INSAT-3DS & Oceansat-3 (EOS-06) Data products and dissemination

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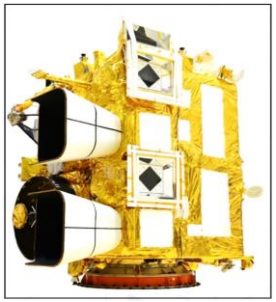
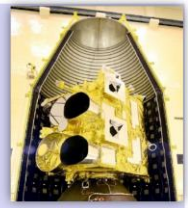
Presented in WG-III, Agenda 4.1

INSAT-3DS (2024)



- Launched on 17-Feb-2024 using GSLV-F14 rocket, from Satish Dhawan Space Centre (SDSC/ISRO)
- Improvements to mitigate the issues related to the blackbody calibration and mid-night sun-intrusion
- **Presently, in IOT phase at 83E. After IOT it will replace INSAT-3D at 82E**



Meteorological Payloads -
- 19 Channel Sounder
- 6 Channel Imager
  - Both the instruments have heritage of INSAT-3D
  - Design identical to INSAT-3D with improvements in light of INSAT-3D onboard observations

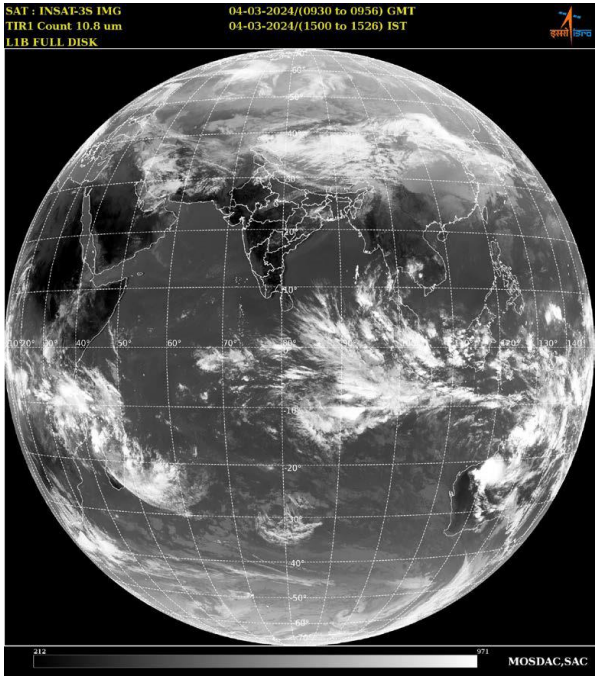
Communication Payloads –
- Data Relay Transponder (DRT)
- Satellite Aided Search & Rescue (SAS&R) Transponder
- MET Transmitter

6-Channel Imager

Channel	Spectral Band (μm)	Spatial Resolution at Nadir (km)	SNR @ 100% or NEΔT@300K
VIS	0.55-0.75	1 km	SNR>150
SWIR	1.55-1.68	1 km	SNR>150
MIR	3.80-4.00	4 km	1.4K
WV	6.5-7.1	8 km	1.0K@230K
TIR-1	10.3-11.3	4 km	0.35K
TIR-2	11.5-12.5	4 km	0.35K

19 - Channel Sounder (18 IR + 1 VIS)

Detector	Ch. No.	λ_c (μm)	ν_c (cm^{-1})	Principal absorbing gas
Long wave	1	14.68	681	CO_2
	2	14.36	696	CO_2
	3	14.06	711	CO_2
	4	13.69	731	CO_2
	5	13.35	749	CO_2
	6	12.63	792	H_2O
	7	12.01	833	H_2O
Mid wave	8	11.00	909	Window
	9	9.72	1029	O_3
	10	7.43	1347	H_2O
	11	7.03	1422	H_2O
	12	6.51	1537	H_2O
Short wave	13	4.60	2174	N_2O
	14	4.55	2200	N_2O
	15	4.48	2235	CO_2
	16	4.16	2404	CO_2
	17	4.01	2493	window
	18	3.76	2659	window
Visible	19	0.695	14367	visible



Coordination Group for Meteorological Satellites

CGMS

INSAT-3DS Geophysical Products (MMDRPS)

Imager

Sr. No.	Geophysical Parameter	Code
1	Clear Sky Brightness Temperature	CSBT
2	Cloud Mask	CMK
3	Hydro Estimator	HEM
4	Improved IMSRA	IMC
5	Outgoing Longwave Radiation	OLR
6	Sea Surface Temperature	SST
7	Cloud Properties	CTP/CTT
8	Upper Tropospheric Humidity	UTH
9	Land Surface Temperature	LST
10	Total Precipitable Water	TPW
11	Fog	FOG
12	MIR Reflectance	REF
13	Snow	SNW
14	Insolation	INS
15	Land Surface Albedo	LSA
16	Net Effective Radiation	NER
17	Cloud Microphysics	CMP
18	Smoke	SMK
19	Forest Fire	FIR

Sr. No.	Geophysical Parameter	Code
20	Atmospheric Motion Vectors	IRW, WVW, MRW, VSW
21	Wind Derived Products (WDP)	WDP
22	Merged Wind Products	IRW_MERGED WVW_MERGED
23	High Resolution Winds	VSW_HR
24	Full Disc Winds	IRW_FD WVW_FD
25	GOES Precipitation Index	GPI
26	Aerosol Optical Depth	AOD
27	Potential EvapoTranspiration	PET_DLY
28	Short Wave Radiation Over Ocean	SWR
29	5 day composite winds	5DCW
30	Actual EvapoTranspiration	AET

Most of these geophysical parameters require high-temporal diurnal sampling, which can only be obtained from GEO satellites.

Sounder

L1B Product

1. Clear Sky Brightness Temperature (CSBT)

Operational Geophysical Profiles

2. Temperature Profiles
3. WV Profiles
4. Surface Skin Temperature
5. Total Ozone

Derived products

6. Geo Potential Height (at 40 pressure levels)
7. Total Precipitable Water
8. Layer-1 (1000-900 hPa) Precipitable Water
9. Layer-2 (900-700 hPa) Precipitable Water
10. Layer-3 (700-300 hPa) Precipitable Water
11. Lifted Index
12. Wind Index
13. Dry Microburst Index
14. Maximum Vertical Theta-e

Cloud Properties

15. Cloud Top Temperature
16. Cloud Top Pressure
17. Cloud effective Emissivity

Oceansat-3 (EOS-06) (2022)

- **Oceansat-3 Payloads**
  - Ku-band Scatterometer: High Resolution wind (12.5 km) mode
  - 13-band OCM-3: narrow bandwidth
  - ARGOS by CNES

OCM-3

- Ground sampling distance of 360 m
- Swath of 1440 km
- SNR at ocean reference > 1000
- Spectral bandwidth 10-20 nm
- Local Area Coverage (LAC): 360 m
- Global Area Coverage (GAC): 1 km

OCM-3 Band description and their applications

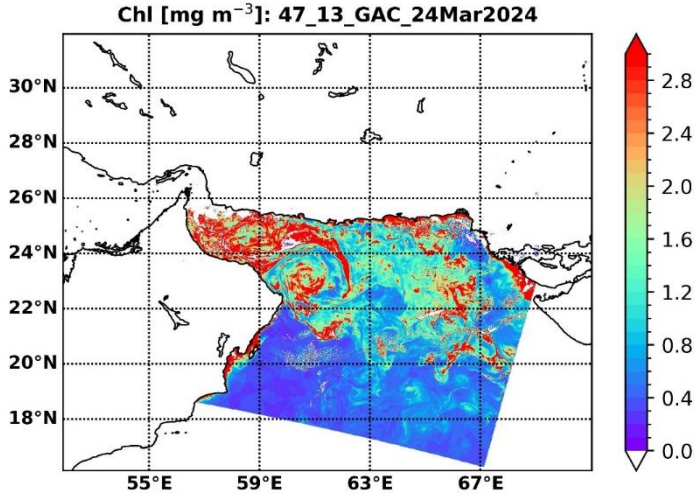
Band	CWL (nm)	BW (nm)	Primary Application
B1	412	20	Differentiate yellow substance from chlorophyll
B2	443	10	Chlorophyll absorption maximum; low chlorophyll
B3	490	10	Moderate chlorophyll
B4	510	10	High chlorophyll; Total Suspended Matter (TSM)
B5	555	10	Weak chlorophyll absorption
B6	566	10	Phycoerythrobilins (PEB)
B7	620	10	Turbidity in coastal Case 2 waters
B8	670	10	Baseline for chlorophyll fluorescence
B9	681	10	Chlorophyll fluorescence for high concentration
B10	710	10	chlorophyll fluorescence; atmospheric Correction
B11	780	10	Atmospheric correction; avoids O2 absorption Band
B12	870	20	Atmospheric correction; good assessment of spectral scattering
B13	1010	20	Atmospheric correction in turbid waters, aerosol – white foam discrimination

Applications

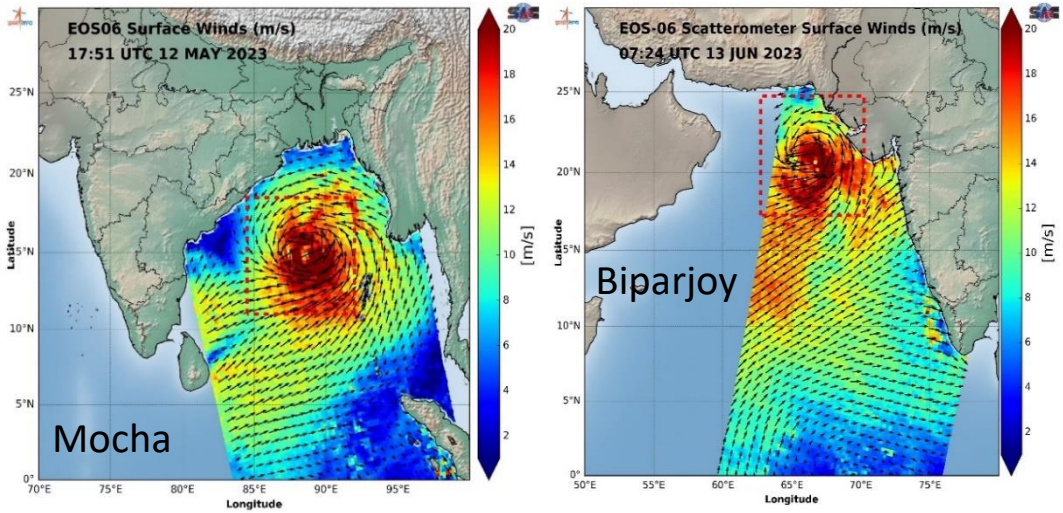
- **Ocean Applications:**
  - Ocean biology and ecosystem science
  - Modelling studies (coupled model, ocean processes)
  - Coastal Zone management studies
  - Studies of ocean surface waves, currents
- **Atmospheric applications:**
  - Assimilation of surface wind, SST in NWP models
  - Cyclogenesis, track prediction, intensification
  - Air quality monitoring
- **Land applications:**
  - Vegetation classifications and their growth assessment
  - Hydrological applications
- **Cryospheric applications:**
  - Sea ice dynamics, surface melting, ice calving events
  - Generation of sea-ice type and extent products.

Operational Products from Oceansat-3 (EOS-06)

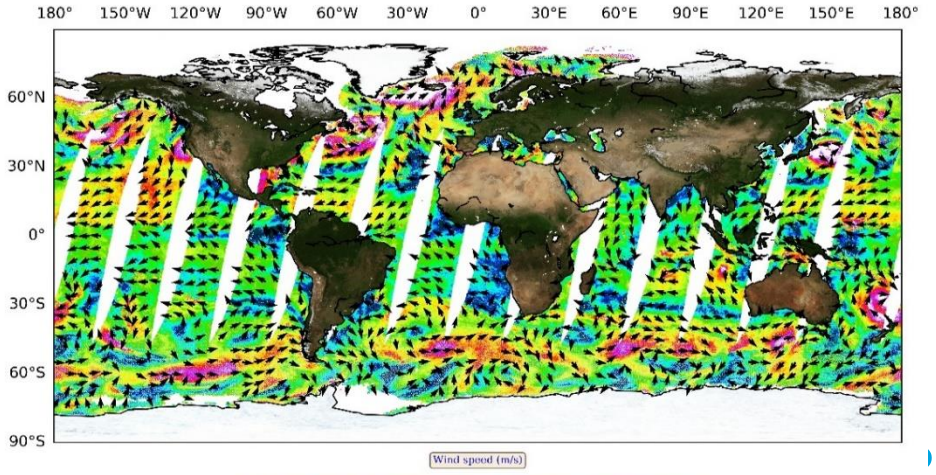
Annual Arabian Sea bloom observed from Ocean Colour Monitor (EOS-06)
24th March 2024



Tropical cyclones captured by EOS-06 Scatterometer



Level-2B (ocean surface vector winds) 11th February 2023



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Oceansat-3 Geophysical Products

S.N.	Operational Products
1	Ocean Biophysical Products: • Chlorophyll-a concentration (Chl-a) • Remote Sensing Reflectance (RSR) • Aerosol Optical Depth (AOD) • Total Suspended Matter (TSM) • Diffuse Attenuation Coefficient (KD_{490})
2	Land Biophysical Products: • Normalized Difference Vegetation Index (NDVI) • Vegetation Fraction
3	Sea Surface Wind Vector
4	Global sea ice extent (Sea-ice flag)

OCM SCAT

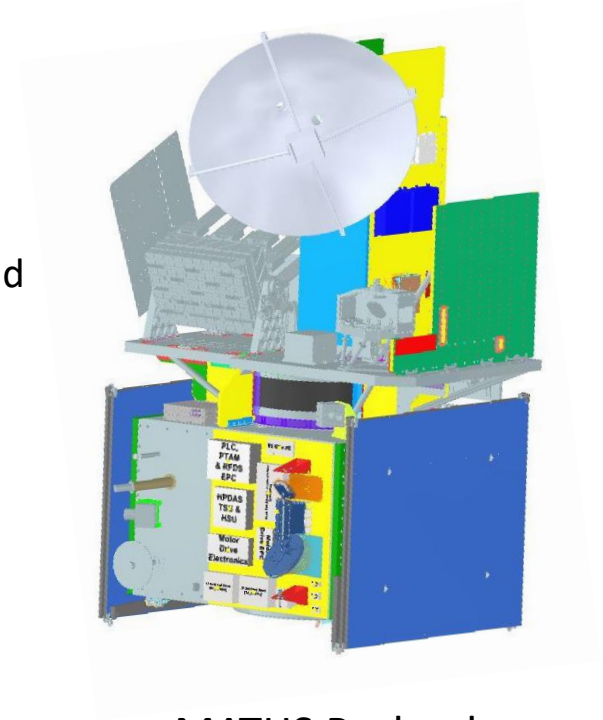
- Operational products are available through Bhoonidhi Web-portal of NRSC/ISRO (***https://bhoonidhi.nrsc.gov.in***)
- Evaluation and R&D Products will be available through MOSDAC Web-portal of SAC/ISRO ***(https://mosdac.gov.in)***

S.N.	Science/R&D Products
1	• Inherent Optical Properties (IOP_S) – Particulate Absorption – Back Scatter – Phytoplankton Absorption • Color Dissolved Organic Matter absorption ($CDOM_\lambda$)
2	• Photo Synthetically Available Radiation (PAR) over Ocean
3	Upwelling Indices: • Ekman transport & Ekman pumping
4	Enhanced Vegetation Index (EVI)
5	Sea Surface Nitrate Maps
6	Cloud Mask (OCM)
7	Daily Analysed Vector winds
8	Ocean Surface Currents
9	Aerosol optical depth over land
10	Inland water related products: • Surface water extent (of major reservoirs) • Suspended sediment concentration

S.N.	Science/R&D Products
11	Particulate and Dissolved Organic Carbon
12	Phytoplankton Functional Types (PFT)
13	Phytoplankton Size Classes
14	Phytoplankton Bloom Detection
15	Ocean Primary Production
16	Arctic/Antarctic mosaic
17	Chlorophyll Florescence Line Height (FLH_{chl})
18	Polar continental surface ice melt product
19	Photo Synthetically Available Radiation (PAR) over Land
20	Leaf Area Index (LAI)
21	Land Surface Albedo
22	Gross Primary Productivity - Land (GPP*)
23	Evapo-Transpiration (ET*)
24	Sea Ice
25	Qualitative snow grain size product

Oceansat-3A

- Oceansat-3A will be launched in 2025
- ARGOS in Oceansat-3 will be replace by Millimeter-wave Atmospheric Temperature and Humidity Sounder (MATHS) Payload
- A 20-channel cross-track scanning Radiometer operating at 50-60GHz and 183.31± 16.25GHz bands
- Atmospheric vertical Temperature & Humidity profiles with nadir spatial resolution of 25 km and 15 km, respectively.



MATHS Payload

Operational Products available from:

Oceansat-3 Products: Bhoonidhi/NRSC https://bhoonidhi.nrsc.gov.in

INSAT-3DS Products: MOSDAC/SAC https://mosdac.gov.in

Thanks