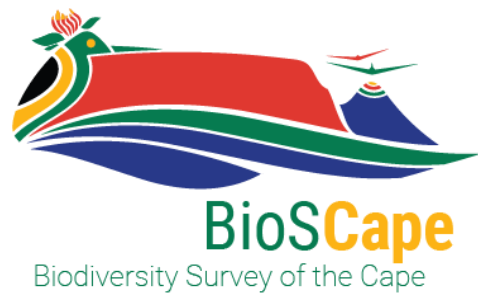


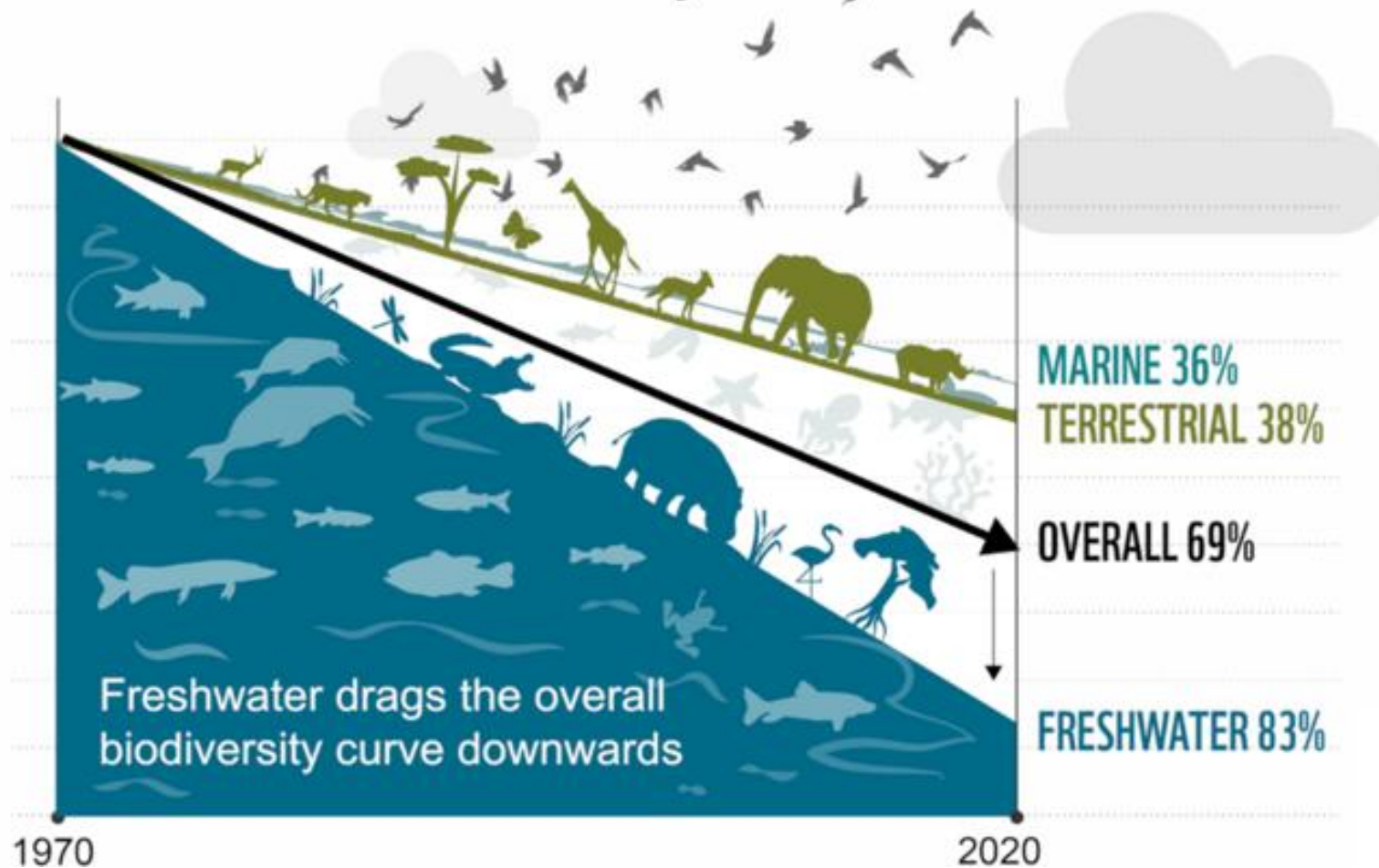
B31D-09: Phytoplankton Community Composition in Inland Waters from Airborne and Satellite Hyperspectral Data

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Freshwater Biodiversity Decline

Global decline in biodiversity since 1970



Phytoplankton

- Basis of aquatic food webs
- Loss of biodiversity = shift in phytoplankton to form Harmful Algal Blooms (HABs)
- Impact ecosystem services
 - Public health concern from toxins
 - Drinking water treatment impacts
 - Shading of aquatic plants, fish kills



HAB Monitoring Programs

- Traditional sampling – boat or buoy based – limited spatial and temporal resolution
- Remote Sensing (RS) complement to in situ HAB monitoring programs – high spatial and temporal data coverage
- Hyperspectral RS – potential for measuring Phytoplankton Community Composition (PCC)



UC Davis Tahoe Environmental Research Center

In situ measurements

- Field campaigns in California and South Africa
- Phytoplankton from surface water samples
 - High Performance Liquid Chromatography (HPLC) pigment data
 - Microscopy (Clear Lake only)
- Spectroradiometer (hyperspectral) measurements



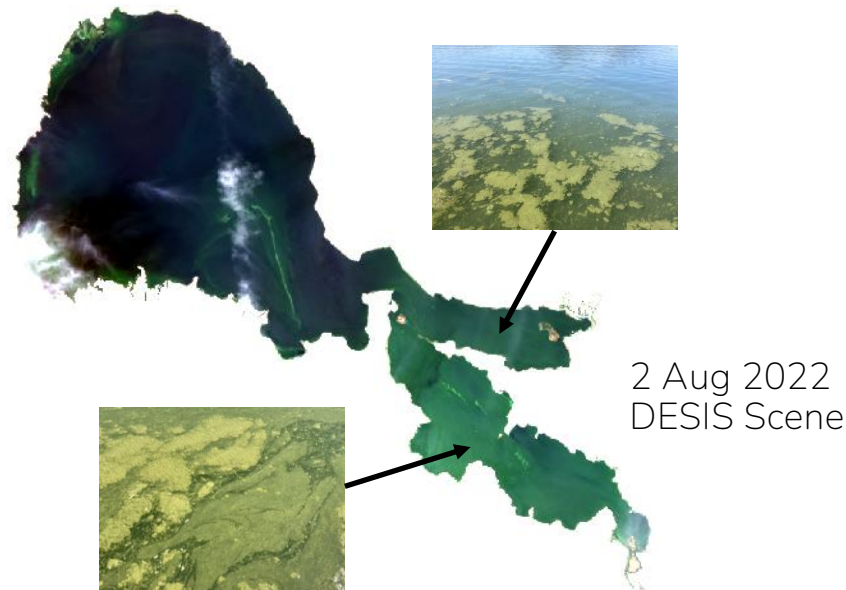
Clear Lake, CA, USA



Theewaterskloof, South Africa

Airborne and Satellite Hyperspectral Imagery

- DESIS imaging spectrometer on International Space Station captured hyperspectral imagery of Clear Lake, CA, USA
- Aircraft-based PRISM imaging spectrometer captured South African inland waters during the NASA BioSCape field campaign

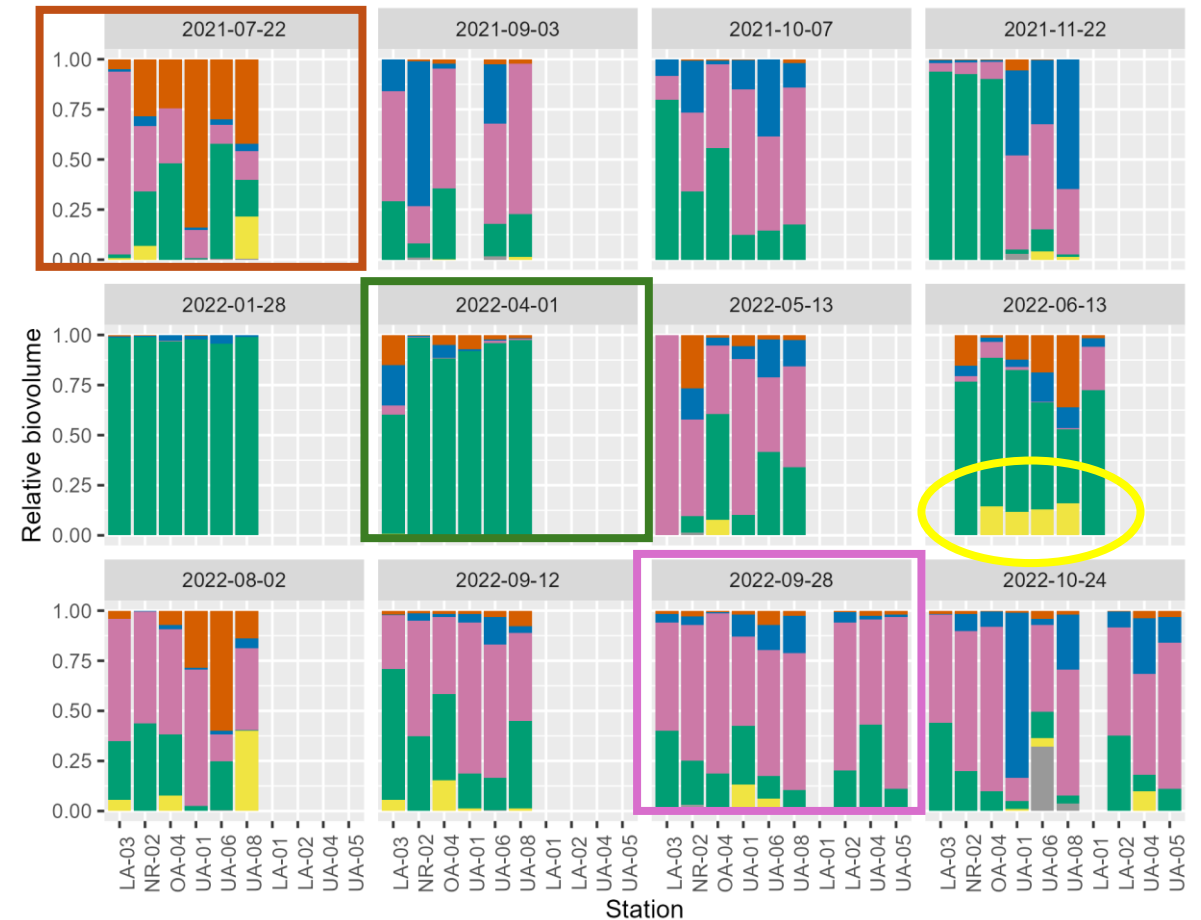


NASA BioSCape field campaign (2023)

In Situ Phytoplankton Community Composition (PCC) – Clear Lake

HPLC-derived PCC using CHEMTAX

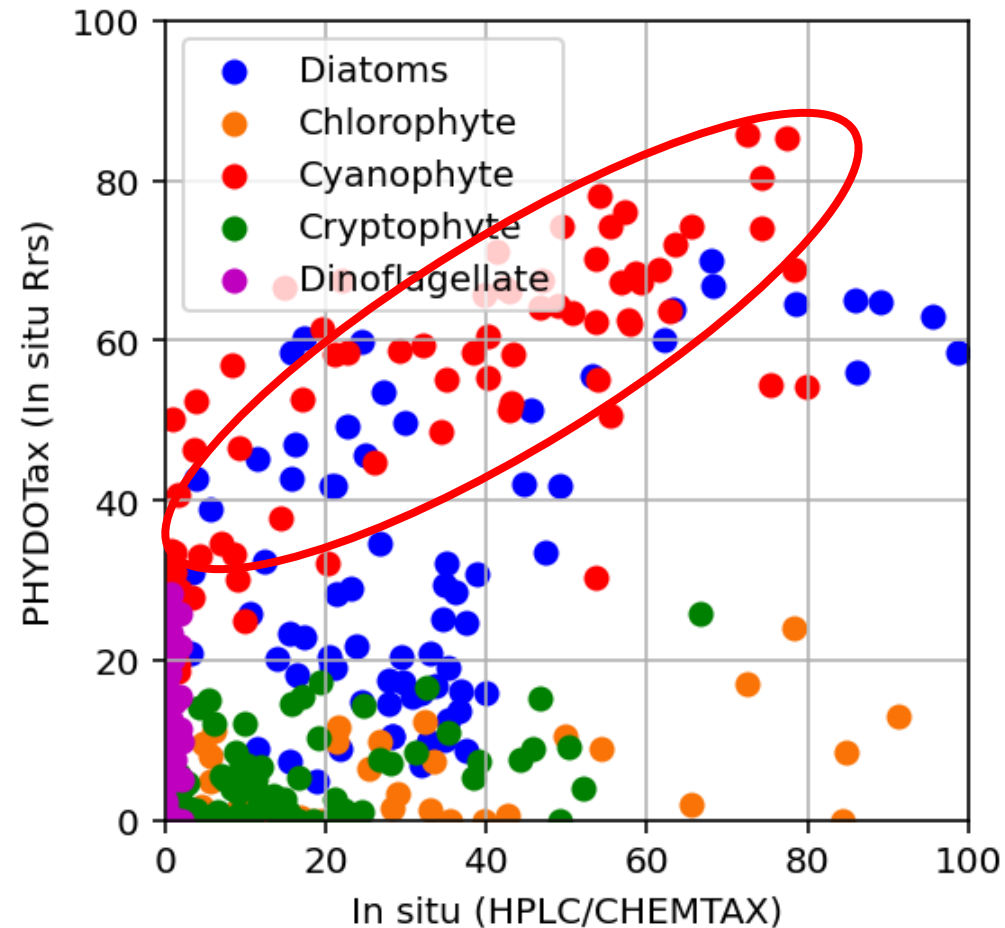
PCC from microscopy evaluation



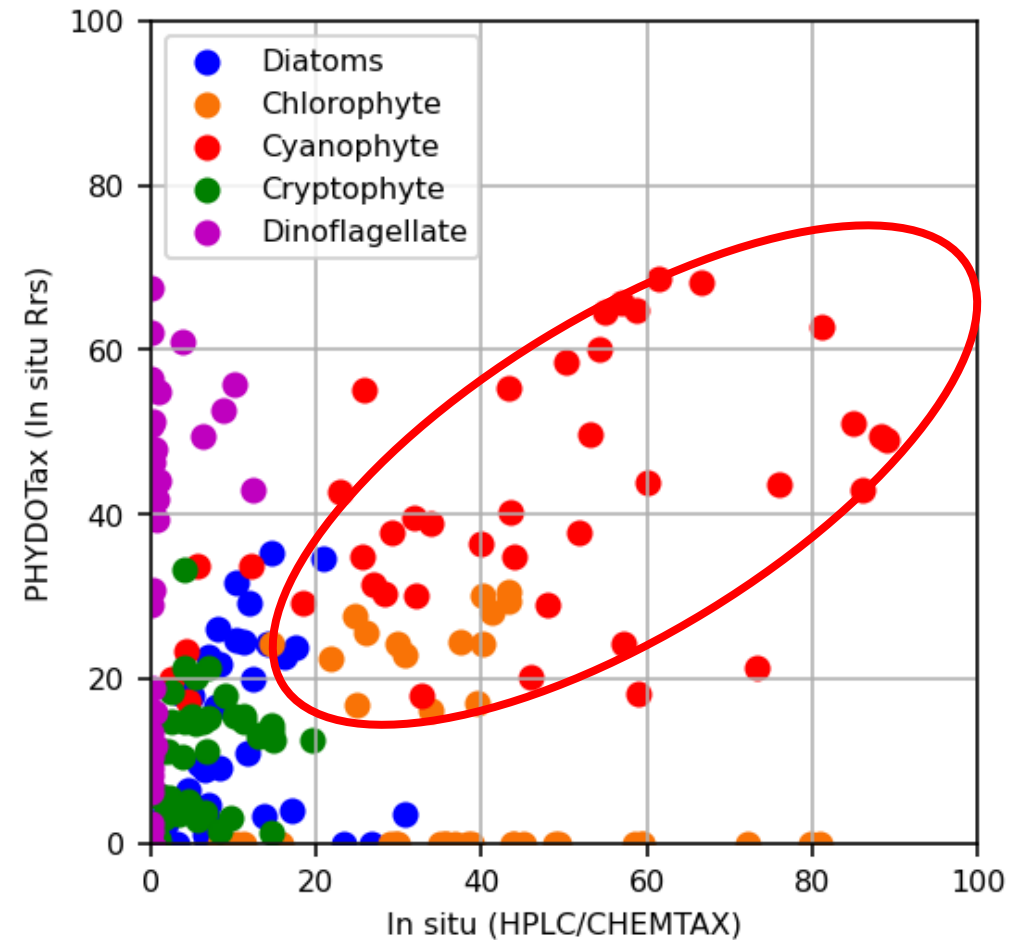
■ Chlorophytes
 ■ Cyanobacteria
 ■ Dinoflagellates
 ■ Cryptophytes
 ■ Diatoms
 ■ Other

Phytoplankton Detection with Optics (PHYDOTax)

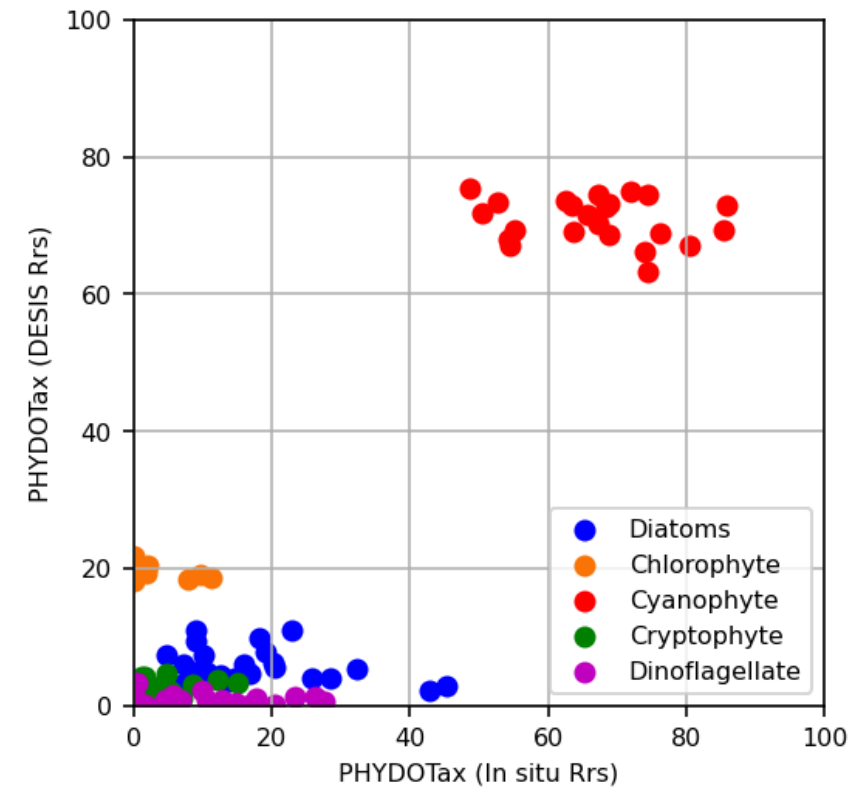
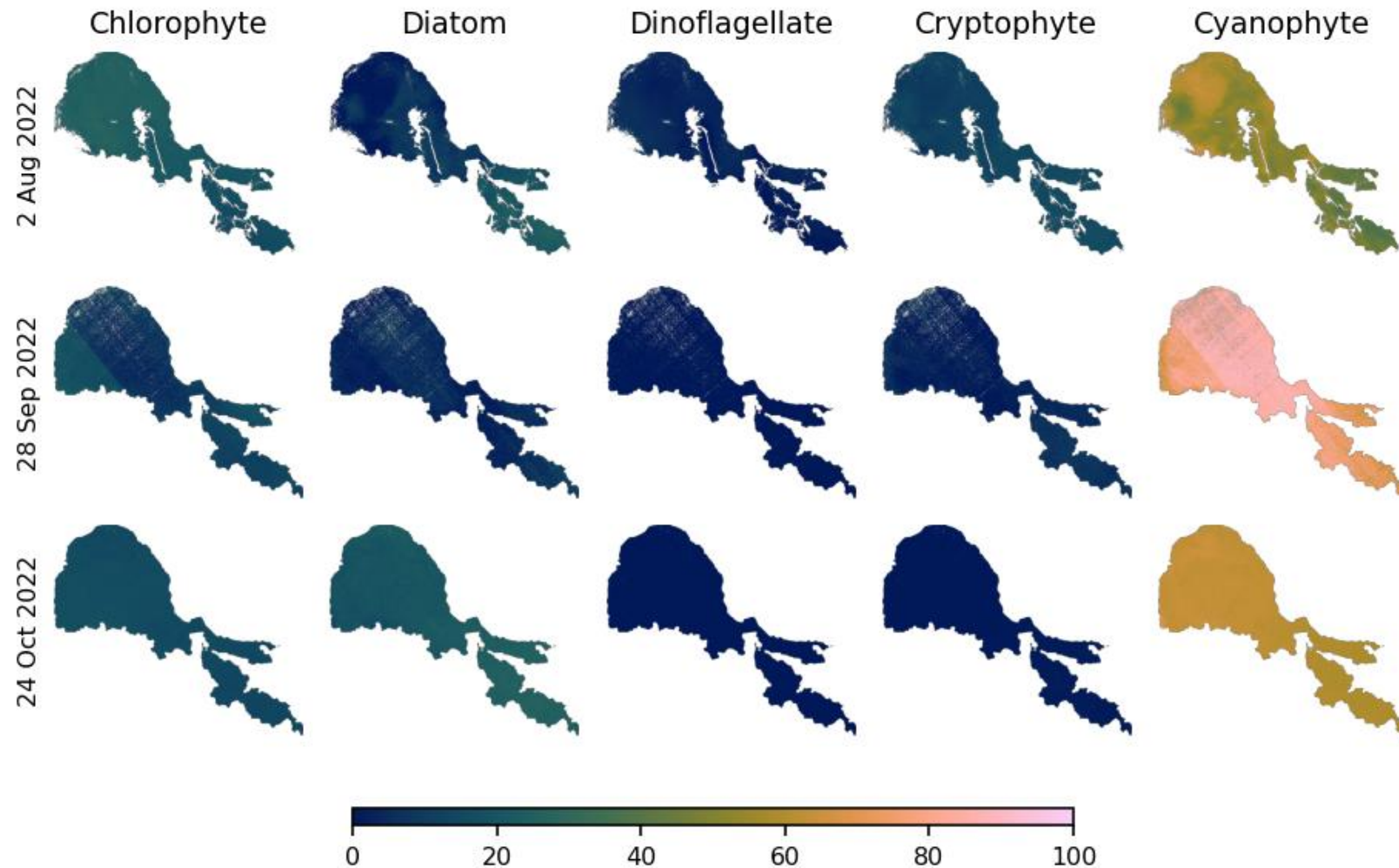
Clear Lake, CA



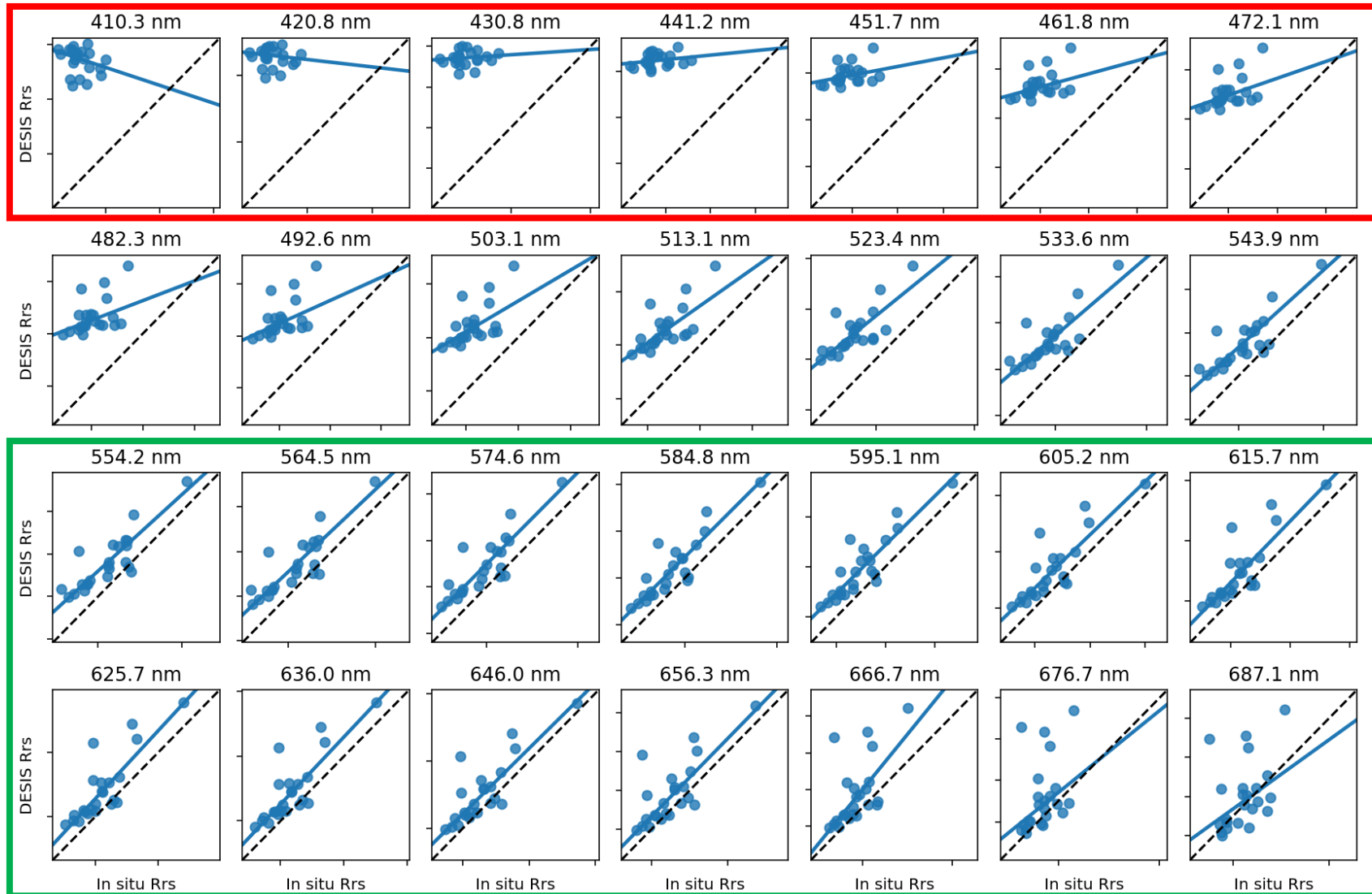
South African Inland Waters



PHYDOTax application to RS images (atmospheric correction with ISOFIT)



Need for improved atmospheric correction



Questions?

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