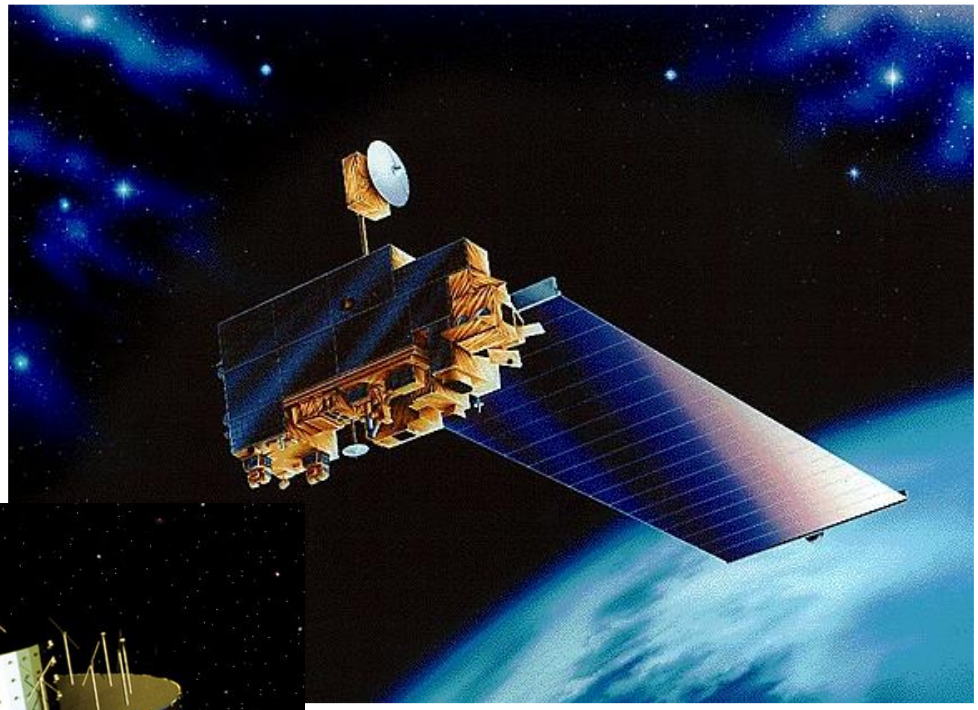
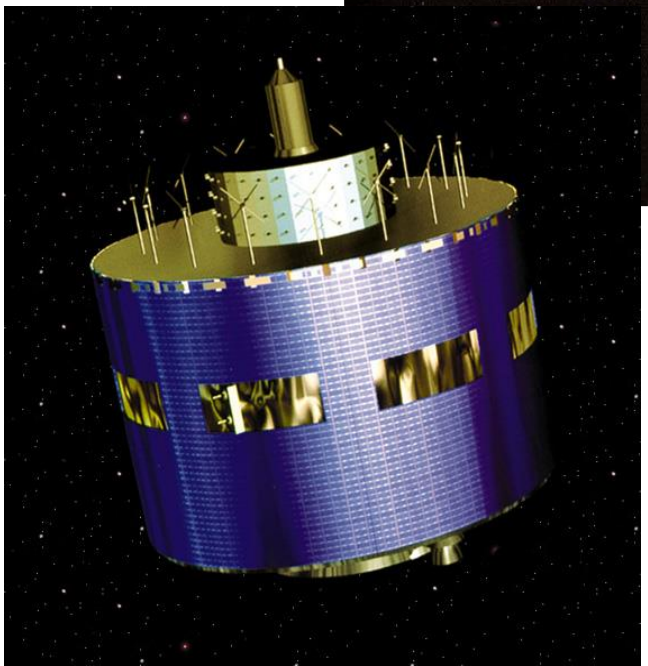
# Satellite data access and Level of processing





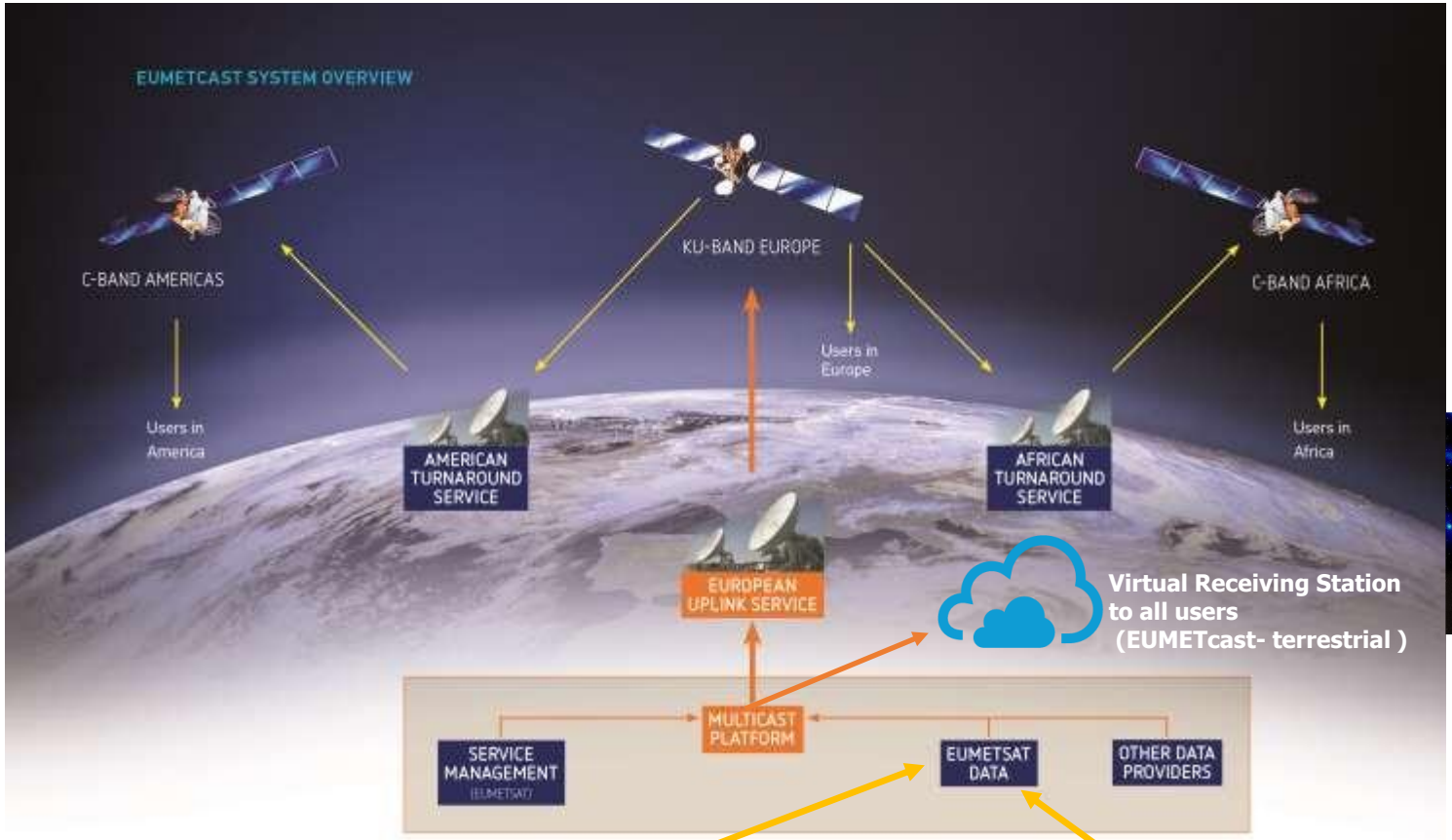
**Dr Humaid AlBadi**

**Centre of Excellence for Satellite Applications- Muscat**

**5 March 2023**

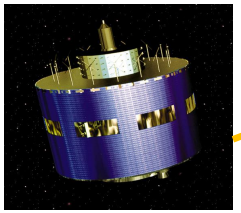
# Access to data

*Direct and Virtual Receiving Station*




Low Earth Orbiting

Geostationary



Regional Direct LEO Satellite Receiving Station

# Access to data

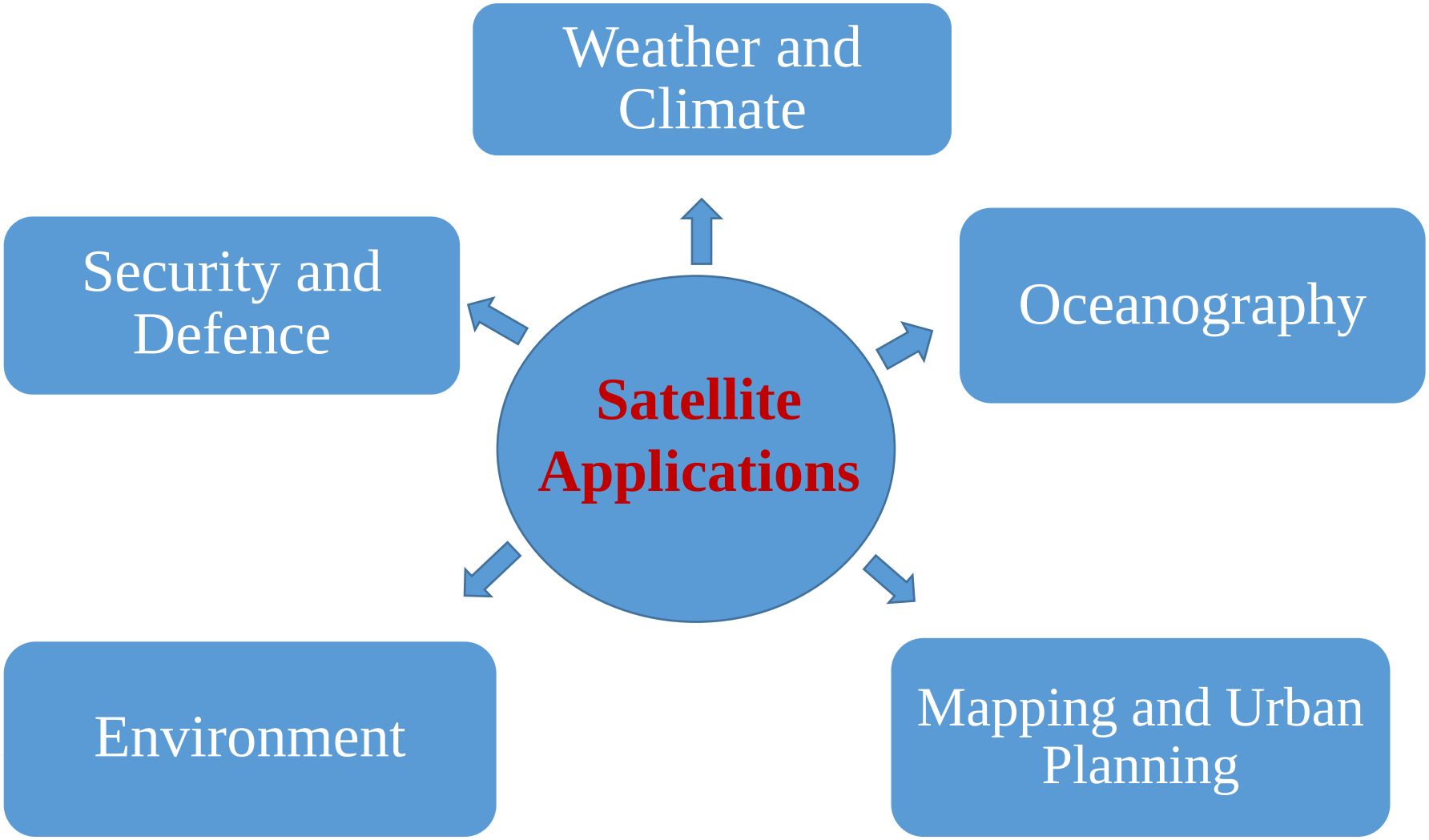
- Advantages and Limitations

  Virtual Receiving station
  Direct Receiving Station

- Satellite Data Centres
  Examples

- https://search.earthdata.nasa.gov
- https://www.sentinel-hub.com/explore/
- https://www.eumetsat.int/access-our-data
- https://worldview.earthdata.nasa.gov/
- https://giovanni.gsfc.nasa.gov/
-

# Earth Observation Satellite Applications



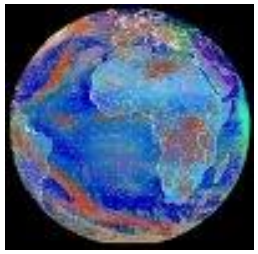
# Types and cost of Satellite data

## Data processing levels

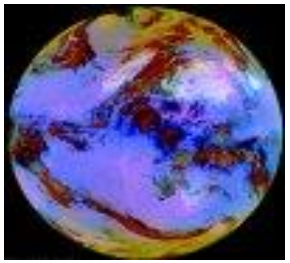
| Data Level | Description |
|---|---|
| Level 0 | Reconstructed, unprocessed instrument and payload data at full resolution, with any and all communications artifacts |
| Level 1A | Reconstructed, unprocessed instrument data at full resolution, time-referenced, and annotated with ancillary information, including radiometric and geometric calibration coefficients and georeferencing parameters |
| Level 1B | Level 1A data that have been processed to physical units |
| Level 1.5 | Level 1.5 rectified data corresponds to the geolocated and radiometrically pre-processed, **ready for further processing** |
| Level 2 | Derived geophysical variables at the same resolution and location as Level 1 source data. |
| Level 3 | Variables mapped on uniform space-time grid scales, usually with some completeness and consistency at different space-time resolution |
| Level 4 | Model output or results from analyses of lower-level data (e.g., variables derived from multiple measurements). |

# Data Processing

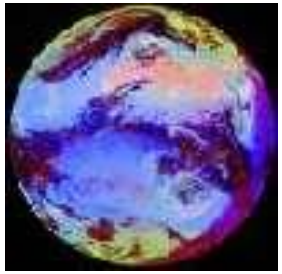
## Satellite Channels and Products



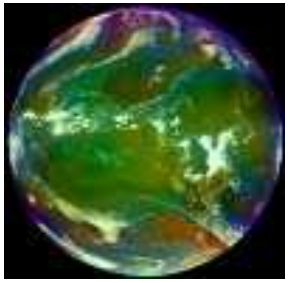
Day Microphysics RGB



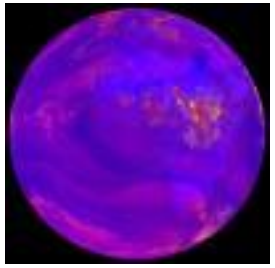
Dust RGB



Fog / Low Clouds RGB



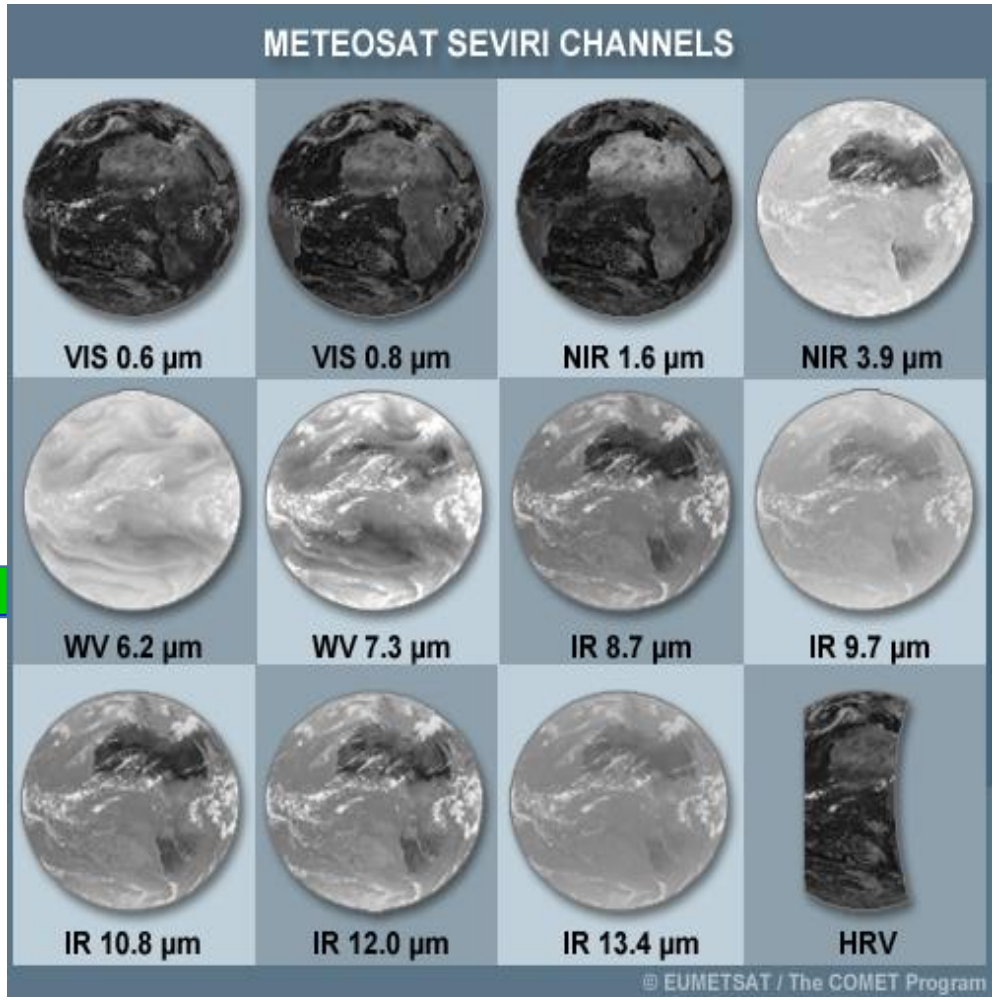
Airmass RGB



Convection RGB

Natural Colour RGB

RGB products- Level 2

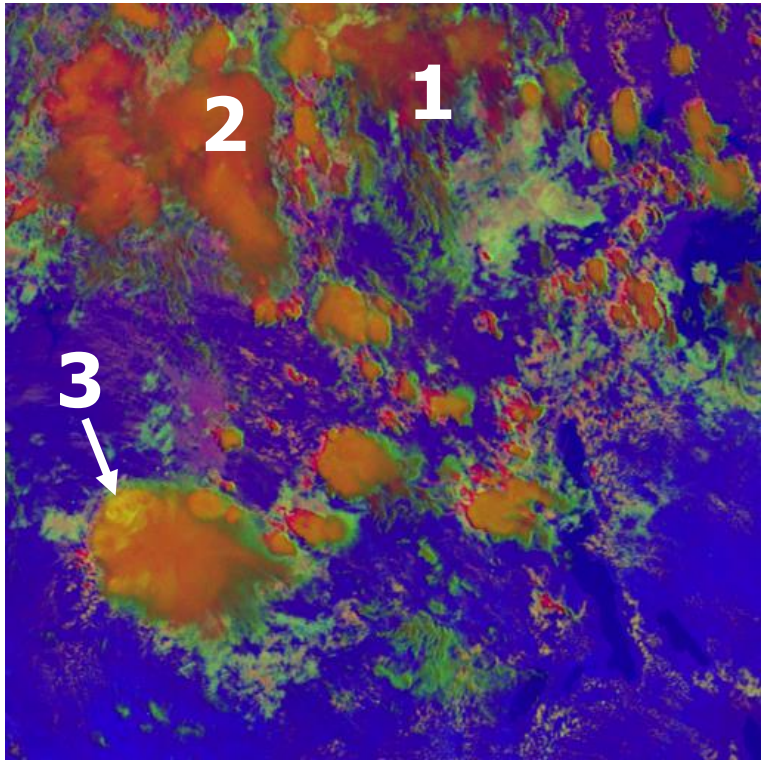



Channels- Level 1.5

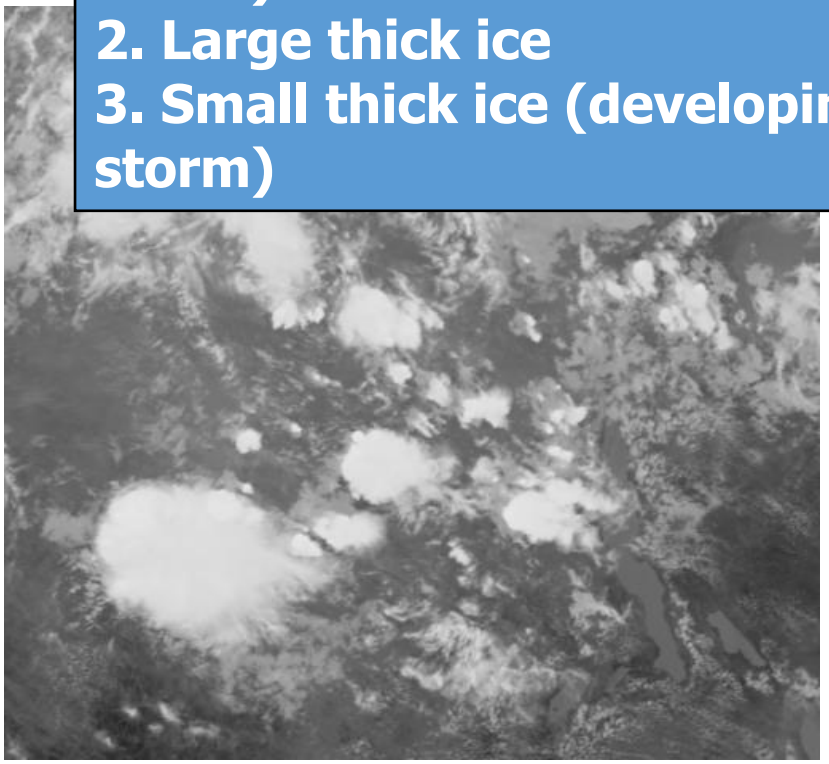
# Data Processing

## RGB Products

1. Large thin ice (dissipating storm)
2. Large thick ice
3. Small thick ice (developing storm)




RGB



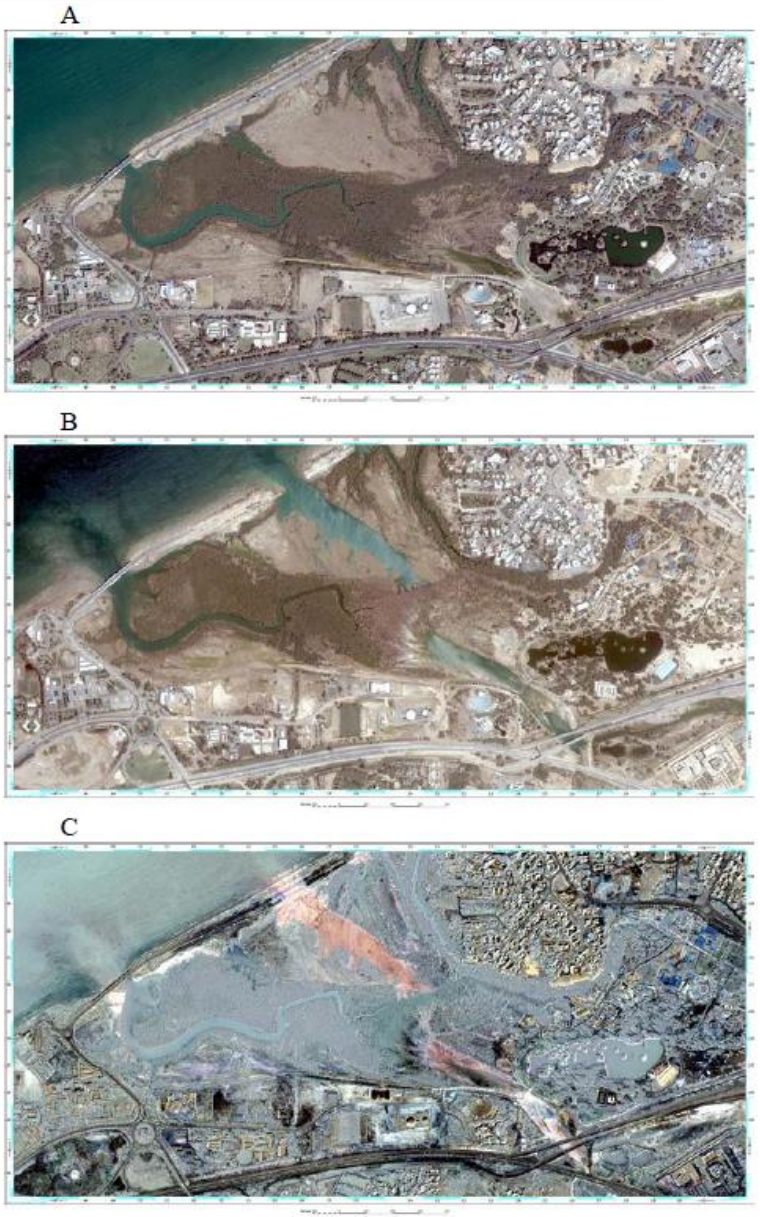
Channel 09 (IR10.8)

**MSG-1 7 September 2003, 11:45 UTC**

# Data Processing

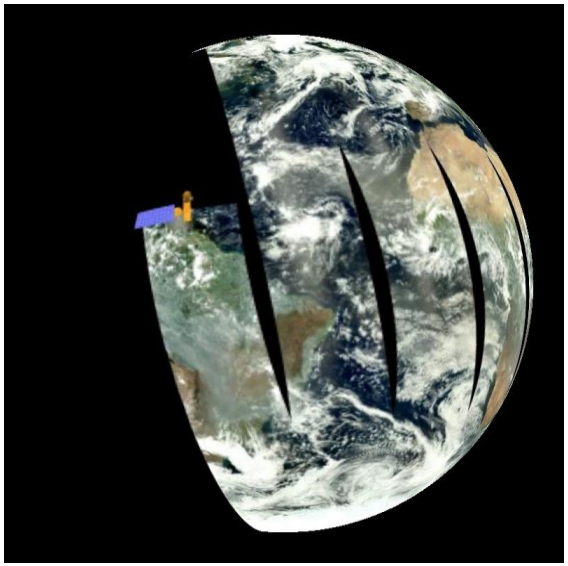
## Derived Product : Landscape Change

Level 1.5 to Level 2 data

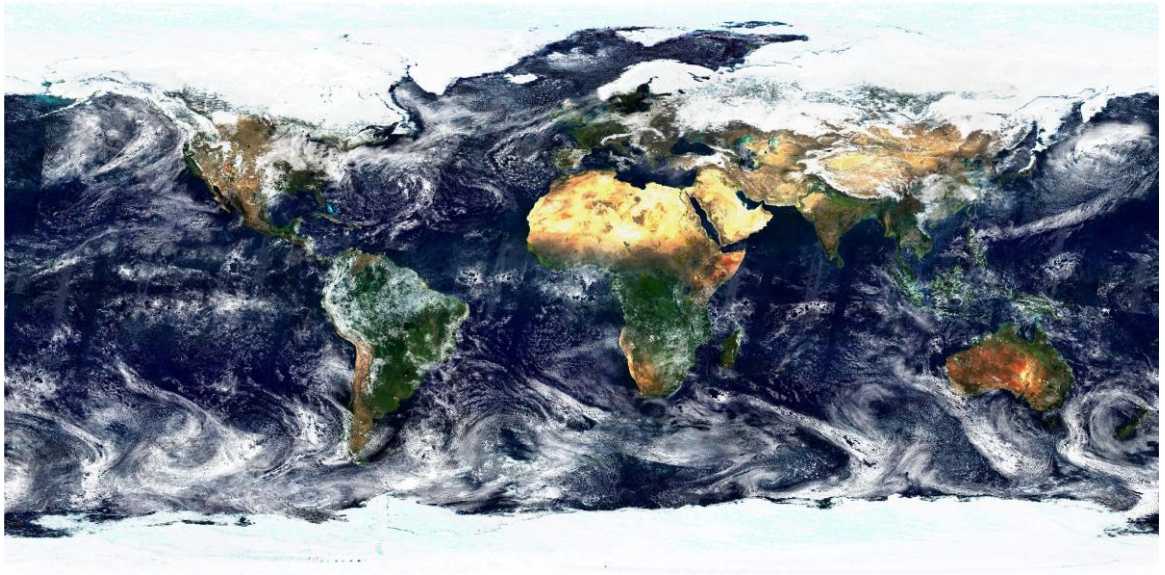



Ikonos bands 3, 2, and 1 color composite image showing Qurum National Park area recorded on March 2, 2006 (A) and June 12, 2007 (B). The change detection image (C) maps the temporal difference between the 2006 and 2007 Ikonos image (Kwarteng, 2010)

## **Derived Product:** Global Surface Reflectance (MODIS)



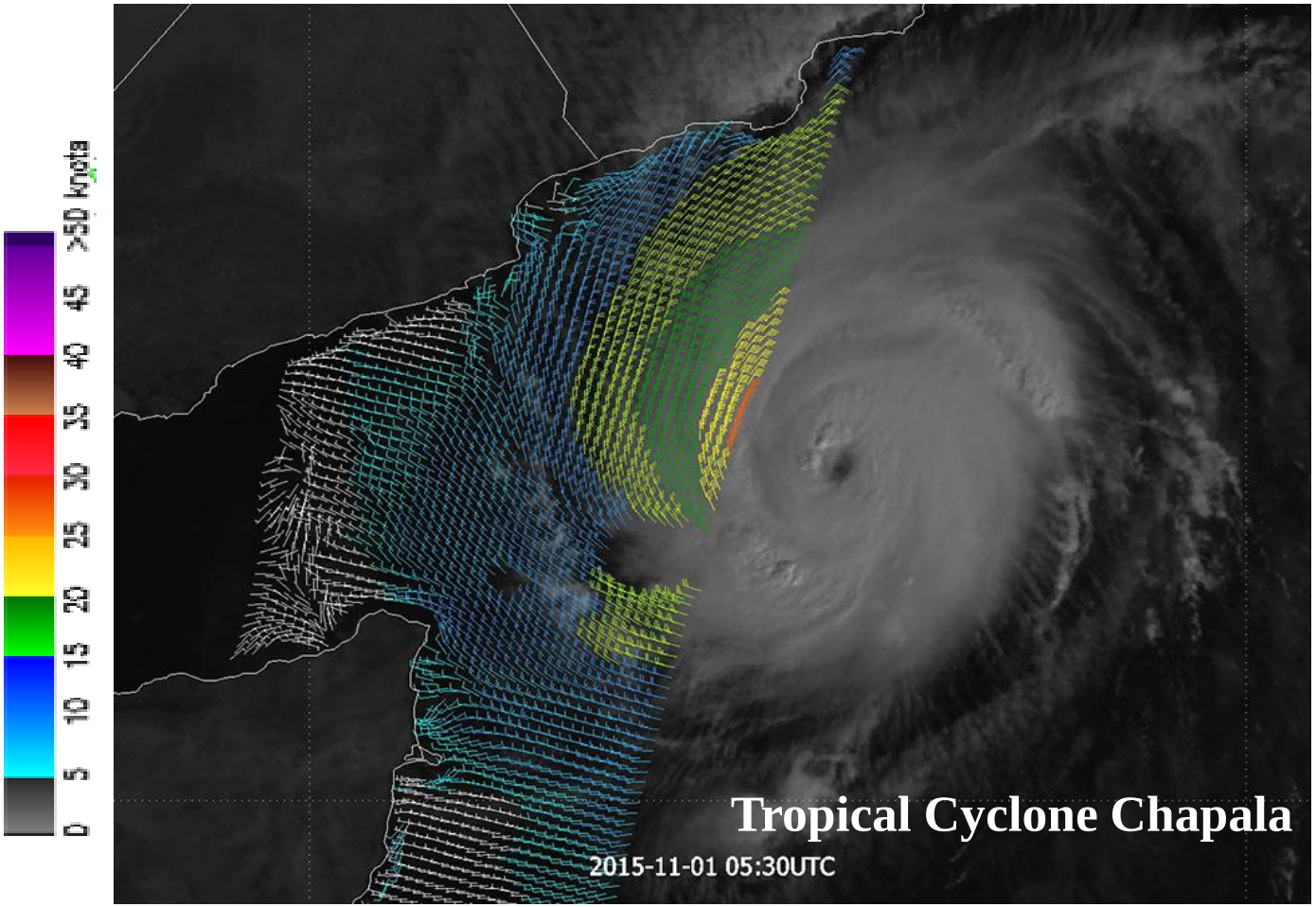
Level -1.5



Level -3

# Data Processing

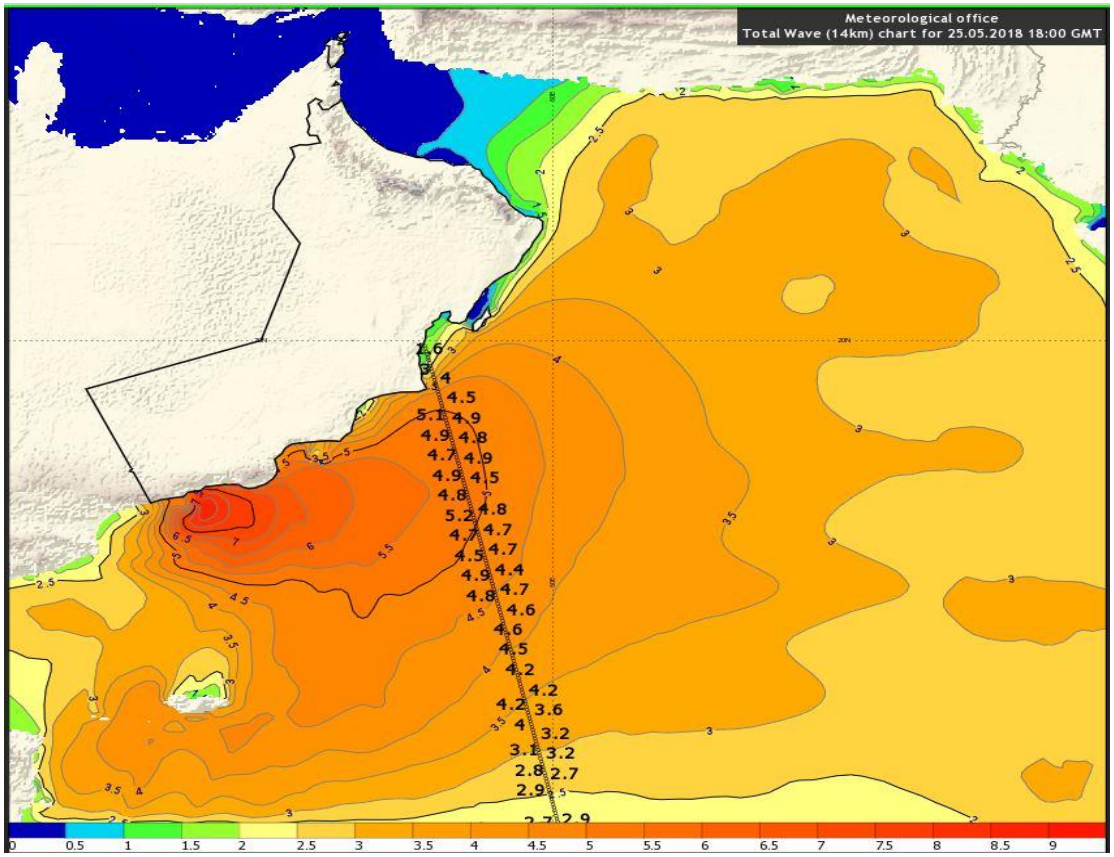
## Derived Products: Wind




Level - 4

# Data Processing

## Derived Product : Wave Height

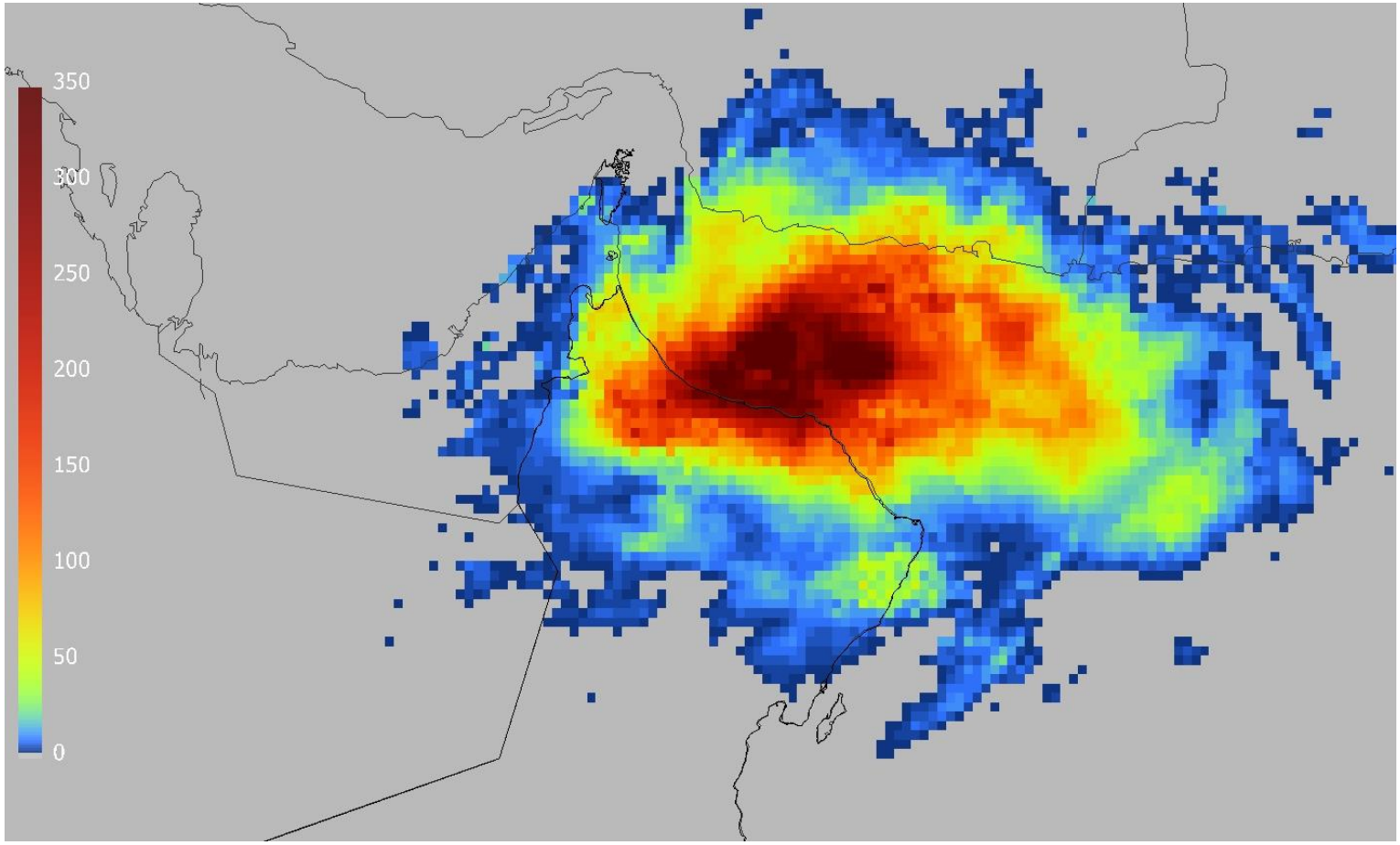



**Sea surface height product from Sentinel-3 satellite altimeter during tropical cyclone Mekunu**

Level - 4

# Data Processing

## Derived Product: Multi-mission precipitation




**Rainfall of Tropical Cyclone Shaheen from several LEO and GEO Satellites**

Level - 4

# Practical
# Task 1

Go to https://eoportal.eumetsat.int/ → Data Centre.

or https://giovanni.gsfc.nasa.gov/

1. Browse through the list of data using the **online data ordering tools**
2. Recognize the different levels of processed satellite data

# Types and cost of Satellite data

## Data cost

The cost differs from one data provider to another but is generally controlled by resolution, the latency of the image

The table below is a general overview.

| Spatial Resolution | Cost |
|---|---|
| Low : over 60m/pixel | Free - American public satellites<br>Free - old images for noncommercial users - European Satellites.<br>low cost for low Latency new images |
| Medium : 10 – 1m/pixel | Free - American Government satellites<br>Free - for low Latency for noncommercial users - European Satellites<br>low cost for new images |
| High : 1m-25 cm / pixel | Expensive<br>Free for selected old imagery to noncommercial users |
| Very High Pixel size < 25 cm/Pixel | Not available commercially |

Thank you