Introduction

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- Joined Curtin Uni – August 16 ,2021
  - will work on OysterQual remote sensing project.

- Background – remote sensing data analysis and application development. Experience in terrestrial and aquatic RS applications.

- Previous roles – with UNSW, CSIRO, DSTO, Commercial Remote Sensing Companies (HyVista, Fugro), NT Department of Environment & Natural Resources.

OysterQual Project

- Funded by SmartSat CRC
- 18 Month Project
- Project goals
  - to develop satellite remote sensing techniques to assess coastal water quality (turbidity, Chlorophyll concentration, etc.)
  - to develop tools for identifying potential sites for oyster aquaculture in remote areas of North-West Australia.
- Study sites – remote coastal waters in NW Australia
  - Near Derby and Karratha
- Sentinel 2 and Sentinel 3 satellite time series imagery analysis
  - Atmospheric corrections
  - Data fusion from the 2 sensors
  - Generation of water quality products
- In situ data collection for validation of satellite products
  - Two buoys deployed at study sites
  - Data transmitted via satellite IoT technology
- Project involves other partners, including
  - Oyster producers
  - Geospatial companies to deliver final products to end-users vis GIS dashboards, etc

OysterQual – Potential Sites

Cone Bay

Near Karratha

Sentinel 2 and Sentinel 3 Imagery

Sentinel 2.

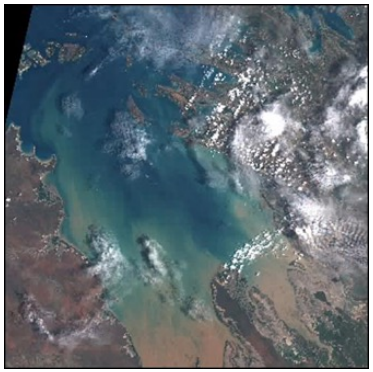
- Imagery collected every 5 days
- 10m and 20m spatial resolution
- 10 VNIR bands, plus two SWIR bands

Sentinel 3

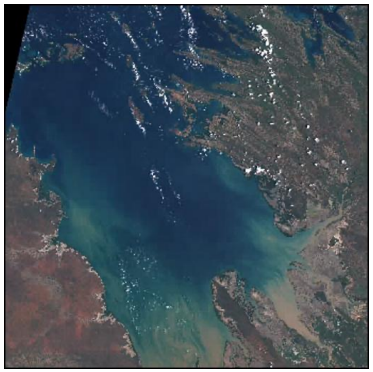
- Imagery collected near daily
- 300m spatial resolution
- 21 VNIR bands

Sentinel 2 – January 2021. Cone Bay area, Kimberly, WA

5 Jan



10 Jan



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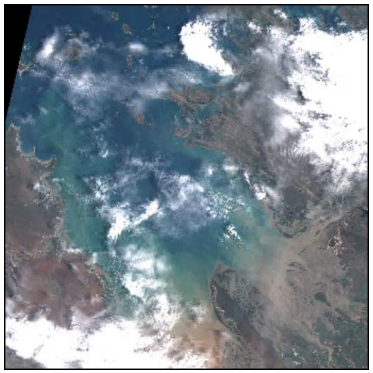
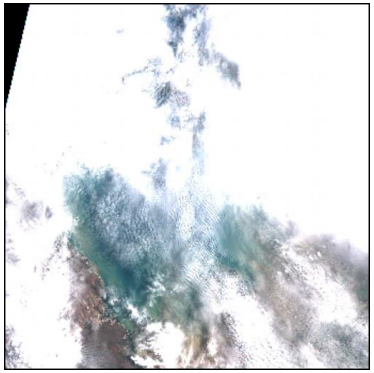


20 Jan



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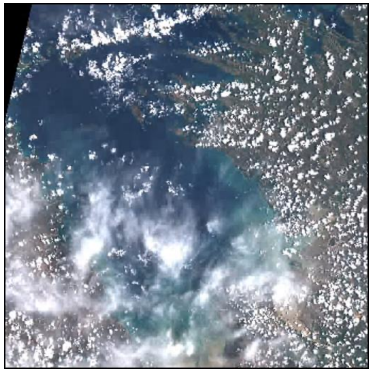
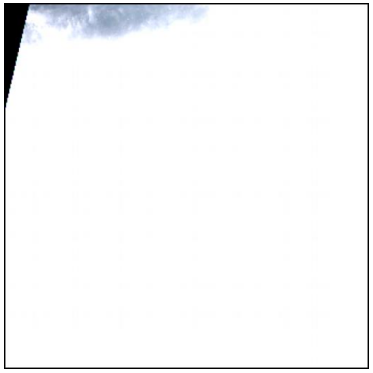
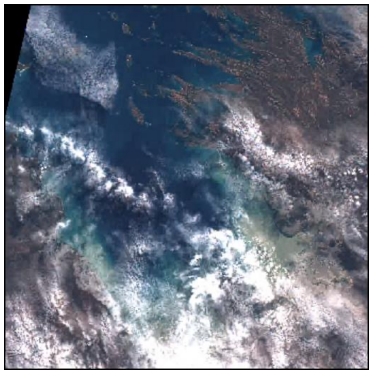


30 Jan



Sentinel 2 – June 2021. Cone Bay area, Kimberly, WA

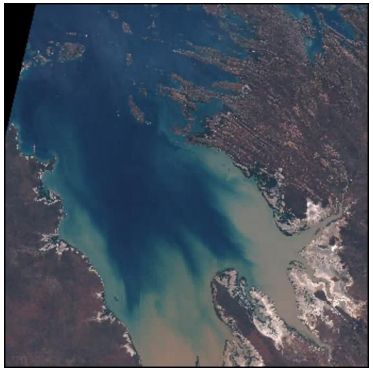
4 Jun



9 Jun

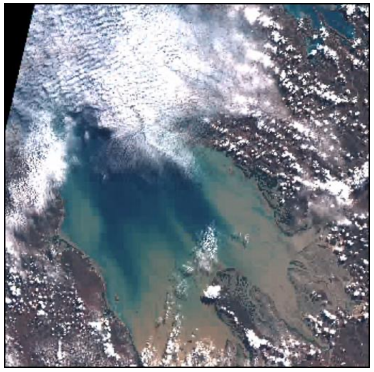
14 Jun

19 Jun



24 Jun

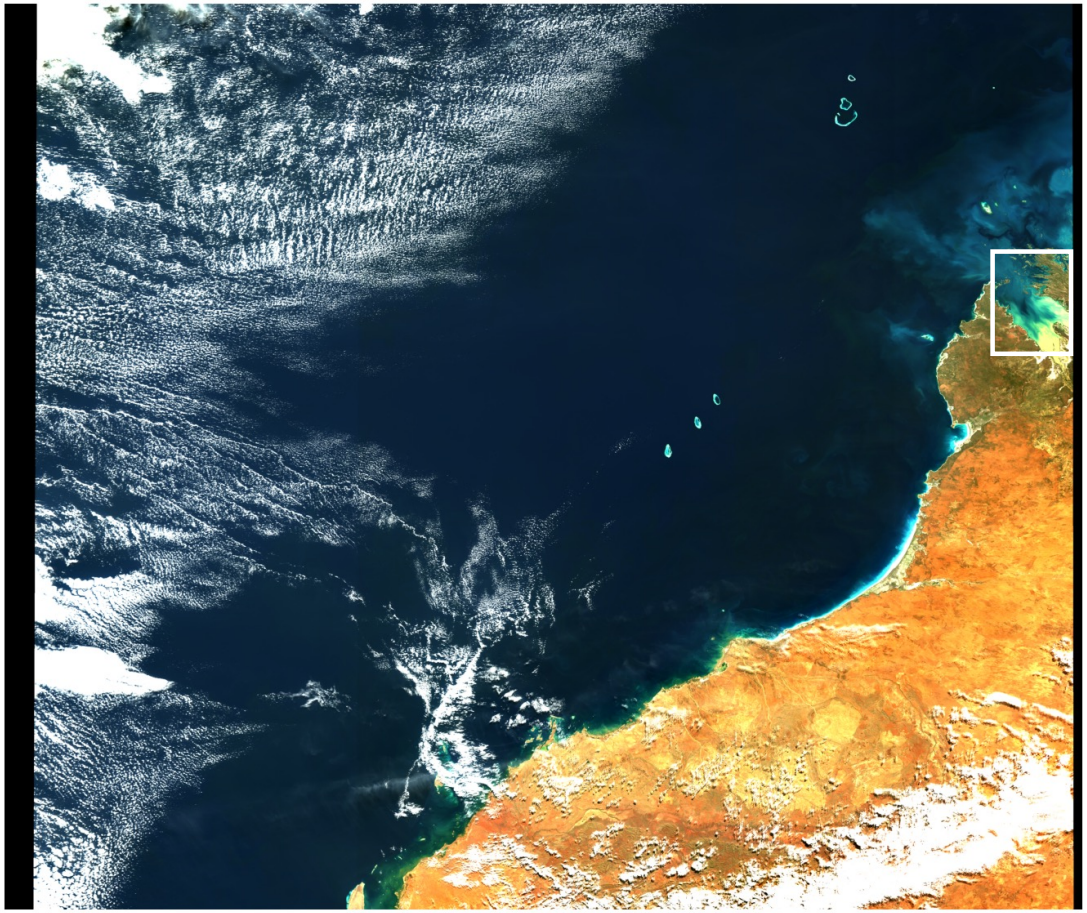
29 Jun



Sentinel 3 – June 2020. Cone Bay area, Kimberly, WA

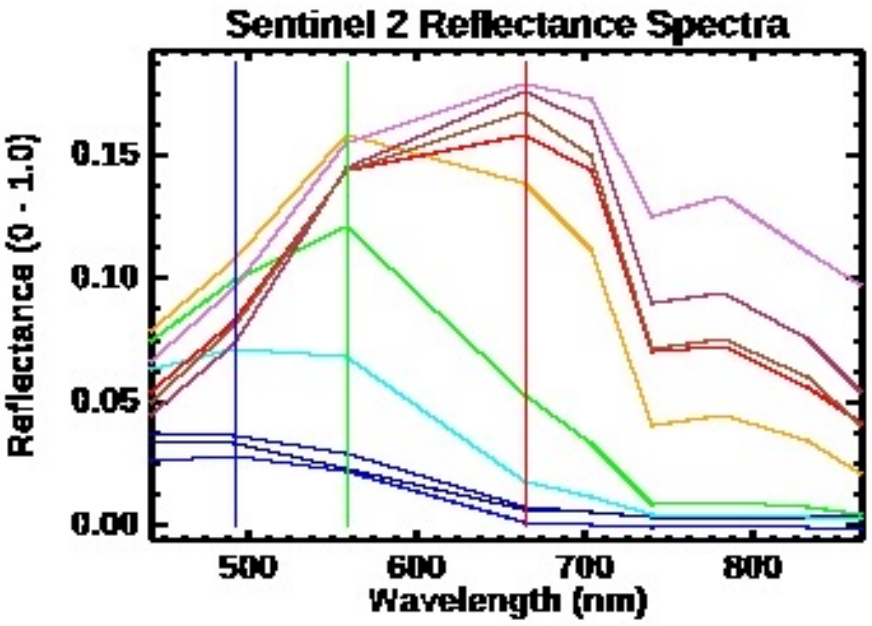
S3B/OLCI 2020-06-14 01:45:26

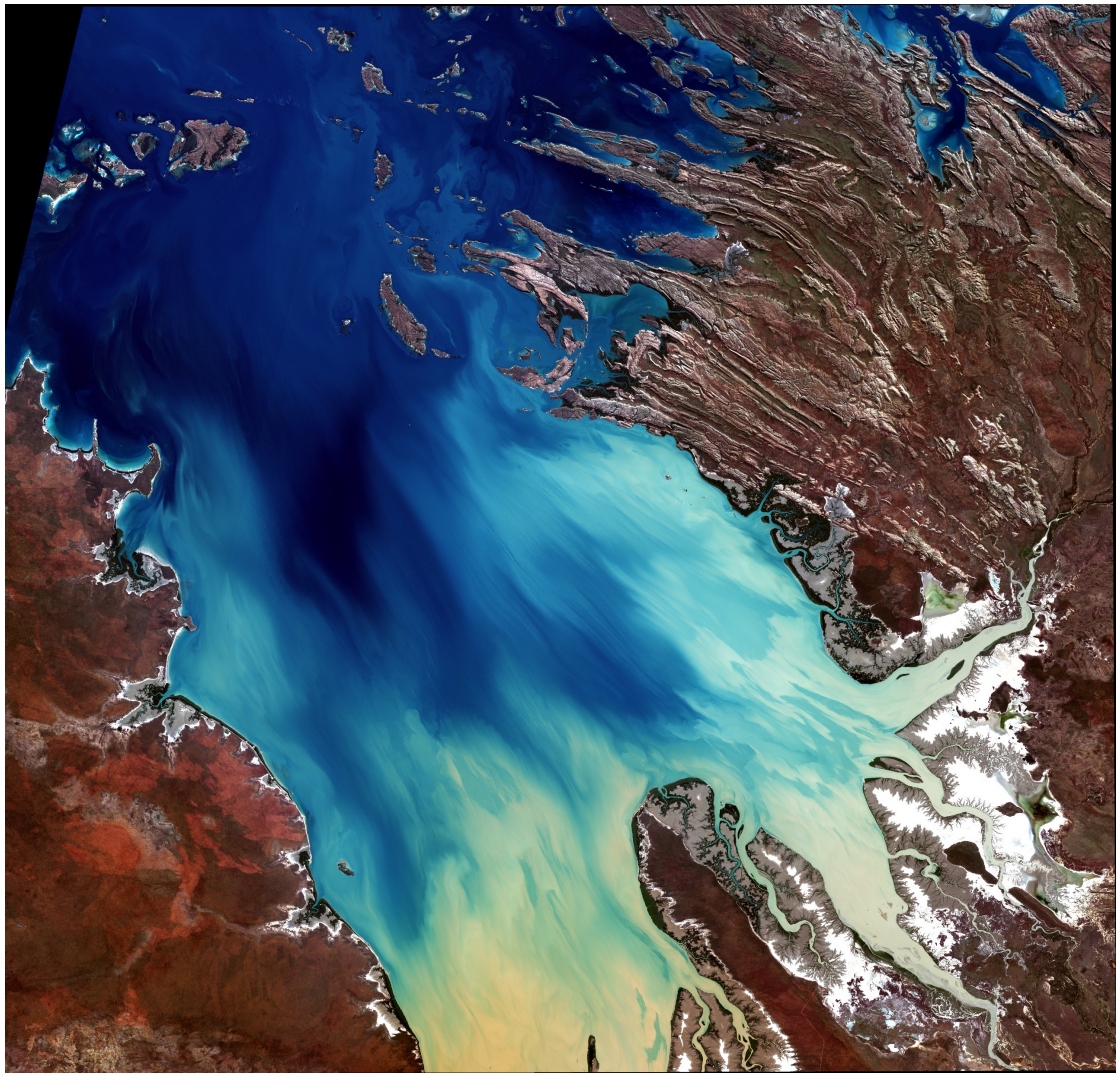
ρ_s RGB



Sentinel 2 Atmospheric Correction

- Level 1C Top of Atmosphere Radiance downloaded from ESA open Hub
- ACOLITE atmospheric correction software used for atmospheric correction to surface reflectance



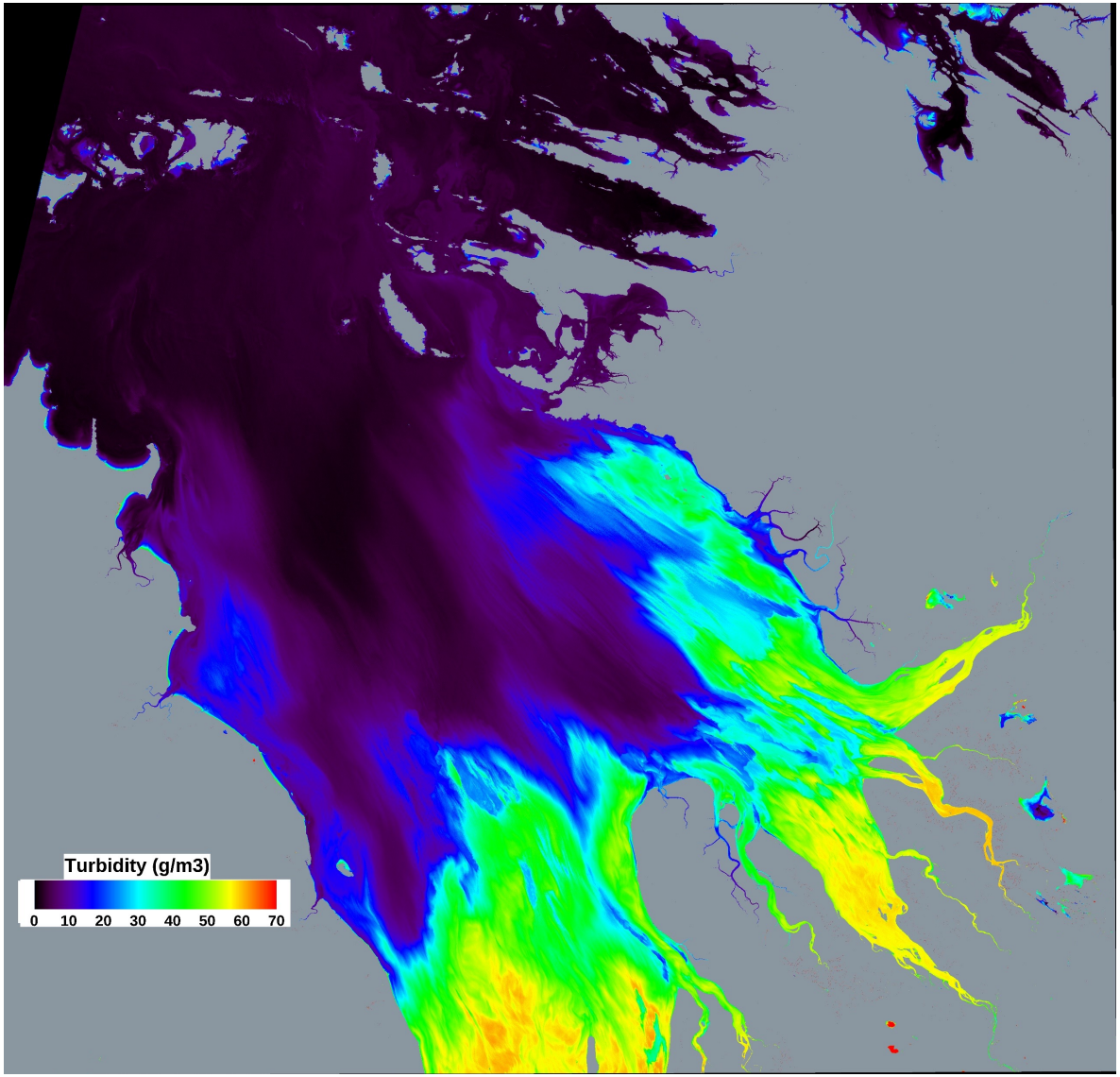


Sentinel 2 Example Product - Turbidity

$$T = A^{\rho} \frac{\rho_w}{1 - \rho_w / C^{\rho}} [gm^{-3}]$$

Where ρ_w = reflectance at 665 nm, A^{ρ} = 355.55, and C_{ρ} = 17.25

(Ref: *Nechad et al. 2010)*



Suitable Oyster Sites
- Example from other studies

frontiers in Marine Science

ORIGINAL RESEARCH
published: 29 June 2017
doi: 10.3389/fmars.2017.00190

Oyster Aquaculture Site Selection Using Landsat 8-Derived Sea Surface Temperature, Turbidity, and Chlorophyll *a*

Jordan Snyder[1], Emmanuel Boss[1], Ryan Weatherbee[2], Andrew C. Thomas[2], Damian Brady[3] and Carter Newell[4]*

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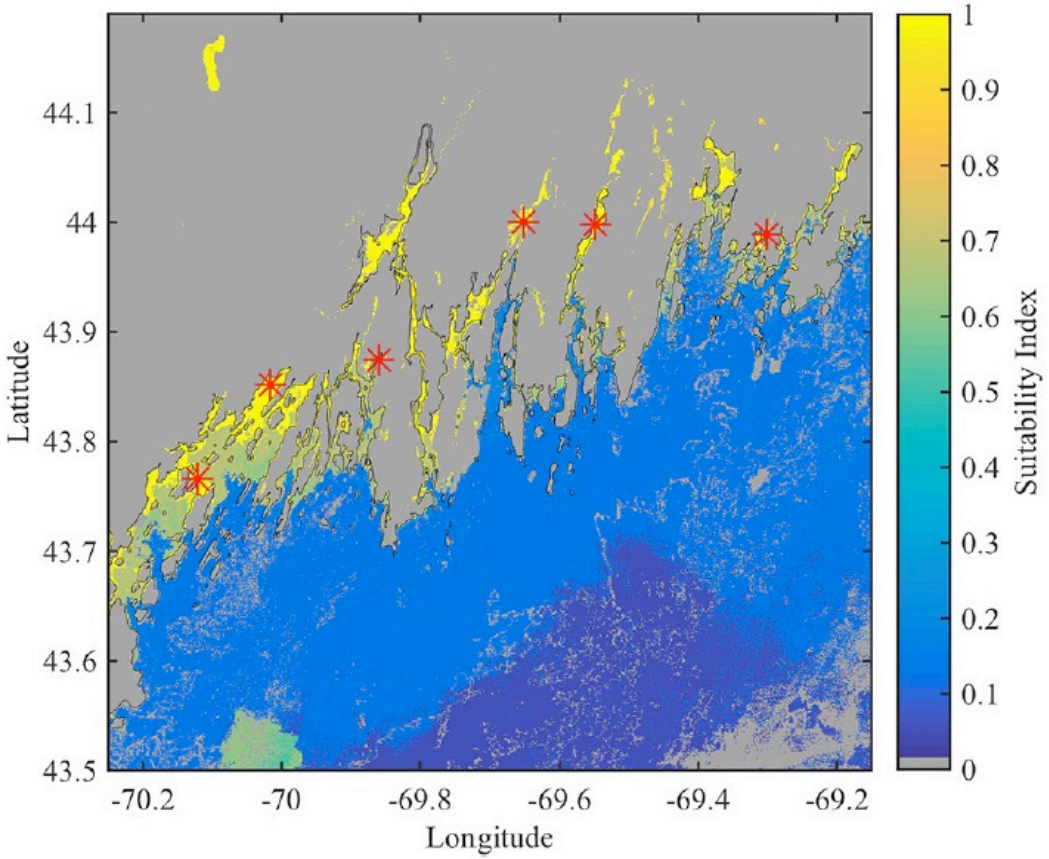

FIGURE 5 | Oyster suitability map based on Landsat 8-derived SST, turbidity, and chlorophyll-*a*. Map is an average of all images in the month of July. Yellow areas indicate ideal conditions, green areas indicate moderate conditions, and blue areas indicate poor conditions. Red stars indicate existing oyster farms. Index criteria is given in Section B in Supplementary Material.