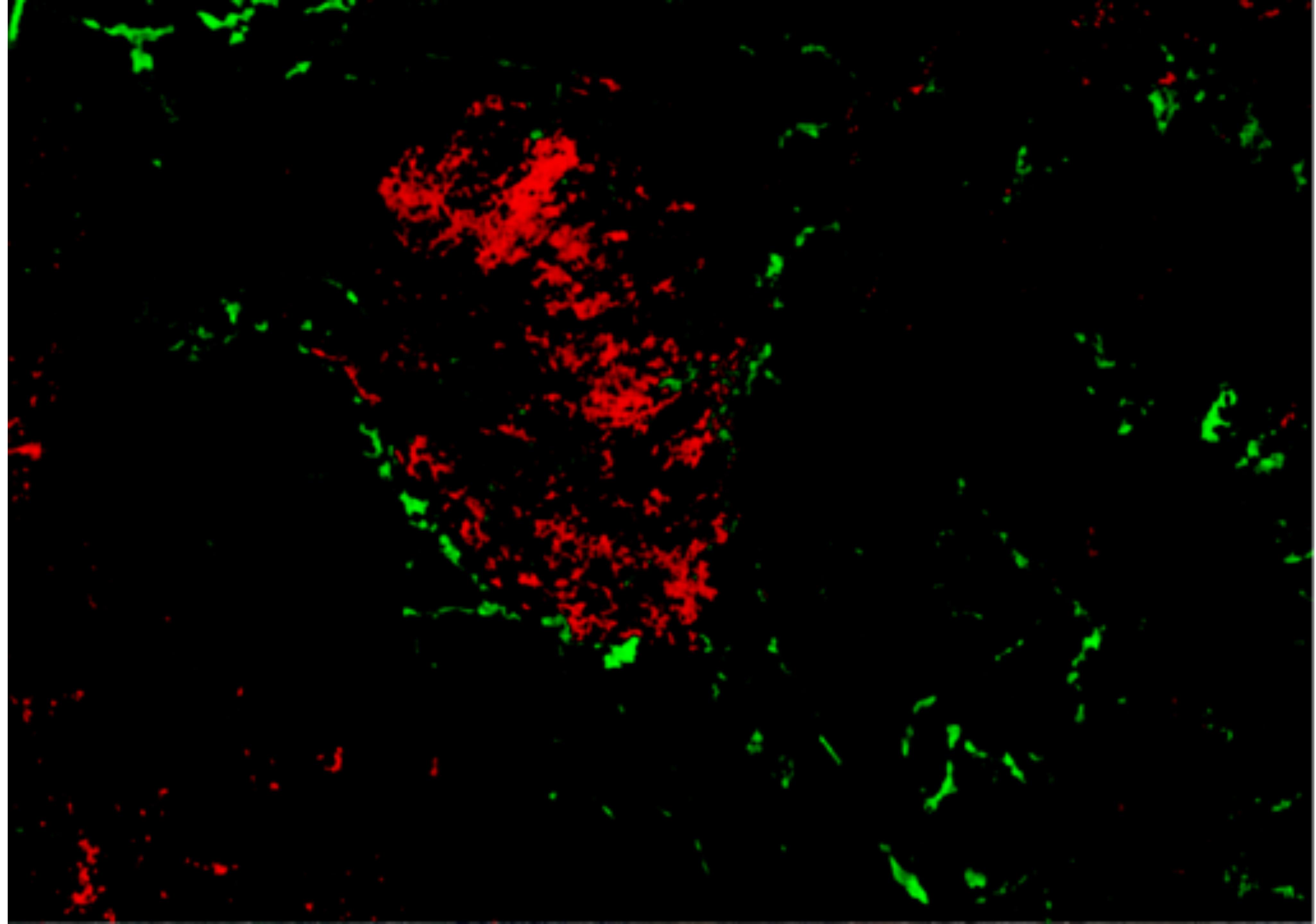


Predictions:

Pines

Gums

Wetland



Predictions:

Pines

Gums

Wetland

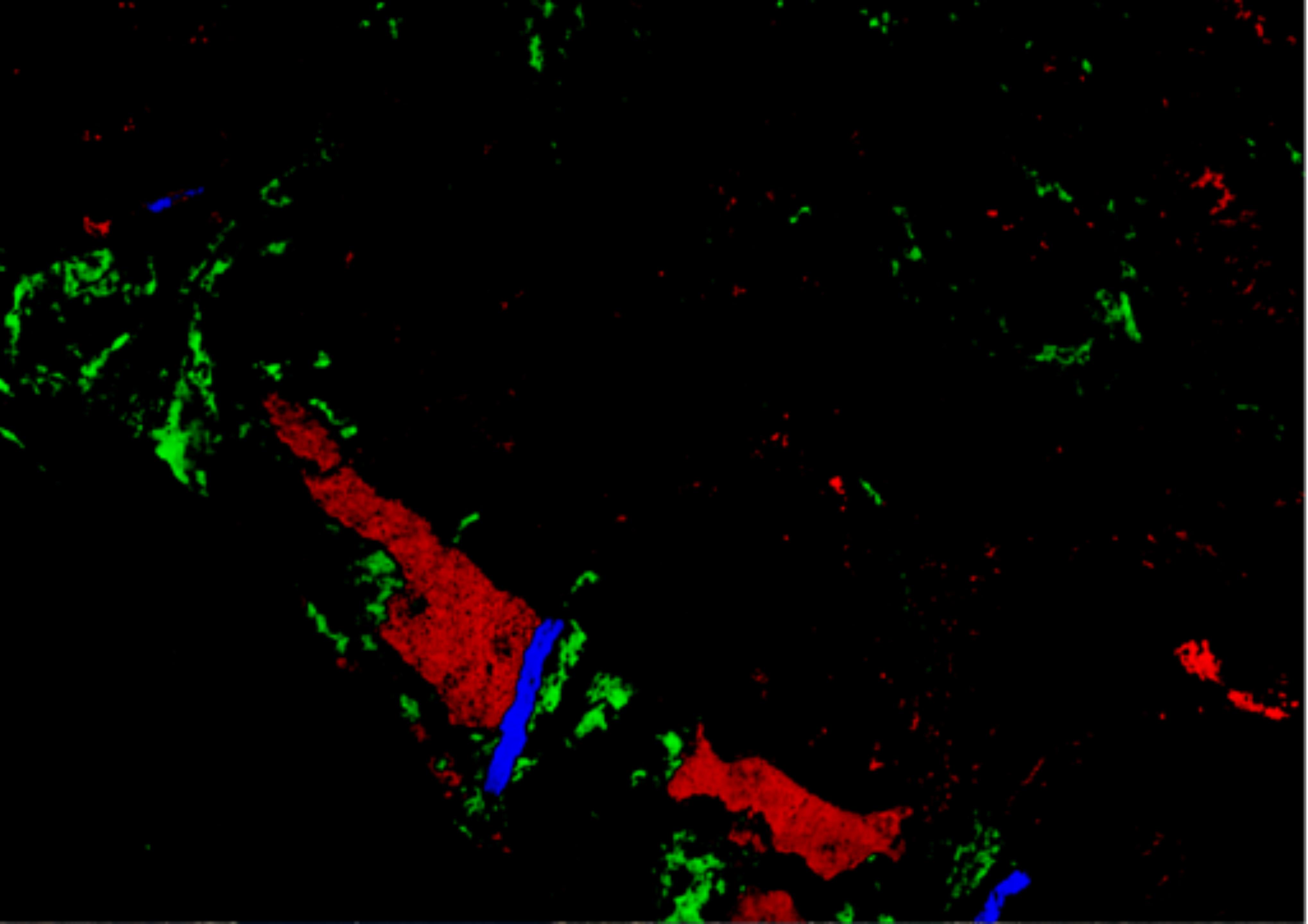


Predictions:

Pines

Gums

Wetland

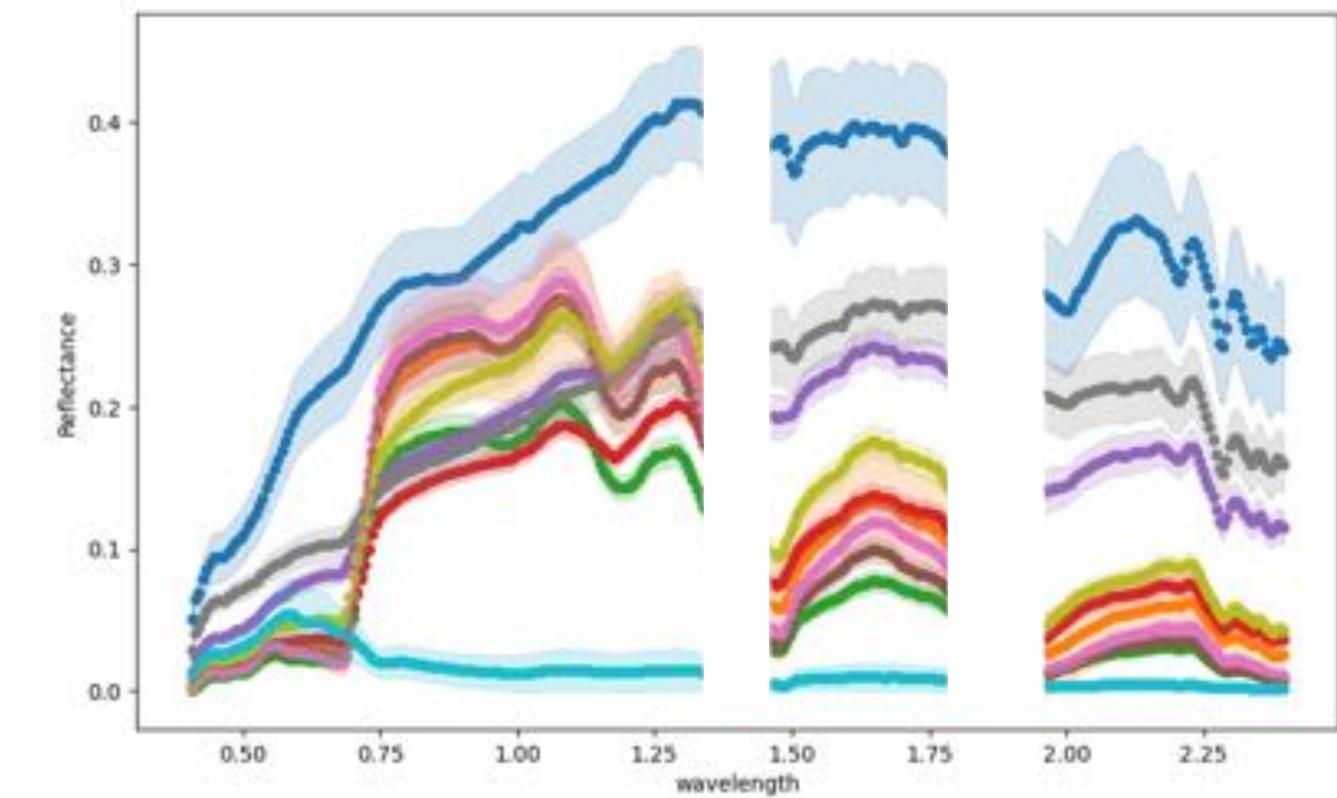


Predictions:

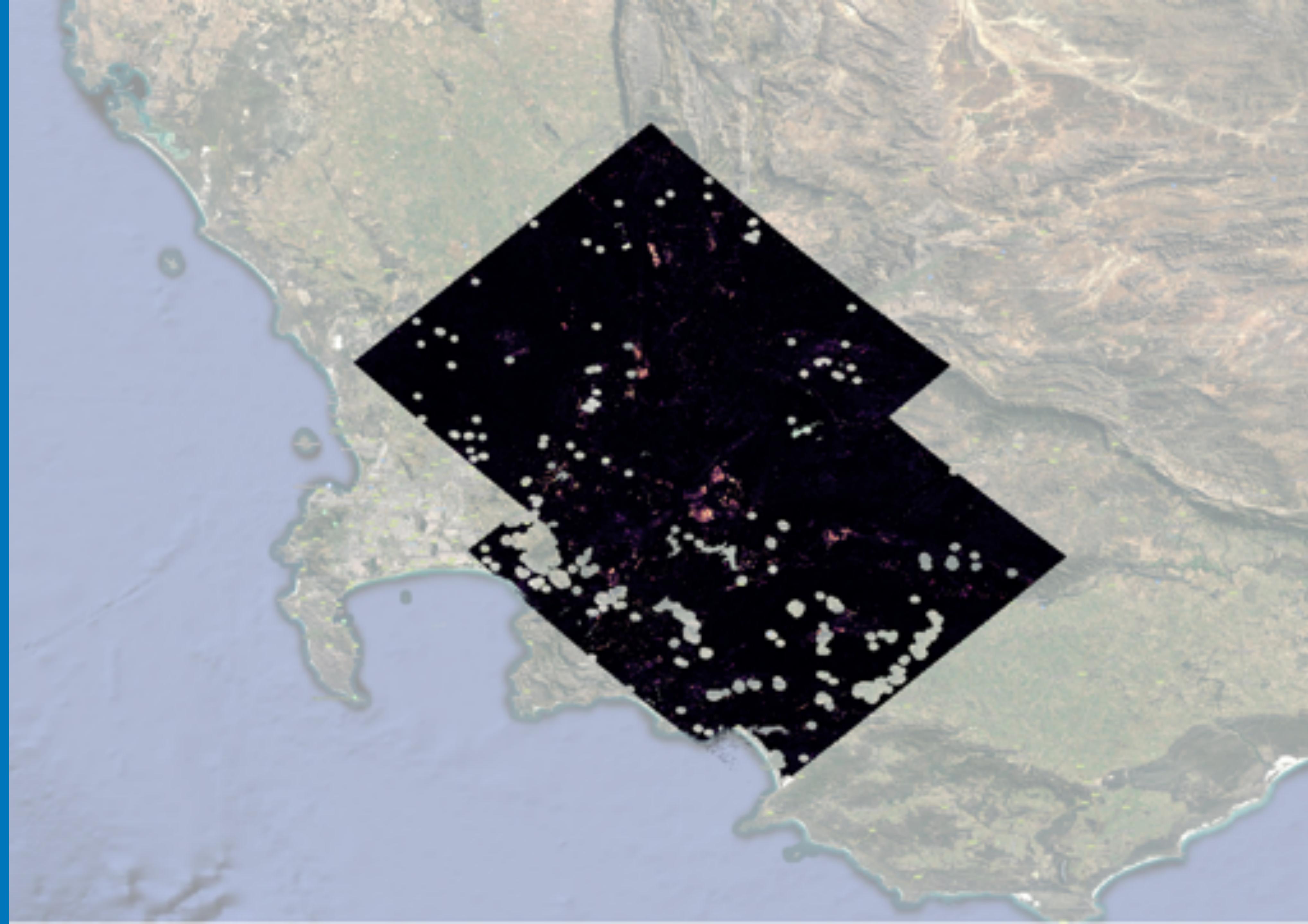
Lots of
problems



iNaturalist







Funding:

SAEON/NRF

SANSA

NASA

Ideas:

Geethen Singh

Jasper Slingsby

Adam Wilson

Alanna Rebelo

Lungile Khuzwayo



github.com/GMoncrieff/hyper-iap

