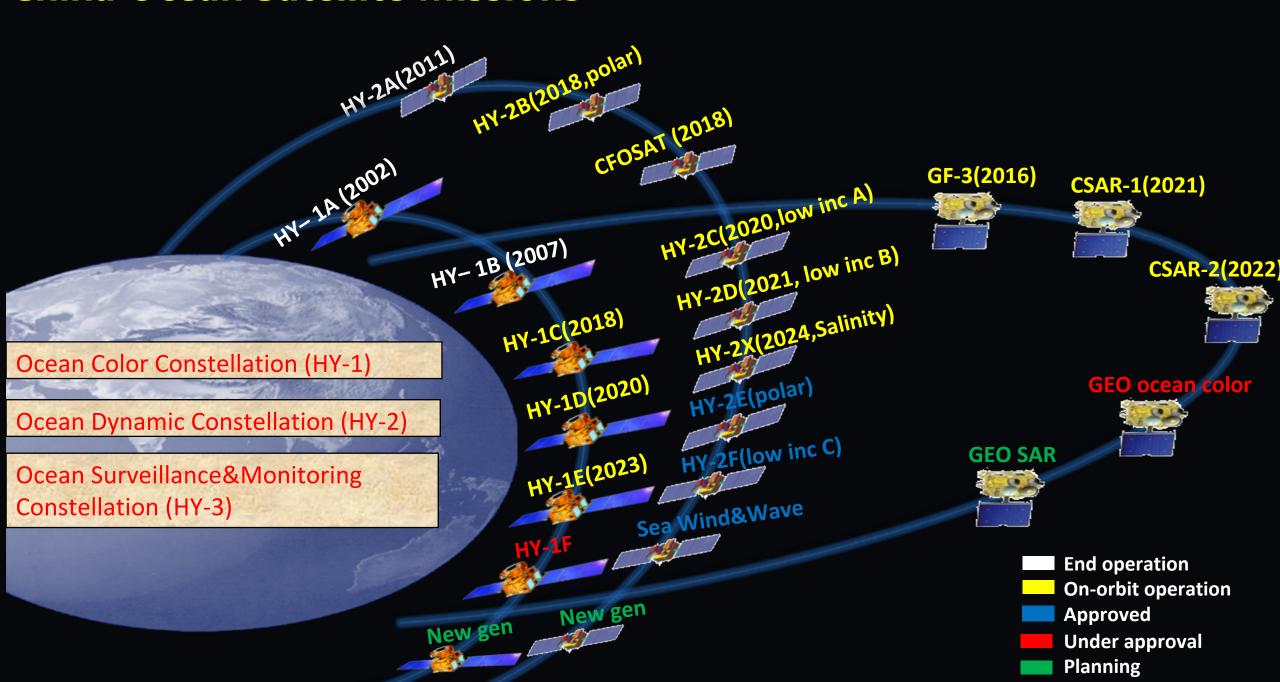


Progress in China's OC satellite missions & remote sensing application technologies

Xianqiang He

Sate Key Laboratory of Satellite Ocean Environment Dynamics, Second Institute of Oceanography, Ministry of Natural Resources, China

China Ocean Satellite Missions



■ HY-1C/HY-1D Missions

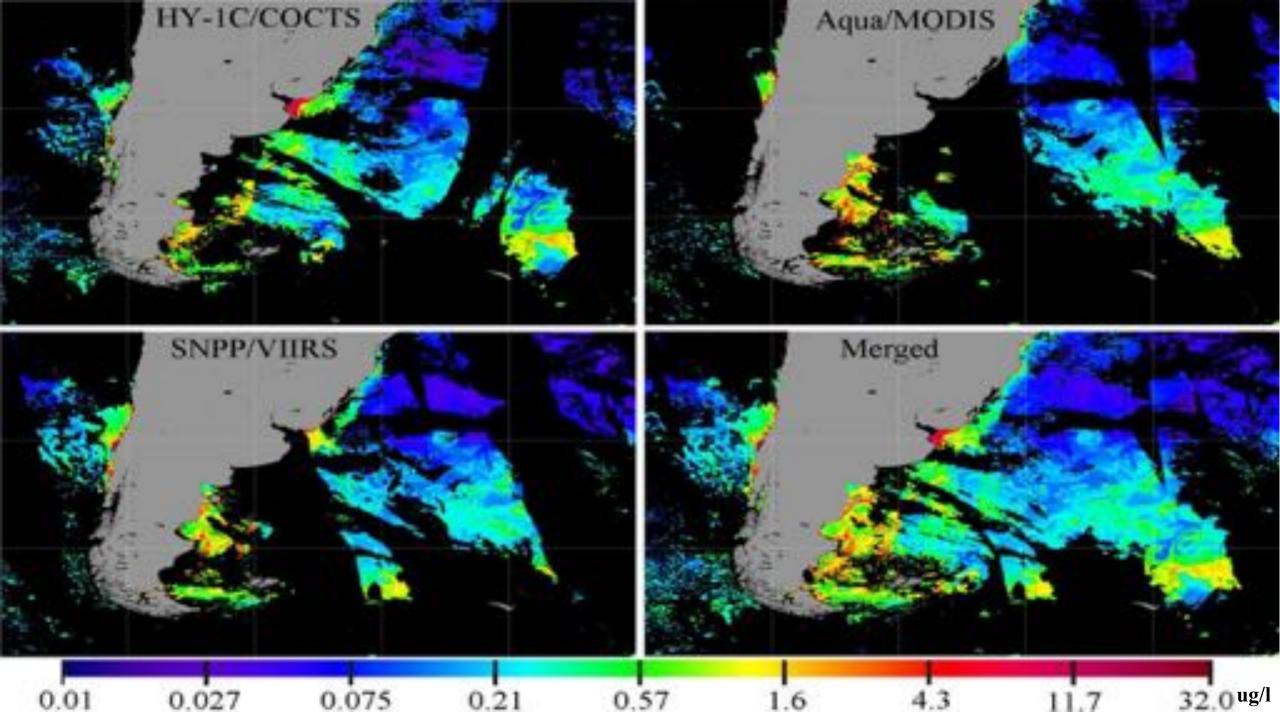


- Operational application missions; successor of two experimental missions (HY-1A, 2002-2004; HY-1B, 2007-2016)
- Realize morning (10:30AM) and afternoon (1:30PM) observations

Payloads	Bands	Resolution	Swath
COCTS (China Ocean Color and Temperature Scanner)	10 bands (VIS/NIR,TNIR)	1.1km	~3000km
CZI (Coastal Zone Imager)	4 bands (VIS/NIR)	50m	~1000km
UVI (Ultra Violet Imager)	2 bands (UV)	550m	~3000km







■ HY-1E/HY-1F Missions



> HY-1E (experiment, launched on 2023.11.16), HY-1F(operational, under approval)

Payloads	Bands	Resolution	Swath
COCTS2 (New Ocean Color and Temperature Scanner)	18 bands (UV/VIS/NIR/SWIR/TNIR, 360nm to 12um)	500m	3000km
PMRIS (Programmable Moderate Resolution Imaging Spectroradiometer)	19 bands (UV/VIS/NIR/SWIR, 385nm to 2135nm); High spectral mode (option)	100m, 200m(high spectral mode)	950km
CZI2 (New Coastal Zone Imager)	8 bands+ 1 Pan (VIS/NIR, 425nm to 950nm)	20m, 5m (Pan)	60km





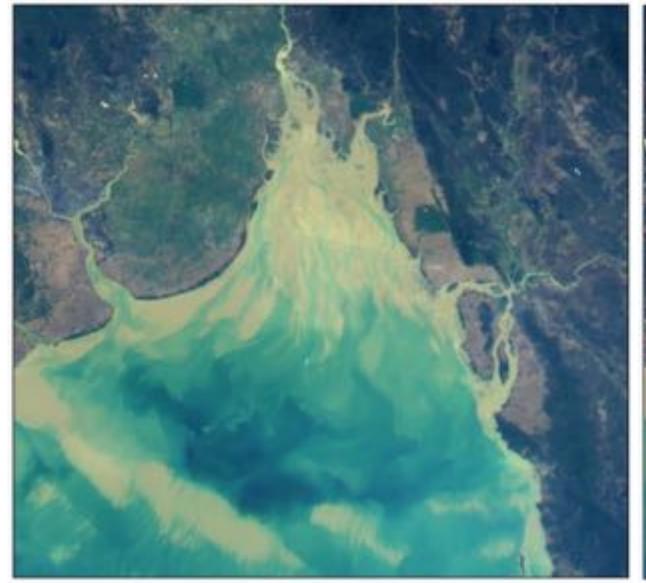


Image covering estuary and bay acquired by COCTS2

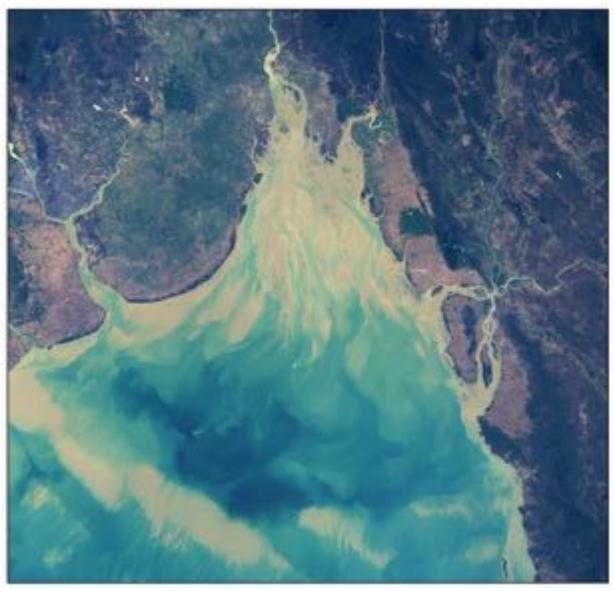
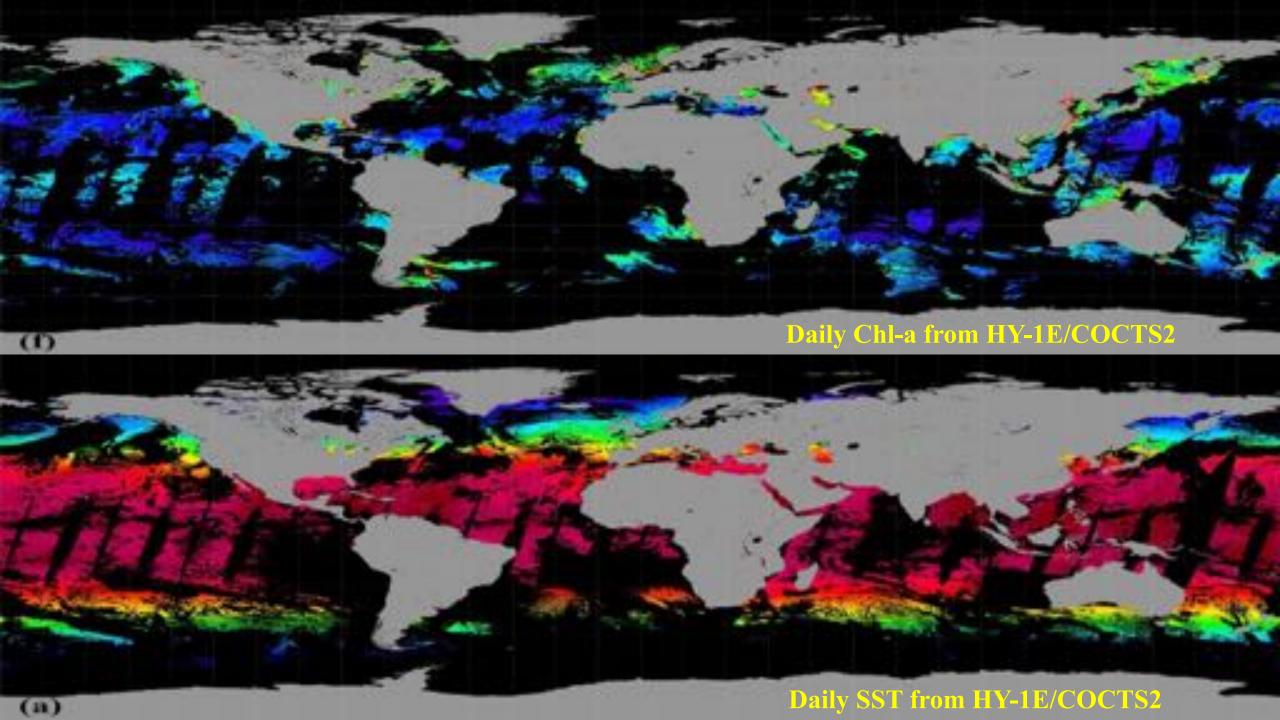
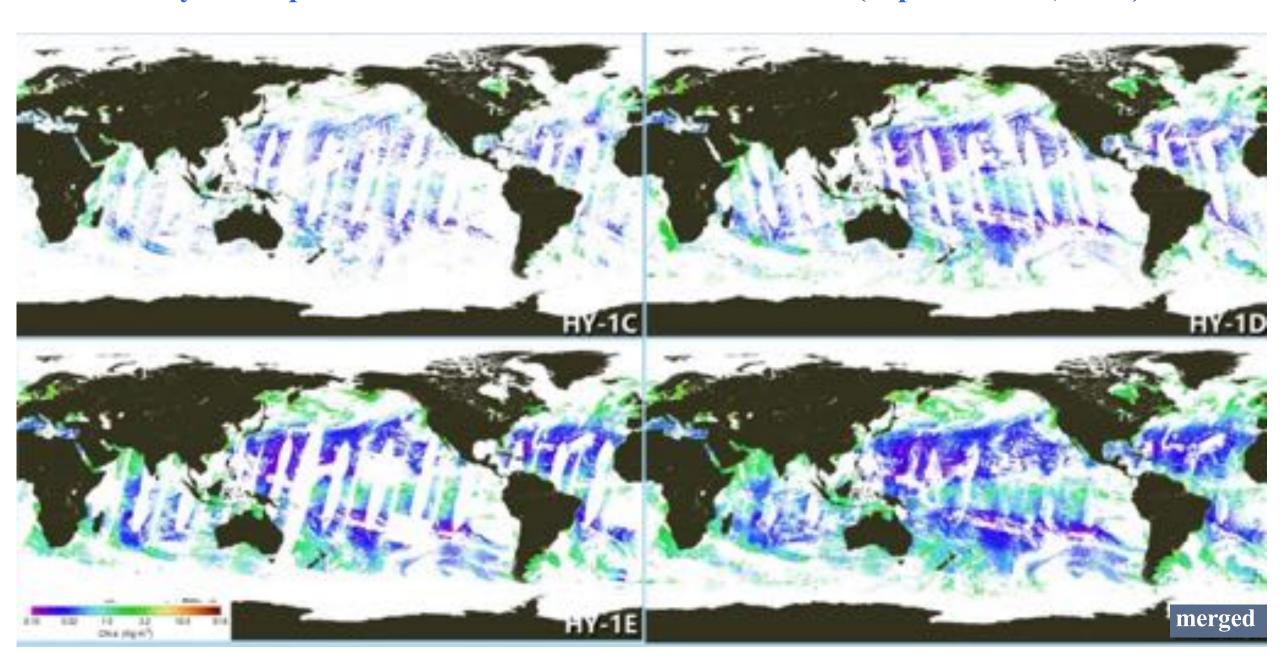


Image covering estuary and bay acquired by PMRIS



Daily Chl-a product from COCTS on the HY-1C/D/E (September 20, 2024)



■ Free access of HY-1 data from NSOAS





■ China Geostationary OC Mission



Geostationary Ocean and Coastal Zone Imager

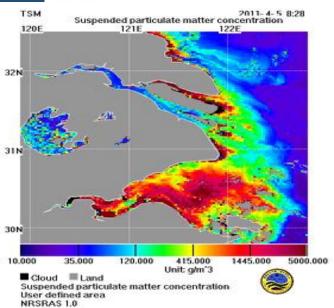
- Spatial Resolution: 25m-500m
- **Swath** : 500km × 500km
- Spectral Range: 350-12500 nm
- Bands: ≥16
- SNR: ≥200-300

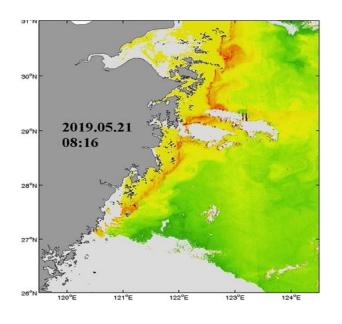
Geostationary Ocean Color Imaging Spectrometer

- 1) Multispectral Module: Spatial Resolution: 200; Swath: 500km×500km; Spectral bands: 12 (including 2 UV bands); SNR: ≥500-1000
- 2) Hyperspectral Module: Spatial Resolution: 400m; Swath: 500km×500km; Spectral resolution: 2.5nm (0.375-0.92μm), 5nm resolution (1-1.7μm); SNR: ≥300-500

Geostationary Atmospheric Differential Absorption Spectrometer

- Spatial Resolution: 5km
- Swath: 500km (E–W) ×1000km (N–S)
- Spectral range: 300-500nm
- Spectral resolution: <0.6nm
- SNR: ≥ 1000@400nm



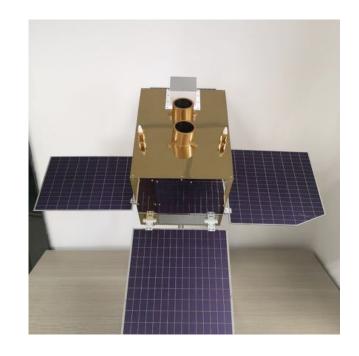


■ SmallSat OC Missions



HiSea-II SmallSat (~65 kg)

180 Km Swath
20 m resolution
8 bands in VIS-NIR



Xiamen University DFH Satellite Co. Fujian Satellite Co.





IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING, VOL. 62, 2021

1002010

SmallSat for Monitoring Aquatic Ecosystem of Coastal and Inland Waters: The Experience of HiSea-II

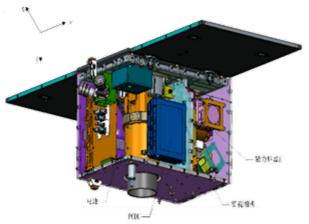
Zhongping Lee[®], Member, IEEE, Daosheng Wang, Zhihuang Zheng, Lili Wang, Pengmei Xu, Xu Li, Hanyang Qiao[®], Xiuling Wu, Canliang Jian, Minhan Dai[®], Shaoling Shang[®], and Yaohui Bao

■ SmallSat OC Missions



BlueCarbon-I SmallSat

(~66 kg) 200 Km Swath 10 m resolution 8 bands in VIS-SWIR





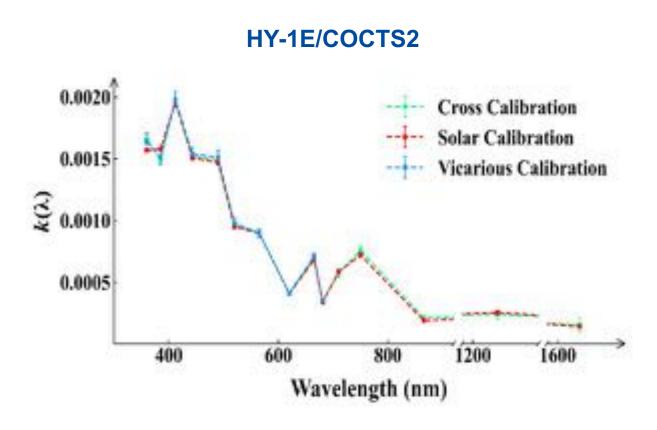
SIO/MNR

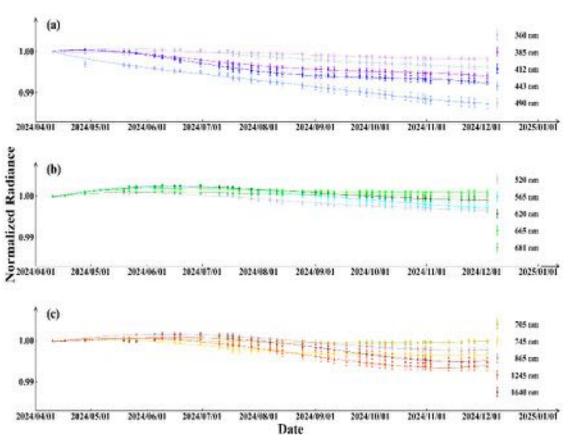
> Launched on 2025/1/17



■ CAL/VAL of HY-1 missions







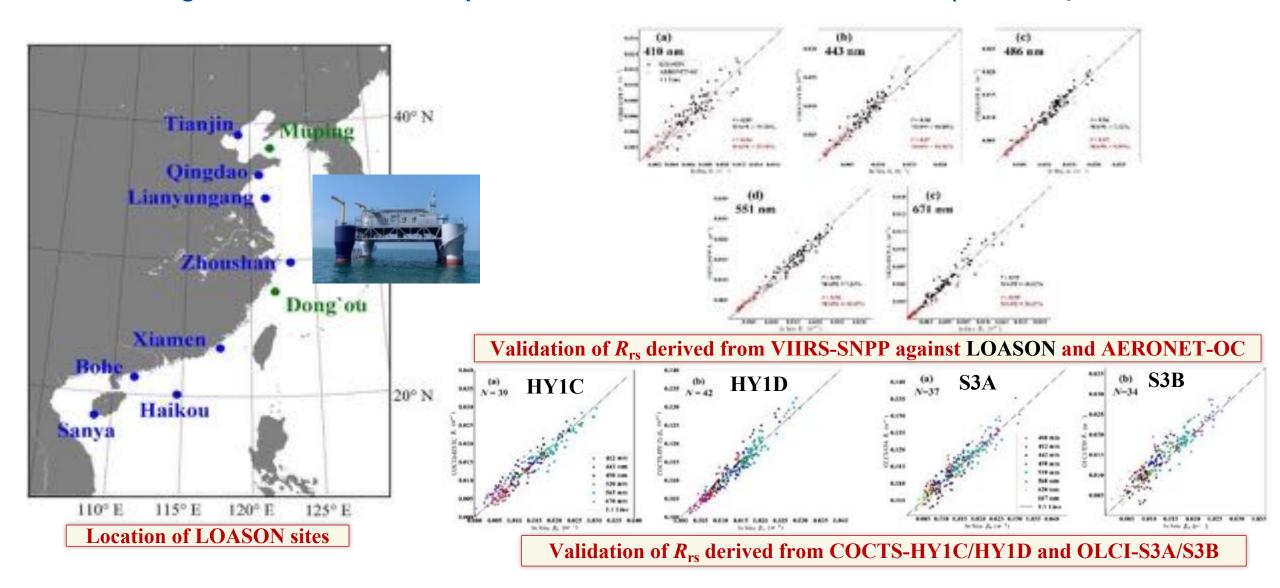
Absolute radiometric calibration coefficients based on cross calibration, solar calibration, and vicarious calibration

Time series of normalized radiance of solar calibration

■ CAL/VAL of HY-1 missions

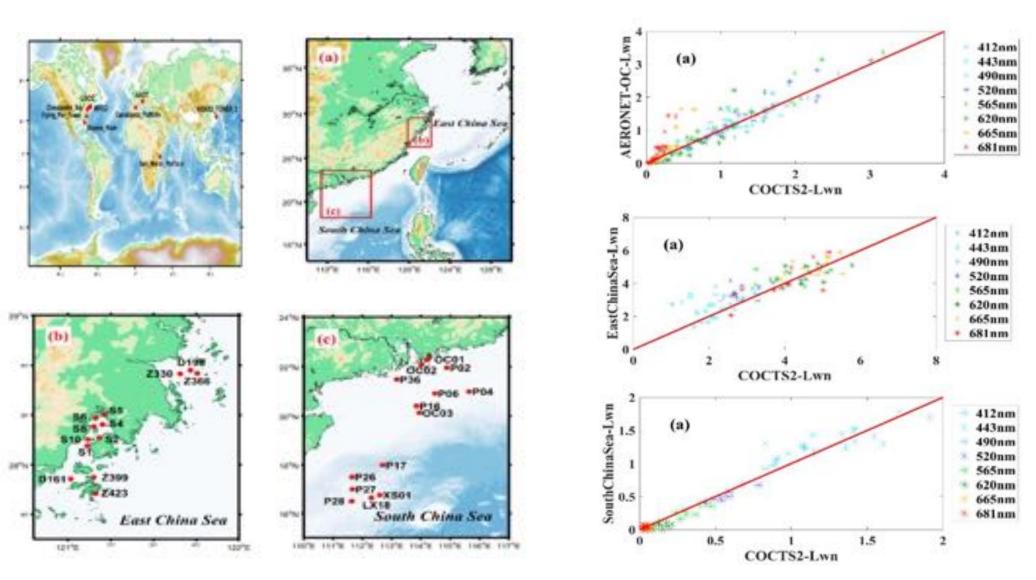


Long-term Ocean and Atmosphere Simultaneous Observation Network (LOASON)



■ CAL/VAL of HY-1 missions





Poster No.33

■ Development of in-situ OCR instruments





HOC (Hyperspectral Ocean Color Radiometers)

- •Compact Design: Miniaturized size for broad platform compatibility.
- •High-Speed Sampling: Up to 4 Hz sampling rate.
- •Low Power Consumption: As low as 0.5 W.
- •Broad Wavelength Range: Covers 310 nm to 1100 nm.



HyperOPS

- •Portable Design: Compact and aerodynamic form factor for easy deployment.
- •High-Precision Data: Minimizes interference from vessel shadows to ensure accuracy.
- •Modular Configuration: Allows flexible combination of various sensors.



Triplet-R AOP

- •Automatic Sun Tracking: Maintains correct observation geometry without manual intervention.
- •Simple Operation: Features one-click measurement for fully automated data collection.
- •**High Accuracy:** Standardized process eliminates human error.
- •High Sampling Rate: 1 Hz frequency captures 3 spectra per second with synchronized GPS and attitude data.



Airborne AOP

- •Ultra-Portable: Compact and lightweight (approx. 400g) for all drone platforms.
- •Broad Wavelength Range: Covers key bands from 350 to 1000 nm for water quality parameters.



■ Marine carbon sink monitoring project



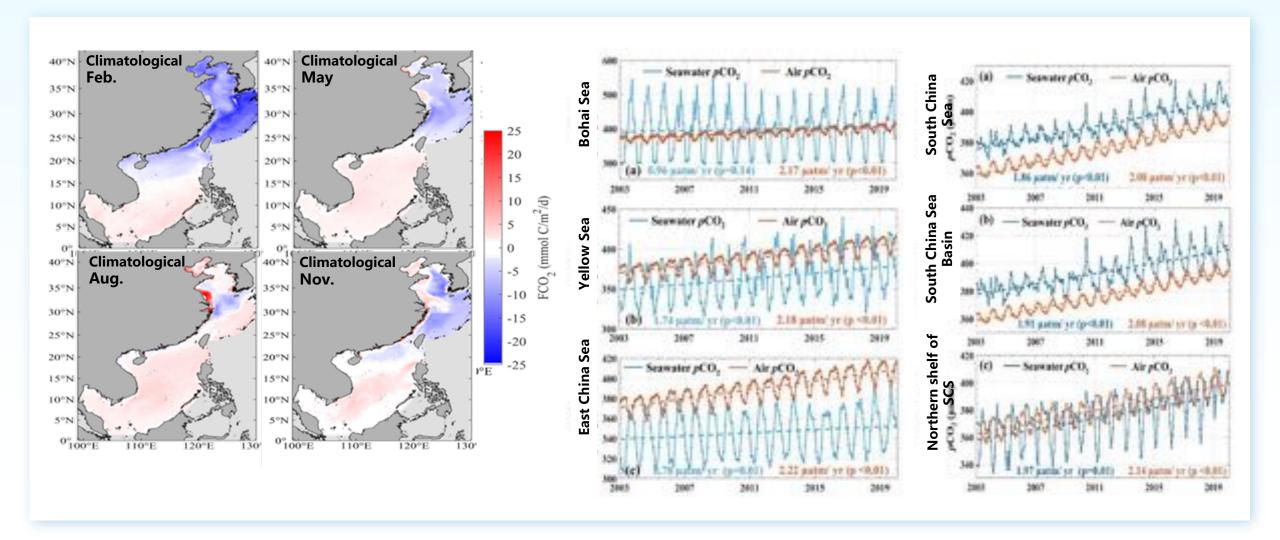






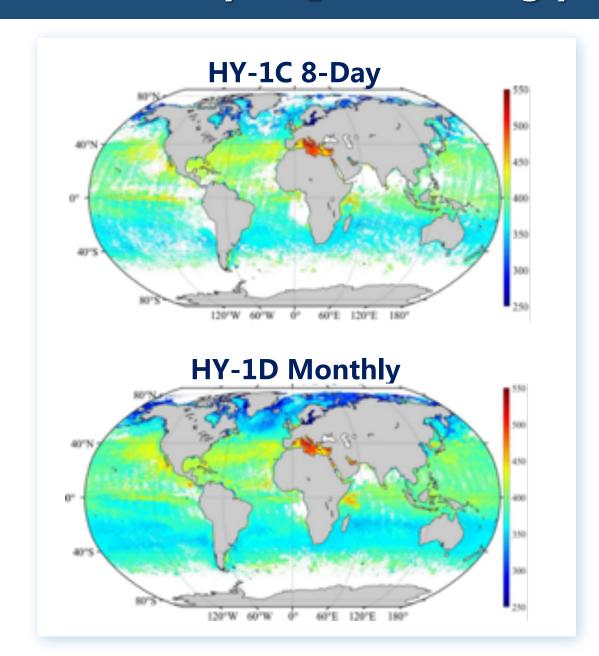


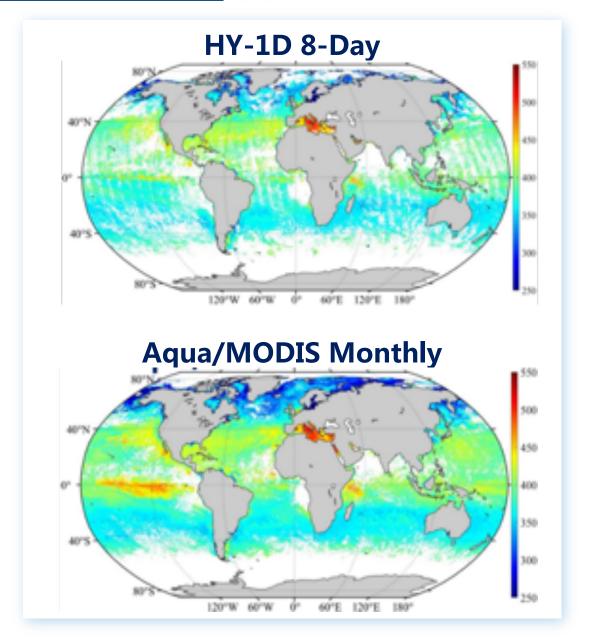
Supported by the National Key Research and Development Program of China (1.4M USD)



■ Satellite pCO_2 monitoring products



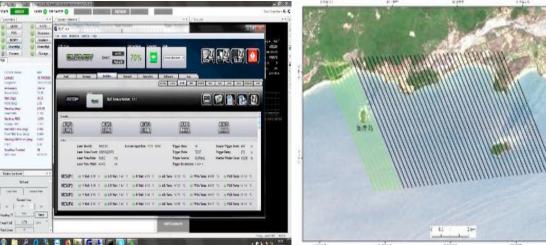


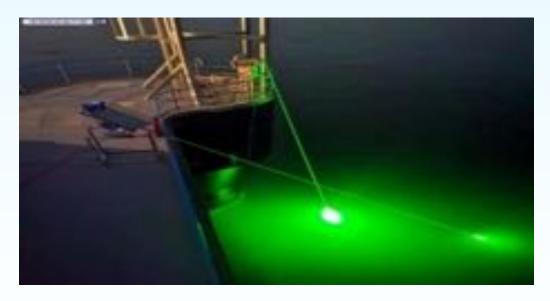


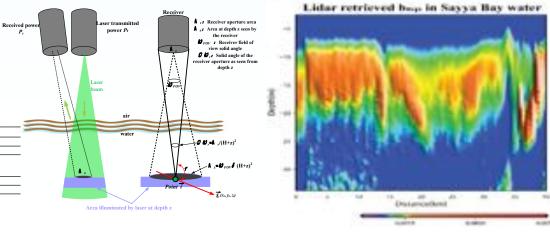
■ Active&passive integrated RS technology and equipment project

➤ Supported by the National Key Research and Development Program of China (1.64M USD)



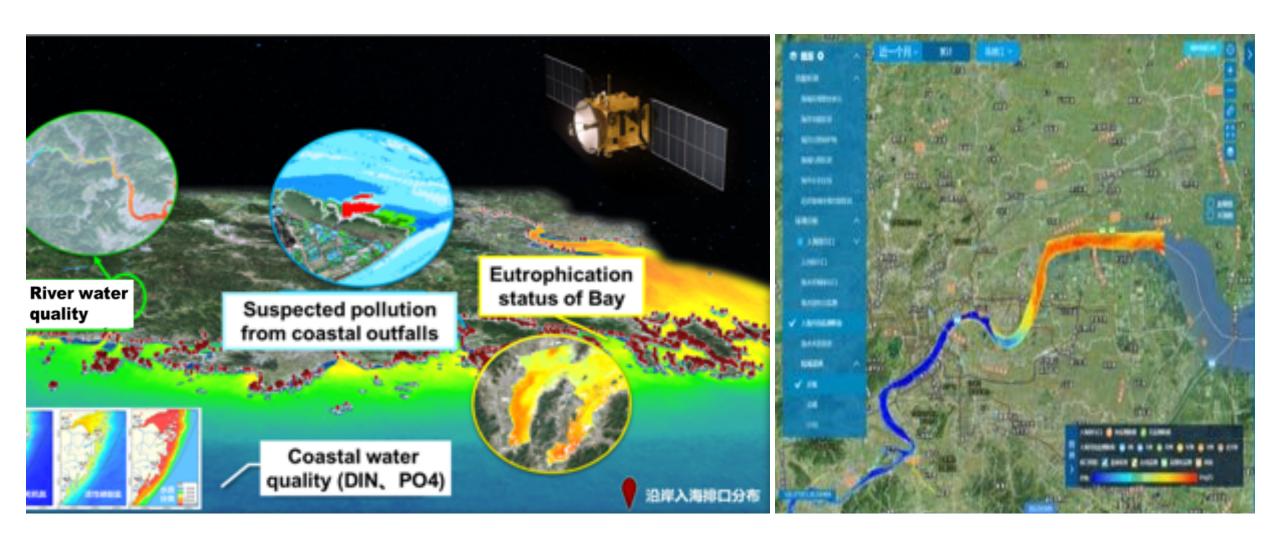




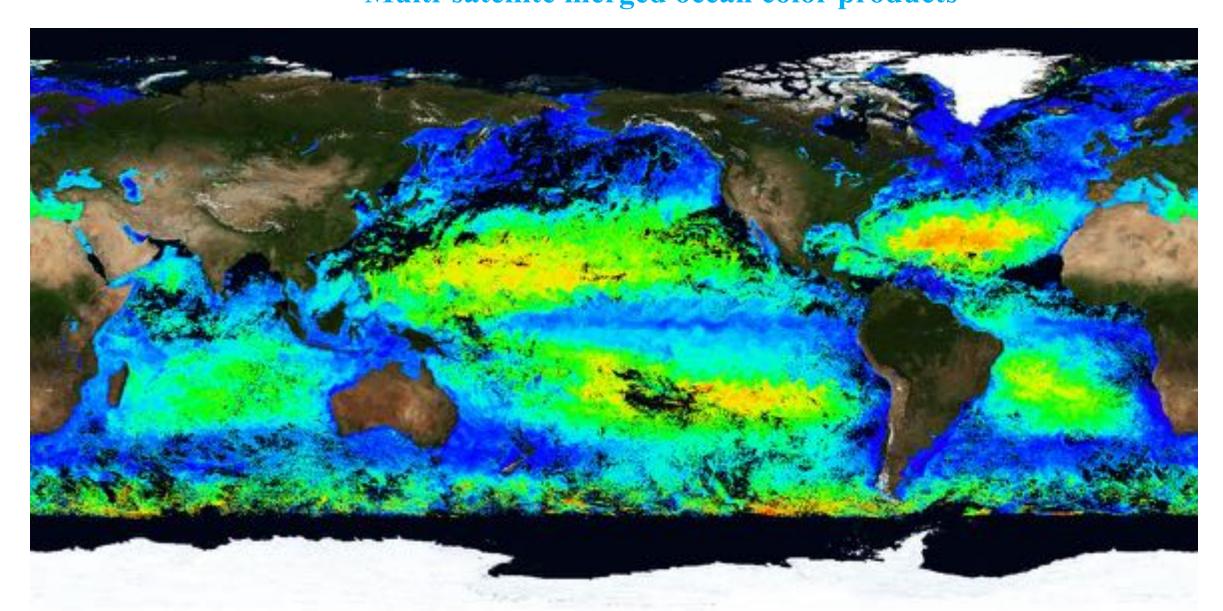


■ Satellite-based water quality monitoring





GLOSS: Global, Long-term, Ocean-color Synthesis Series Multi-satellite merged ocean color products



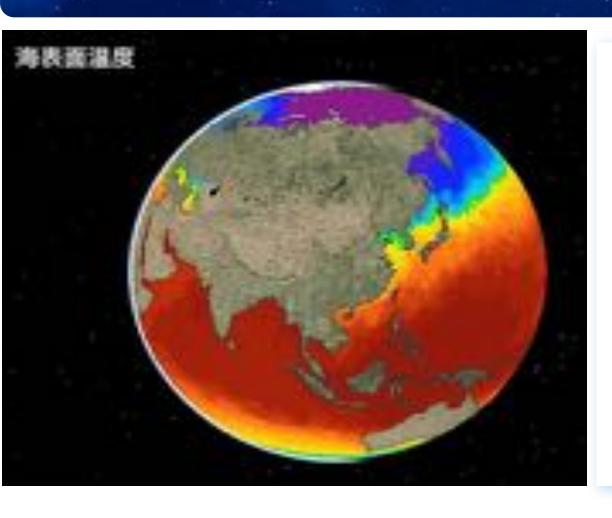
Marine Satellite Data Online Analysis Platform (SatCO2)



海洋遥感在线分析平台

IARINE SATELLITE DATA ONLINE ANALYSIS PLATFORM (SATCO2)

www.satco2.com



SatCO2 main features:

- > Online access of remote sensing datasets
- > 3D visualization and scientific calculation
- > User algorithms and new product generation
- > Interactive analysis and accuracy verification of satellite, in-situ, and model-simulated data
- ➤ Assessment and evaluation of air-sea CO₂ flux and marine carbon sink
- Extensible thematic application modules (e.g., HAB detection and water quality classification)



International training and application





SatCO2-II 2017



2018 SatCO2-III



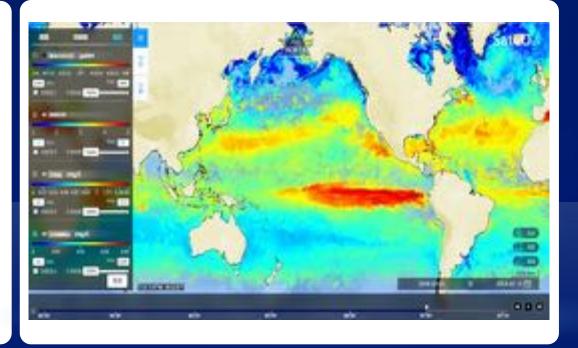
SatCO2-IV 2020



SatC02-V 2023







Journal of Remote Sensing (JRS)

An Open Access Science Partner Journal



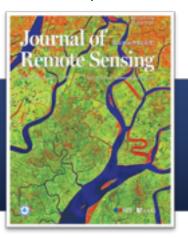


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