

# OCEAN COLOUR MONITOR ON-BOARD OCEANSAT-2

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# OCEANSAT-2 MISSION

OCEANSAT-2 is a global mission and is configured to cover global oceans and provide continuity of ocean colour data , global wind vector and characterization of lower atmosphere and ionosphere.

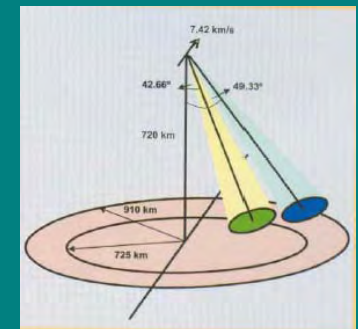
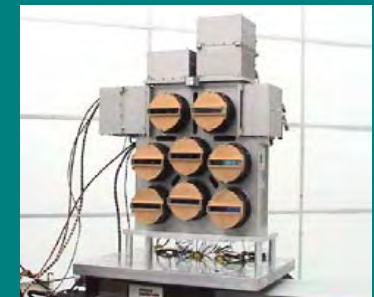
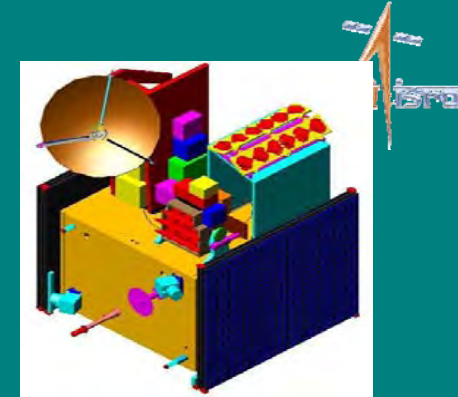
## INSTRUMENTS

Modified Ocean Colour Monitor (OCM-2)

Ku-band Pencil beam Scatterometer

Radio Occultation Sounder for Atmosphere (ROSA)

**LAUNCH: Third quarter of 2008**



# ORBITAL PARAMETERS



The Orbit of Oceansat-2 will be identical to Oceansat-1

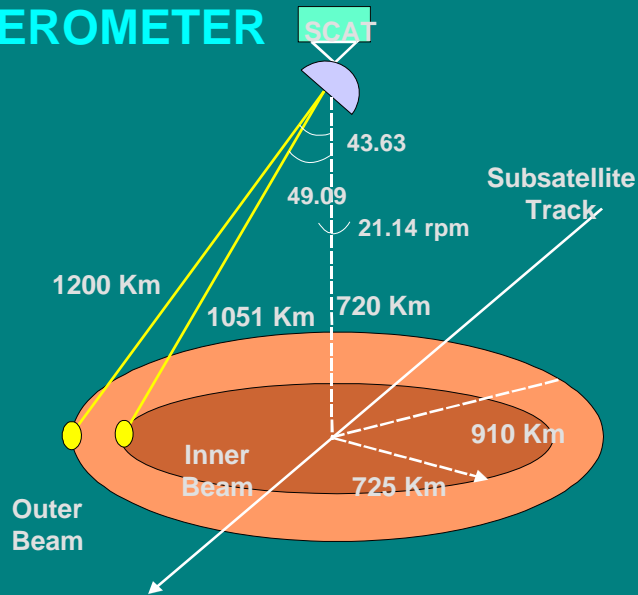
Type	-	Near polar sun-synchronous
Altitude	-	720 kms
Inclination	-	98.28 Deg.
Eccentricity	-	0.00113
Period	-	99.31 mts.
Avg Ground Track Vel	-	6.7818 km/sec
Local time of pass	-	12 noon $\pm$ 10 mts.
Repetevity cycle	-	2 days



# SCATTEROMETER & ROSA INSTRUMENTS

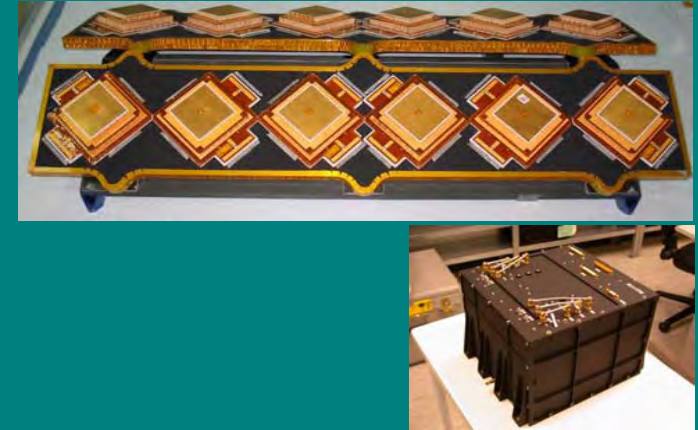


## SCATTEROMETER



<b>Swath</b>	: 1450 km (inner) 1820 (outer)
<b>3dB footprint</b>	: 26x46 km (inner) 31x65 km (outer)
<b>Frequency</b>	: 13.515 GHz( Ku Band)
<b>Polarization</b>	: VV (inner beam) HH (outer beam)
<b>Wind speed range</b>	: 4 to 24 m/sec
<b>Accuracy</b>	: 2 m/sec or 10%

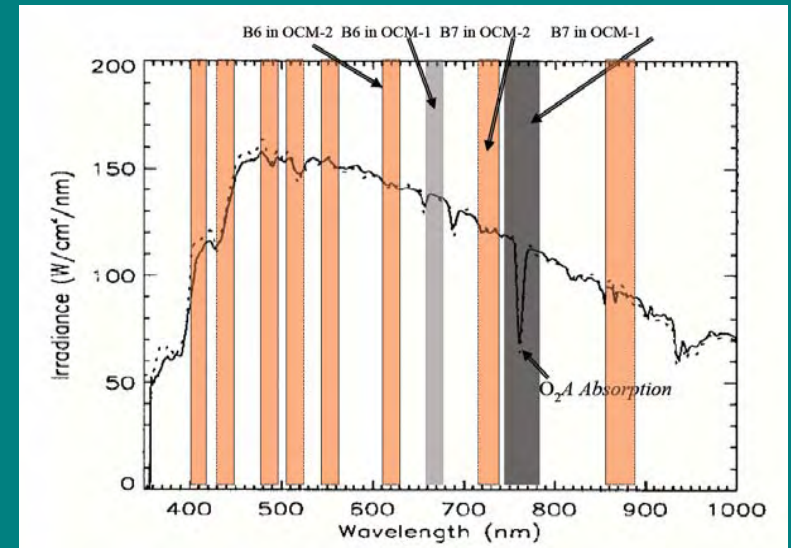
## ROSA



<b>Frequency of operation</b>	- L1 & L2 of GPS
<b>Codes used</b>	- C/A and P code
<b>Horizontal resolution</b>	- 300 kms
<b>Vertical Resolution</b>	- 0.3 kms (lower Troposphere) 1 – 3 kms (high Troposphere)
<b>Accuracy</b>	- 1 K for Temperature - 10 % or 0.2 g/Kg for Humidity



# OCEANSAT-2 OCM Instrument

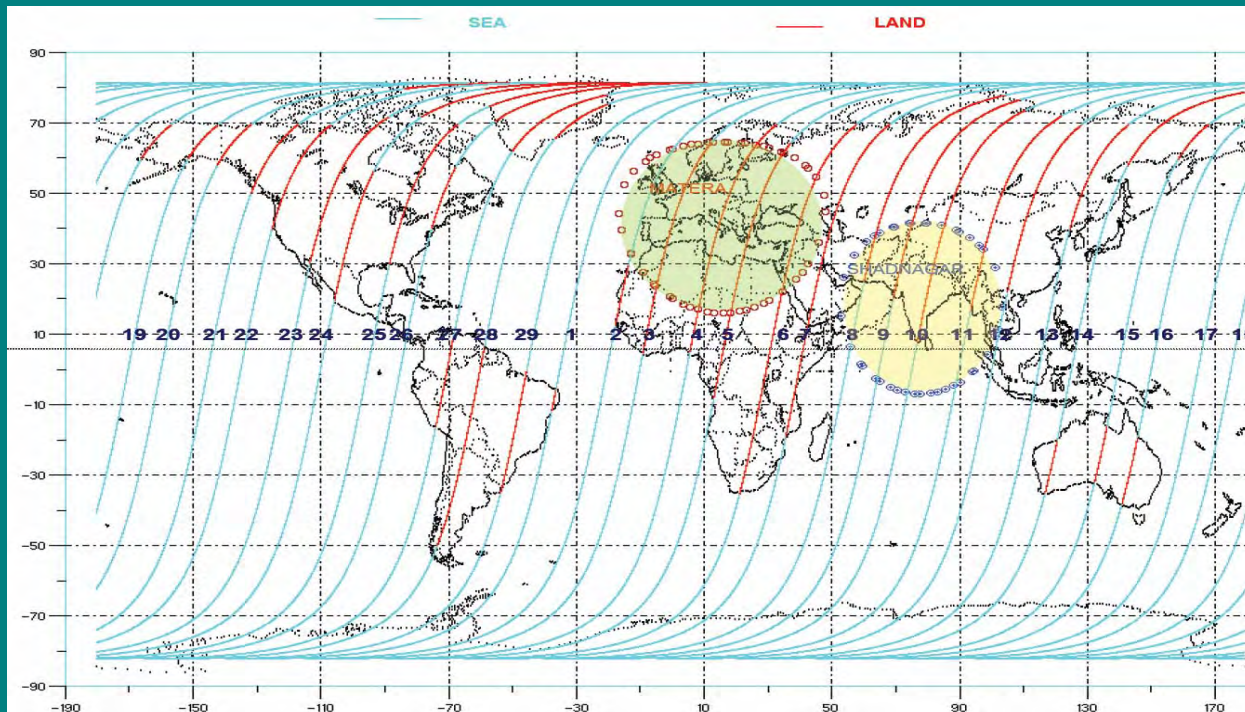


Swath : 1420 km  
IGFOV : 360x236 m  
Repetivity : 2 days  
No. of Bands : 8 (VNIR)  
Quantization : 12  
Data rate : 21.226 Mbps

- Changed 765 nm channel into 740 nm to avoid O<sub>2</sub> absorption
- Replacement of 670 nm channel into 620 nm channel for better quantification of suspended sediments



# MODES OF OPERATIONS



**Local Area Coverage (LAC) with 360m, real time transmission**

**Global area coverage (GAC) with 4 km, on-board Recording & playback**

**GAC data coverage between +/- 75° Latitude on a continuous basis, for full cycle of 29 paths**



# OCEANSAT-2 OCM Data products



## LEVEL-1 Product: Basic Data Products

- L1A RAW Products (Internal Use Only & DQE)
- L1B Radiance Product
- L1C Radiometrically and Geometrically corrected

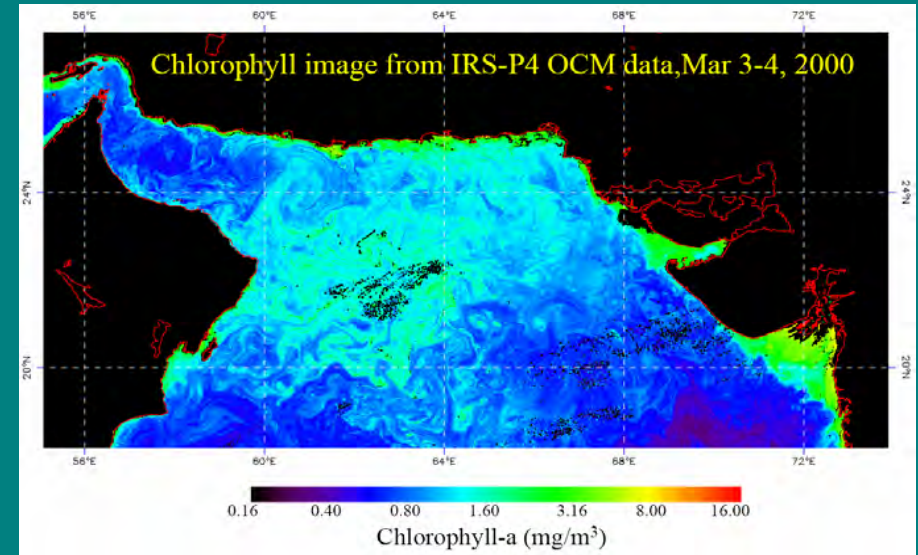
## LEVEL-2 Product: Geo-Physical Parameters

- Chlorophyll-a concentration
- Total Suspended Matter (TSM)
- Diffused Attenuation Coefficients ( $K_d$ -490 nm)
- Aerosol Optical Depth (AOD) at 865 nm

## LEVEL-3 Product: Binned Products (4 km)

- Weekly
- Monthly
- Yearly

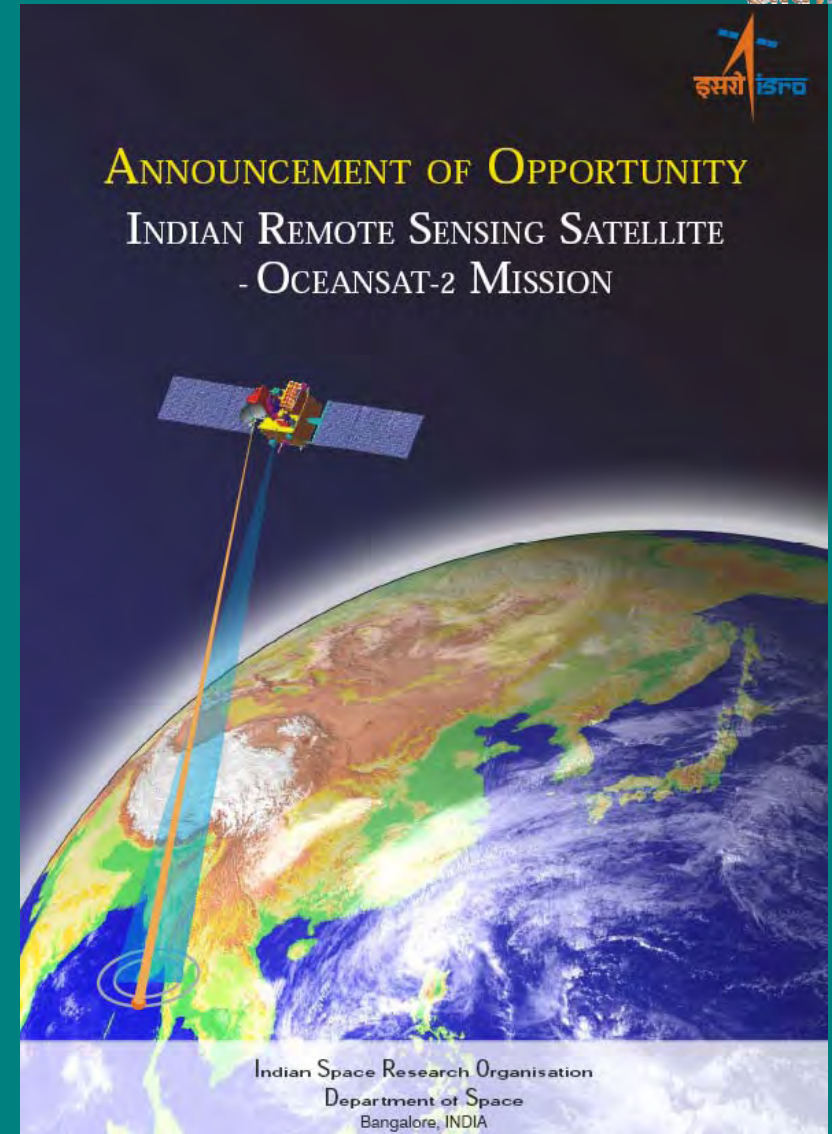
Products supported in  
HDF 4 format



# OCEANSAT-2 AO

- **OCEANSAT-2 AO for international users was announced in January 2008**
- **Broad research areas are**
  - Retrieval algorithms and Calibration & Validation
  - Application of ocean colour and Scatterometer data for ocean & atmospheric research
  - Synergistic studies using multi-sensor data to understand processes
  - Assimilation of geo-physical parameters in models
- **Details can be obtained on ISRO web site ([www.isro.gov.in](http://www.isro.gov.in))**

**Data Product Dissemination: NRSA Data Center (NDC) will carry out data dissemination to users. GAC product of 4 km resolution will be made available on the Internet.**





# OCEANSAT-2 OCM chlorophyll algorithm



Bio-optical archive data collected in the Arabian Sea and from NOMAD has been used to develop OC-4 type of algorithm

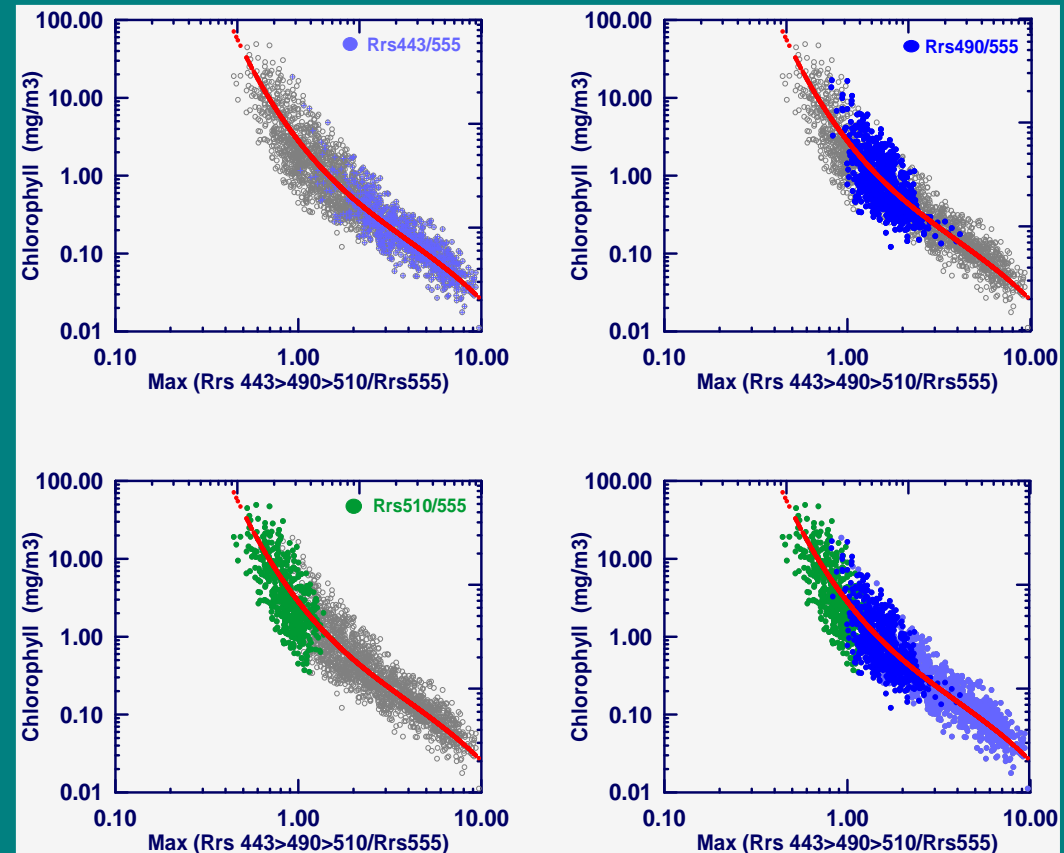
The equation has following form

$$C = 10^{(a+bR+cR^2+dR^3)} + e$$

where, C= chlorophyll;

$R = \log_{10}[\max(R_{rs443>490>510}/R_{rs555})]$

a = 0.48; b = -3.03; c = 2.24; d = -1.25; and e = -0.03



Max Ratio= Maximum ( $R_{rs\ 443}>R_{rs\ 490}>R_{rs\ 510}/R_{rs\ 555nm}$ )



# Cal & Val Experiments

A Permanent Cal-Val site is being set up near Kavaratti in Lakshadweep Sea

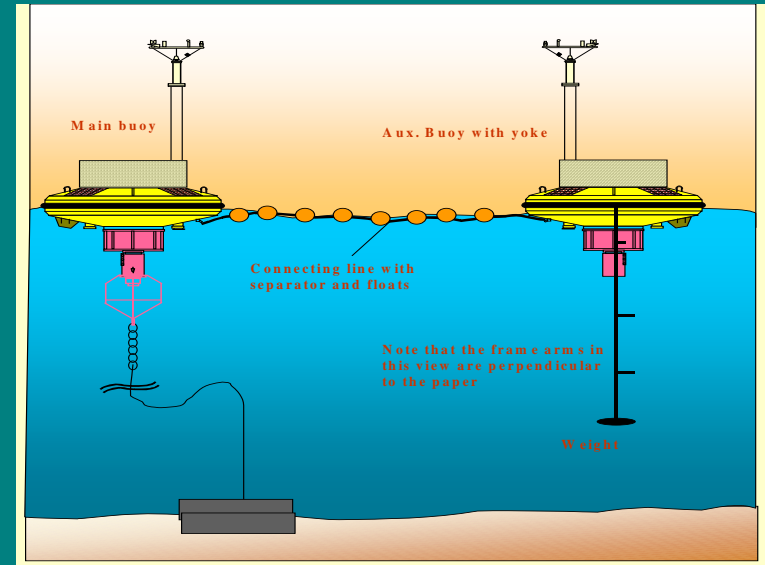
Optical buoy is deployed to collect hyperspectral observations of light, chlorophyll-a, temperature and aerosol optical depth

This *in-situ* data sets will be used for vicarious calibration of ocean colour sensors

Extensive Ship campaigns will also be organized for validation of geophysical data products.

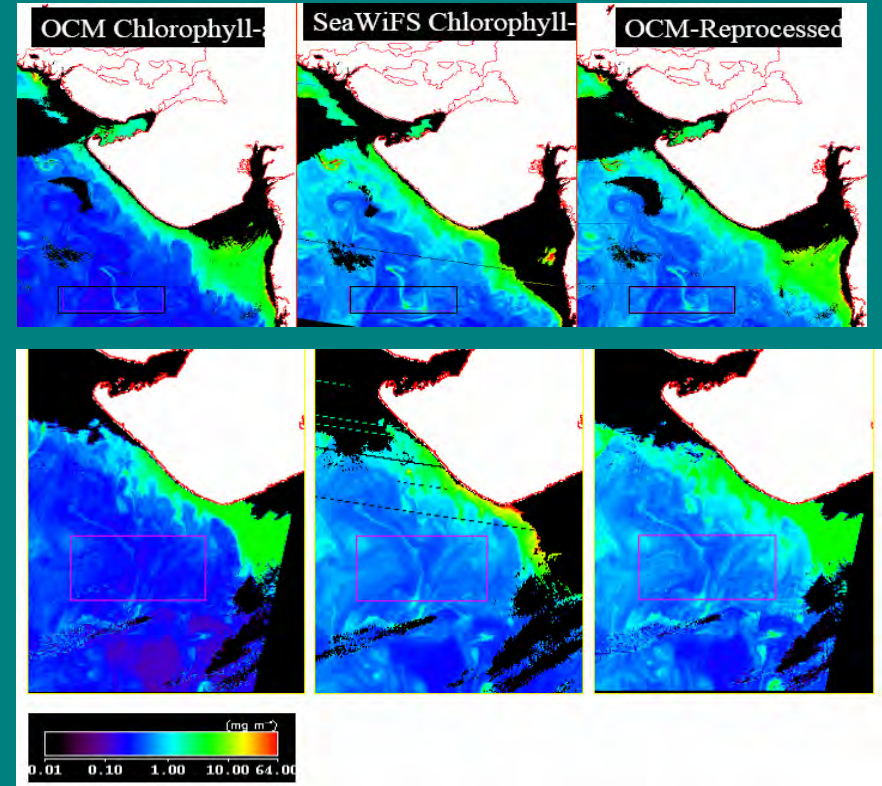
Inter-sensor calibration with contemporary missions like MODIS, MERIS etc

Lunar calibration of OCM-2

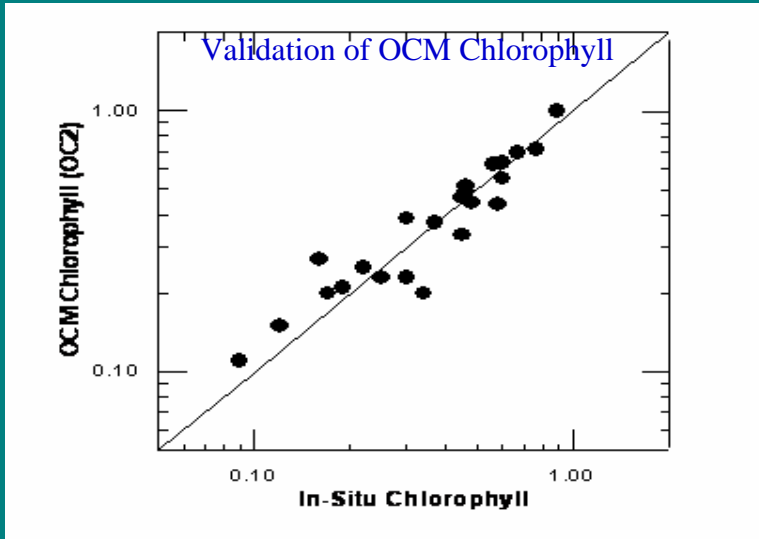


# OCM-1 Cal / Val Experiments

- Inter sensor calibration of OCM & SeaWiFS
- Vicarious calibration of OCM was done
- Validation of derived products using *in-situ* measurements
- Chlorophyll-a estimation errors within 30%



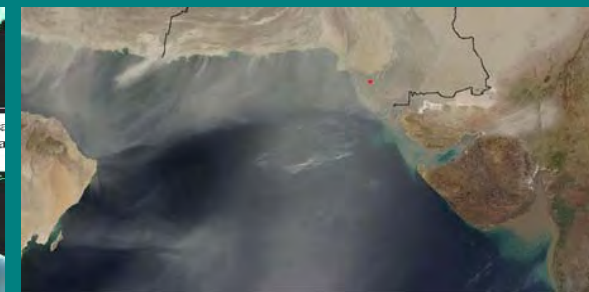
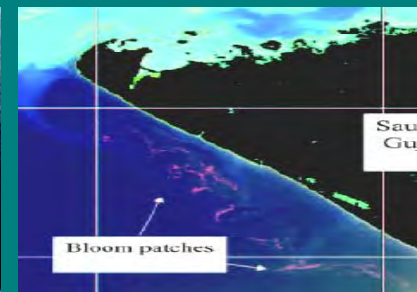
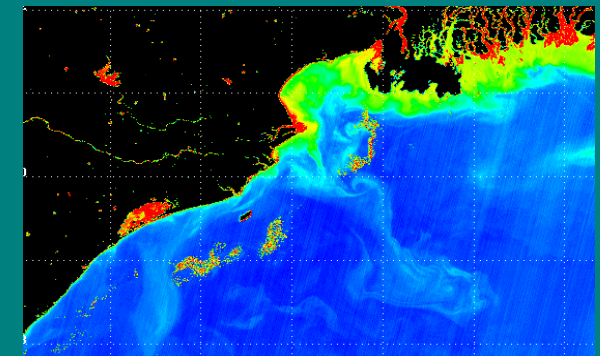
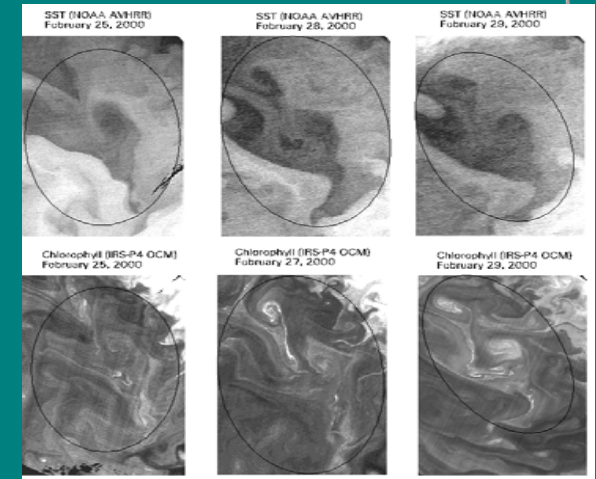
SeaWiFS-OCM inter-calibration



# Applications of OCM data



- Potential yield of marine resources using primary production modeling
- Synergistic use of surface winds, ocean-colour and SST for enhanced PFZ
- Species specific fish forecast
- Fluvial fluxes in coastal environment
- Algal blooms
- Dust Aerosol Transport



# Future Ocean Colour sensors



## • High Resolution GEO Imager (HR-GEO)

A multi-spectral multi-resolution imaging instrument capable to image full or part of the earth disk from the geo-stationary platform

## • 12 band Ocean Colour Monitor on OCEANSAT-3 including fluorescence bands

HR-Geo Modules	No. of Bands	Spectral range	Band-width (nm)	Spatial Resolution (m)
High Resolution multi-spectral VNIR Imager (HRMX-VNIR)	4	0.45 $\mu\text{m}$ -0.52 $\mu\text{m}$	70	50
		0.52 $\mu\text{m}$ -0.59 $\mu\text{m}$	70	
		0.62 $\mu\text{m}$ -0.68 $\mu\text{m}$	60	
		0.77 $\mu\text{m}$ -0.86 $\mu\text{m}$	90	
Hyper spectral (Hys-VNIR) Imager	60	0.40 to 0.87 $\mu\text{m}$	~10	500
Hyper spectral (Hys-SWIR) Imager	150	1.0 to 2.5 $\mu\text{m}$	?	500
High Resolution multi-spectral TIR Imager	3	8.2 $\mu\text{m}$ -9.2 $\mu\text{m}$	1000	1500
		10.3 $\mu\text{m}$ -11.3 $\mu\text{m}$	1000	
		11.5 $\mu\text{m}$ -12.5 $\mu\text{m}$	1000	





13<sup>th</sup> IOCCG Committee meeting, Paris, France, 12-14 February 2008

