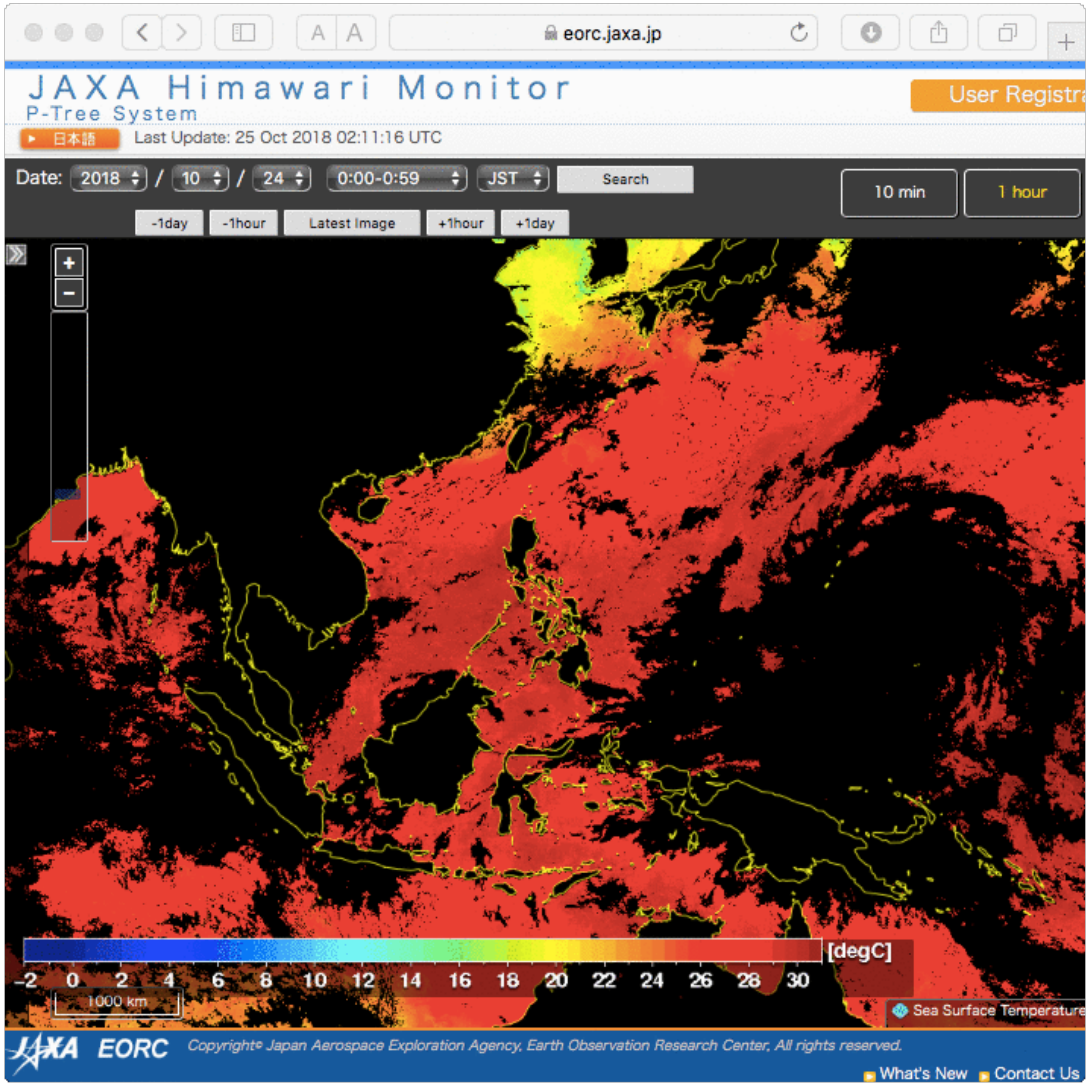
Coastal physical data from satellite and assimilation

Hidenori AIKI (Nagoya Univ., Japan)



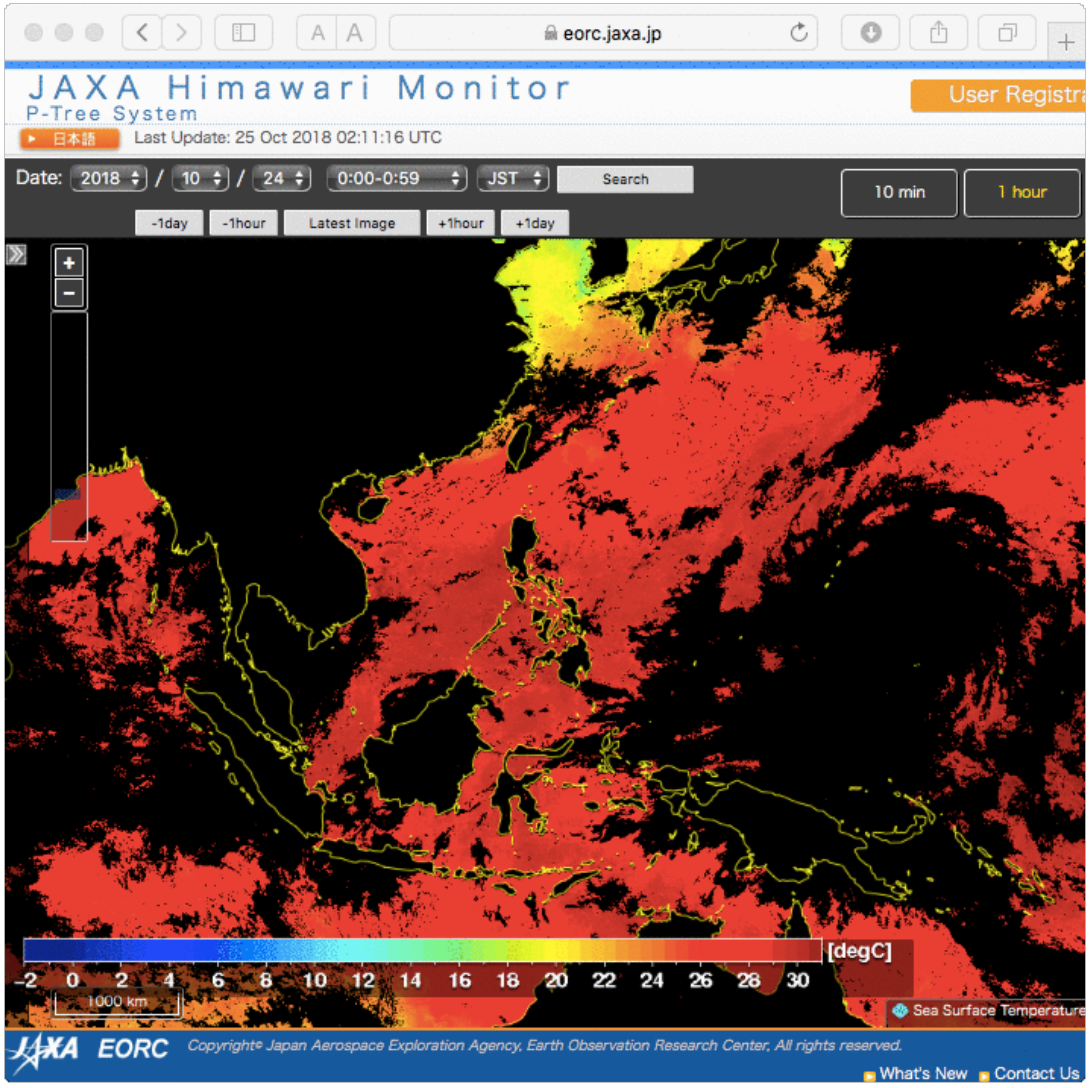
Himawari-8 geostationary weather satellite (2015-)

Japan Meteorological Agency

Infrared sensor for SST observation

(dt=10 min., dx=2km)

Japan Aerospace Exploration Agency

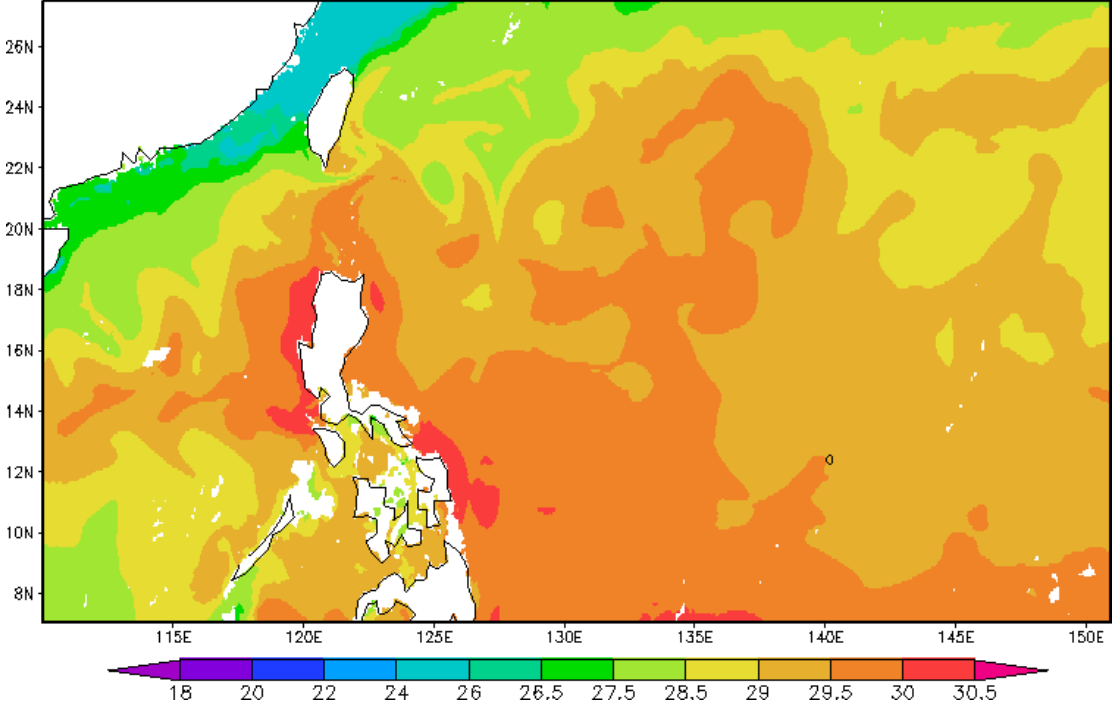


Typhoon Yutu (T1826)

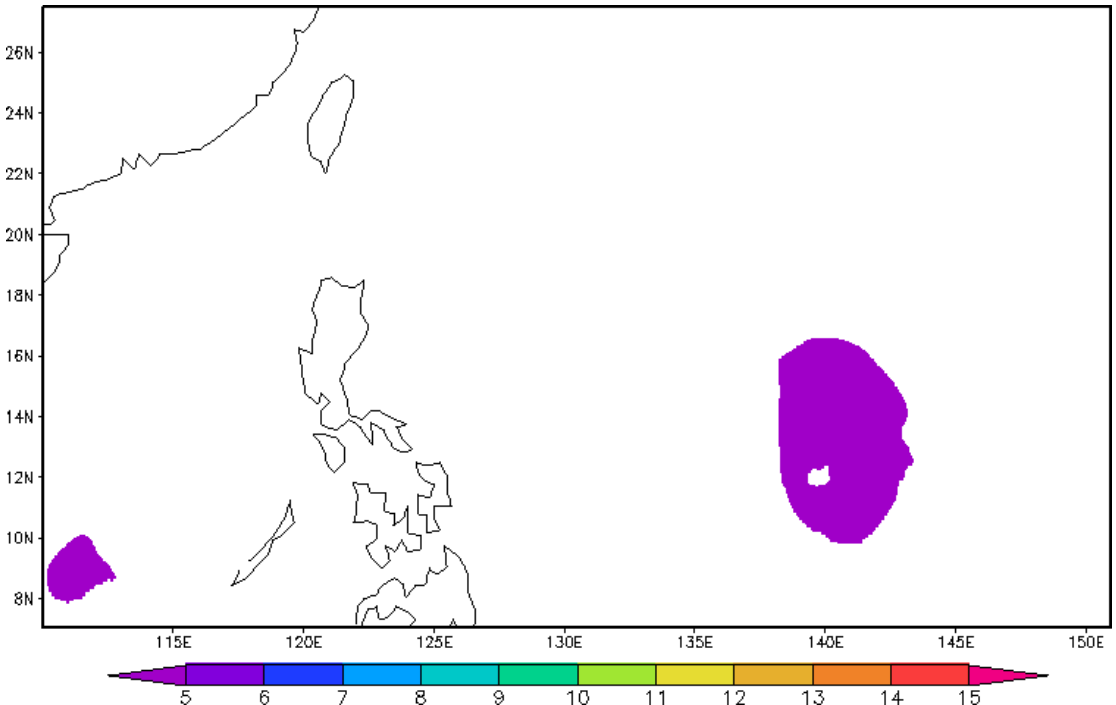
Coupled Model Simulation for Typhoon Megi

(2010.10.14-)

Color: SST
Contour:
Sea Surface Pressure



Color:
Significant Wave Height (m)
Contour: Wind Speed



Importance of Oceanic Heat Content and Mixed Layer Depth that are not available from remote sensing

Aiki et al. 2015 Bulletin on Coastal Ocean.
Kanada et al. 2017 JGR-Atmos

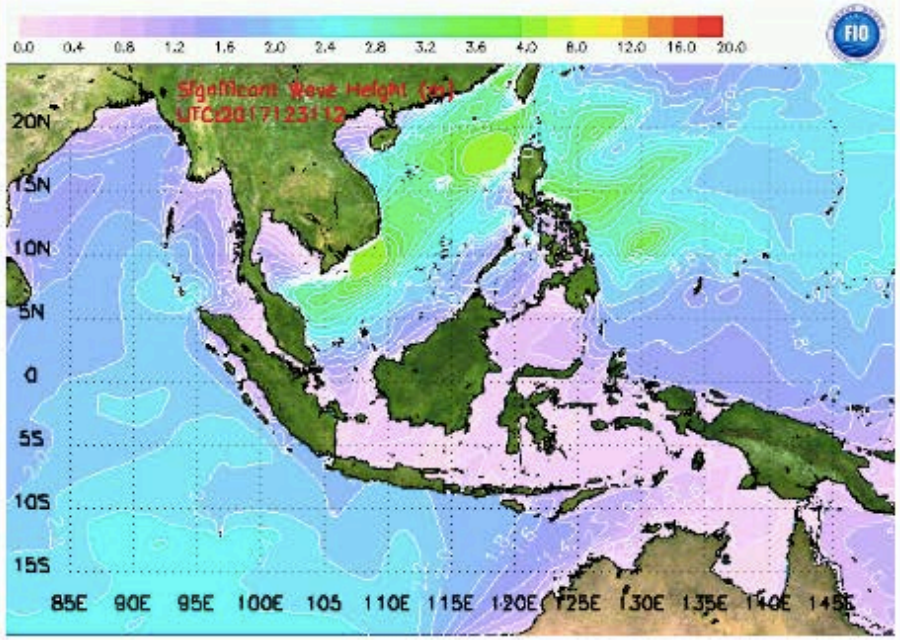
United Nations Educational, Scientific and Cultural Organization

Intergovernmental Oceanographic Commission

Ocean Forecasting System in the Southeast Asian Seas of IOC/WESTPAC

SEAGOOS

>> Forecast Results
>> Background
>> Research Team
>> Numerical Model
>> Model Validation
>> Publication
>> Archives



Latest Forecast

Message Board

MORE

>> The 7th Thailand-China joint workshop on ocean science and technology collaboration was held in Phang-nga, Thailand

During July 14-16, 2015, The 7th Thailand-China joint workshop on ocean science and technology collaboration was held in Phang-nga, Thailand.

>> Prof. Somkiat Khokiattiwong was selected as vice-chair of IOC in June, 2015 in Paris

Prof. Somkiat Khokiattiwong, one of the steering committee member of OFS and the chair of SEAGOOS, was elected as vice-chair of IOC during the 28th Session of the Assembly in June 2015.

>> Prof. Fangli Qiao received Wooster Award of PICES on Oct 20, 2014

At the 2014 PICES Annual Meeting in Yeosu, it was announced that Prof. Fangli Qiao (First Institute of Oceanography State Oceanic Administration, Qingdao) was the recipient of the 14th annual Wooster Award.

Related Websites

>> Intergovernmental Oceanographic Commission

>> IOC Sub-Commission for the Western Pacific (WESTPAC)

>> New Version of Ocean Forecasting System

国家海洋局第一海洋研究所 THE FIRST INSTITUTE OF OCEANOGRAPHY, SOA

PHUKET MARINE BIOLOGICAL CENTER

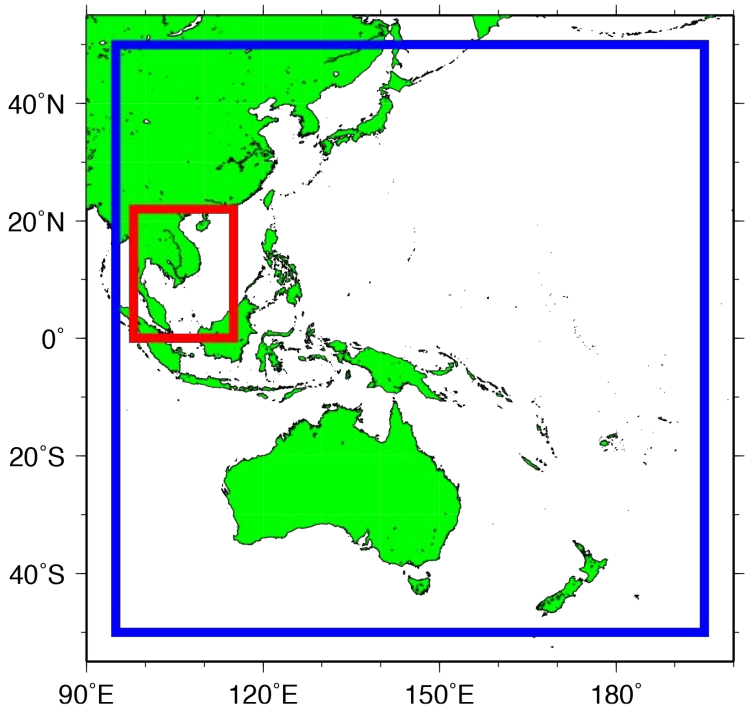
Universiti Kebangsaan Malaysia

Assimilation System for Southeast Asian Coastal Waters (JAXA-JAMSTEC-Nagoya Univ.)

Ohishi, Hihara, Miyazawa, Aiki, Ishizaka, Kachi

Model: (Mellor 2004; Jordi and Wang 2012)

sbPOM (the Stony Brook Parallel Ocean Model)



Resolution and Lateral Boundary:

1/36° x 47 layers Daily one-way nest

1/12° x 47 layers

SODA (Simple Ocean Data Assimilation)

monthly climatology (Carton et al. 2000)

Atmospheric forcing:

JRA55 (Japanese 55-year reanalysis) (Kobayashi et al. 2015) +

GSMaP (Global Satellite Mapping of Precipitation) (Okamoto et al. 2005)

River discharge:

CaMa-Flood (Catchment-based Macro-scale Floodplain) / GSMaP

Spin-up period: 2011.01.01 – 2015.07.07

Assimilation Scheme:

LETKF (Local Ensemble Transform Kalman Filter) (Hunt et al. 2007; Miyoshi et al. 2010)

Ensemble member: 20, Time interval: 1day

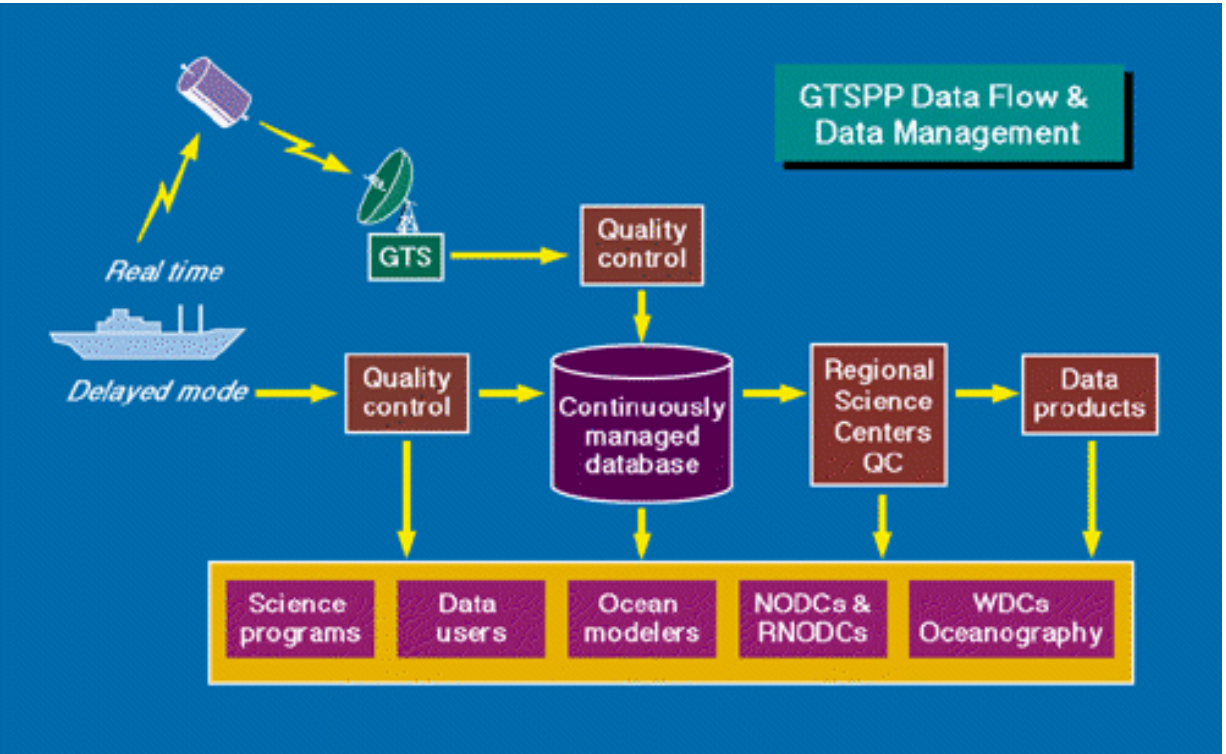
Assimilation Data:

Temperature/Salinity profiles

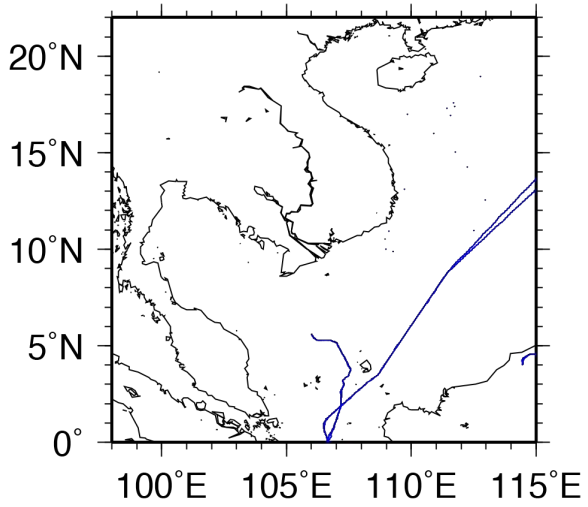
GTSPP (Global Temperature and Salinity Profile Programme, Sun et al. 2010) and

AQC Argo (Advanced automatic QC Argo, JAMSTEC)

Australia
Canada
France
Germany
Japan
Russia
United States



2015.8–2016.12



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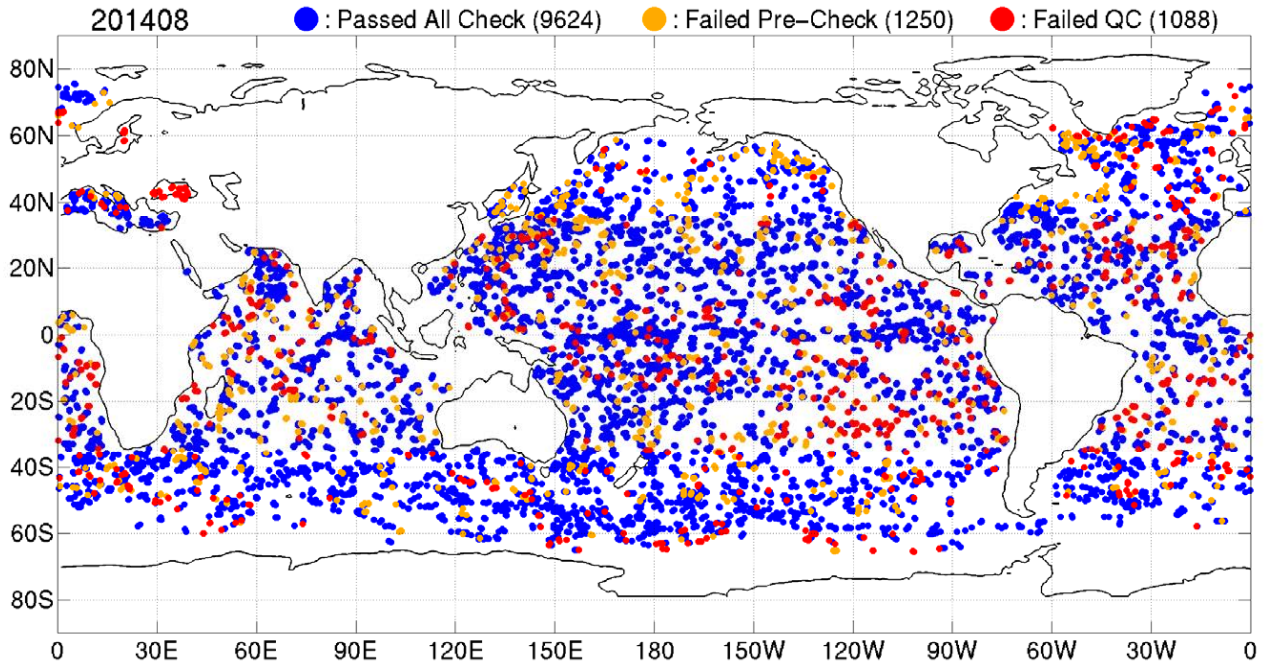
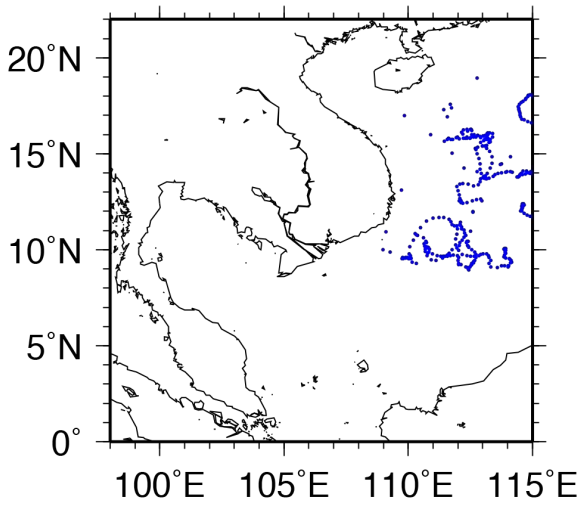


2015.8–2016.12



Assimilation Data:

Temperature/Salinity profiles

GTSPP (Global Temperature and Salinity Profile Programme, Sun et al. 2010) and

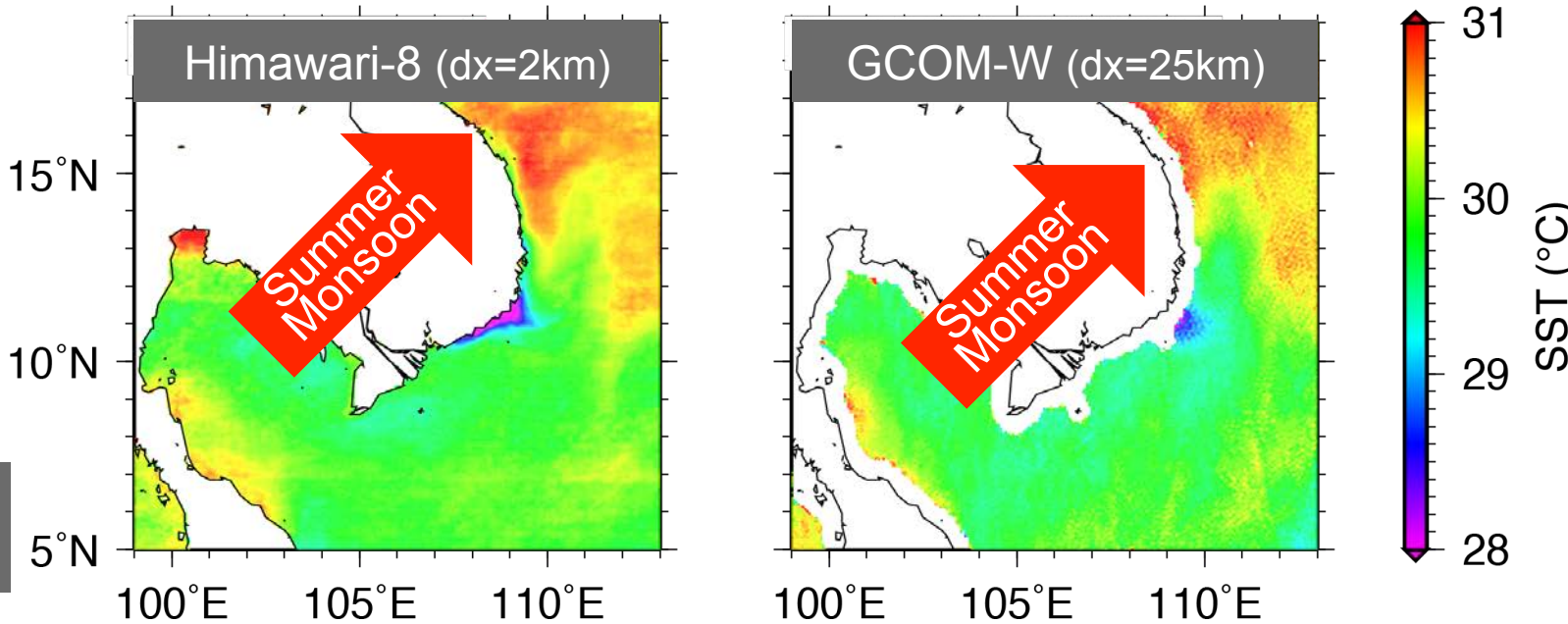
AQC Argo (Advanced automatic QC Argo, JAMSTEC)

Sea Surface Temperature

Himawari-8 geostationary weather satellite (infrared sensor: cloud-mask, JAXA) and

GCOM-W (Global Change Observation Mission - Water) polar-orbital satellite

(microwave sensor: cloud-free, JAXA)



Monthly SST in 2015.08

Assimilation Scheme:

LETKF (Local Ensemble Transform Kalman Filter) (Hunt et al. 2007; Miyoshi et al. 2010)

Ensemble member: 20, Time interval: 1day

Assimilation Data:

Temperature/Salinity profiles

GTSPP (Global Temperature and Salinity Profile Programme, Sun et al. 2010) and AQC Argo (Advanced automatic QC Argo, JAMSTEC)

Sea Surface Temperature

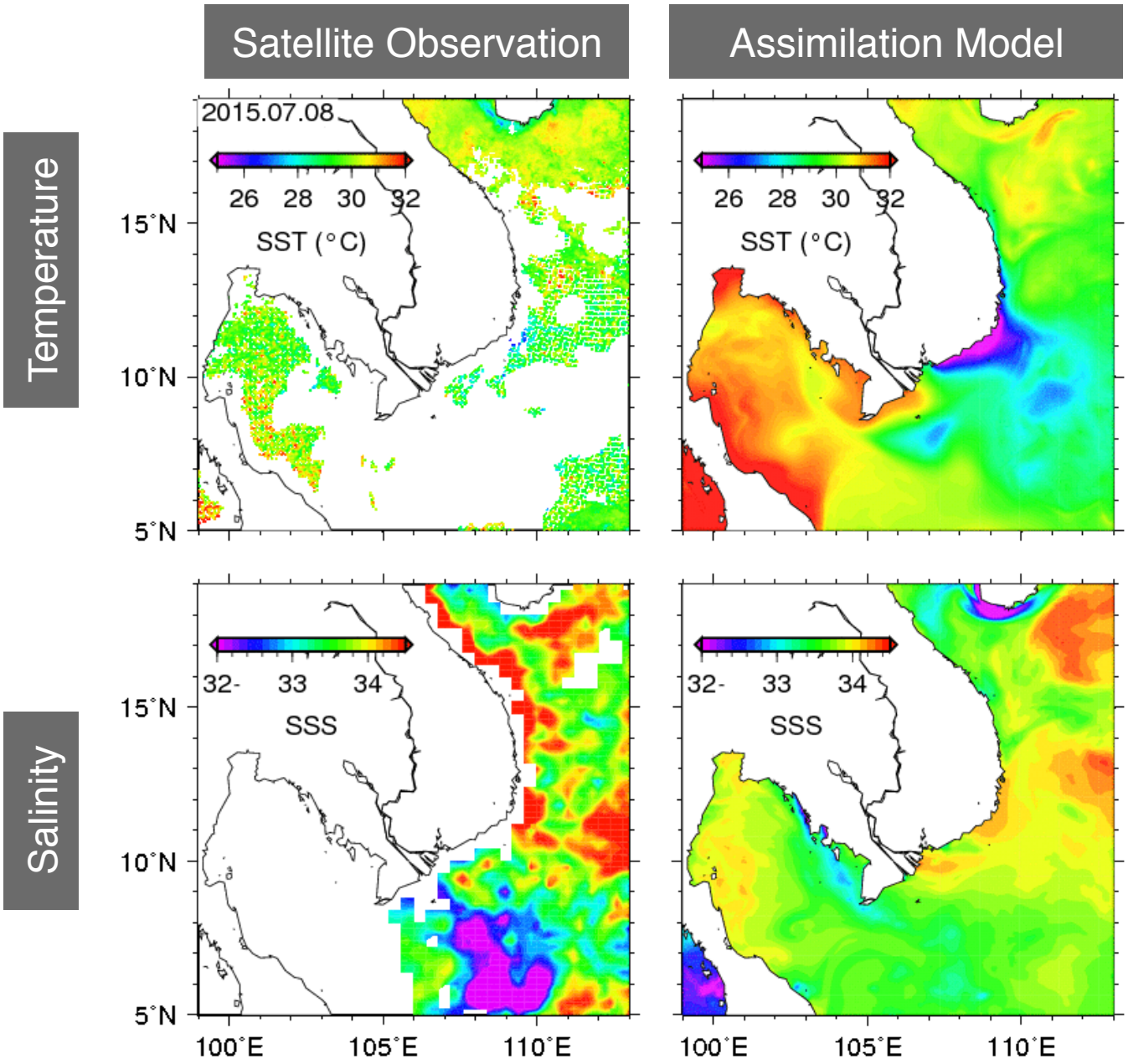
Himawari-8 geostationary weather satellite (infrared sensor: cloud-mask, JAXA) and GCOM-W (Global Change Observation Mission - Water) polar-orbital satellite (microwave sensor: cloud-free, JAXA)

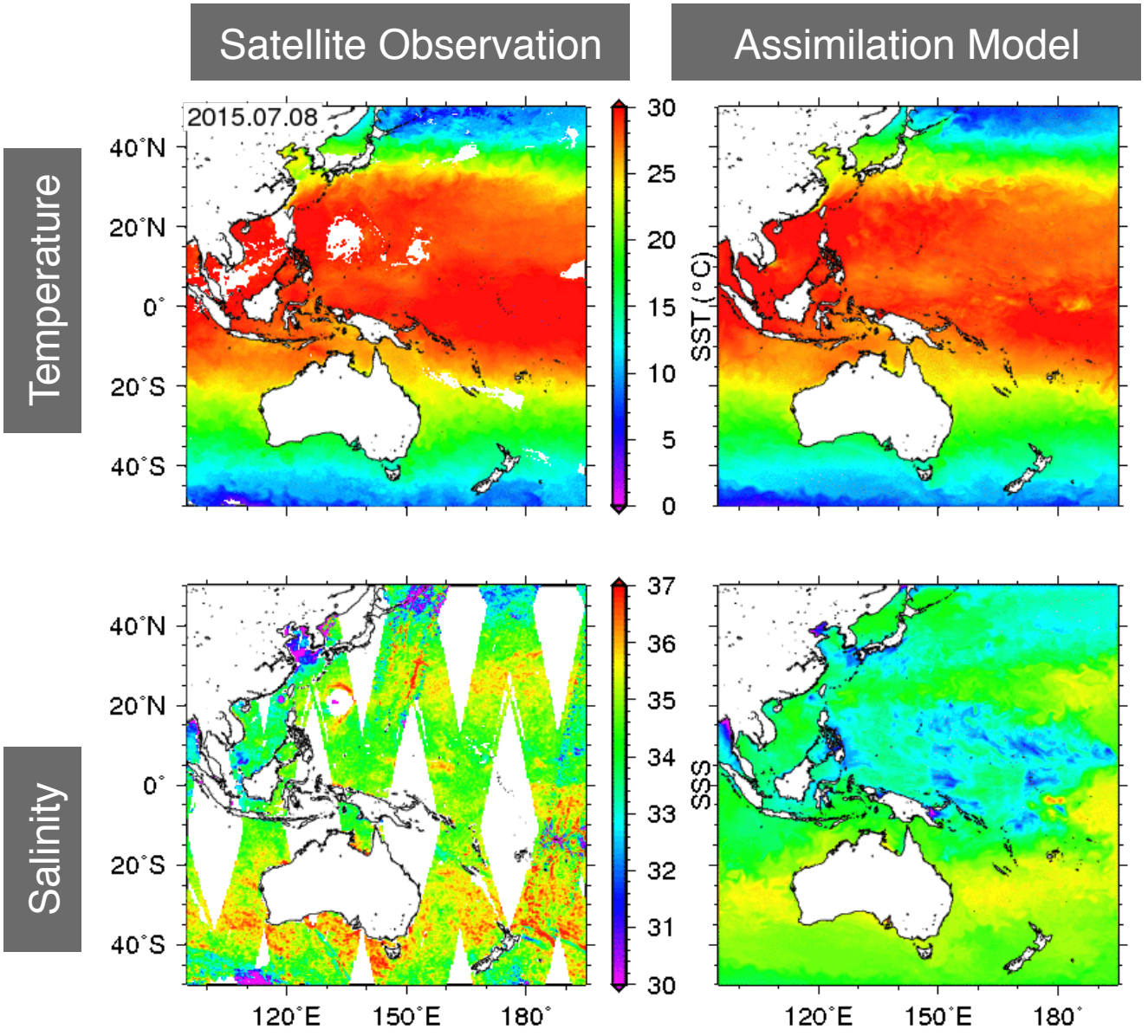
Sea Surface Salinity

SMOS (Soil Moisture Ocean Salinity) and SMAP (Soil Moisture Active Passive)

Sea Level Anomaly

CMEMS (Copernicus Marine Environment Monitoring Service)


Satellite Observation
Assimilation Model
Temperature
Salinity
2015.07.08
26 28 30 32
SST (°C)
32- 33 34
SSS
15°N
10°N
5°N
100°E
105°E
110°E


Satellite Observation
Assimilation Model
Temperature
Salinity
2015.07.08
40˚N
20˚N
0˚
20˚S
40˚S
120˚E
150˚E
180˚
30
25
20
15
10
5
0
SST (°C)
37
36
35
34
33
32
31
30
SSS

Coastal physical data from satellite and assimilation

Assimilation System for Southeast Asian Coastal Waters (JAXA-JAMSTEC-Nagoya Univ.)

Ohishi, Hihara, Miyazawa, Aiki, Ishizaka, Kachi

Discrete / Sparse Observational Data

→ Continuous Reanalysis/Forecast Data

Assimilation Data:

Temperature/Salinity profiles

GTSPP (Global Temperature and Salinity Profile Programme,
Australia, Canada, France, Germany, Japan, Russia, United State)

and AQC Argo (Advanced automatic QC Argo, JAMSTEC)

Sea Surface Temperature

Himawari-8 geostationary weather satellite (infrared sensor: cloud-mask, dx=2km JAXA)

and

GCOM-W (Global Change Observation Mission - Water) polar-orbital satellite

(microwave sensor: cloud-free, dx=25km, JAXA)

Coastal physical data from satellite and assimilation

Assimilation System for Southeast Asian Coastal Waters (JAXA-JAMSTEC-Nagoya Univ.)

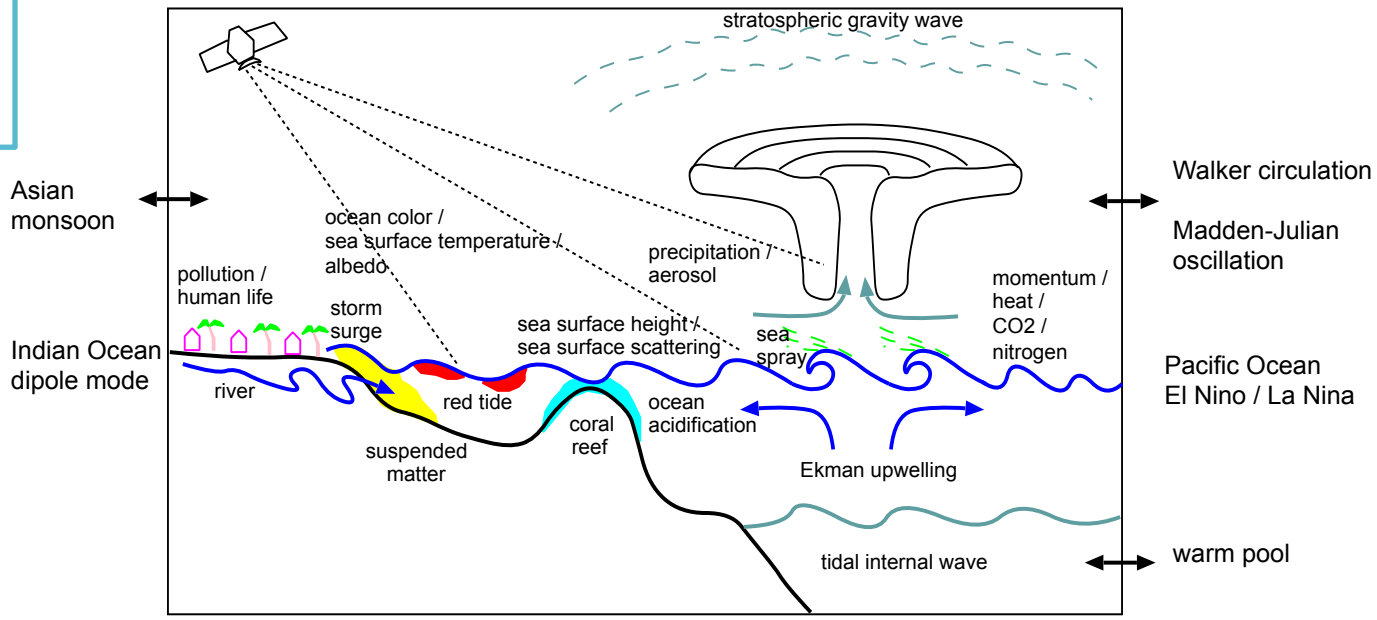
Ohishi, Hihara, Miyazawa, Aiki, Ishizaka, Kachi

Discrete / Sparse Observational Data

→ Continuous Reanalysis/Forecast Data

To be coupled with
marine ecosystem model
land-river model

How to assimilate
satellite ocean color?



Marine Environment
(pollution, flood, storm surge, sea level rise, coral reef, HAB, fishery)