

# Mapping floating matters in the PACE and AI era

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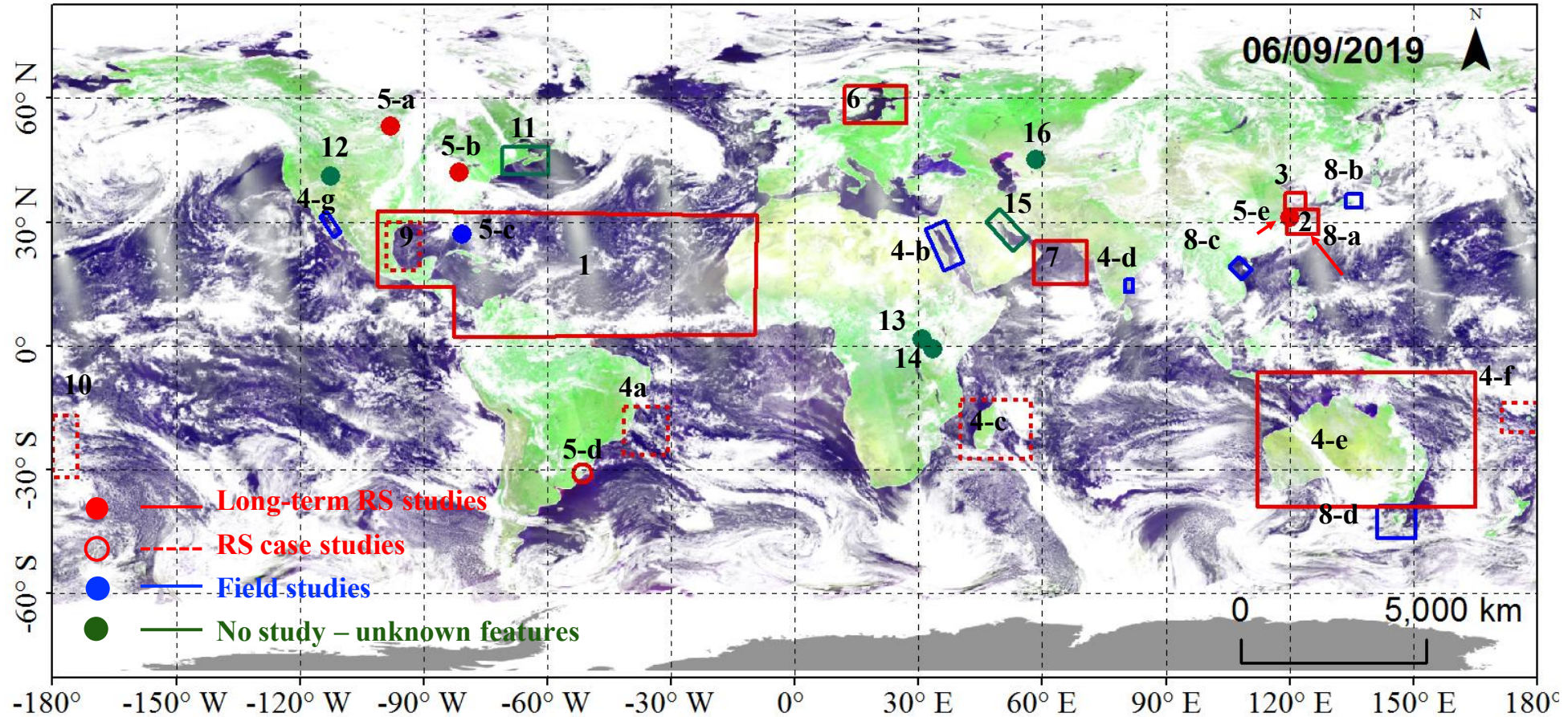
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# Why do we care?

Our knowledge on floating macroalgae, microalgae scums, and non-algae matters is very limited

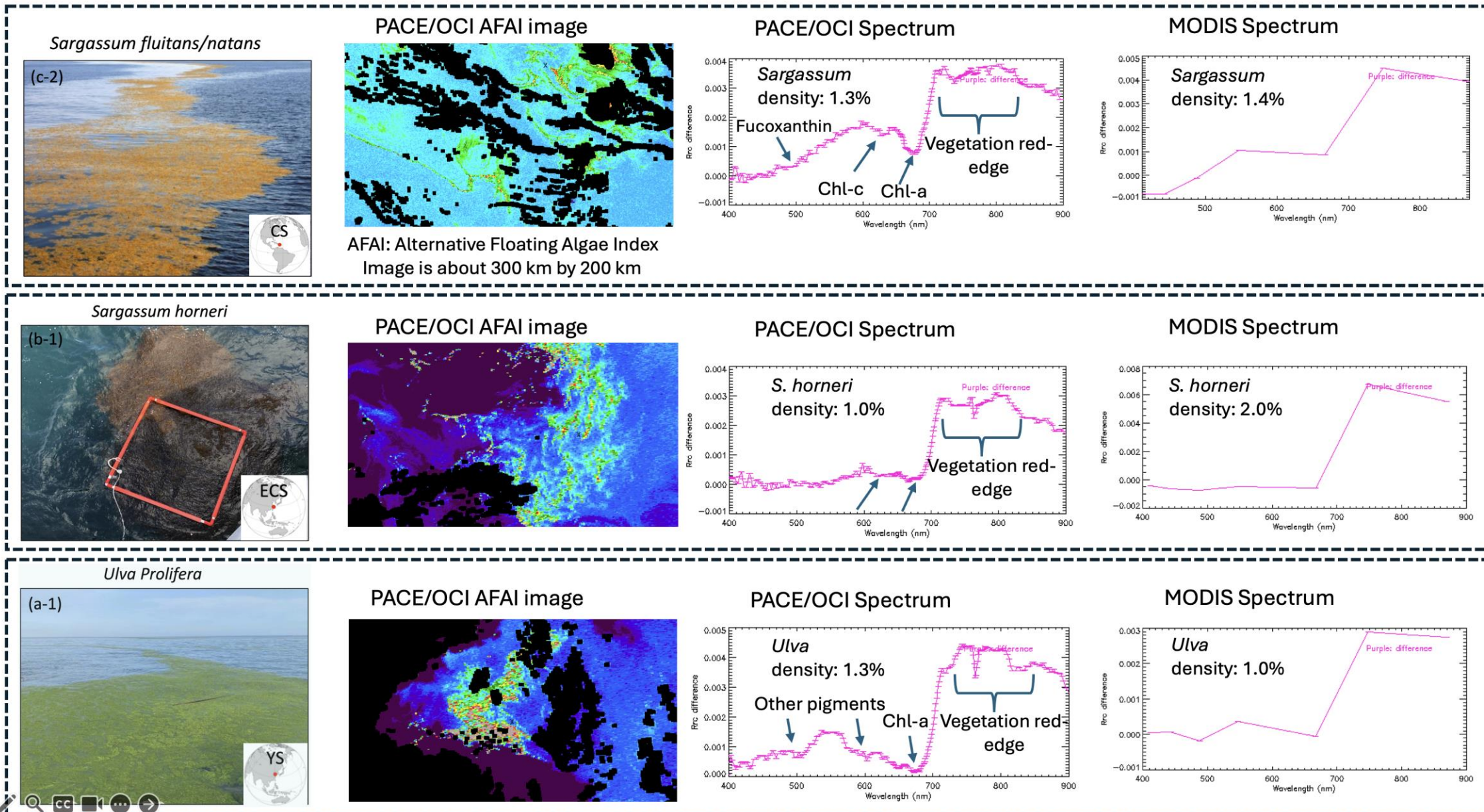
Locations of floating matters from manual search of satellite imagery (Qi et al., 2020)



Hyperspectral OCI can improve spectral discrimination, boost SNRs, and reduce uncertainties

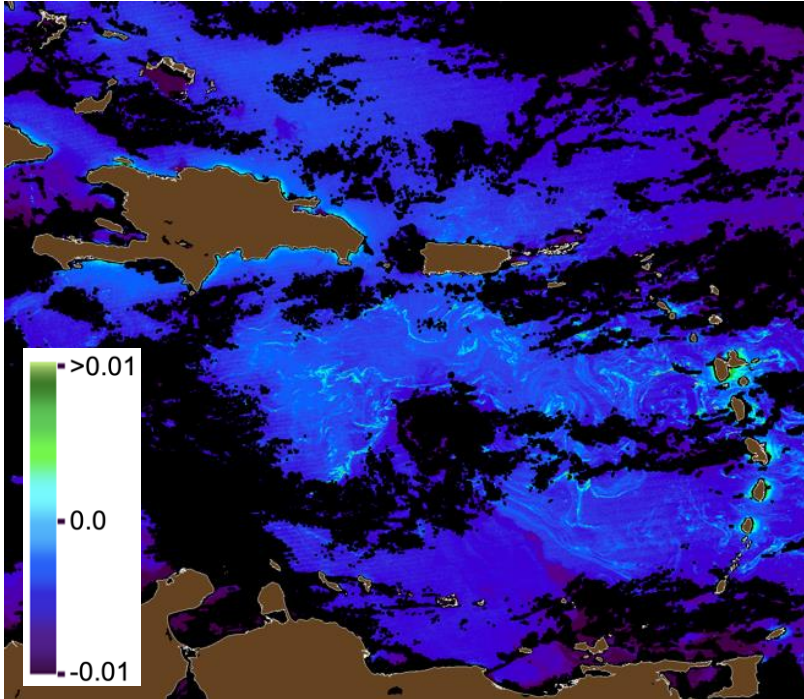
# Initial results: spectral discrimination

PACE/OCI shows the capacity of imaging spectroscopy over floating algae; MODIS does not

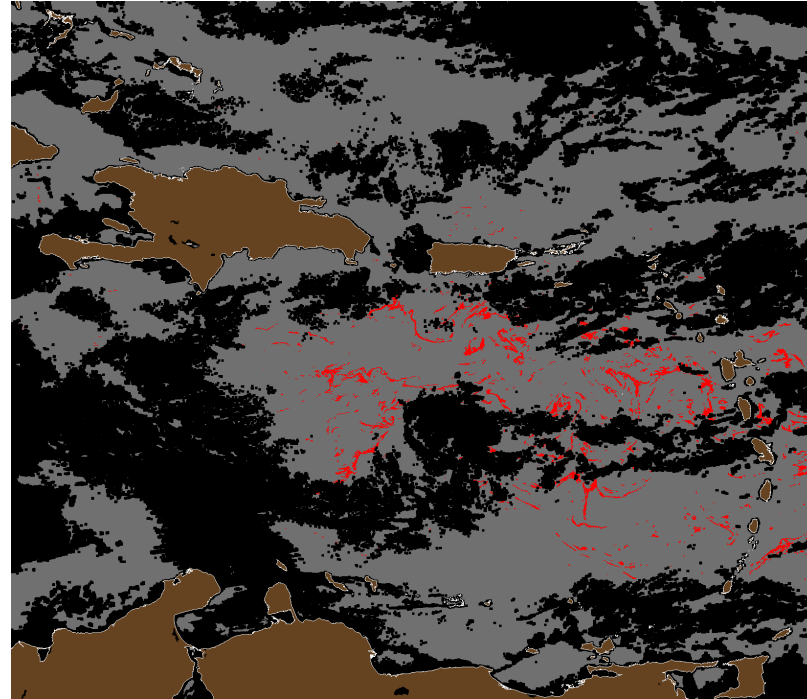


# Initial results: AI feature extraction and pixel unmixing

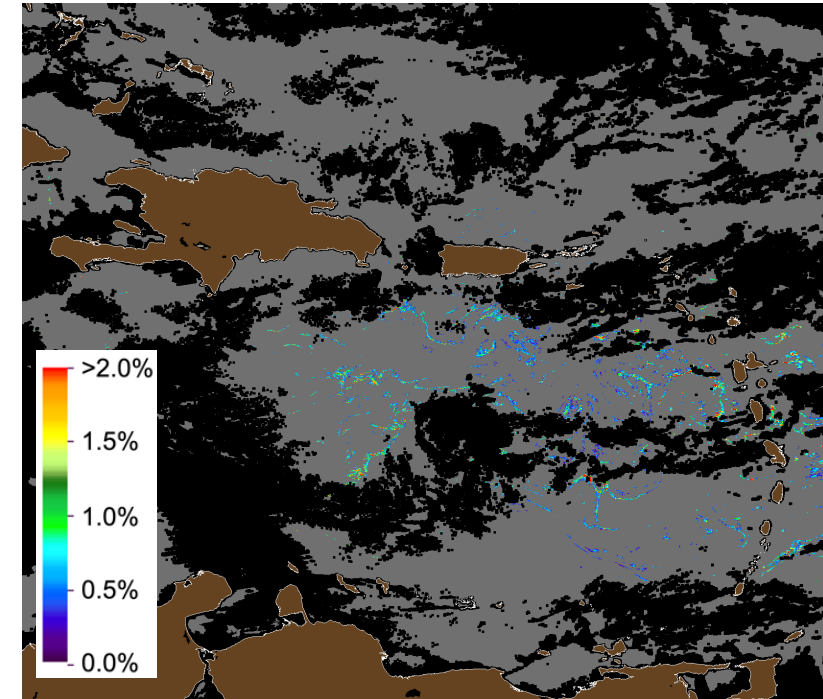
AFAI image shows features



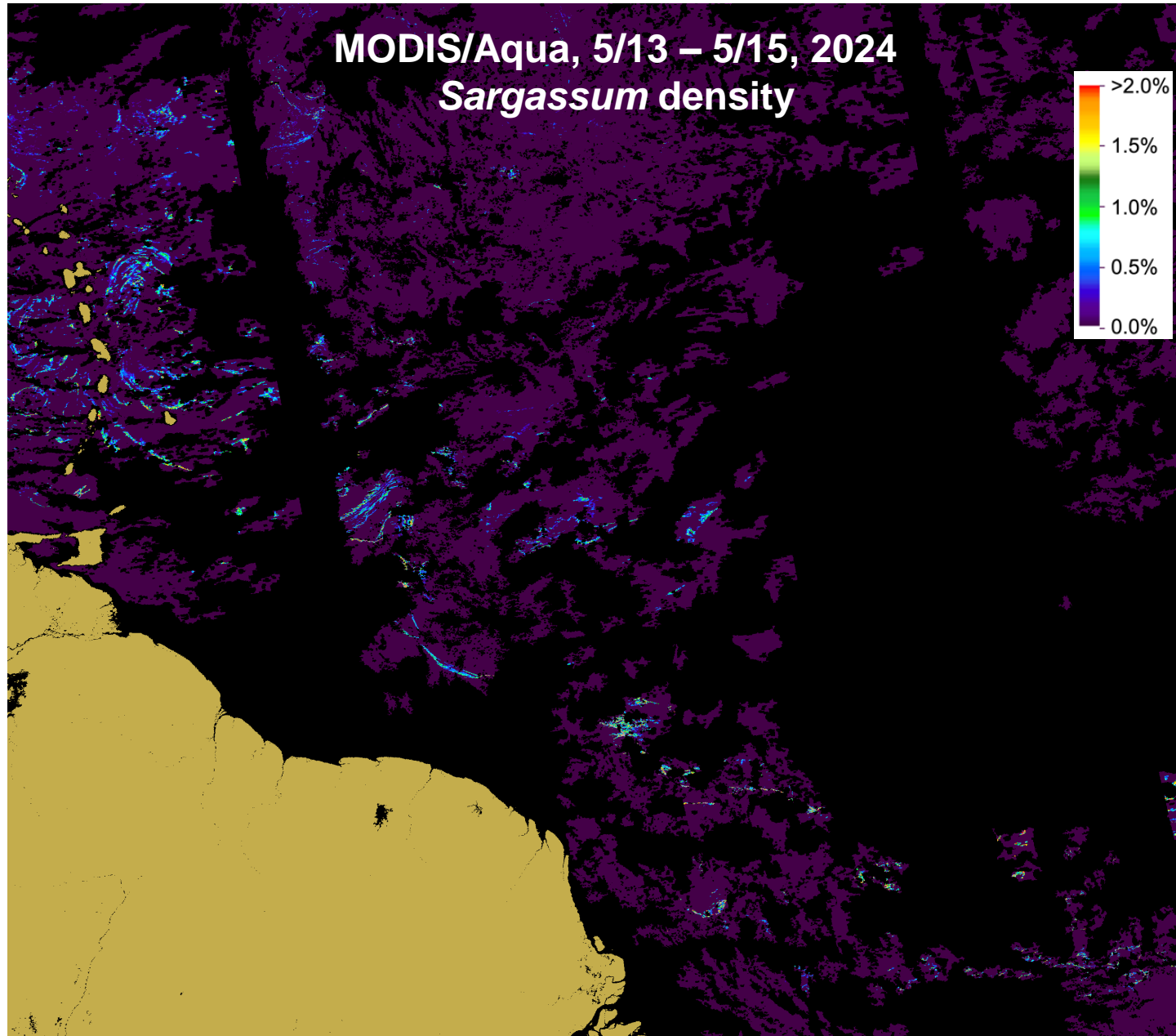
DL model to extract features



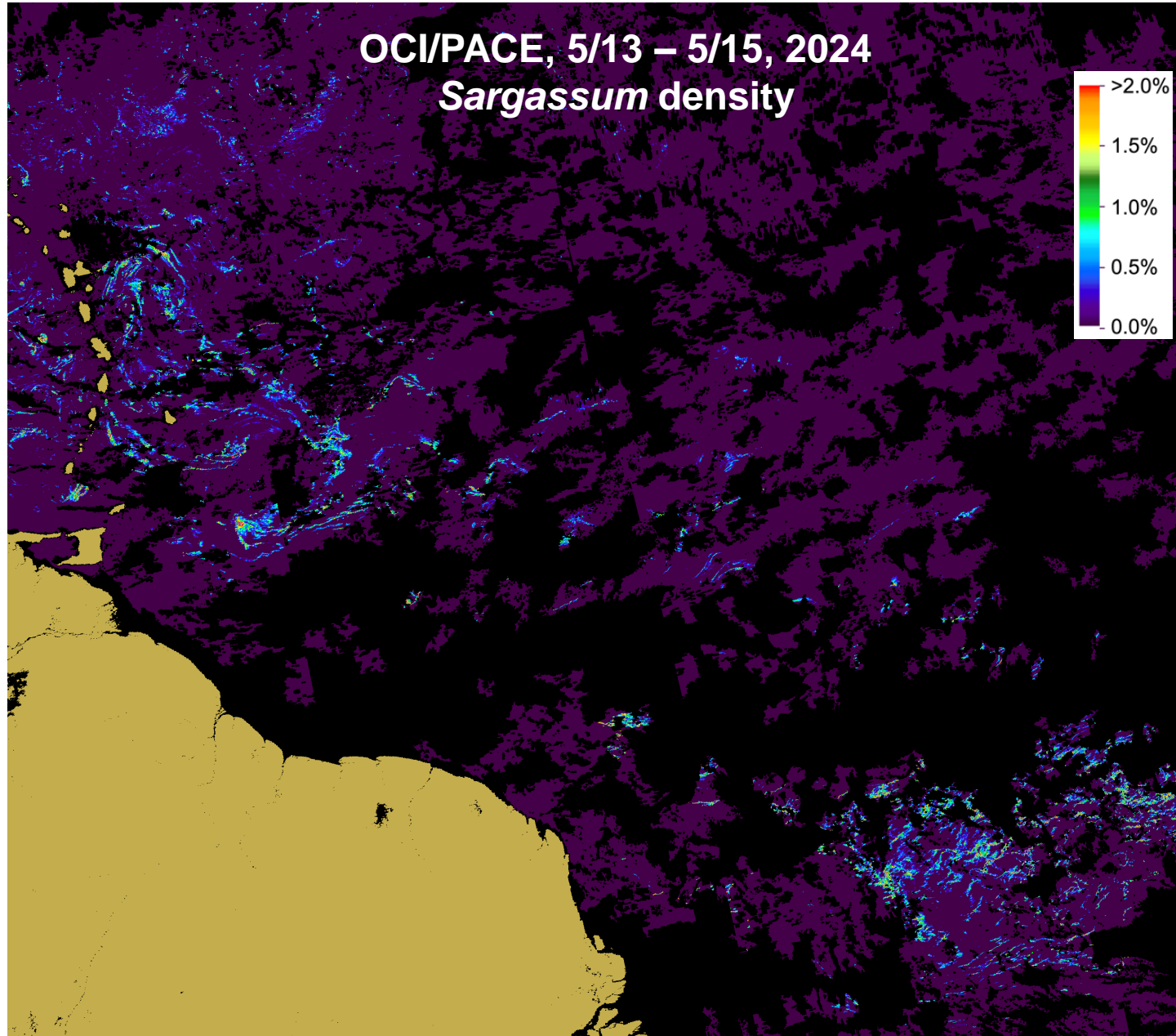
Pixel unmixing to quantify



# Initial results: comparison with heritage sensors

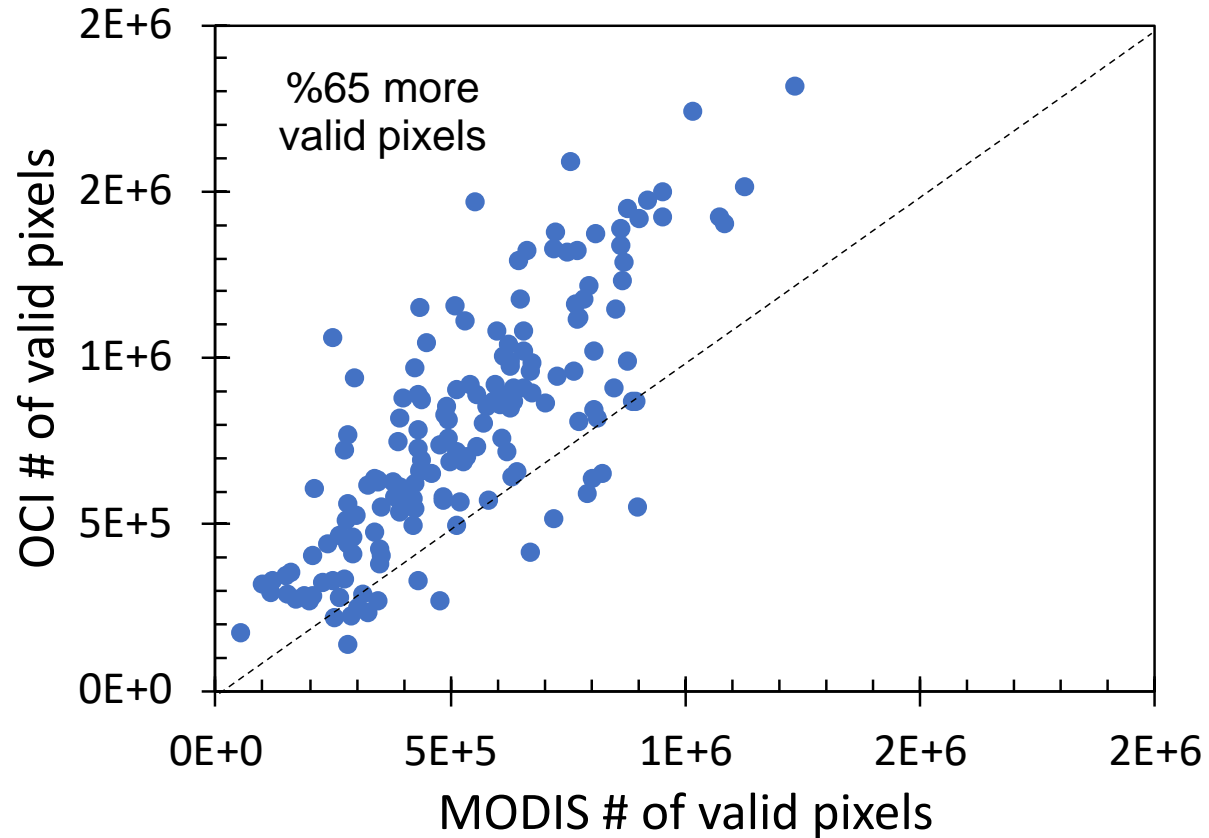


# Initial results: comparison with heritage sensors

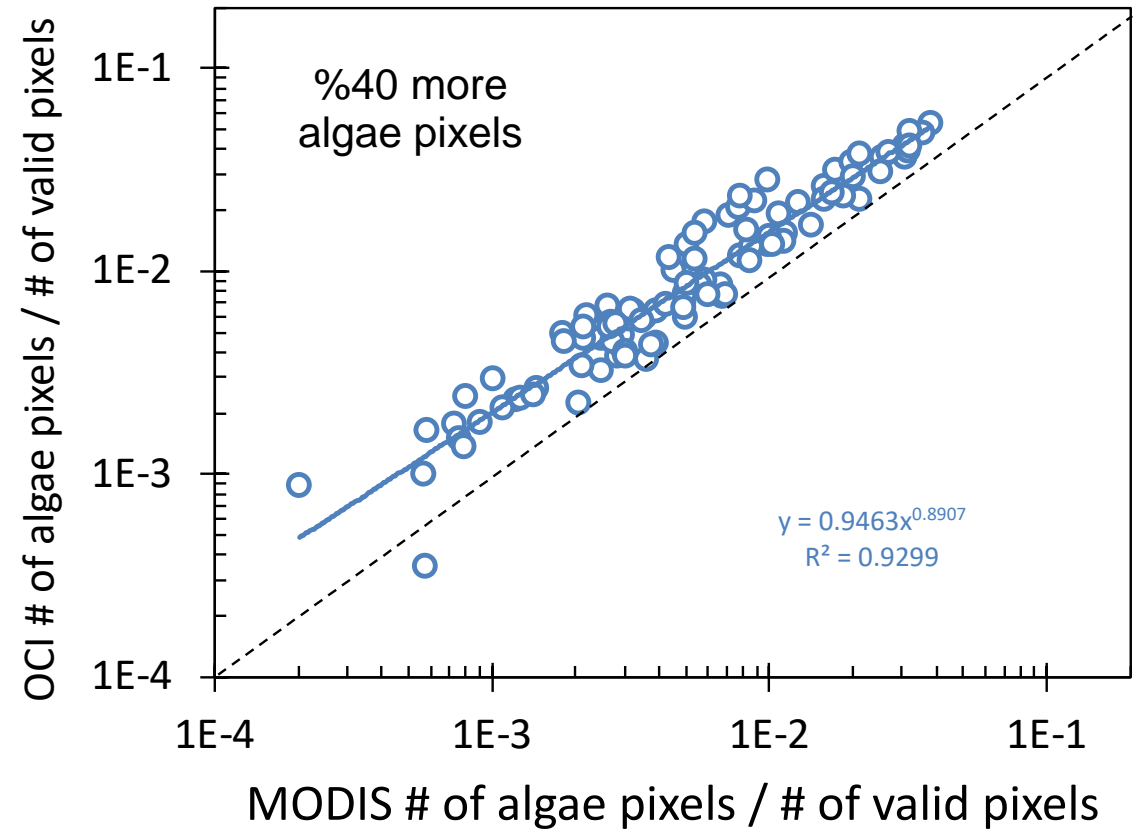


# Initial results: comparison with heritage sensors

Daily # of valid pixels in CW\_ATLANTIC  
Each point represents an image pair



Ratio of # algae pixels / # of commonly  
viewed valid pixels



# Summary

- A deep learning (DL) model has been developed to extract OCI image features
- PACE/OCI shows advantage over Aqua/MODIS in three ways:
  - 1) Improved spectral discrimination because of hyperspectral bands
  - 2) Increased # of valid pixels due to avoidance of sun glint and other “artifacts”
  - 3) Improved sensitivity to detect floating algae due to band binning
- Application at the global scale still requires more work