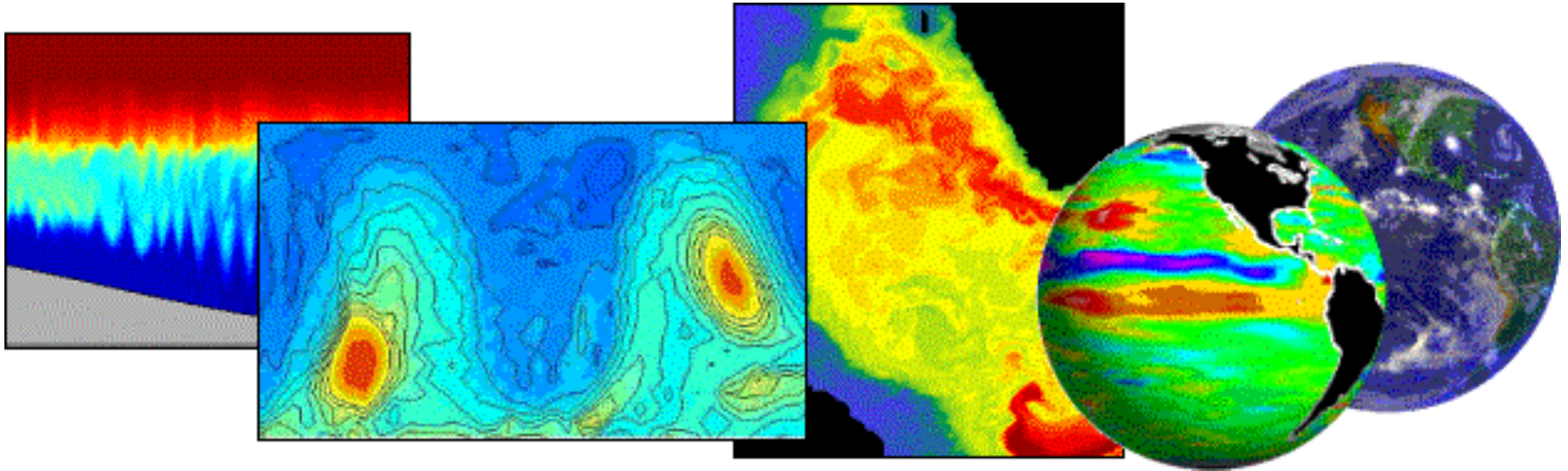


# Satellite Oceanography Lab

**Ebenezer Nyadjro**

**US Naval Research Lab/  
University of New Orleans**



**UG-DMFS Summer School (July 30-August 3, 2018)**

NASA

<ftp://podaac-ftp.jpl.nasa.gov/allData/>

CNES

<http://www.aviso.altimetry.fr/en/data/data-access.html>

NOAA

<http://www.ncdc.noaa.gov/data-access/satellite-data/satellite-data-access-datasets>

ESA

<http://marine.copernicus.eu/>

IFREMER

[http://wwz.ifremer.fr/institut\\_eng/Marine-science/French-facilities/Data-Centres/Coriolis](http://wwz.ifremer.fr/institut_eng/Marine-science/French-facilities/Data-Centres/Coriolis)

SANSA

<http://www.sansa.org.za/>

MESA

<http://www.ug-mesa.org/>

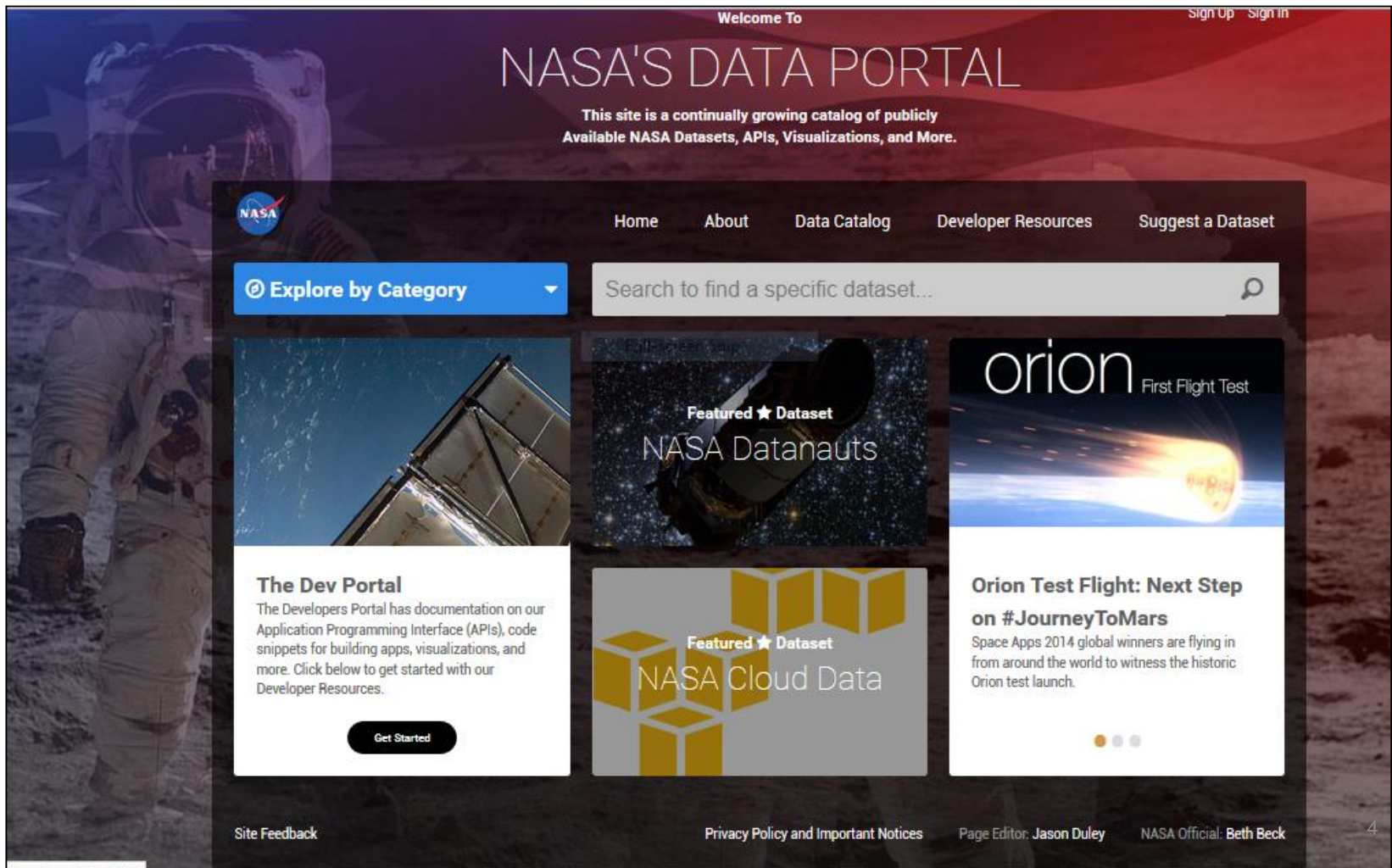
Individual Universities and Labs

e.g. University of Hawaii

<http://apdrc.soest.hawaii.edu/data/data.php>

# Data Sources

- ✓ National institutions that manage satellite data
  - National Aeronautics and Space Administration (NASA)



# Data Sources

- ✓ National institutions that manage satellite data
  - National Oceanic and Atmospheric Administration (NOAA)





# Data Sources

- ✓ National institutions that manage satellite data
  - European Space Agency (ESA)



# Data Sources

- ✓ National institutions that manage satellite data
  - South African Space Agency (SANSA)

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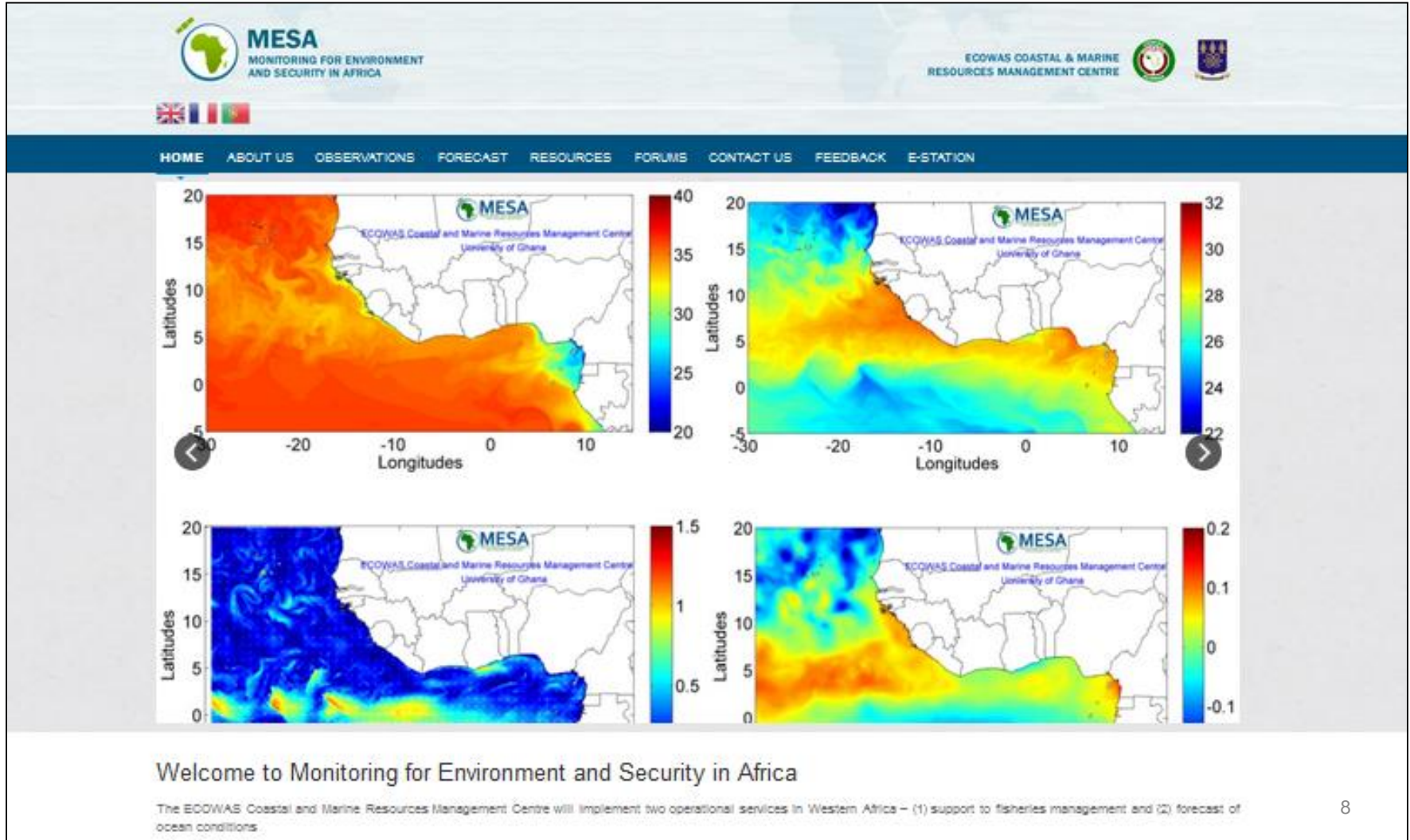
## SANSA Earth Observation History

### A view of South Africa's Earth Observation history

SANSA Earth Observation has in excess of 30 years history of receipt of Satellite Earth Observation data. Dating back as early as December 1978, when the first images were received from Meteosat 1, a European geostationary meteorological satellite, resulting in the birth of the satellite remote sensing centre (SRSC).

# Data Sources

- ✓ National institutions that manage satellite data
  - Monitoring for Environment and Security for Africa (MESA)





# Satellite Data Processing

## Levels of data processing:

**Level 0** – Raw data received from satellite, in standard binary form;

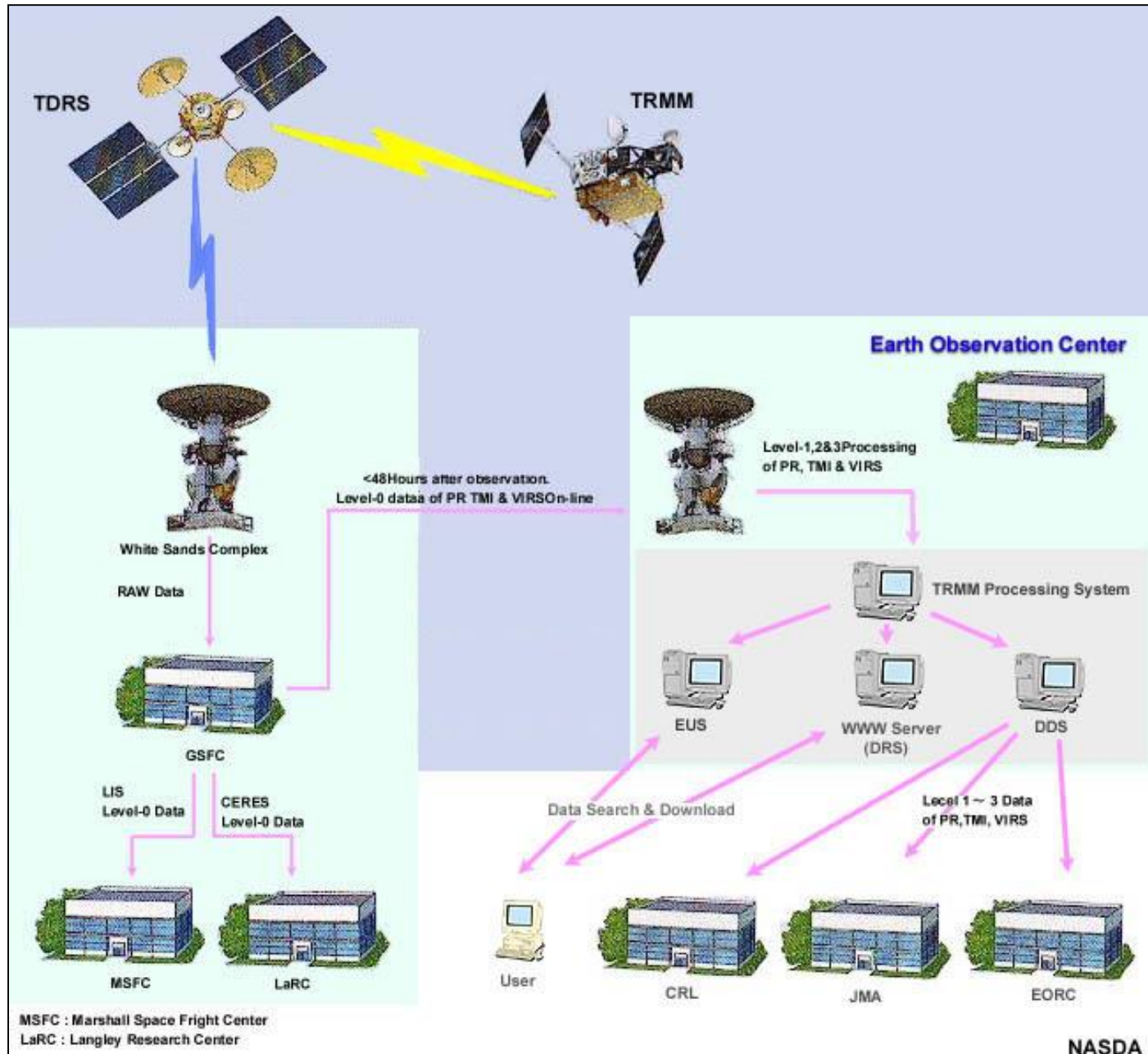
**Level 1** – Image data in sensor coordinates, contain individual calibrated channels;

**Level 2** – Derived oceanic variable, atmospherically corrected and geolocated, but presented in sensor coordinates;

**Level 3** – Composite images of derived ocean variable resampled onto standard map base and averaged over a certain time period (may contain gaps);

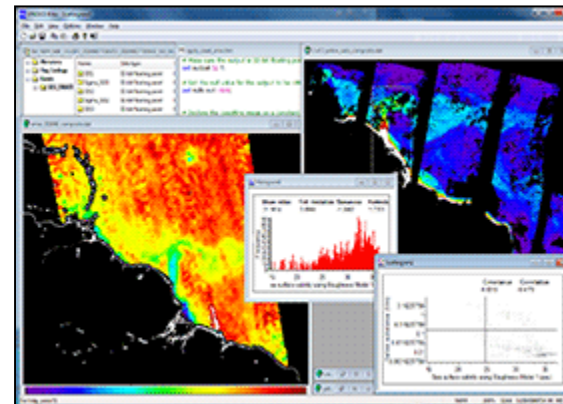
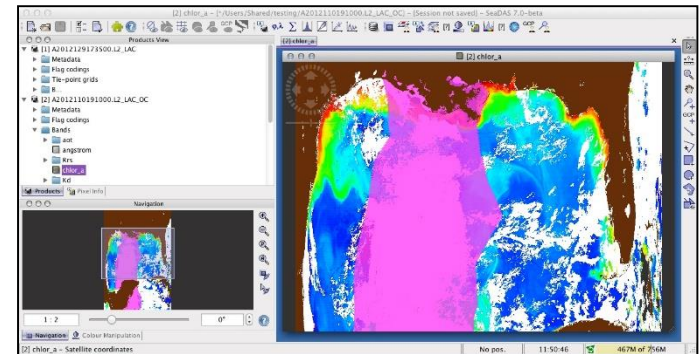
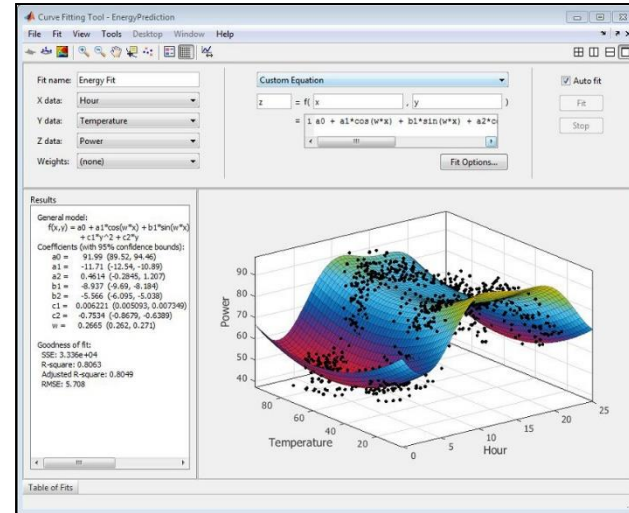
**Level 4** – Image representing an ocean variable averaged within each grid cell as a result of data analysis, e.g., modeling.

# Satellite Data Processing



# Satellite Data Processing

- ✓ Computer programming software: Matlab, Python, Ocean Data View,
- ✓ Specialized data software:
  - NASA's SeaDAS: ocean color
  - ESA's BEAM – ocean color, SAR, etc
  - UNESCO's Bilko - ocean color, SMOS
  - ENVI, ERDAS, IDRIS



# Remote sensing of the sea: Data usage

1. Sensor calibration

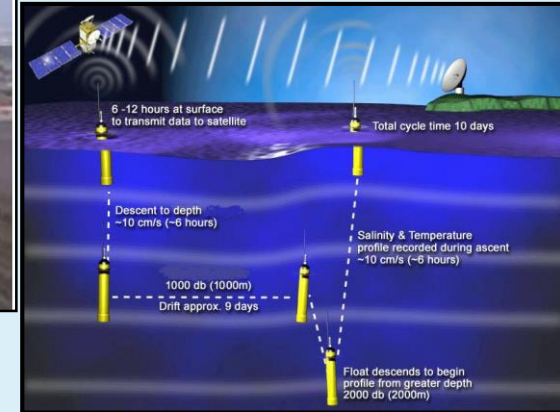
2. Atmospheric correction

3. Positional registration

4. Oceanographic sampling for “sea truth”

5. Image processing

6. Oceanographic applications of satellite  
Remote sensing



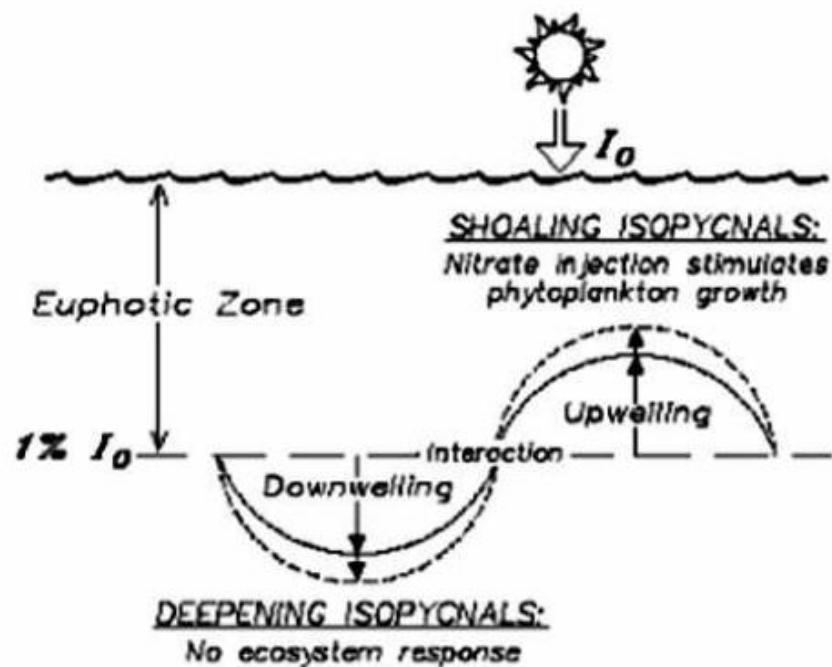


# Major image processing software

- ENVI/IDL: <http://www.rsinc.com/>
- ERDAS Imagine: <http://www.gis.leica-geosystems.com/Products/Imagine/>
- PCI Geomatics: <http://www.pci.on.ca/>
- ER Mapper: <http://www.ermapper.com/>
- INTERGRAPH: <http://imgs.intergraph.com/gimage/>
- IDRIS:
- Ecognition: <http://www.definiens-imaging.com/ecognition/pro/40.htm>
- Matlab
- Python



**Low (negative) SSH  
corresponding to shallow  
(positive) thermocline, high  
productivity**



(McGillicuddy, et al)

