



The Regional Organization for the Protection
of the Marine Environment (ROPME)

Role of real-time satellite data acquisition & online monitoring platforms in regular assessment of the state of the marine environment



Wahid Moufaddal (Ph.D)

Remote Sensing Expert, ROPME

wahid_moufaddal@yahoo.com



Segment-2: Multi-stakeholder Dialogue / Capacity-building Partnership
Event of the Regular Process
24-25 Jan. 2019, UN Headquarters



Advantages & Special Characteristics of Remote Sensing



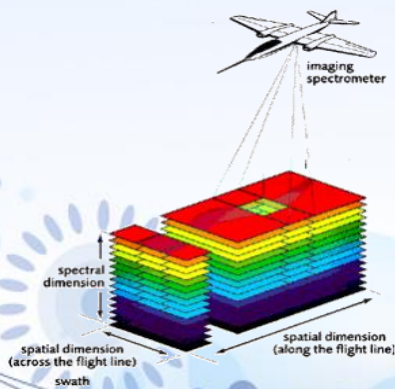
Synoptic



Time Efficient



Cost-effective



Multispectral Imaging



Long-term Datasets



Broad Range of Applications

Current Ocean-Color Sensors

SENSOR / DATA LINK	AGENCY	SATELLITE	LAUNCH DATE	SWATH (KM)	SPATIAL RESOLUTION (M)	BANDS	SPECTRAL COVERAGE (NM)	SPECTRAL RESPONSE FUNCTION	EQUATORIAL CROSSING TIME
COCTS UI CZI	CNSA/NSOAS (China)	HY-1C	7 September 2018	3000 3000 950	1100 550 50	10 2 4	402 - 12,500 345 - 395 433 - 885		10:30
GOCI Geostationary	KARI/KIOST (South Korea)	COMS	26 June 2010	2500	500	8	400 - 865		8 times/day
MODIS-Aqua	NASA (USA)	Aqua (EOS-PM1)	4 May 2002	2330	250/500/1000	36	405-14,385	SRF-link	13:30
MODIS-Terra	NASA (USA)	Terra (EOS-AM1)	18 Dec 1999	2330	250/500/1000	36	405-14,385	SRF-link	10:30
OCM-2	ISRO (India)	Oceansat-2 (India)	23 Sept 2009	1420	360/4000	8	400 - 900		12:00
OLCI	ESA/ EUMETSAT	Sentinel 3A	16 Feb 2016	1270	300/1200	21	400 - 1020	SRF-link	10:00
OLCI	ESA/ EUMETSAT	Sentinel 3B	25 April 2018	1270	300/1200	21	400 - 1020		10:00
SGLI	JAXA (Japan)	GCOM-C	23 Dec 2017	1150 - 1400	250/1000	19	375 - 12,500		10:30
SGLI	JAXA (Japan)	GCOM-C	23 Dec 2017	1150 - 1400	250/1000	19	375 - 12,500		10:30
VIIRS	NOAA (USA)	Suomi NPP	28 Oct 2011	3000	375 / 750	22	402 - 11,800	SRF-link	13:30
VIIRS	NOAA/NASA (USA)	JPSS- 1/NOAA-20	18 Nov 2017	3000	370 / 740	22	402 - 11,800	SRF-link	13:30

[Landsat-8](#)

[Sentinel-2](#)

[Other Optical Sensors](#)

Source: International Ocean Color Coordinating Group (IOCCG)



What Can Be Measured From Space?

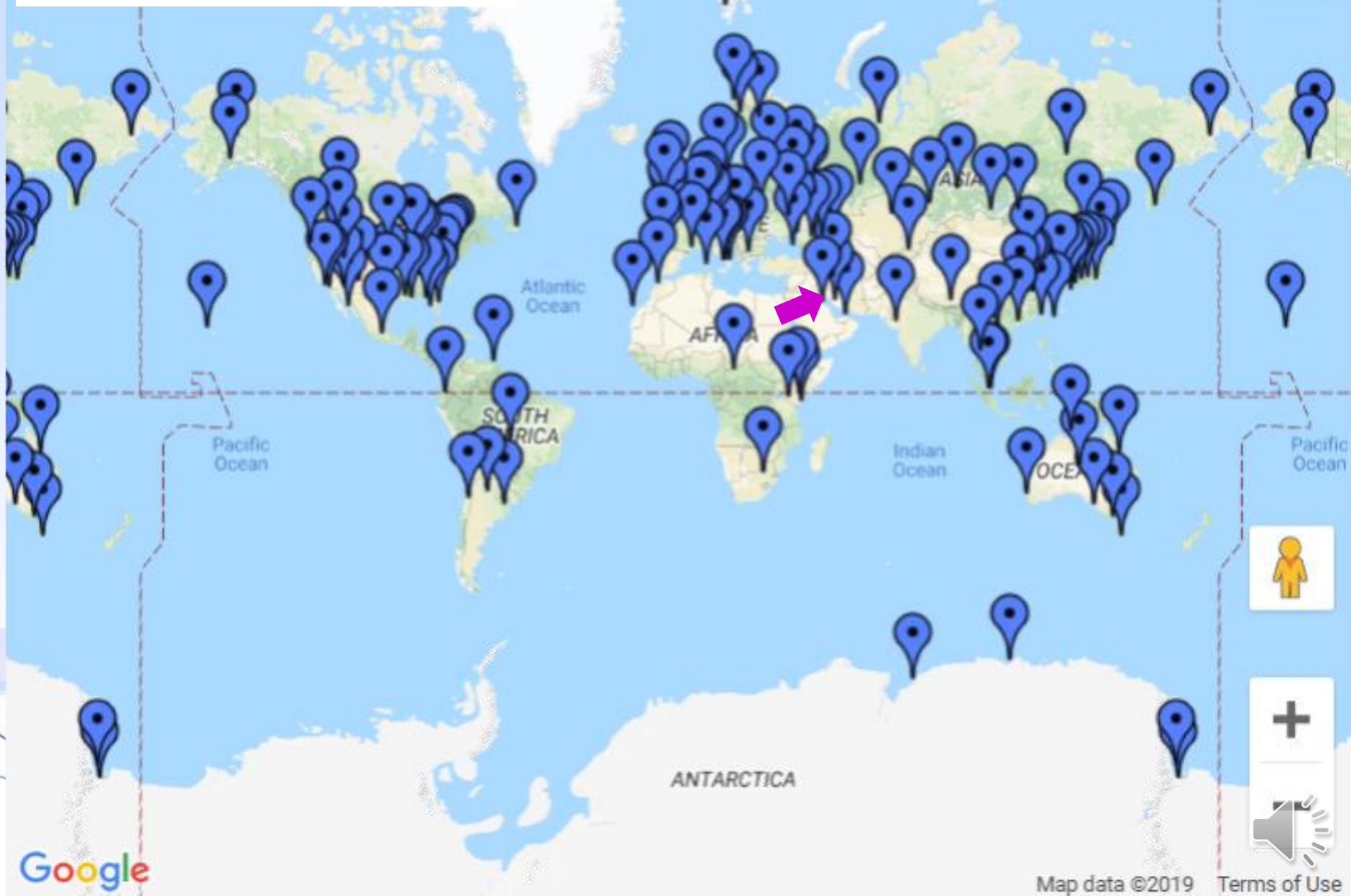
- ❖ Four types of **primary ocean measurements** can be made from remote sensing depending on the part of the **electromagnetic spectrum** being used. They are:
 - Ocean colour
 - Sea Surface Temperature (SST)
 - Sea Surface Roughness
 - Sea Surface Slope/Sea Surface Height
- ❖ Satellites can also detect **water depth, what is beneath water** and what **covers sea bottom** (mapping and study of sea bed and major benthic habitats like coral reefs, mangrove, seagrass, etc)



The power of receiving ocean satellite data in real-time mode



Direct Broadcast / Read-out Ground Stations



ROPME X-band Receiving Station

Abandoned and **replaced** by a new and more advanced Station

Installed in early 2003



Installed in May 2018



Satellite Coverage (Footprint) of MODIS and VIIRS Data Received by ROPME Station

MODIS onboard **Terra & Aqua**



VIIRS onboard **Suomi-NPP & NOAA-20**



MODerate Resolution Imaging Spectrometer (**MODIS**) Specifications

Launch Date:	Terra: 18 December 1999, and Aqua: 04 May 2002
Orbit:	705 km, 10:30 a.m. descending node (Terra) or 1:30 p.m. ascending node (Aqua), sun-synchronous, near-polar, circular
Swath Dimensions:	2330 km (cross track) by 10 km (along track at nadir)
Repeat Cycle:	16 days
Number of bands and bandwidth	36 bands: 1-19: from 620 to 965nm 20-36: from 3.66 to 14.28 microns
Wavebands:	10 visible bands 6 NIR bands 20 mid-IR and LW IR bands
Spatial Resolution:	250 m (bands 1-2), 500 m (bands 3-7), 1000 m (bands 8-36)
Quantization:	12 bits
Data Rate:	10.6 Mbps (peak daytime); 6.1 Mbps (orbital average)
Design Life:	6 years

Visible Infrared Imaging Radiometer Suite (**VIIRS**) Specifications

Launch Date:	Suomi NPP: 28 October 2011, and NOAA-20: 18 November 2017
Orbit:	830km, 1:30 p.m. mean local solar time. sun-synchronous, polar
Swath Dimensions:	3000km, nearly global coverage every day
Repeat Cycle:	16 days
Number of bands and bandwidth	22 bands: M1-M16: from 0.02 to 1.0 microns (DNB: 0.4 microns) I1-I5: from 0.08 to 1.9 microns
Wavebands:	9 visible/NIR bands plus day/night pan band 8 mid-IR 4 LW IR
Spatial Resolution:	375 m (bands I1-I5), 750 m (bands M1-M16 + band DNB)
Quantization:	12 bits
Data Rate:	5.9 Mbps
Design Life:	7 years



Standard Products Available from ROPME's Satellite Receiving Station

MODIS	Parameter
chlor_a	chlorophyll a concentration
nflh	fluorescence line height
cdom_index	colored dissolved organic matter
Kd_490	attenuation coefficient at 490 nm
pic	particulate inorganic carbon
poc	particulate organic carbon
par	photosynthetically available radiation (par)
ipar	instantaneous par
Rrs_412	remote sensing reflectances
Rrs_443	
Rrs_469	
Rrs_488	
Rrs_531	
Rrs_547	
Rrs_555	
Rrs_645	
Rrs_667	
Rrs_678	
sst	sea surface temperature (daytime)
sst4	sea surface temperature (night time)

✓ **Phytoplankton conc.**

✓ **Ocean color**

✓ **Turbidities & Sedimentary Processes**

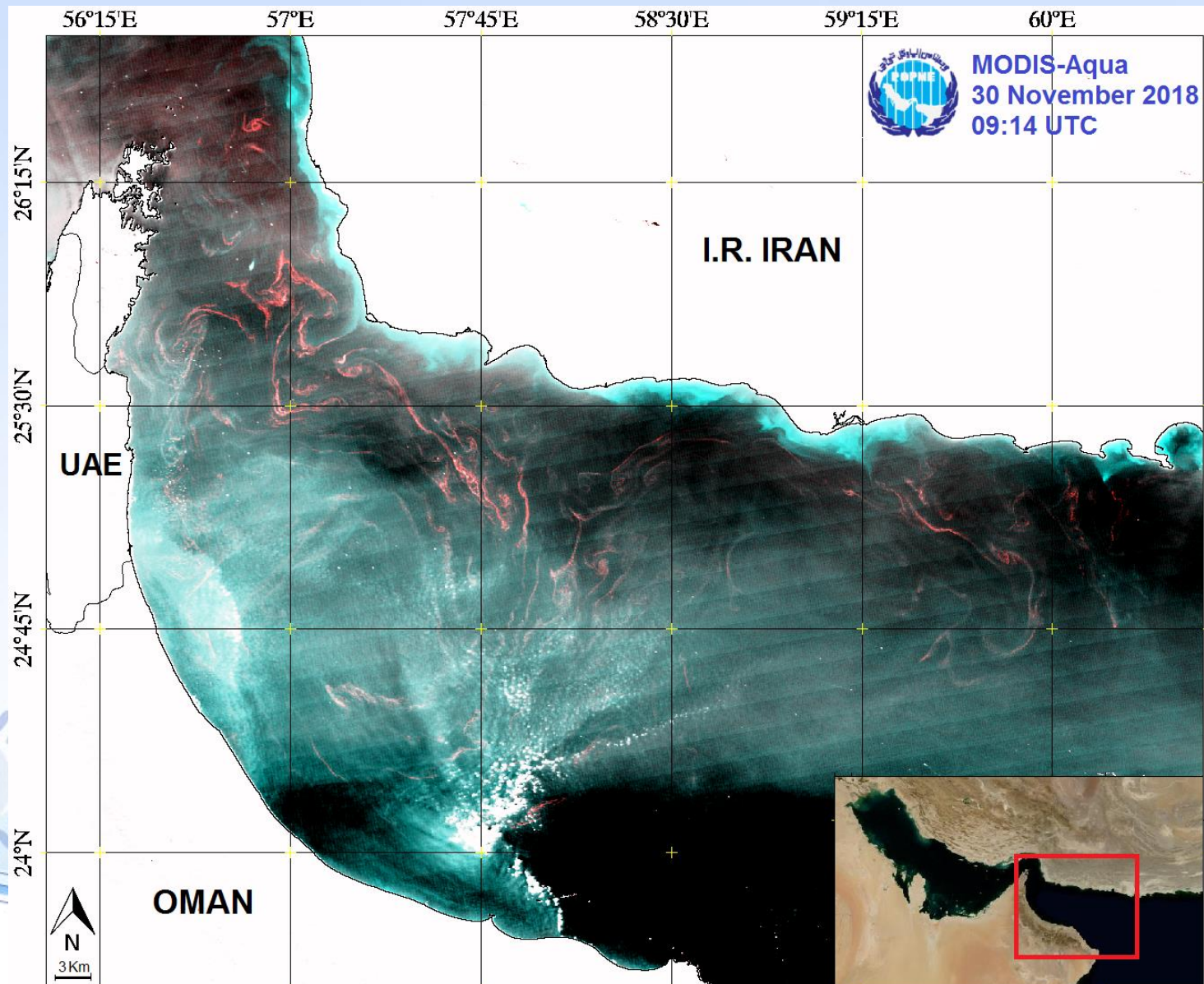
✓ **Aerosol optical depth**

✓ **Physical forcing, eddies**

✓ **Upwelling & downwelling**

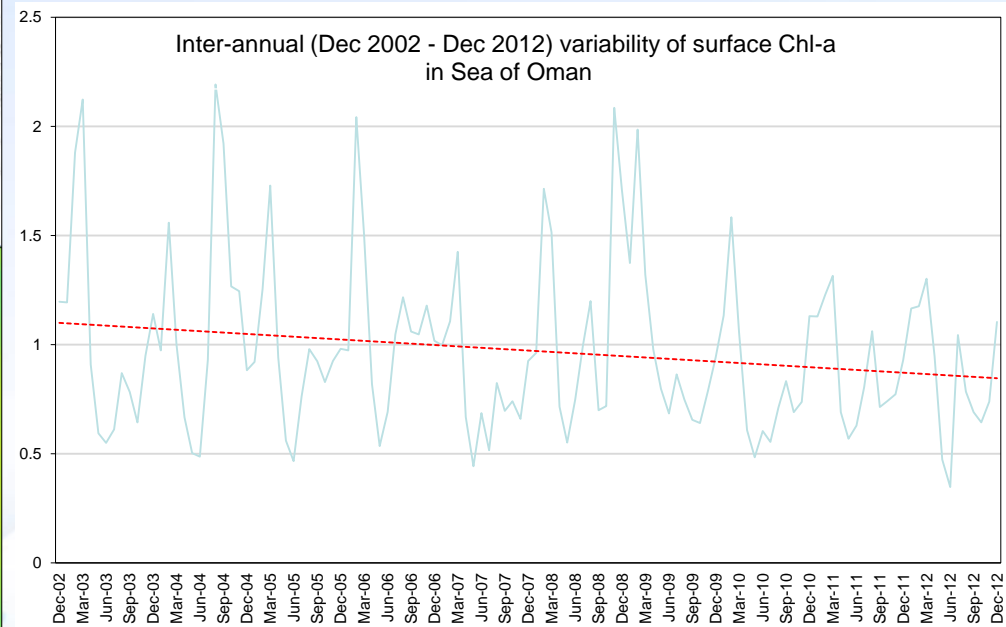
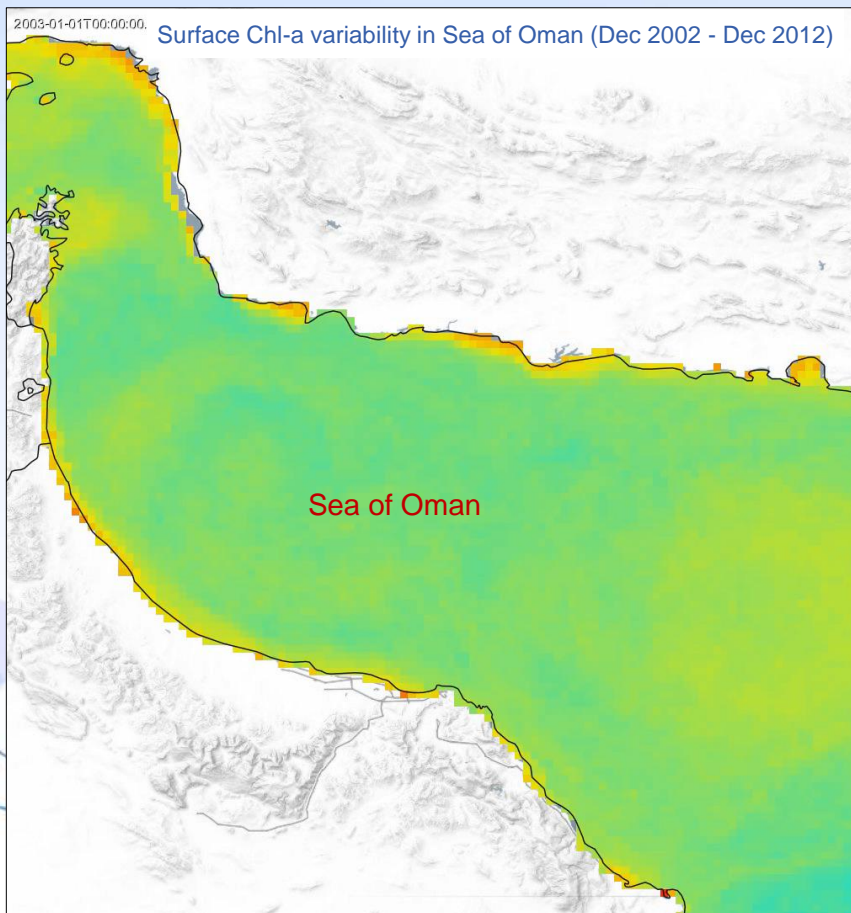
Satellite-based Monitoring of Short-term Threats:

Massive Algal Blooms & HABs



Satellite-based Monitoring of Short-term Threats: Massive Algal Blooms & HABs

Time-series analysis of decadal and historical datasets of
satellite-derived surface Chl-a measurements



Satellite detection and monitoring of pollution source and socio-economic stressors



Satellite-based Monitoring of Long-term Threats: Impacts of Coastal Development & Land Reclamation

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www.satimagingcorp.com

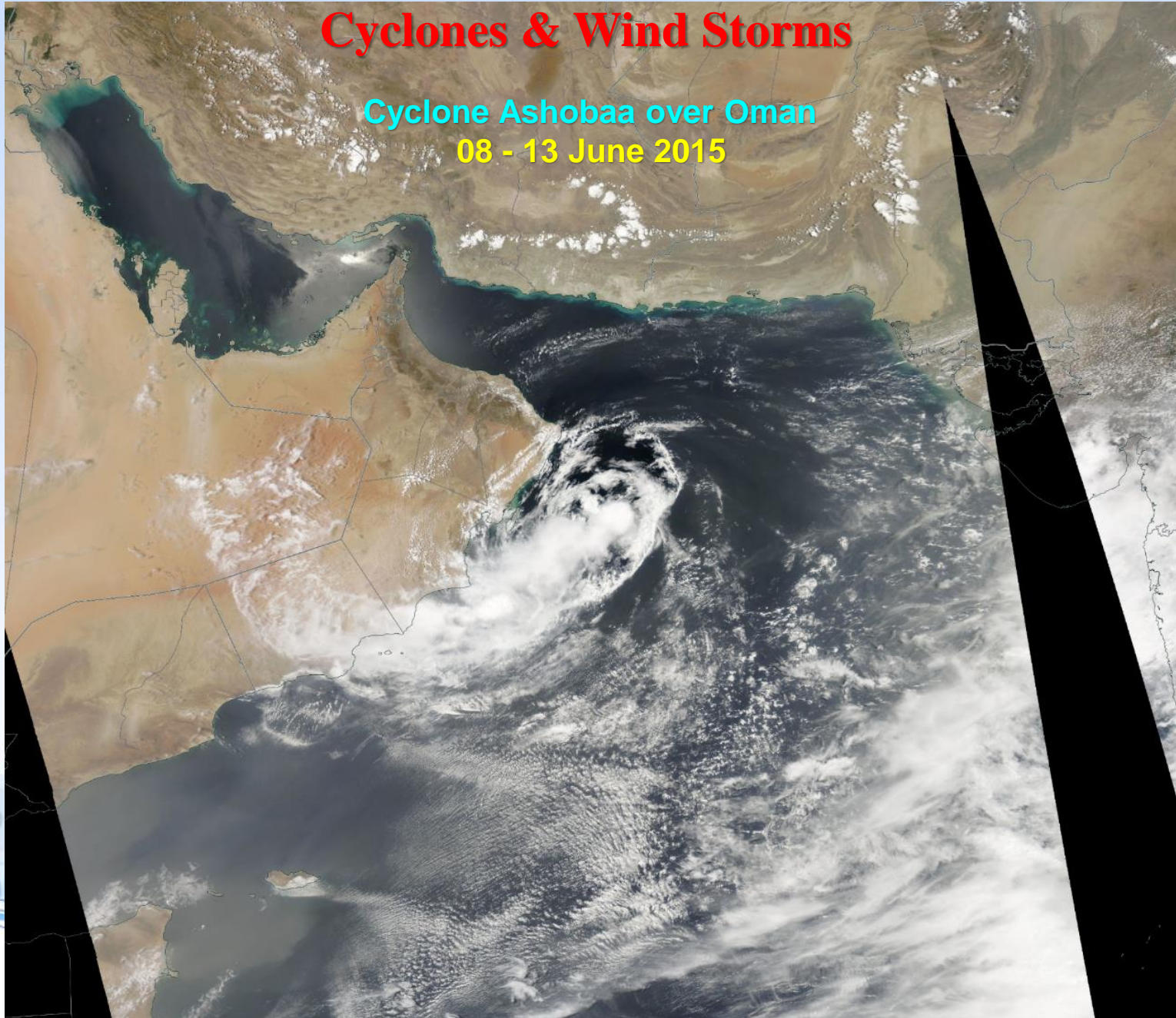


Satellite-based Monitoring of Long-term Threats:

Cyclones & Wind Storms

Cyclone Ashobaa over Oman

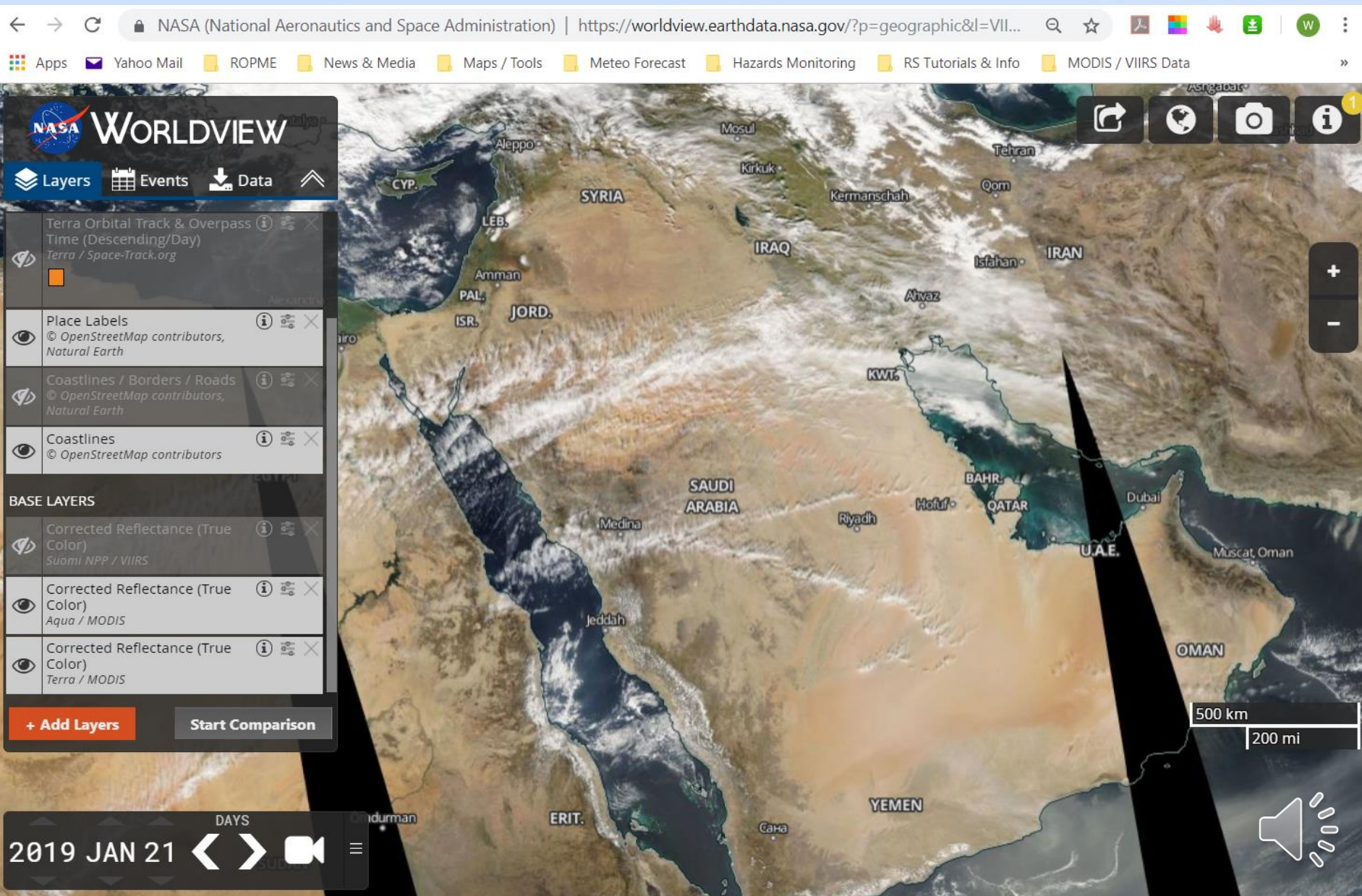
08 - 13 June 2015



The power of online near-real-time distribution of ocean satellite data by space agencies and other providers



This app from NASA's [EOSDIS](#) provides the capability to **interactively browse over 800 global, full-resolution satellite imagery layers** and then download the underlying data. Many of the available imagery layers **are updated within three hours of observation**, essentially showing the entire Earth as it looks "right now".



EUMETView, a new way to visualise EUMETSAT satellite data

EUMETView is a visualisation service that allows users to view EUMETSAT imagery in a more interactive way through an online map viewer or [Web Map Service](#) (WMS). It is currently a pilot service.

← → ↺ European Organisation for Meteorological Satellites [DE] | <https://eumetview.eumetsat.int/mapviewer/> ☆ 📄 🌈 🖨️ 📱 🌐

📱 Apps 📧 Yahoo Mail 📁 ROPME 📁 News & Media 📁 Maps / Tools 📁 Meteo Forecast 📁 Hazards Monitoring 📁 RS Tutorials & Info 📁 MODIS / VIIRS Data »

EUMETSAT

MONITORING WEATHER AND CLIMATE FROM SPACE

METEOSAT 41.5 DEGREES (IODC)
METEOSAT 0 DEGREE

IMAGERY
IR 03.9
IR 10.8
VIS 0.6
WV 6.2
VISUALISED PRODUCTS
RGB COMPOSITES
AIRMASS
ASH
CONVECTION
DAY MICROPHYSICS
DUST
EVIEW
FOG
NATURAL COLOUR
NATURAL COLOUR ENHNC.D.
SNOW
TROPICAL AIRMASS
COPERNICUS SENTINEL-3
OLCI L1 ORBIT RGB

Time (UTC): 2019-01-22 05:22:00 ◀ ▶ Region: [dropdown] [gear] [plus] [download] [print] [share]

62.07813, -4.05375

FORMATION ▶ DATA POLICY ▶ HELP

SCALE = 1 : 12M

Concluding Remarks:

- Remote sensing data and satellite imagery can provide a very detailed and accurate information about essential oceanic variables.
- Satellite data reconceived by direct broadcast stations can also provide a very important timely information about physical and chemical variables affecting coastal water quality and state of the marine environments.
- Remote sensing received by such stations can also track the extent & intensity of the short-term and long-term threats affecting marine environment very efficiently in time and space.
- There are increasing number of data providers started distribution of satellite data on oceans and final image products to different stockholders online and users in near real-time through friendly web interfaces and data portals. This is likely to cause a revolution in use and benefiting of such data and their final products.



For further information, please contact me at:

wahid_moufaddal@yahoo.com

w.moufaddal@ropme.org

or visit: <http://ropme.org/>



Thank You

