

A satellite image of the Red Sea region, showing the coastline of the Arabian Peninsula on the left and the Red Sea basin. The water is dark, and there are some lighter patches, possibly indicating sediment or shallow waters. The land is a mix of brown and green, representing desert and some vegetation.

Satellite For Marine Applications

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Outline



General Ocean Satellite Applications



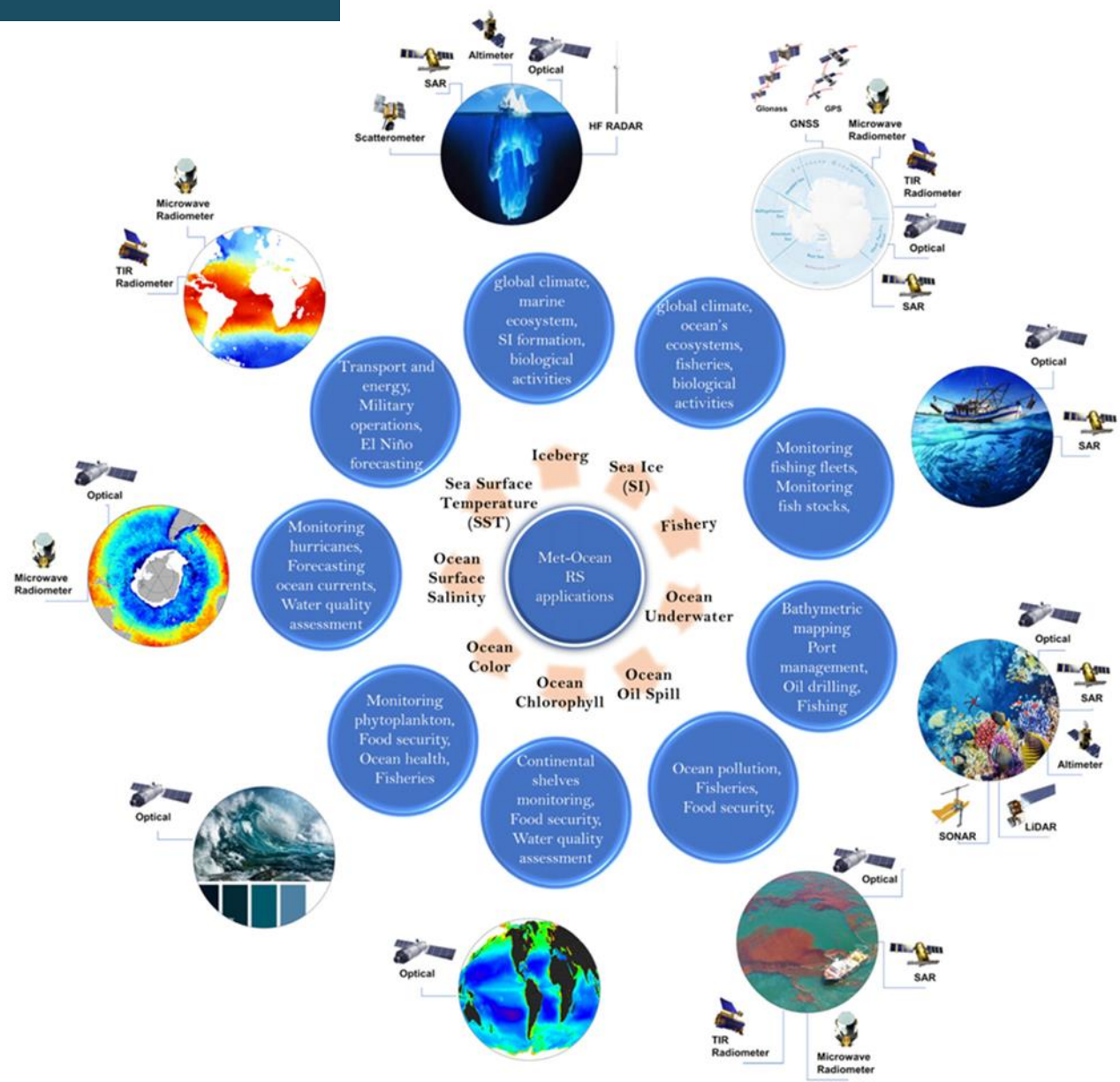
Ocean Monitoring Satellites & Instruments



Main Ocean Applications:


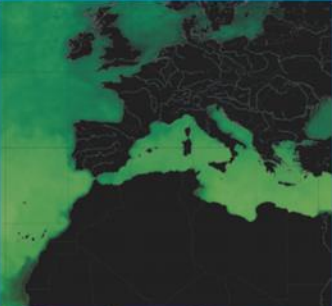





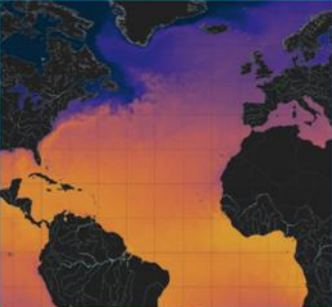








- Sea Surface Temperature Estimation
- Sea Surface Wind Speed Estimation
- Sea Significant Wave Height Estimation
- Water Quality

Marine Satellite Applications

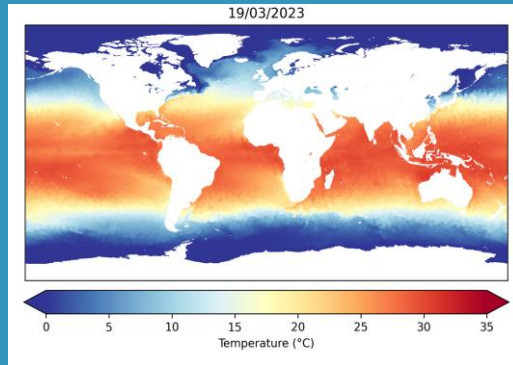


Observing the Ocean with Satellite

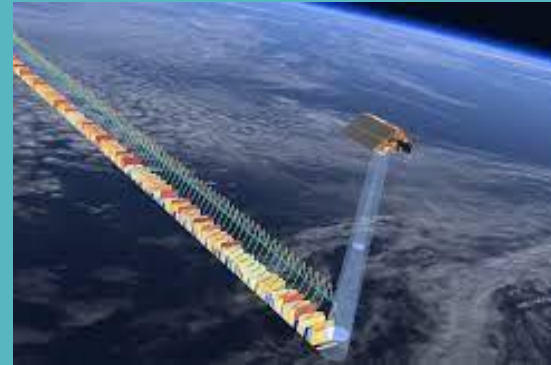
Go To

Type of instrument	What does it do	Examples of output	Variables that can be measured
	<p>Spectroradiometer</p> <p>A spectroradiometer is a light measurement tool that is able to measure both the wavelength and amplitude of the light emitted from a light source. It can thus monitor the Earth's atmosphere, ocean and land surface in a wide wavelength spectrum ranging from the visible to near-infrared, medium-infrared and thermal frequencies. Outputs for the ocean include chlorophyll content, mineral and organic content, sea surface temperature and sea ice cover.</p>		<ul style="list-style-type: none">  Chlorophyll content  Organic and mineral content  Sea surface temperature (SST)  Sea ice cover
	<p>Infrared radiometers</p> <p>Infrared radiometers are sensors that use infrared light to measure the radiation being reflected by surfaces and thus estimate the temperature of a surface without touching it. Outputs for the ocean are the sea surface temperature.</p>		<ul style="list-style-type: none">  Sea surface temperature (SST)
	<p>Microwave radiometer</p> <p>A microwave radiometer is a radiometer that measures energy emitted at millimetre-to-centimetre wavelengths, known as microwaves. They are very sensitive receivers designed to measure vertical profiles of important meteorological quantities, such as vertical temperature and humidity profile, columnar water vapor amount, or columnar liquid</p>		<ul style="list-style-type: none">  Atmospheric water vapour content  Atmospheric water liquid content  Rain rates  Sea ice concentration  Sea surface temperature

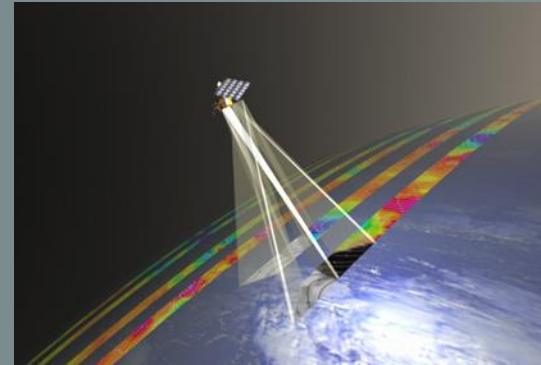
Main Ocean Properties derived from satellite



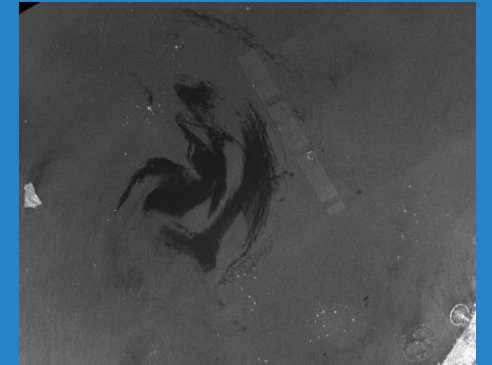
Sea Surface
Temperature



Significant Wave
Height



Sea Surface
Wind Speed



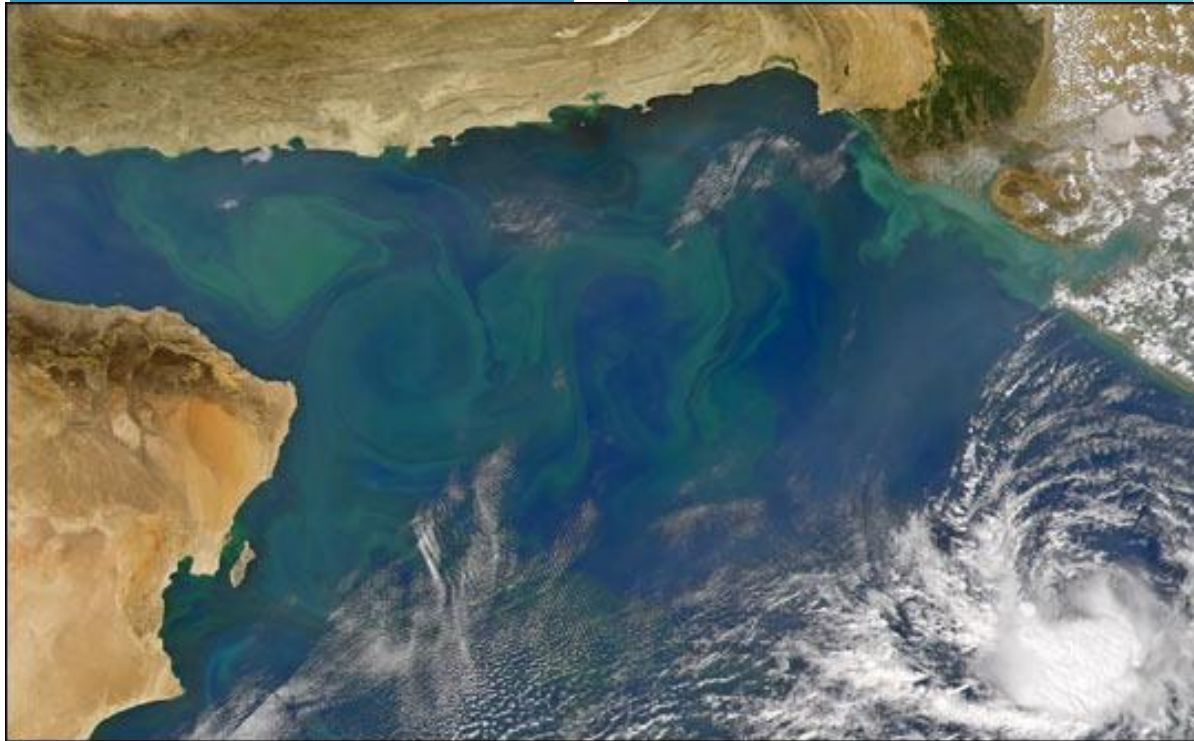
Water Quality

Chlorophyll

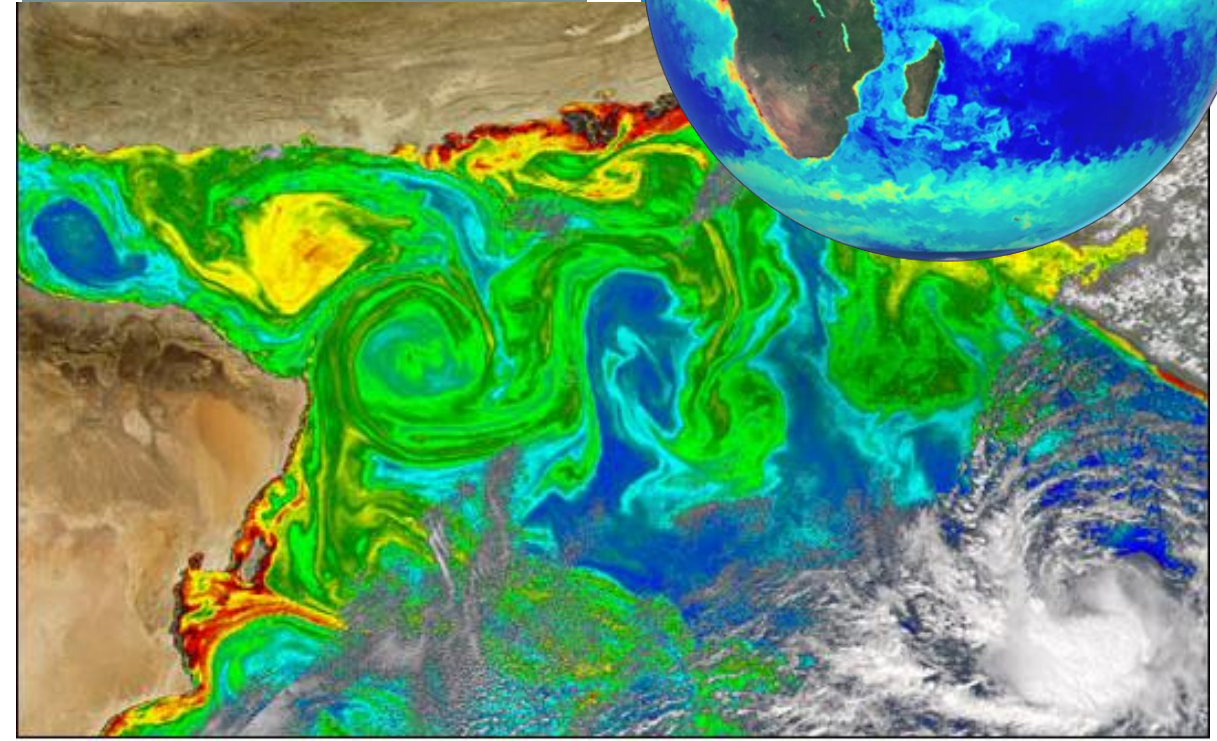
Salinity

Oil spill

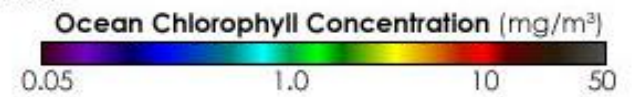
Water Quality/algal bloom



Natural Color

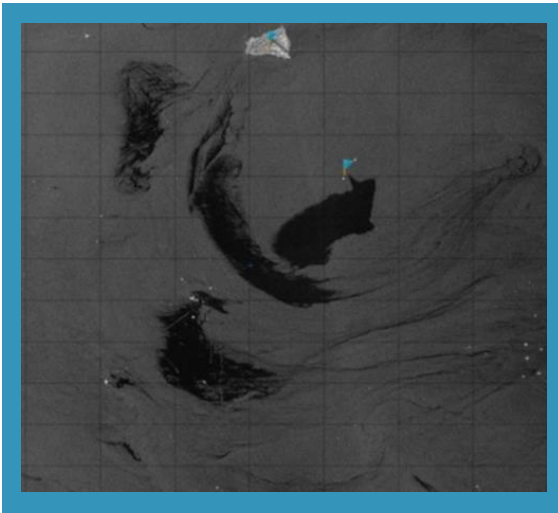


Chlorophyll Concentration

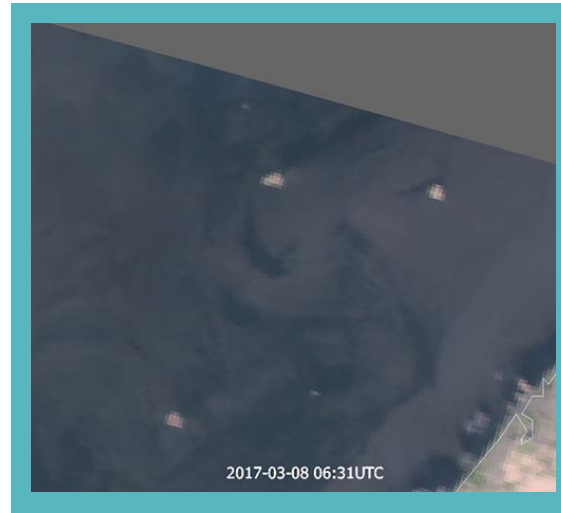


Eumetview /Case

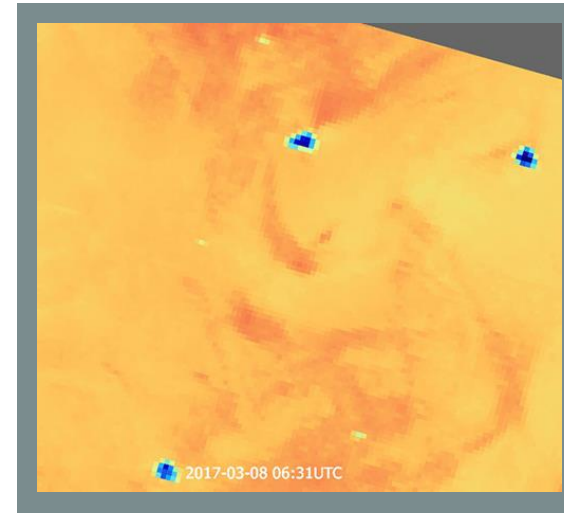
Why SAR data??



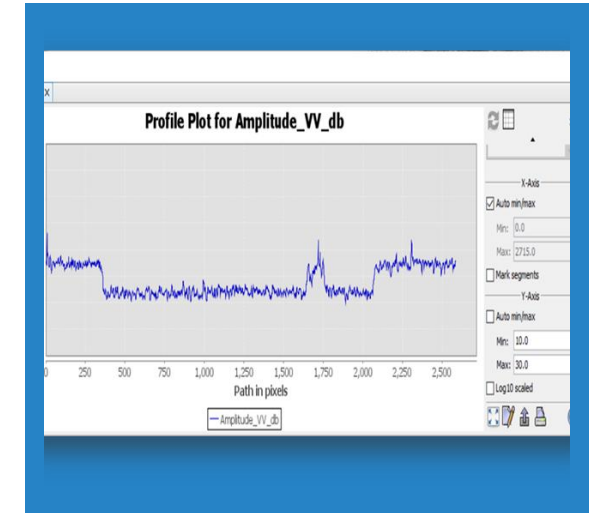
SAR/ Sentinel-1
8 March 2017



Natural RGB/Metop-A



Difference Vis0.6 &
NIR1.6 /Metop-A

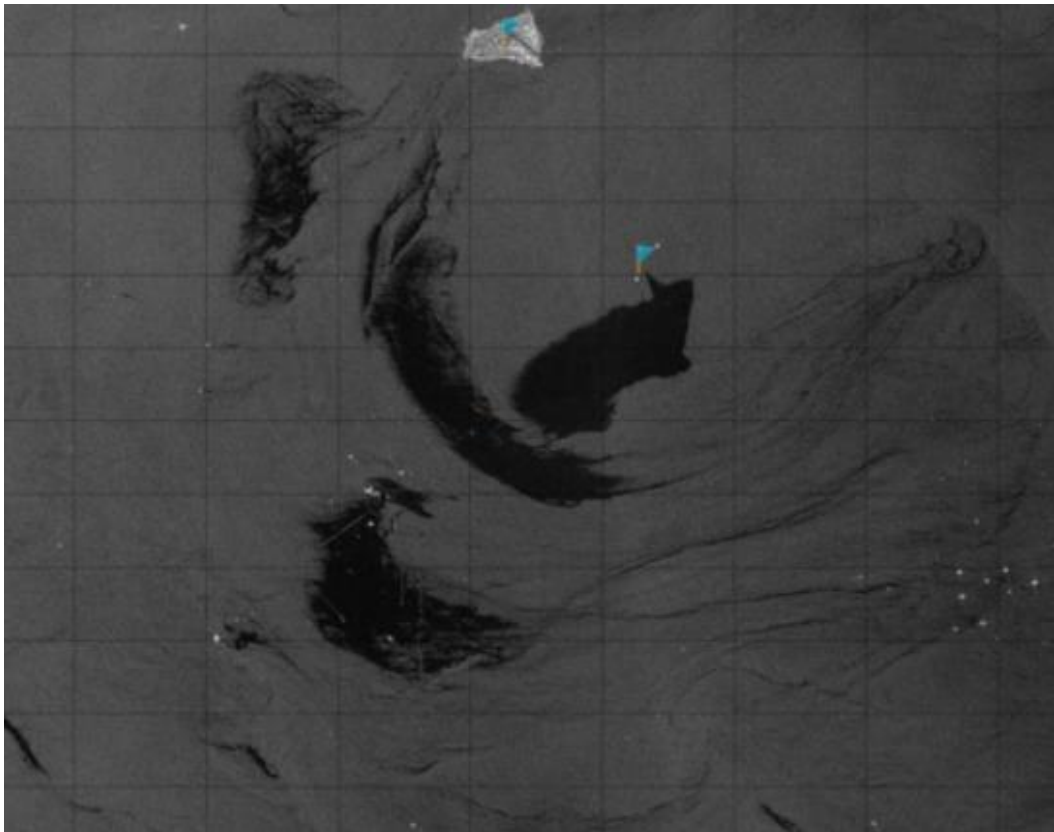


Reflectivity Analysis SAR

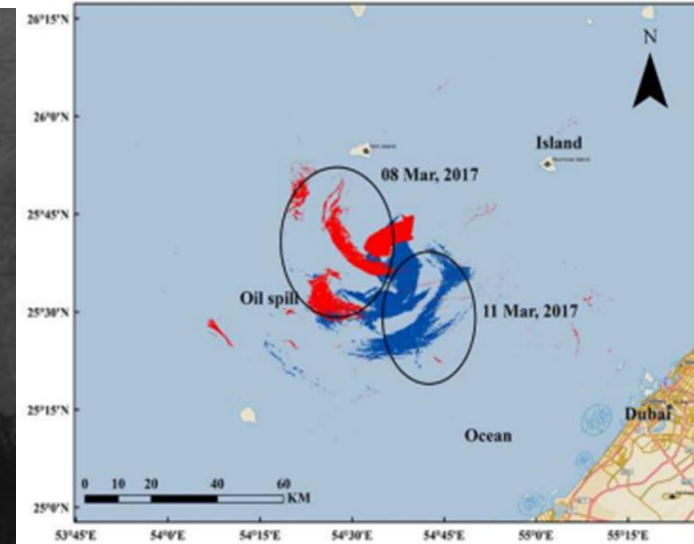
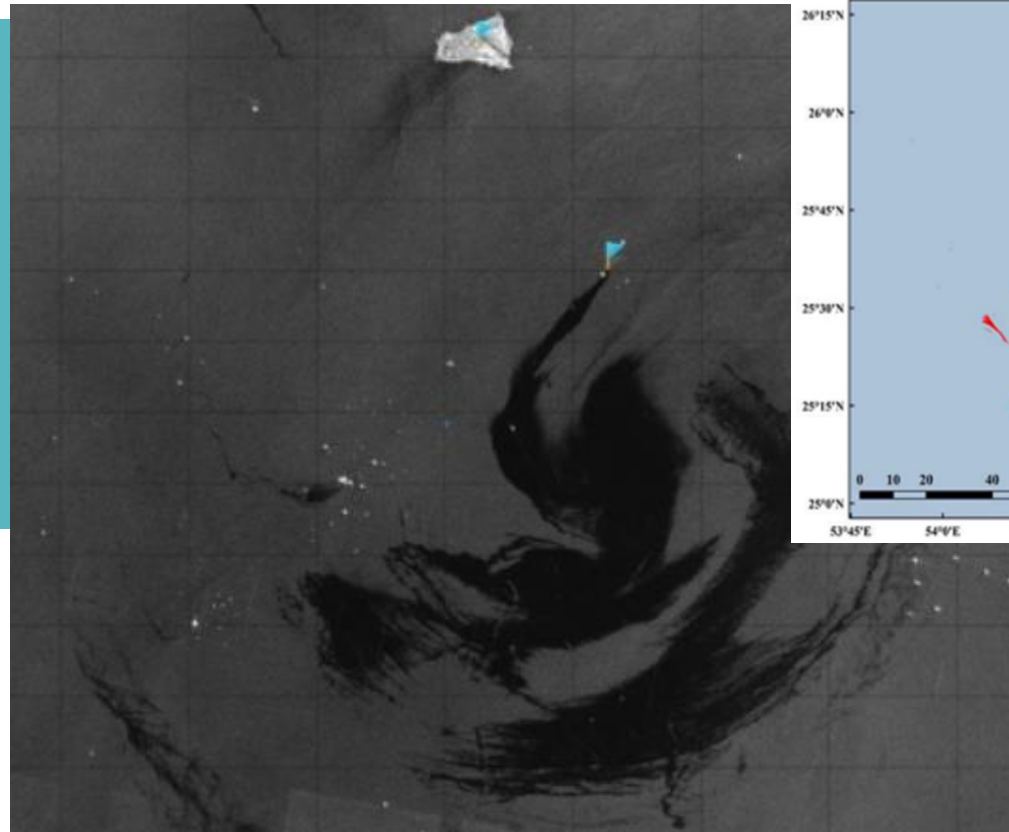
- Oil spill appear dark (smooth surface) , lower reflectivity, back scattered comparable with the sea surface that appears bright due to its high reflectivity and natural roughness.
- See through cloud.
- Large Swath
- Day and Night

Water Quality/ Oil Spill Detection

- 8 March 2017

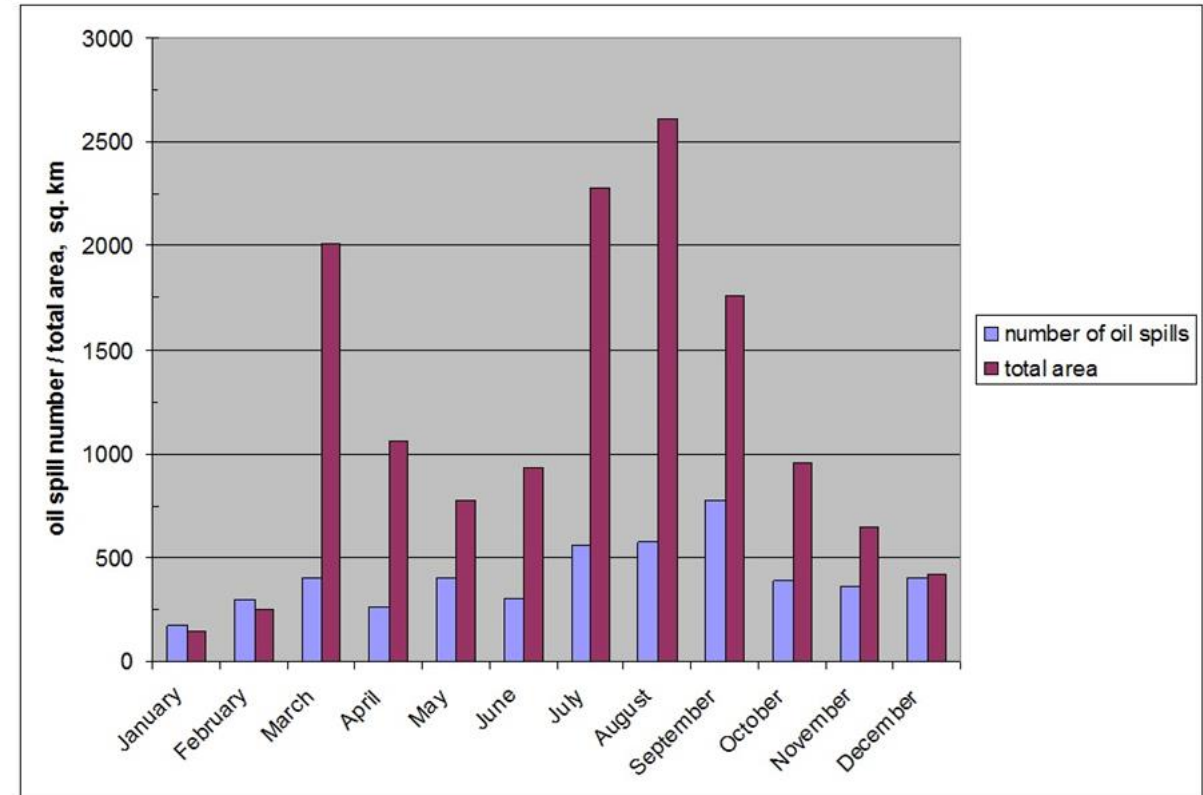


- 11 March 2017



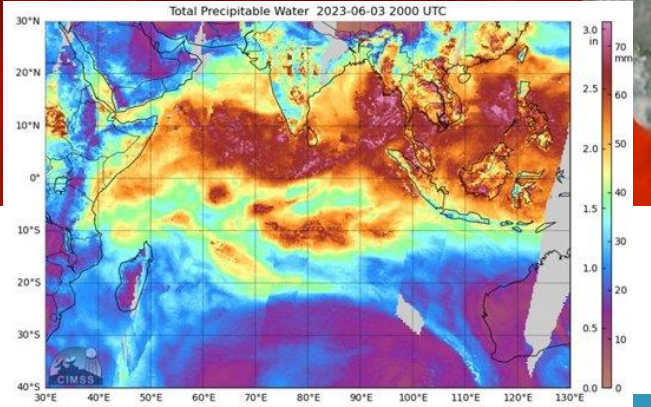
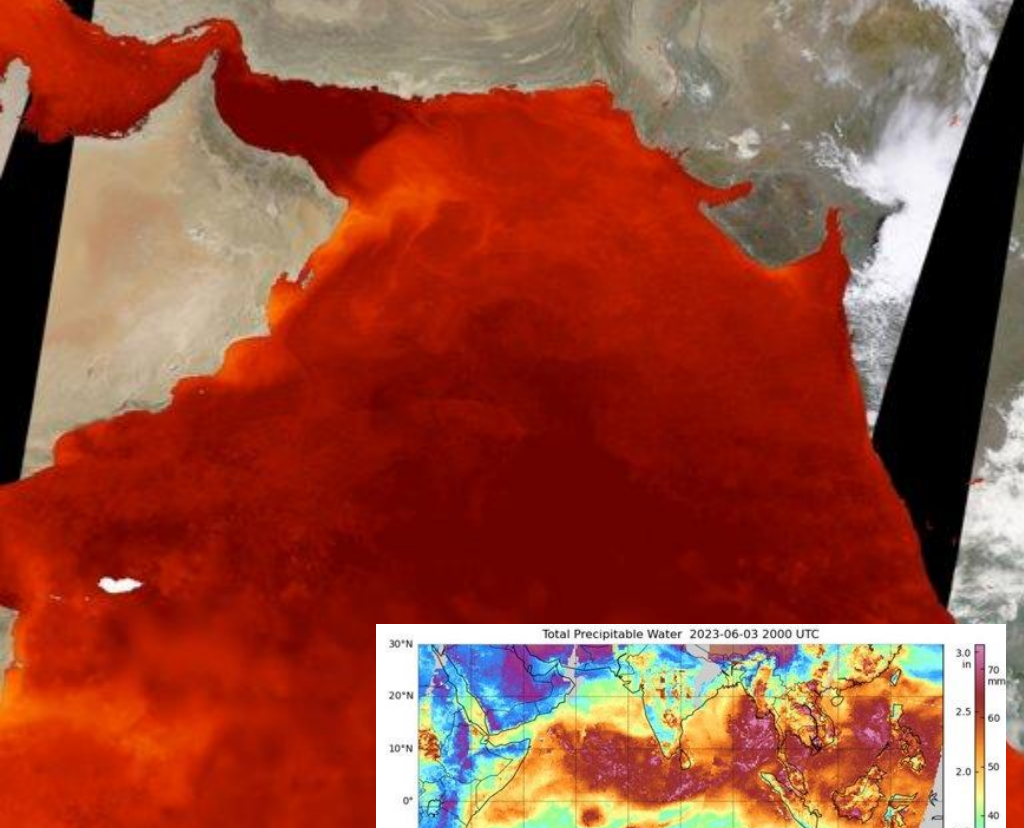
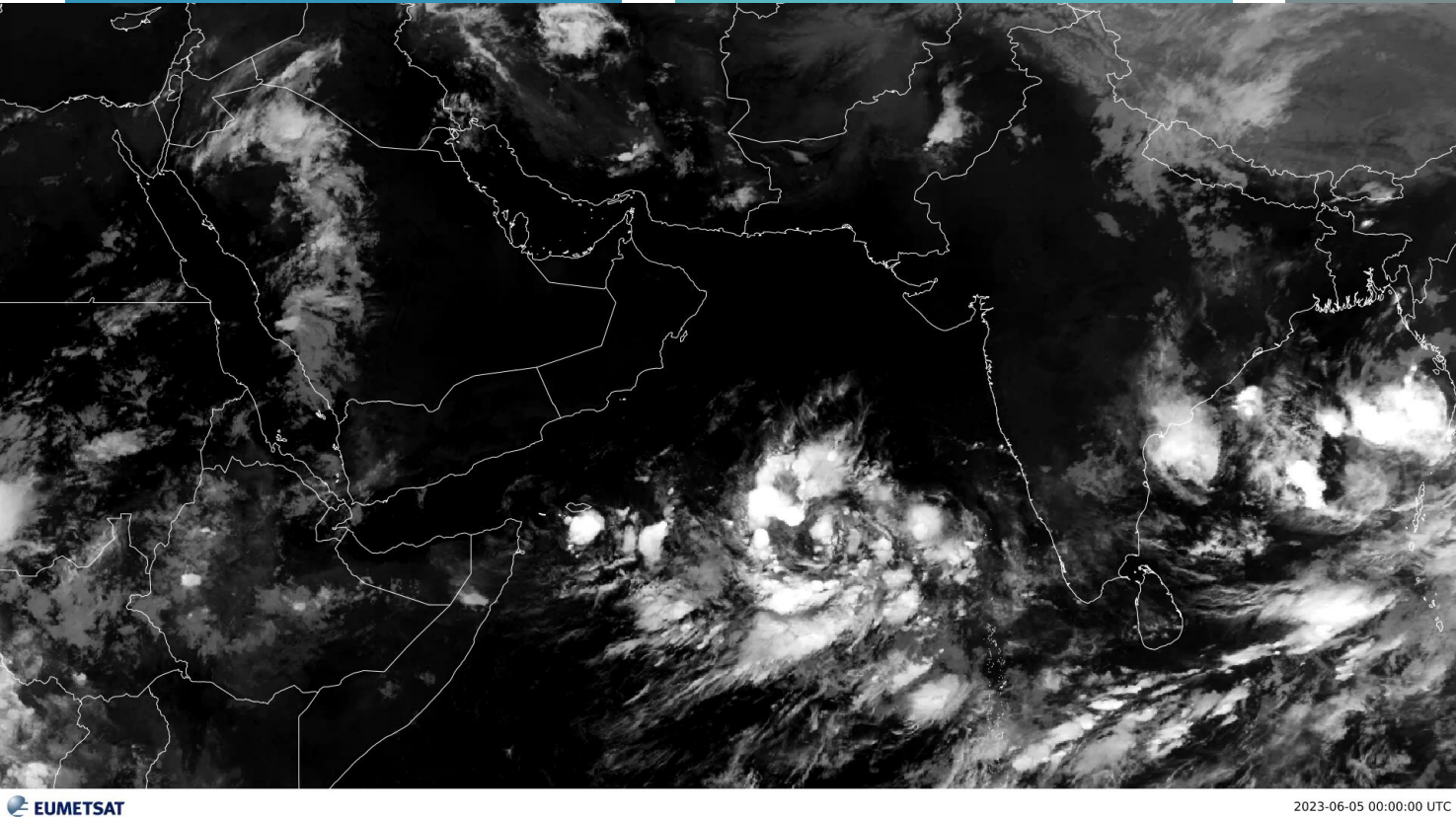
Statistical Analysis of Satellite data

Month of 2017	Number of detected oil spills	Total area of all detected oil spills, km ²
January	176	143
February	297	246
March	399	2011
April	265	1061
May	403	775
June	306	932
July	564	2279
August	575	2612
September	773	1759
October	390	954
November	358	643
December	399	420
Total	4905	13835



Sea Surface Temperature Estimation

- High Temperature: Developing factor for Extreme Weather



Sea Surface Temperature Estimation

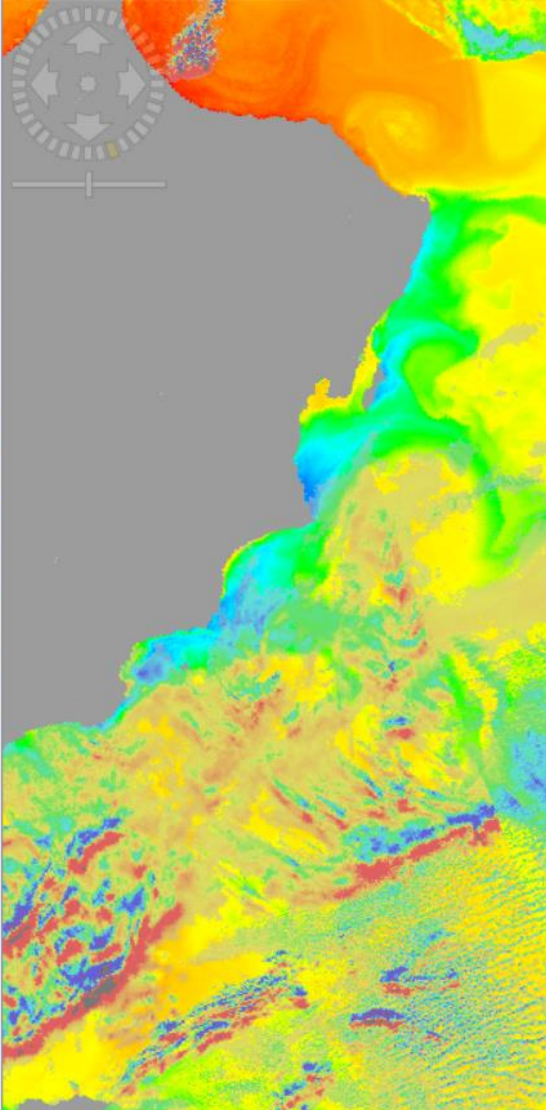
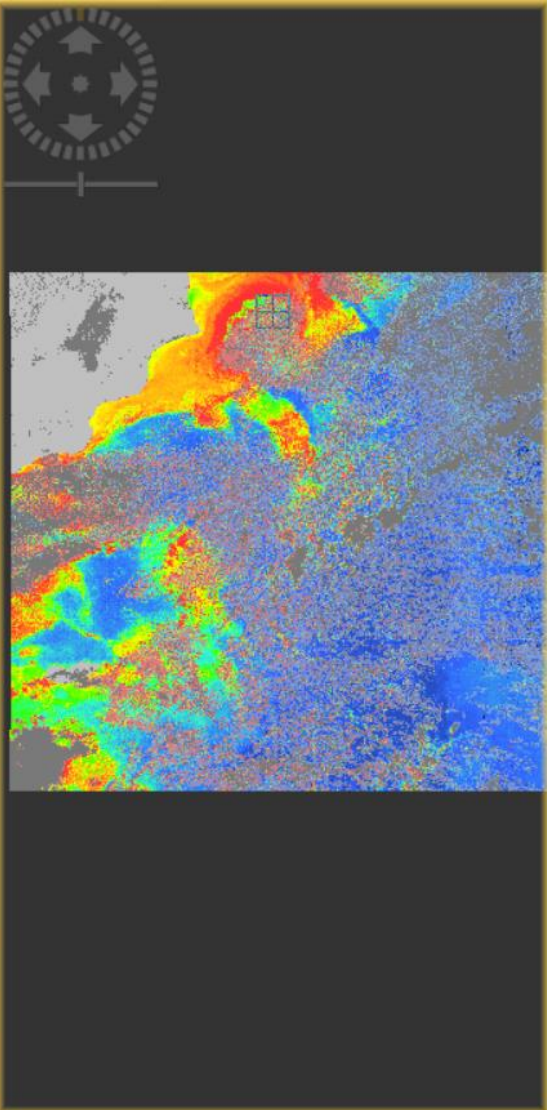
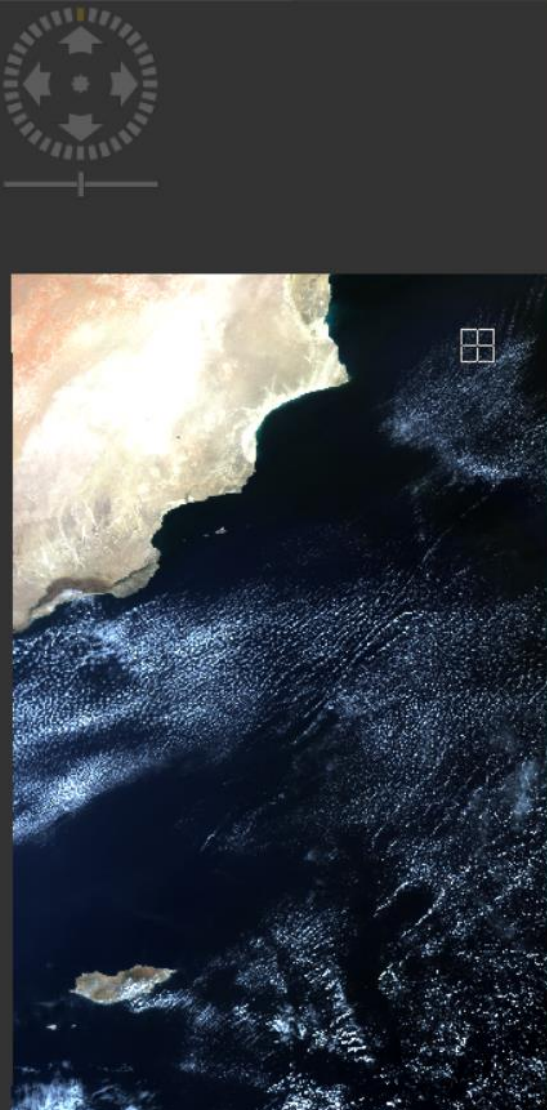
The software interface displays a file tree on the left with the following structure:

- [2] S3A_OL_1_EFR_20210603T060024_20210603T060324_20210604T115431_0
- [3] S3A_OL_2_WFR_20210603T060024_20210603T060324_20210604T193236_0
 - Metadata
 - Flag Codings
 - Vector Data
 - Tie-Point Grids
 - Bands
 - Masks
- [4] S3B_SL_2_WST_20210603T173835_20210603T191935_20210605T030229_6

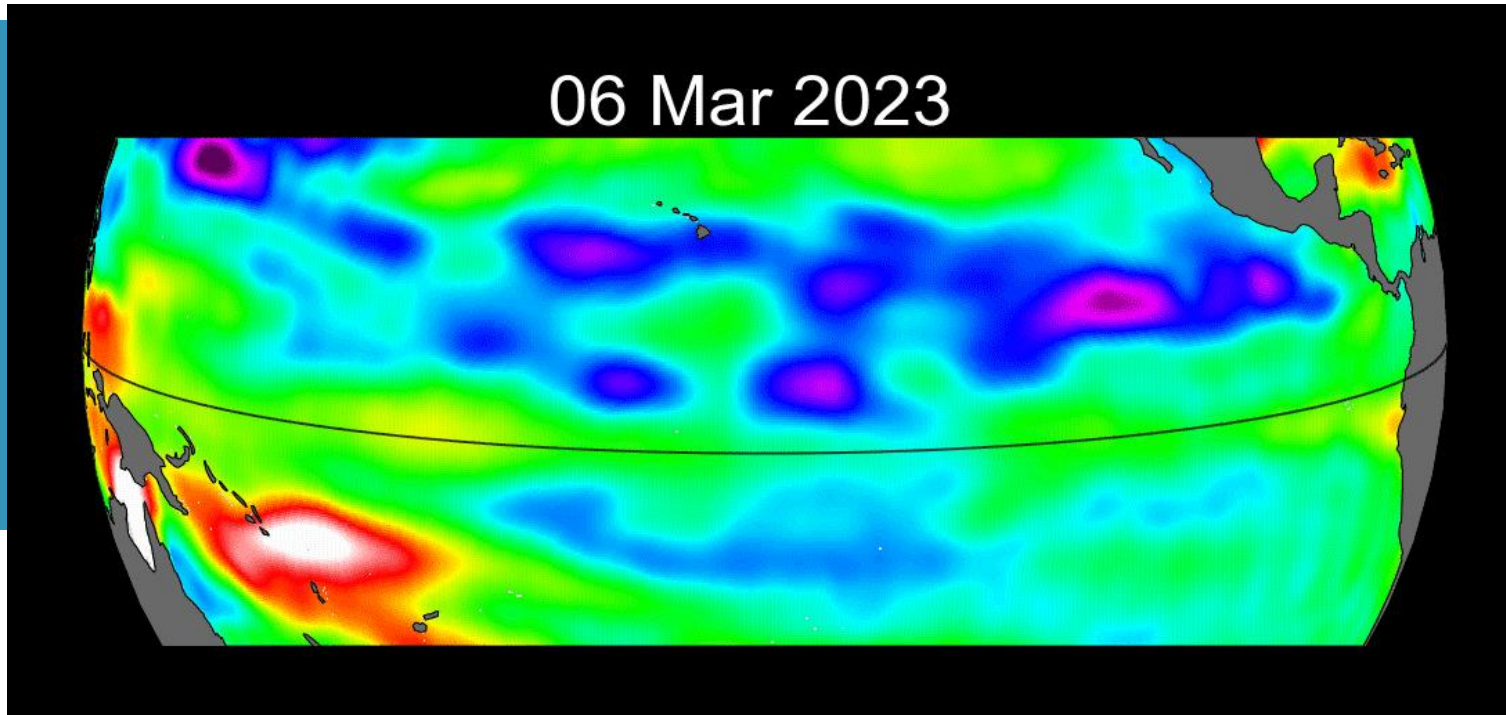
Navigation tabs include: Navigation - [3] ... | Uncertainty Vis... | Colour Mani... | World View

Editor: Basic | Sliders | Table

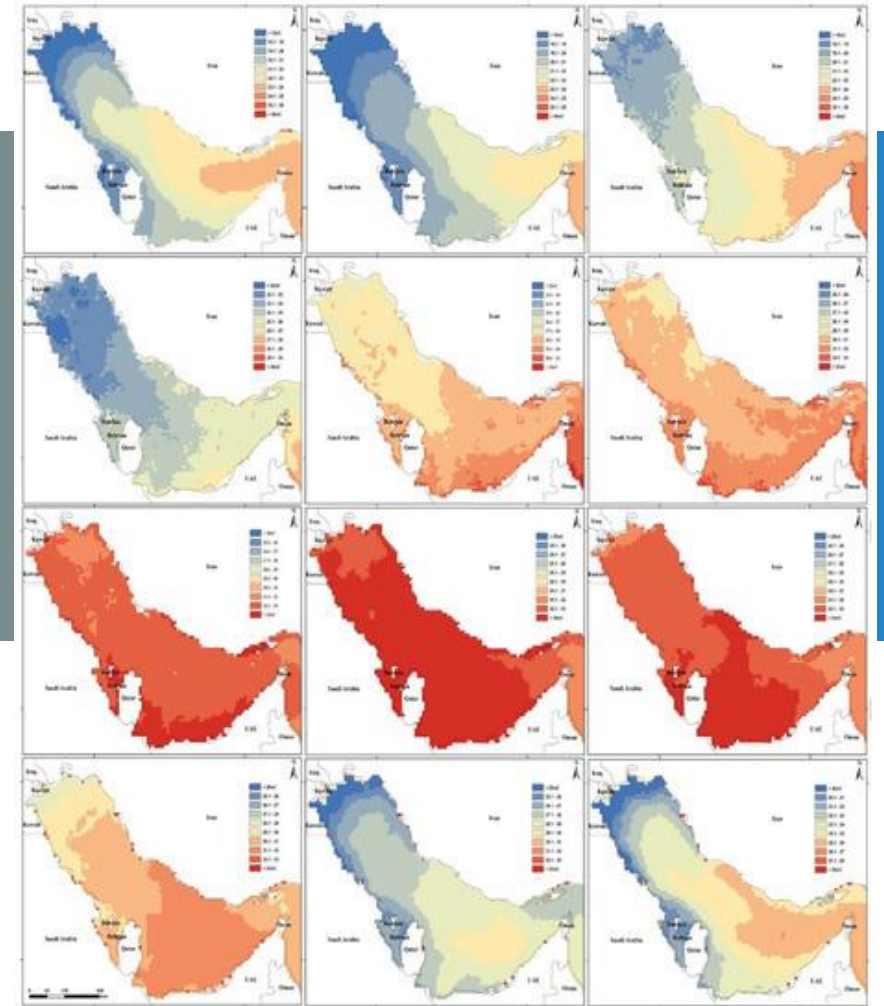
A histogram shows the distribution of data values. A color scale below the histogram maps values to colors, with markers at: 1.72E-2, 7.76E-2, 0.38, 1.57, 5.31, and 34.75.



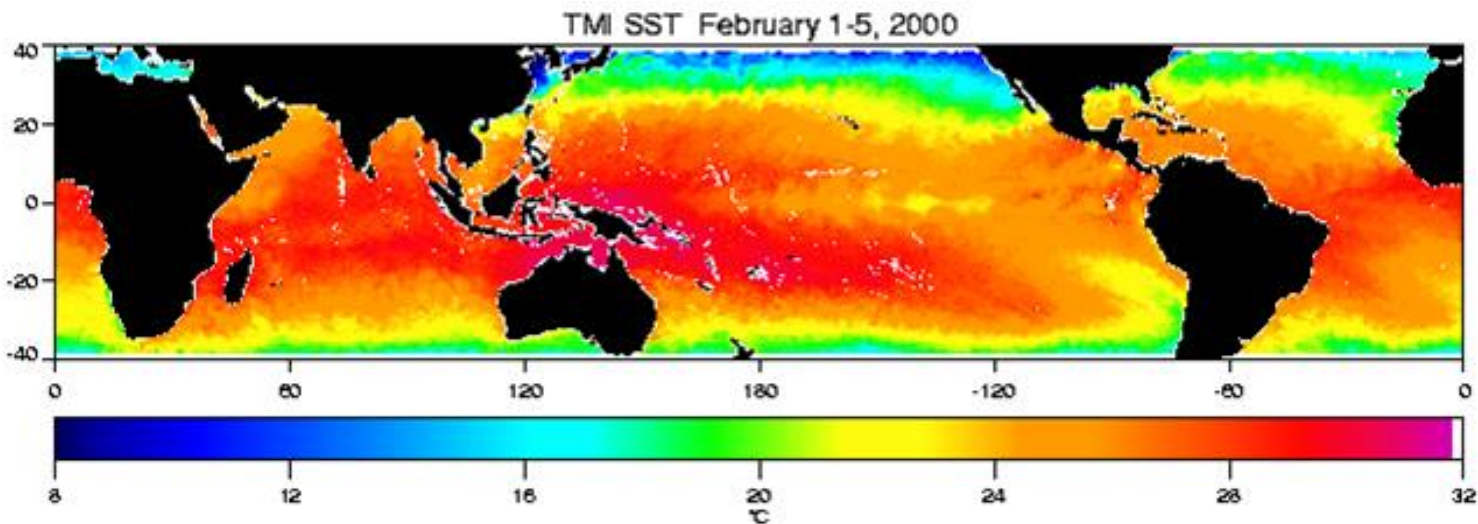
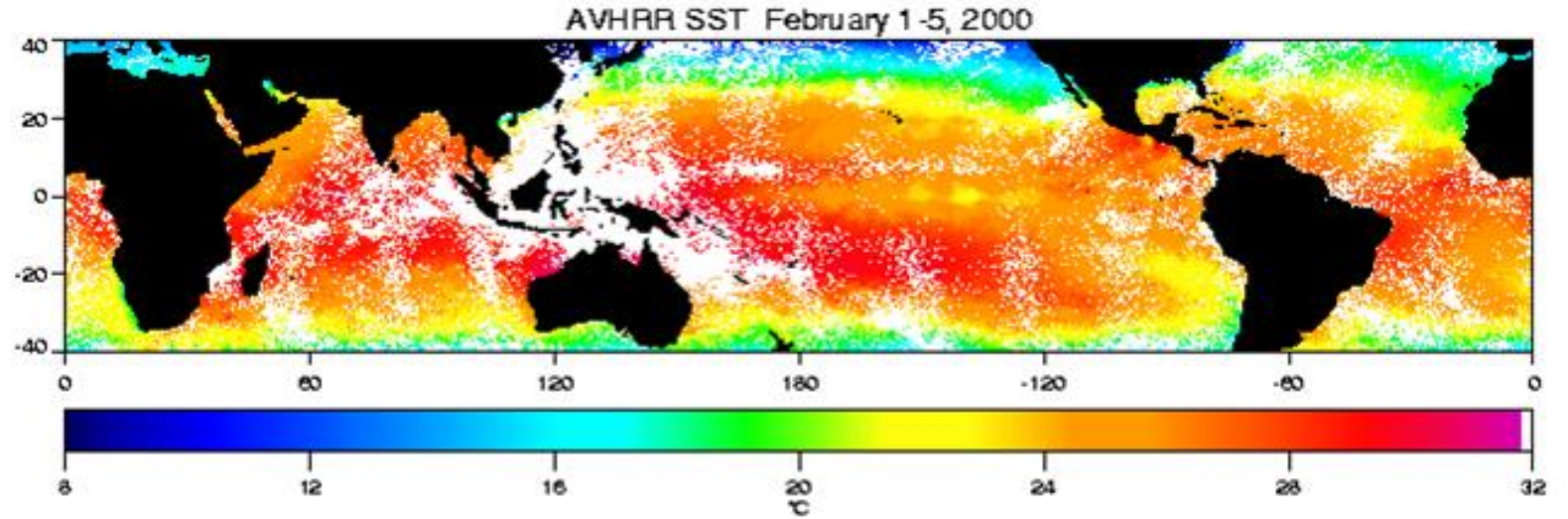
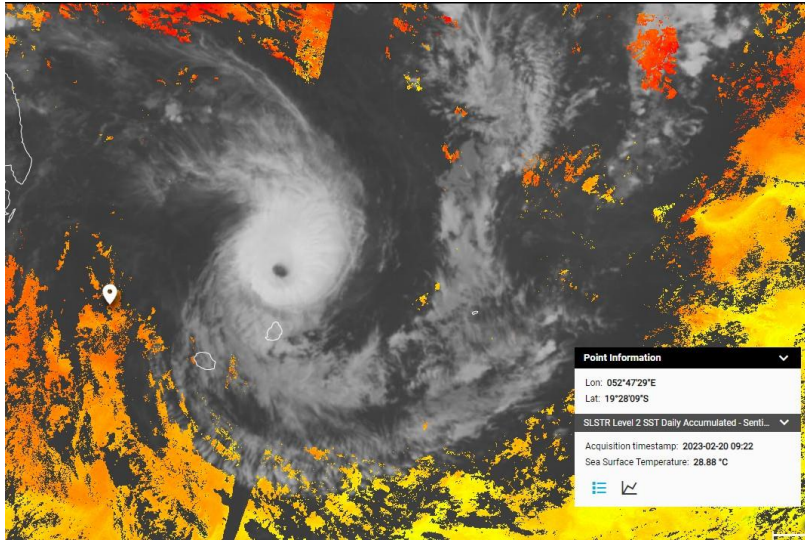
Sea Surface Temperature Estimation



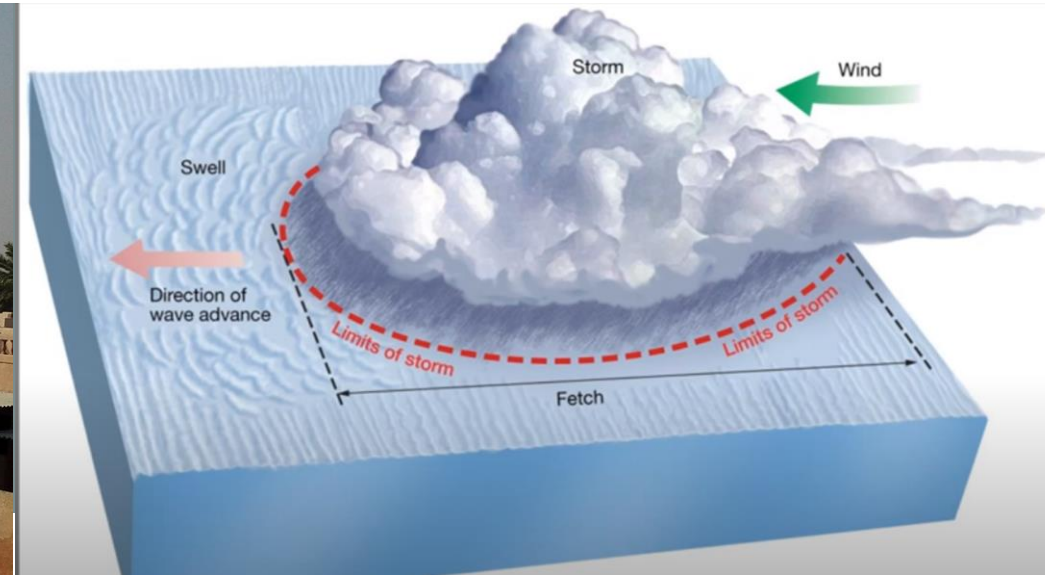
Seasonal Forecasting



Sea Surface Temperature Estimation



Significant Wave Height



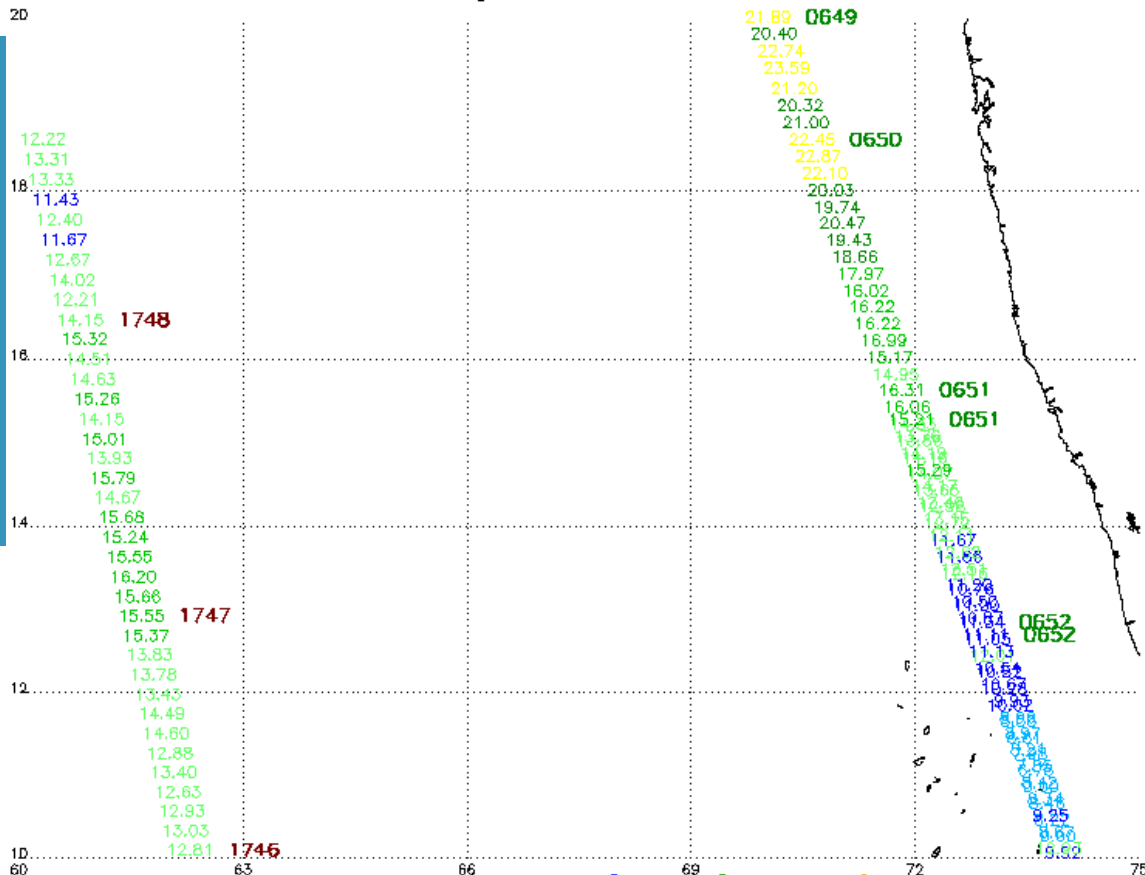
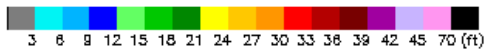
Wind waves : creates by wind close to the costs.
Sweel Waves: Creates Offshore , Tropical Cyclone

Significant Wave Height



06:00 06/12/23 – 18:00 06/12/23

12 hour collection of altimeter wave heights

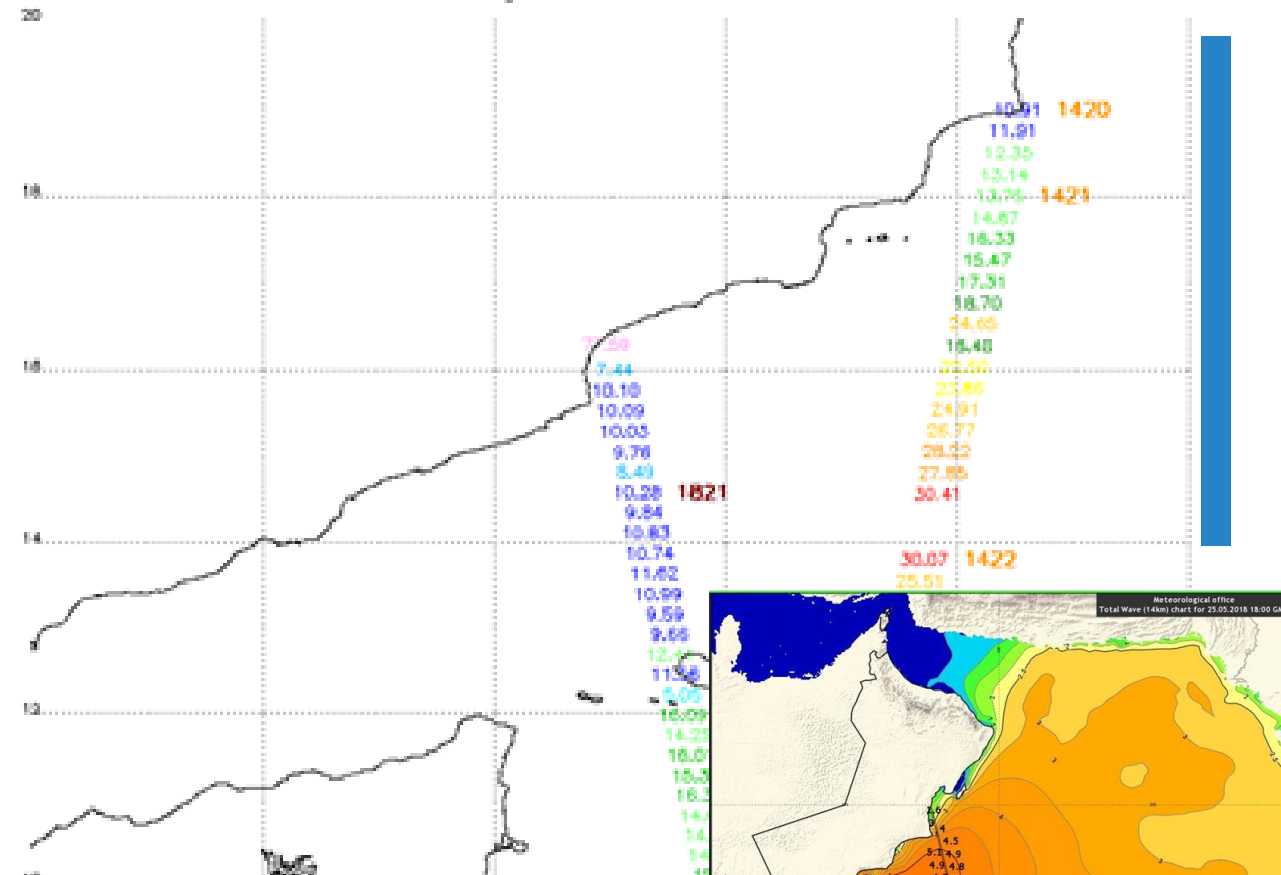


note: 1) Time is in UTC; 2) SWH is in feet

NOAA/NESDIS Center for Satellite Applications and Research Jun 13 06:26:22 UTC 2023

12:00 – 23:59 UTC 05/24/2018

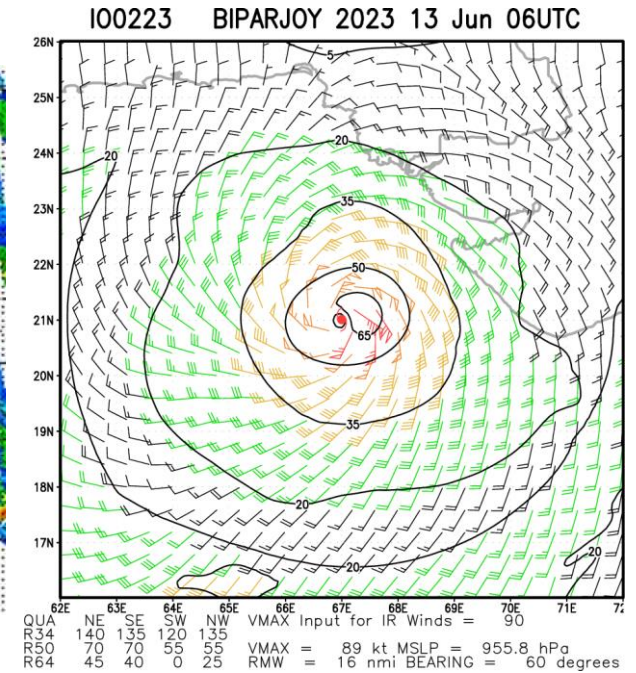
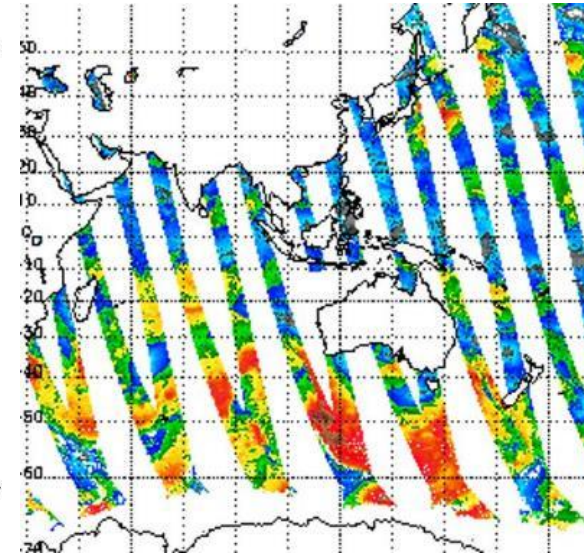
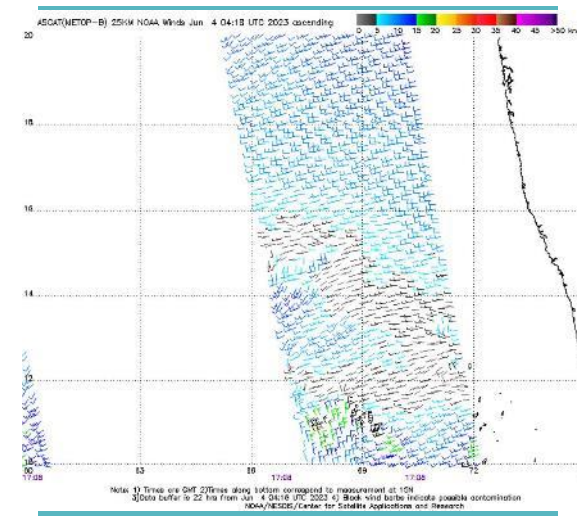
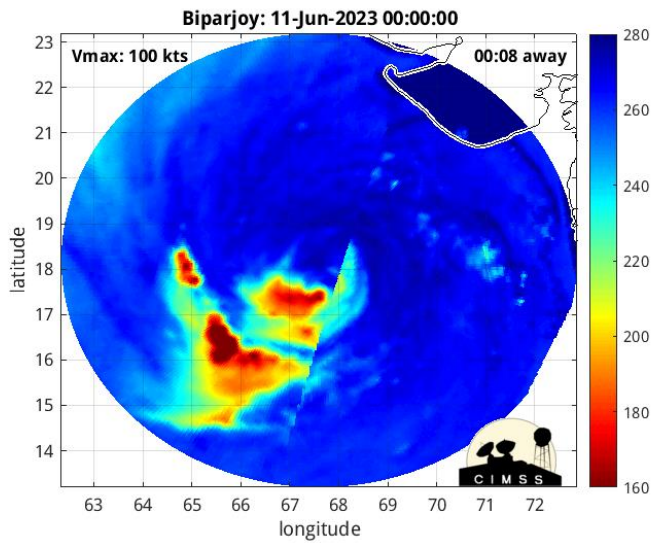
12 hour collection of altimeter wave heights



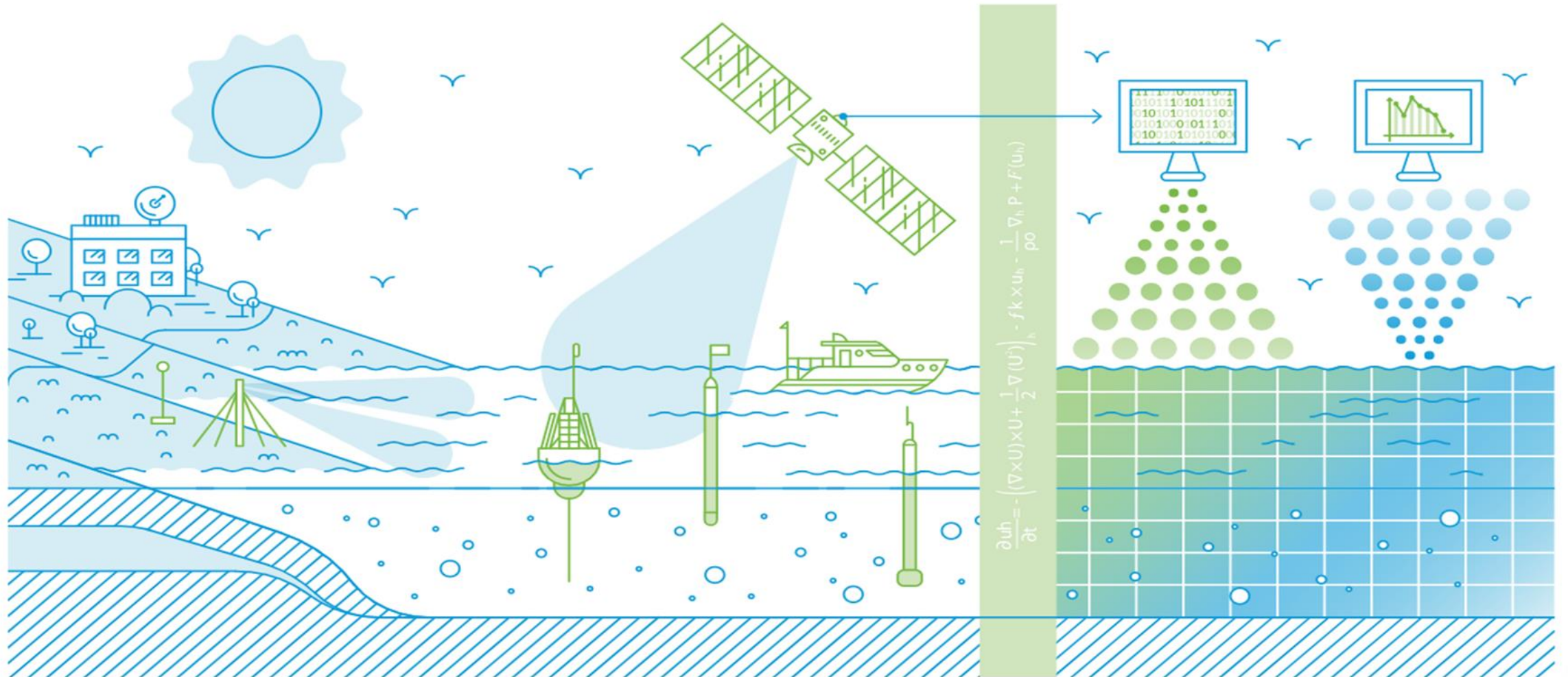
note: 1) Time is in UTC; 2) SWH is in feet

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Sea Surface Wind Speed



Ocean Monitoring & Forecasting System



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THANK YOU

