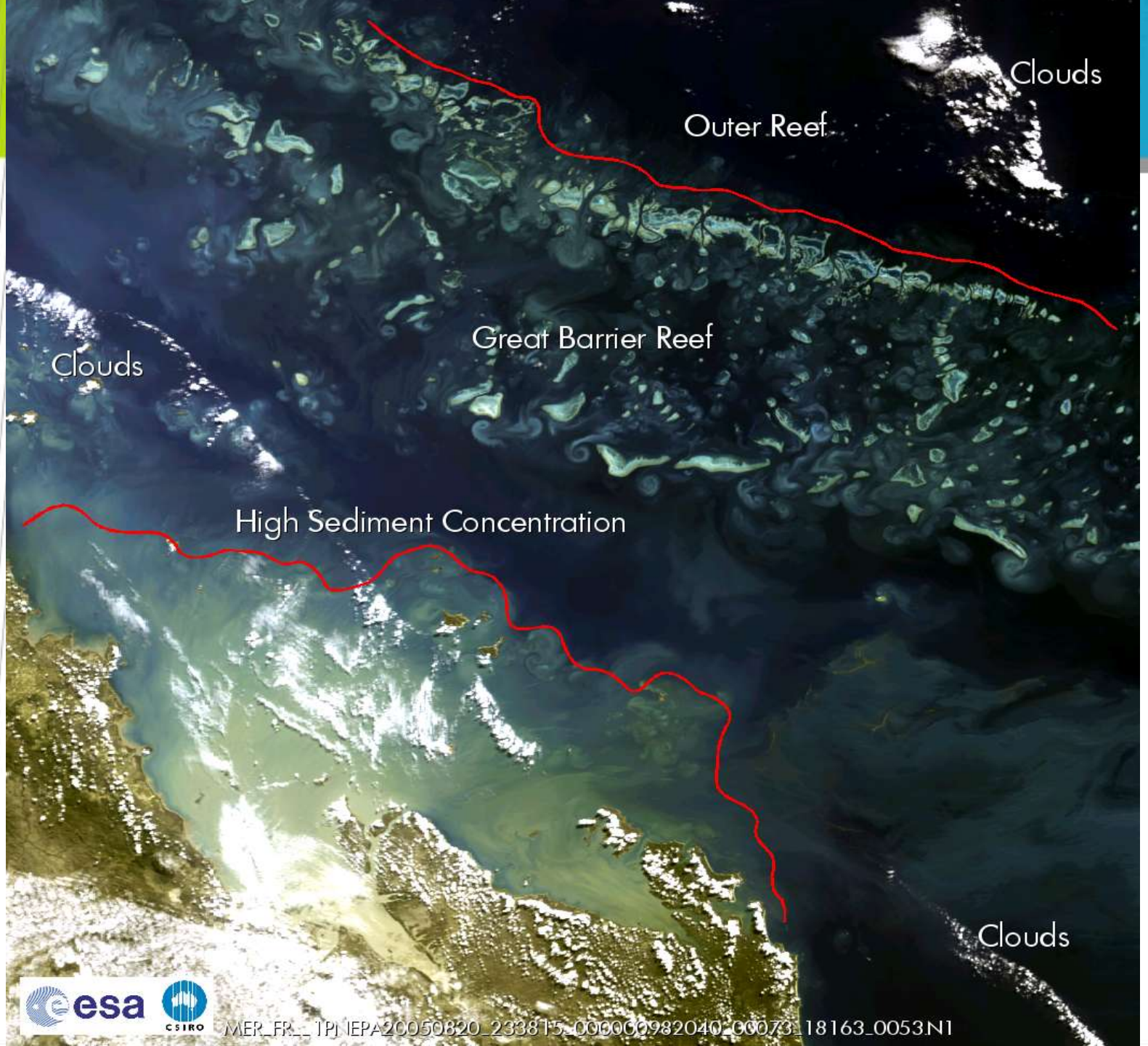
www.csiro.au

ESA-CoastColour Australian perspective as “user”

Arnold G. Dekker

CSIRO


Clouds
Outer Reef
Great Barrier Reef
Clouds
High Sediment Concentration
Clouds
esa
CSIRO
MER_FR__1PNIEPA20050820_233815_000000982040_00073_18163_0053.N1

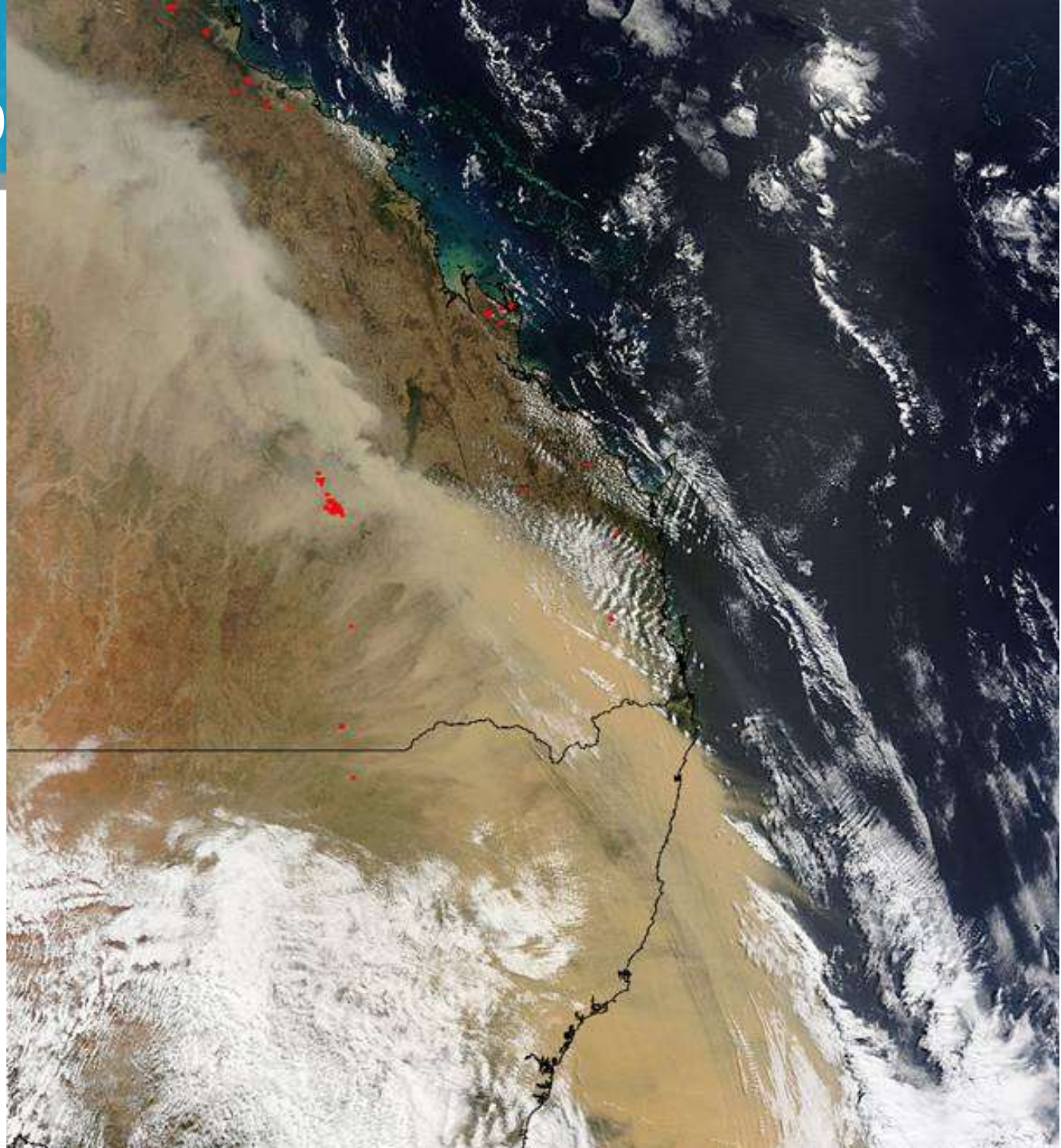
MODIS 28 January 2005: Burdekin River (centre – muddy) and Mackay Whitsunday Rivers (lower, green) river flood plumes

Dust Storm 23th Sep-6th Oct 2009

MODIS image

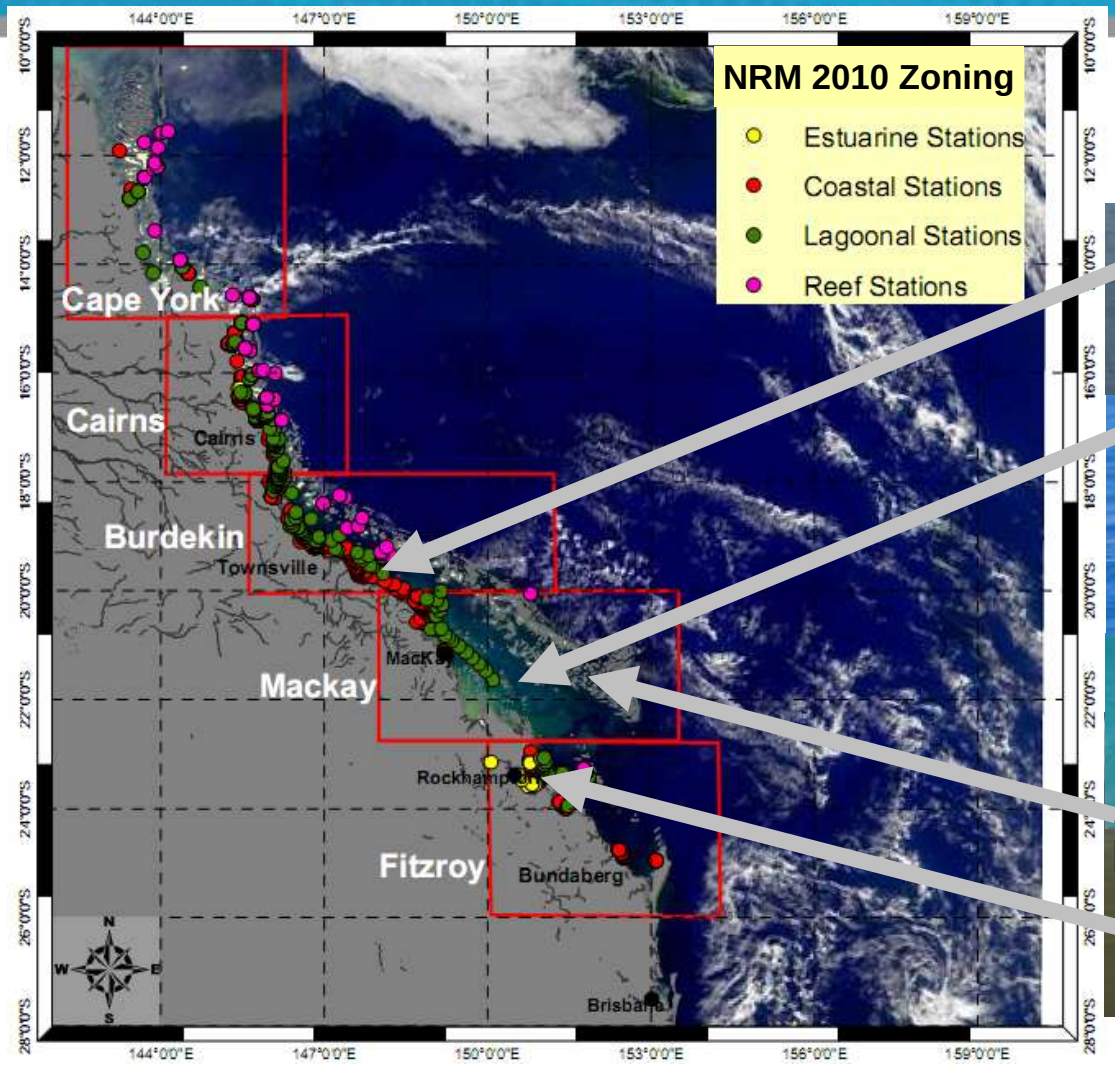
23-09-2009

0005UTC



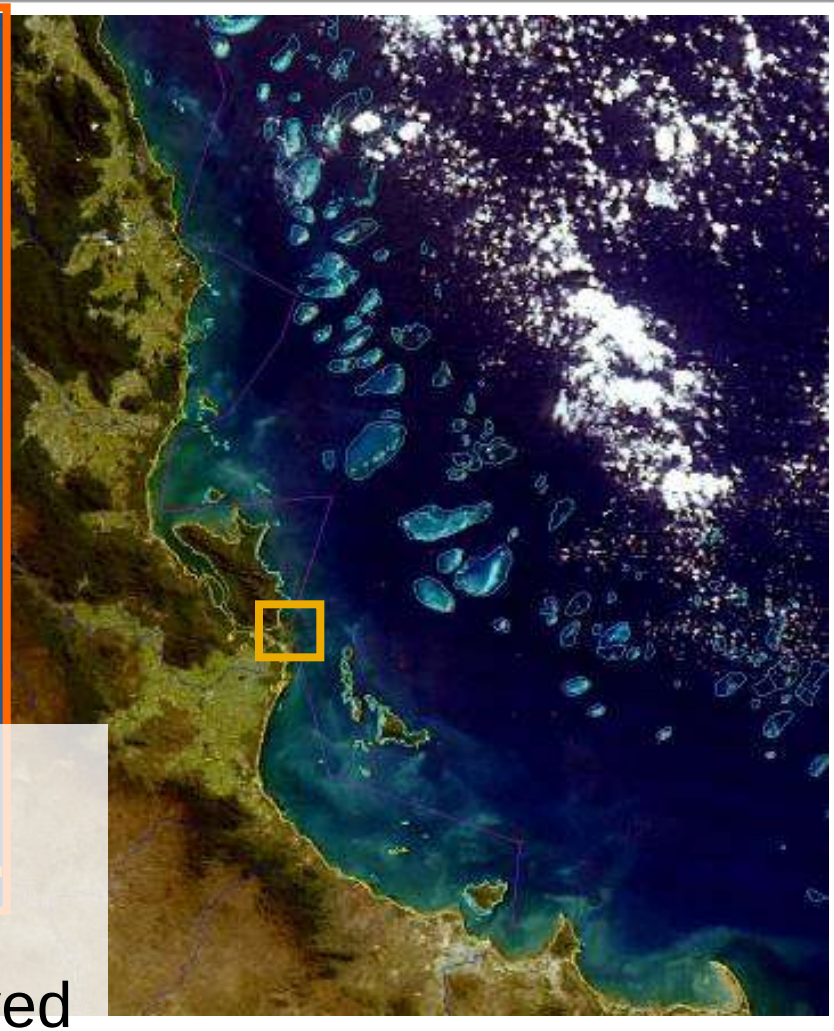
THE GREAT BARRIER REEF: A NOT-SO SIMPLE SYSTEM

- **Water types:**
  - ✓ Coastal
  - ✓ Estuarine
  - ✓ Reef waters
- **IOPs**
  - ✓ Absorption
  - ✓ Backscatter
- **HPLC CHL**



Blondeau-Patissier, Brando, Dekker et al. (2009), *Bio-optical variability of the absorption and scattering properties of the Queensland inshore and reef waters*, Australia, *JGR, 114*

The Lucinda Jetty Coastal Observatory

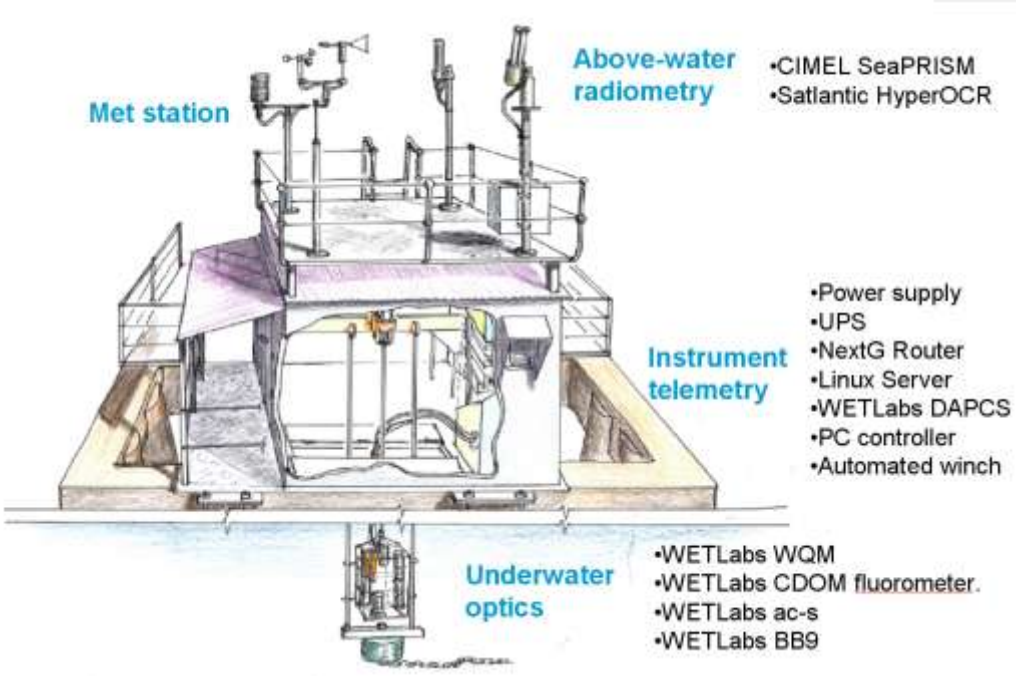


The location of the LJCO is ideal to monitor and characterize the optical properties in a coastal system where the sources of particulate and dissolved matter substantially vary during the tidal and seasonal cycles.

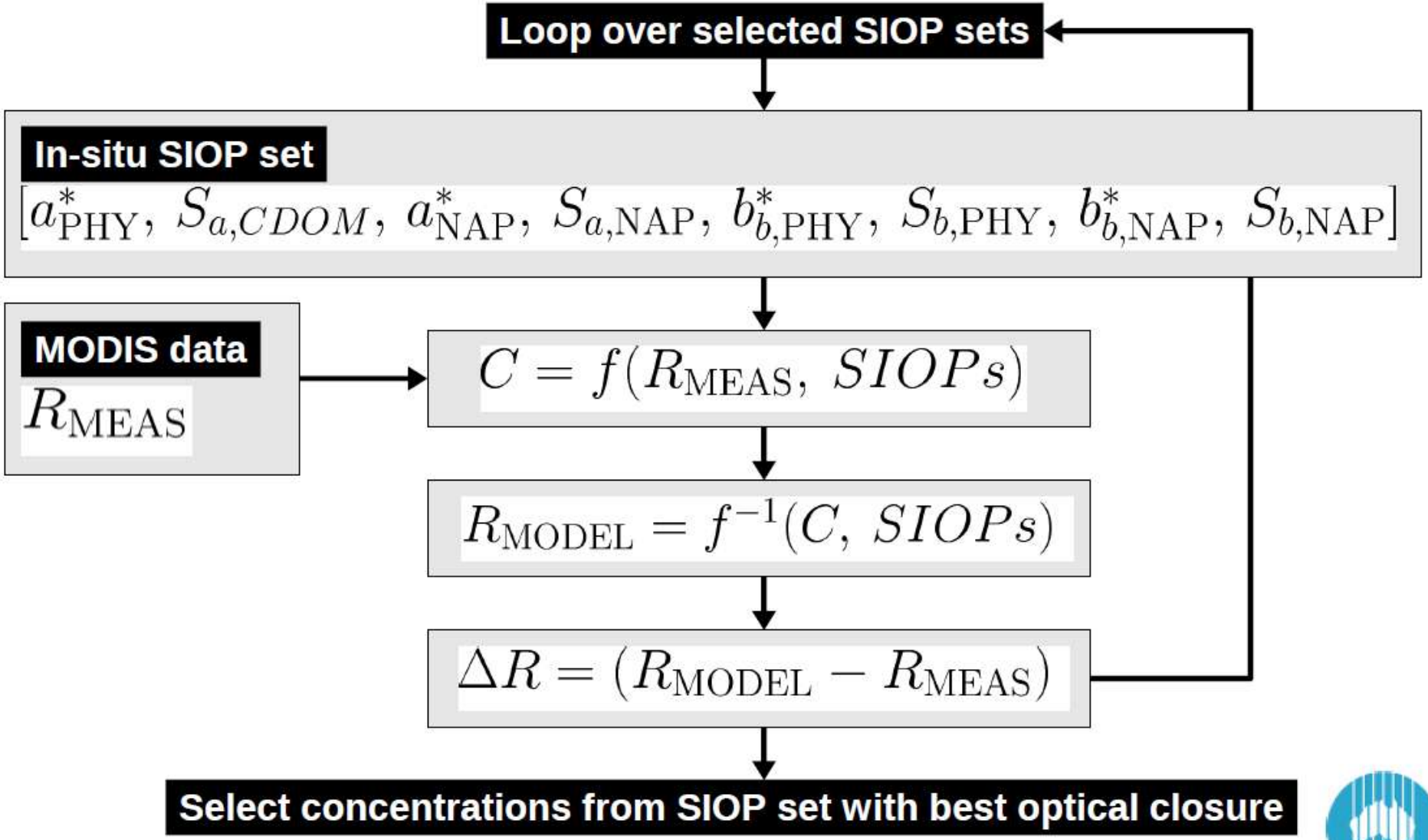
IMOS Integrated **Marine Observing** System

Lucinda Jetty Coastal Observatory (LJCO)

imos.org.au/ljco.html



Principle water constituents retrieval
Linear Matrix Inversion (LMI)



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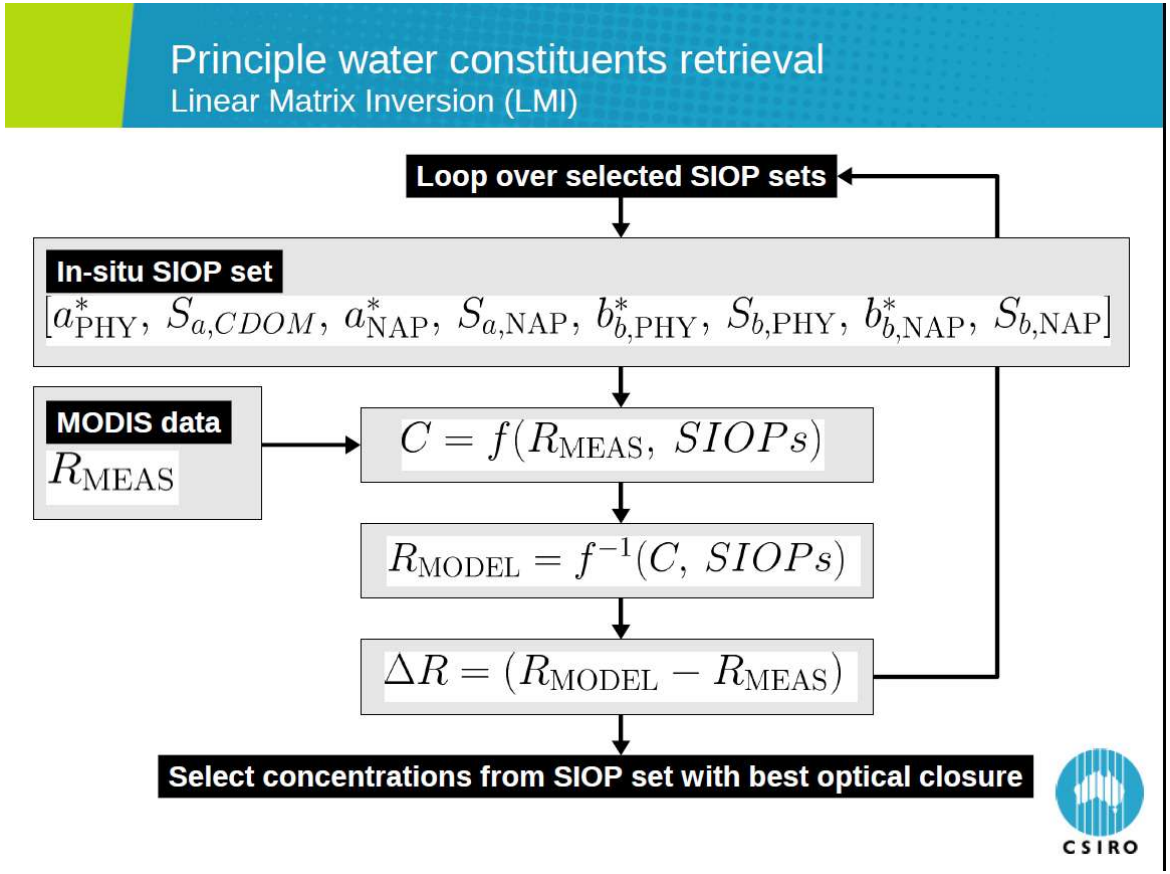
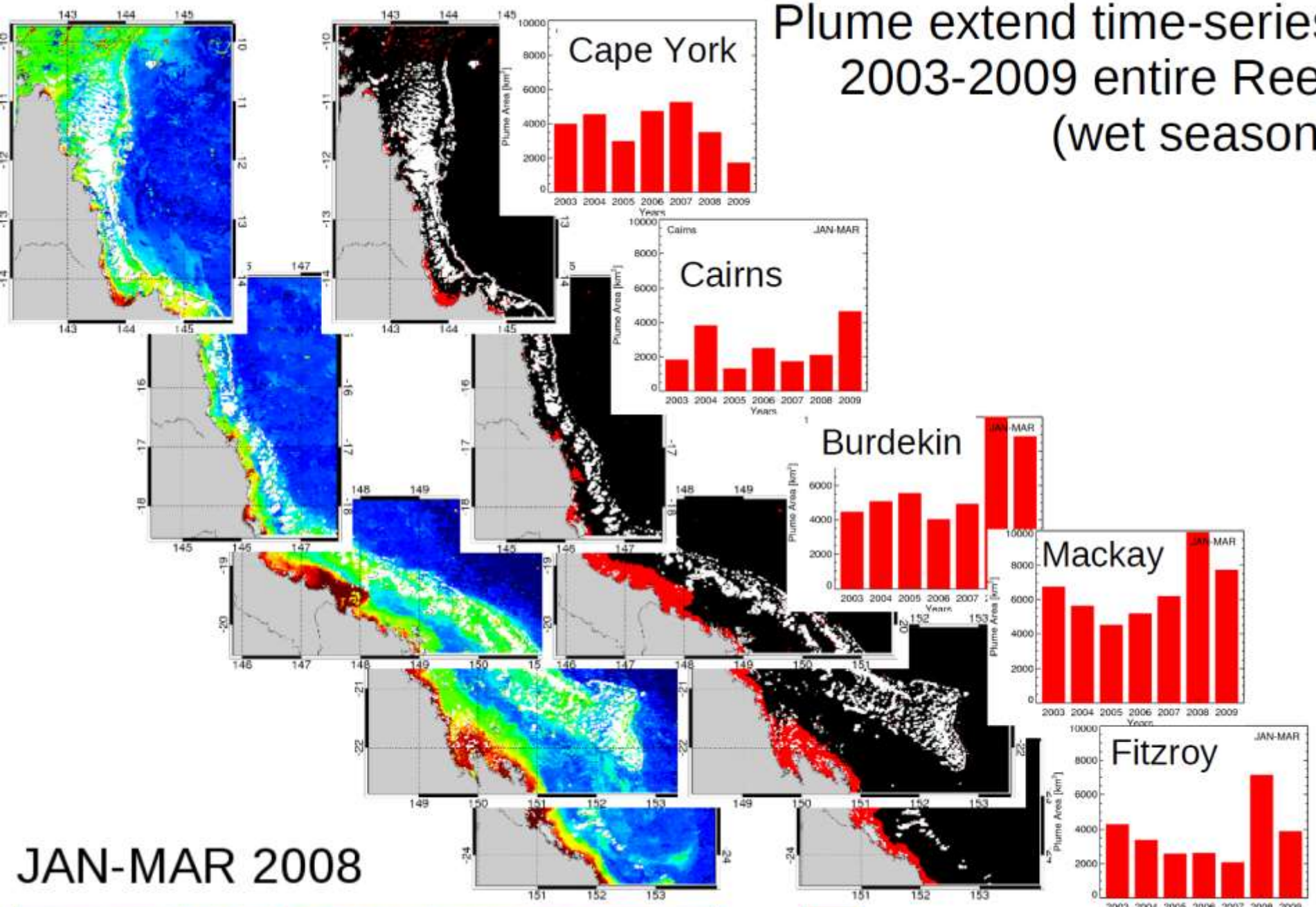
We need access to input data to parameterise our inversion model-is not allowed in RR

- **Small dilemma**



Plume extend time-series 2003-2009 entire Reef (wet season)



In Situ data Provision to ESA-CoastColour

- **In June 2010 we provided 119 in situ samples for GBR to ESA-CoastColour**
- **Still need to provide Tasmania data**
- **Can add more data such as:**
  - bathymetry of entire GBR
  - ……?
  - ……?

What Information do Managers Need (from Optical Remote Sensing) in Aquatic Ecosystems?

- **Status, Condition and Trend & Anomalies:**
  - **Status (survey, classify and map)**
    - **what is where? (=99%of current remote sensing effort)**
      - **(is it absent when it should be present) or**
      - **(is it present when it should be absent?)**
  - **Condition:**
    - **is it healthy?, is it stable?**
    - **Is it stressed?**
  - **Trend:**
    - **Is it getting worse or is it improving?**
      - **Remote Sensing can do hind casting and now casting**
      - **Model data fusion needed for forecasting**
  - **Anomalies:**
    - **Normal (to be expected) or exceptional (indicating exceptional change from before? E.g. climate change indication?)**

What do managers need to know before accepting information from optical remote sensing in aquatic ecosystems?

- **Status, Condition and Trend & Anomalies:**
  - **Crucial questions by management authorities to belief/invest in remote sensing:**
    - **Validity**
      - **is what you show on the maps real?**
    - **Accuracy**
      - **can I rely on your information from satellite data to invest (or not to invest) millions of dollars in improved management?**

Algorithm Specific Requirements Effective Operationalisation EO-

- **Robust algorithms for primary information products:**
  - Chlorophyll, Phaeophytin (&CP-Cyanin & CP-Erythrin)
  - *PFT?*
  - Suspended matter
  - *PSD?*
  - Coloured dissolved organic matter
  - Transparency & turbidity as vertical attenuation of light (k_d)
  - *Corrections for bottom effects?*
- **Robust methods for assimilating this data into information products:**
  - Eutrophication/compliance
  - Sediment loads/compliance
  - Primary Productivity
  - Flood Plume
  - Algal Bloom
  - ??Coral Bleaching?? (needs 3-D water column and substratum analysis = more complex)

Question to ESA-CoastColour: We did not ask for products we have no current capacity for providing validation –but are interested as proof of concept: can we still request these?

- **Robust algorithms for primary information products:**
  - Chlorophyll, Phaeophytin (&CP-Cyanin & CP-Erythrin)
  - ***PFT?***
  - Suspended matter
  - ***PSD?***
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Requirements Effective Operationalisation EO-Uptake Side Considerations in GBR

- Anticipated uses:
  - End of Estuary Loads Assessment to understand effect of climate change vs changing land management practises
  - GBR Marine Monitoring
  - GBR Reef Atlas – Health Score
  - State-of-the Environment Reporting
  - Event Monitoring (Early Warning Algal Blooms; Flood Plume Trajectories)

Requirements Effective Operationalisation EO-Uptake Side Considerations (2)

- Anticipated uses:
  - End of Estuary Loads Assessment to understand effect of climate change vs changing land management practises
  - GBR Marine Monitoring
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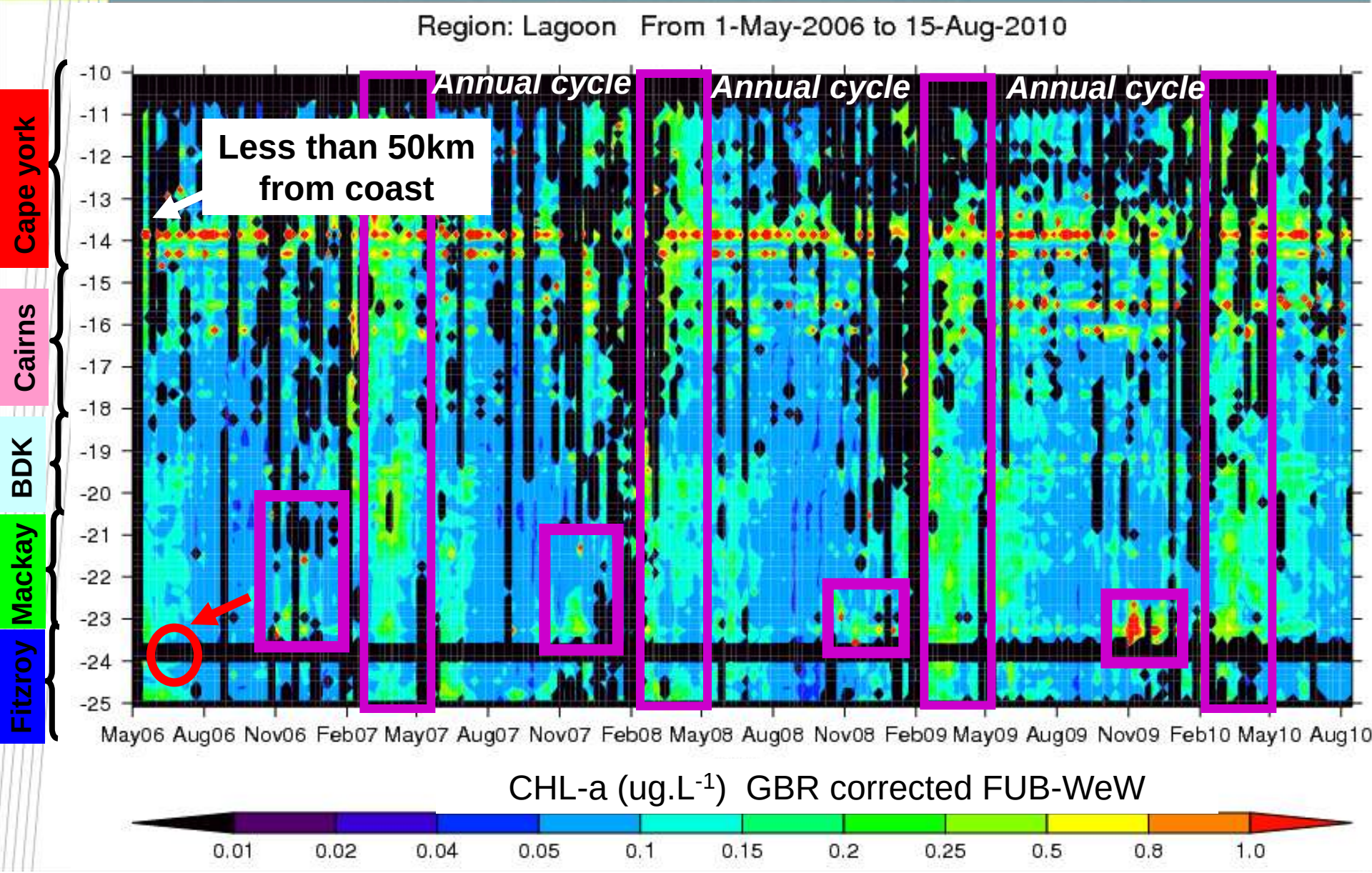
  - Event Monitoring (Early Warning Algal Blooms; Flood Plume Trajectories)

OLIGOTROPHIC LAGOONAL WATERS CLUSTER: CHLOROPHYLL-a



Conclusion

- **For (actual) end-users (= not us in this room except for EEA) information needs to be packaged into manageable format before it shall be adopted**
- **SoE in Australia knowledgeable about earth observation of coastal and marine systems but Hovmoller plot made it feasible to incorporate 5 years of trends and anomalies into total of 5 pages of SoE discussion coasts and oceans Australia.**
- **Continuity of data provision crucial! (requires smooth transition MERIS – SENTINEL-3 OLCI)**

Wrap-Up

Sincere thanks to ESA CoastColour for being “global”.

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