Bio-optical and biogeochemical parameterization of IOP-traceable, hyperspectral R_{rs} datasets for transitional water applications

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The diversity of phytoplankton communities and the robustness of ecosystem stability over annual and interannual time scales is not well characterized in South Africa. Extensive optical & biogeochemical **field measurements** are being collected in support of the NASA hyperspectral imaging campaign in the Greater Cape Floristic Region of the Western Cape (i.e. BioSCAPE).

This study focuses on the highly dynamic, optically complex coastal and inland water bodies of the Western Cape, and features broad diversity in sites and *in situ* parameters.

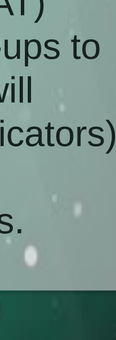
The CSIR have deployed their bio-optical buoy, affectionately named ***Gizmo,*** equipped with Trios RAMSES radiometers and ancillary sensors, to characterize daily and diurnal optical variability

Measurements every 30 min include:
- ✓ Above-water irradiance
- ✓ In-water radiance at 2 depths
- ✓ In-water fluorescence and temp
- ✓ Wind speed, tilt & roll

Rietvlei
- ✓ CDOM and algae dominated
- ✓ frequent blooms

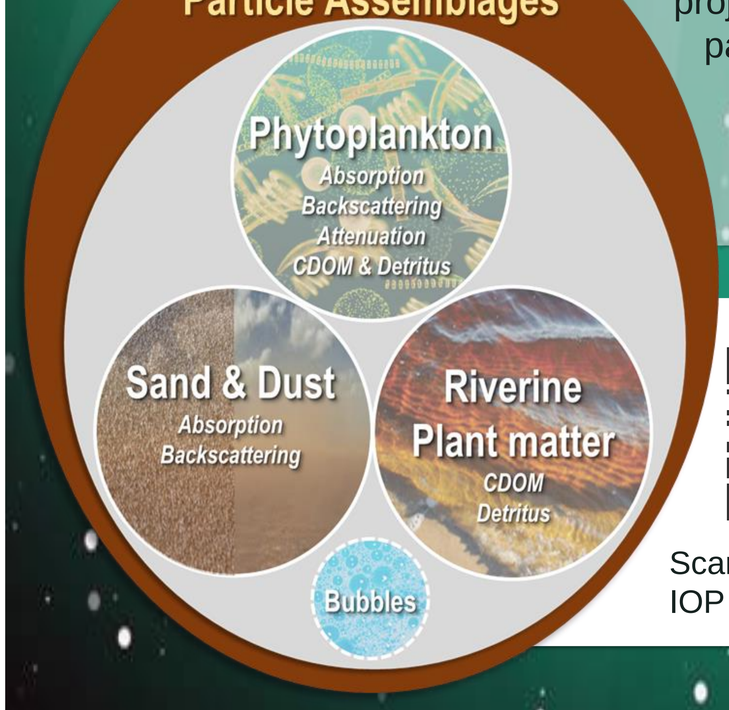
Zeekoevlei
- ✓ Eutrophic
- ✓ Cyanobacteria

Theewaterskloof dam
- ✓ Sediment dominated
- ✓ Moderate algal biomass
- ✓ Agriculture pressures
- ✓ Long-term buoy deployment site



Kleinrivier Lagoon
- ✓ Tidal temporarily open estuary
- ✓ Agriculture runoff pressures

Walker Bay
- ✓ Productive upwelling zone
- ✓ History of harmful algal blooms
- ✓ Important aquaculture area
- ✓ Future buoy deployment site



The Hyperspectral Capabilities across Atmospheric, Aquatic and Terrestrial Domains (HyperCAAT) project incorporates in- and above-water radiometry, hyperspectral satellite and airborne match-ups to parameterize an extensive **IOP-traceable spectral library**. Investigations using this dataset will identify tipping points in R_{rs} signal change with respect to algal biomass (eutrophication indicators) and to evaluate signal sensitivity requirements for distinguishing algal types as well as differentiation from suspended non-algal particulate, aquatic vegetation, and bottom effects.

Scan for link to IOP Publication

The HyperCAAT dataset will facilitate the development of new and **improved algorithms** and **indicators** for upcoming international hyperspectral earth observing satellite missions like NASA PACE. Identifying instability in intact and transformed aquatic ecosystems enables targeted management interventions. This study will contribute to improved capabilities for **water quality** and **ecosystem health** monitoring from space. This is ongoing work.

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