

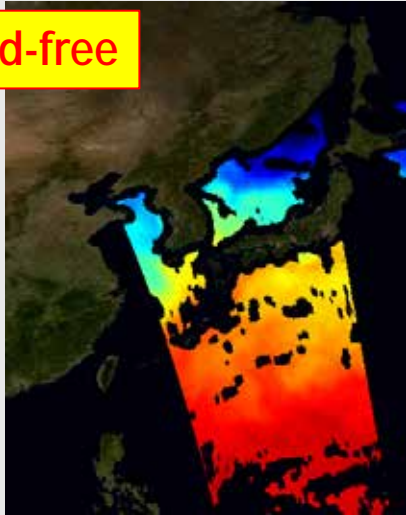
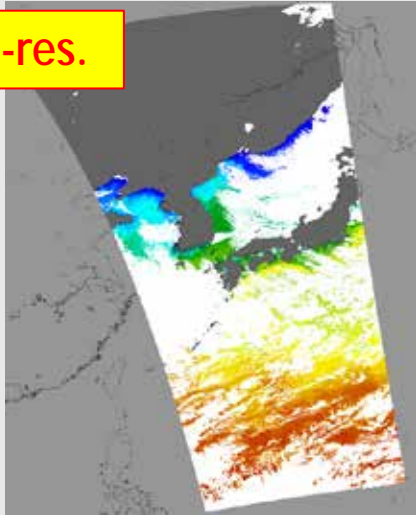
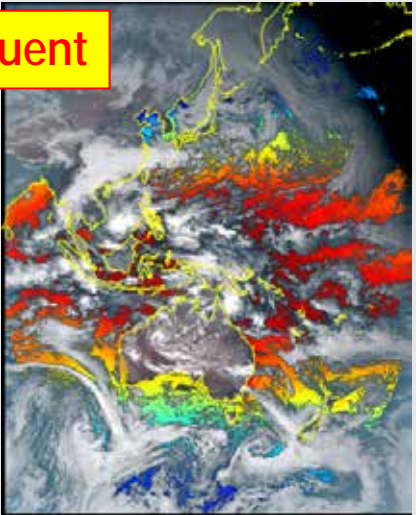
# Latest Improvements and Future Plans of the JAXA GHRSSST Datasets of MW, LEO-IR and GEO-IR

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2) Remote Sensing Technology Center of Japan (RESTEC)

# SST Observations by MW, LEO-IR, GEO-IR

Category	Low Earth Orbit Passive MW Imager	Low Earth Orbit IR Imager	Geostationary IR Imager
Instrument	GCOM-W/AMSR2	GCOM-C/SGLI, Aqua/MODIS, JPSS/VIIRS	Himawari-8/AHI
Horizontal resolution	AMSR2: 30-60km	SGLI: 250m, MODIS: 1km, VIIRS: 750m	Himawari-8: 2km
Temporal resolution	1-2 per day (mid-latitude)	1-2 per day (mid-latitude)	2.5min (Japan) /10min (full-disc)
Coverage	Global (including Polar region)	Global (including Polar region)	1/3 of surface (except Polar region)
Under cloud	Can observe except rainfall	Cannot observe	Cannot observe
Sample images (04Z on 11 Jan. 2017)	<p><b>Cloud-free</b></p> 	<p><b>High-res.</b></p> 	<p><b>Frequent</b></p> 

# List of the JAXA GHRSSST Datasets

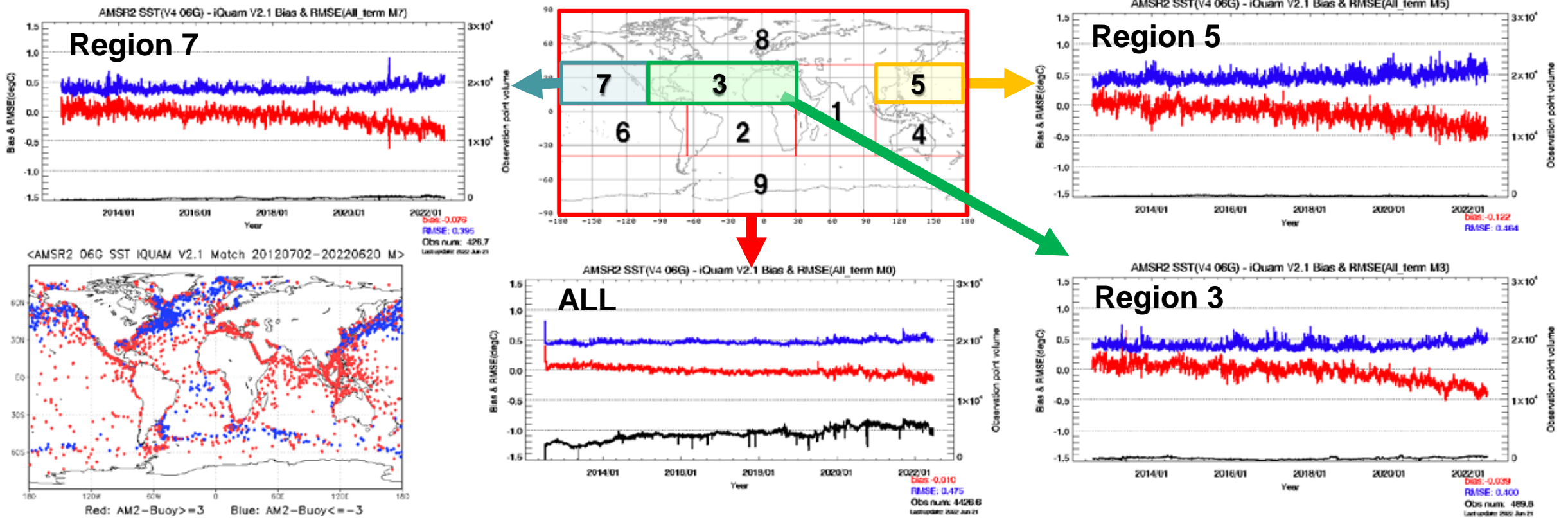
Satellite/ Sensor	Processing Type	Product	Archive Period	Latency	Version	URL
Aqua/ AMSR-E	Standard	L2P	from June 2002 to October 2011	N/A	Ver.8	 <p><b>GHRSSST</b> GROUP FOR HIGH RESOLUTION SEA SURFACE TEMPERATURE</p> <p>JAXA GHRSSST server  <a href="https://suzaku.eorc.jaxa.jp/GHRSSST/">https://suzaku.eorc.jaxa.jp/GHRSSST/</a></p>
		L3C				
GCOM-W/ AMSR2	Near RealTime	L2P	latest 7 days (10GHz SST is available from V3.0.)	4 hours	Ver.4.0 (to be updated to Ver.4.1 soon)	
		L3C				
	Standard	L2P	from 3 July 2012 to present (10GHz SST is available from V3.0.)	1 day		
		L3C				
GPM /GMI	Near RealTime	L2P	latest 7 days	4 hours	Ver.5 (updated in May 2022)	
		L3C				
	Standard	L2P	from 4 March 2014 to present	1 day		
		L3C				
Coriolis/ WindSat	Near RealTime	L2P	from 3 August 2011 to 19 October 2020	N/A	Ver.8	
		L3C				
GCOM-C/ SGLI	Near RealTime	L2P	1km: from 1 January 2020 to present 250m: latest 7 days	1 day	Ver.3000	
Himawari-8/ AHI	Near Realtime	L2P	latest 4 days	25 minutes	Ver.2.0	JAXA Himawari Monitor <a href="https://www.eorc.jaxa.jp/ptree/">https://www.eorc.jaxa.jp/ptree/</a>
		L3C				
	Standard	L2P	from 7 July 2015 to present	4 days		
		L3C				



# Update of GCOM-W/AMSR2 SST (1/2)

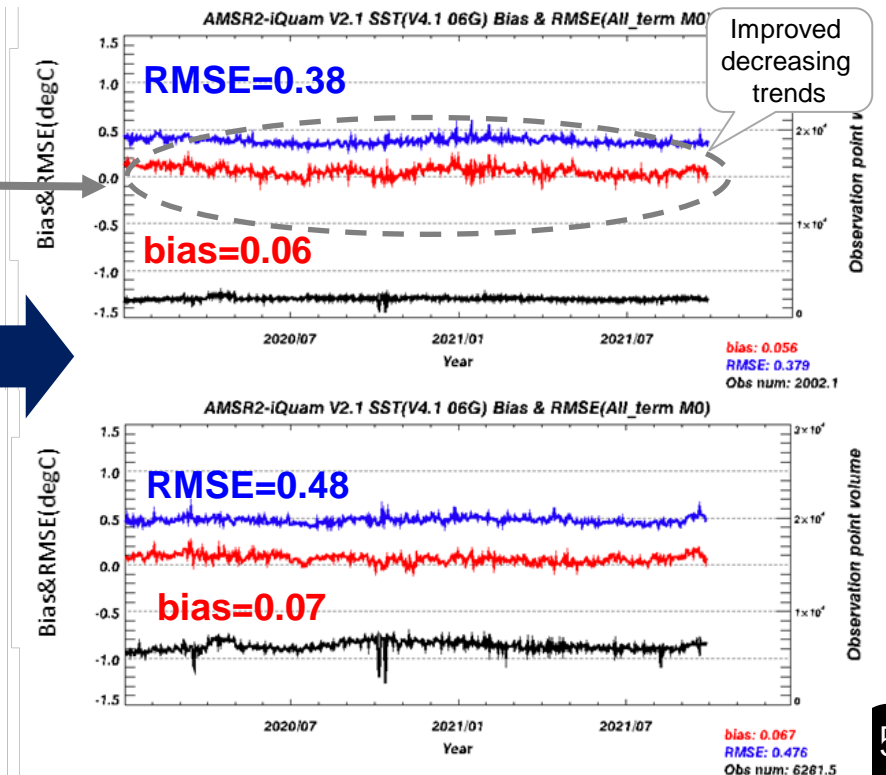
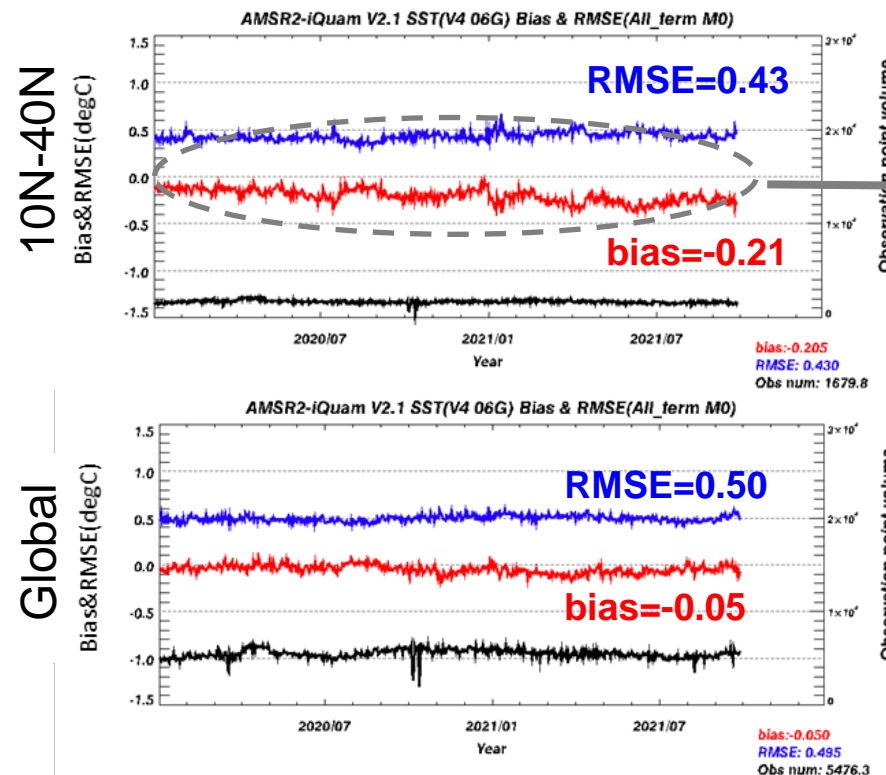
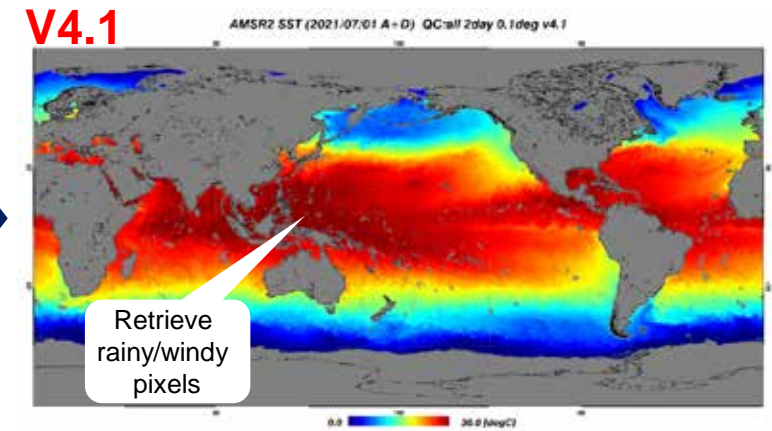
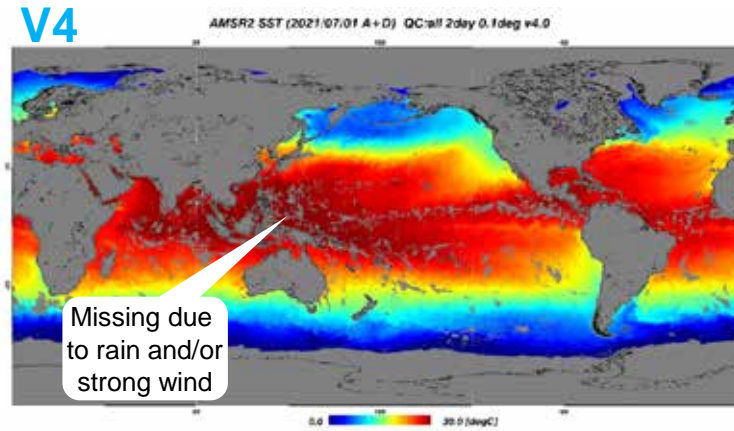
- Current AMSR2 6GHz SST ver.4.0 (released in Oct. 2020) has decreasing trends versus drifting buoys (iQuam V2.1) in the Northern sub-tropics since 2019.
  - No trends in 10GHz & multi-band SSTs
- It may be due to overcorrection of positive trends found in 6GHz TB since the launch.

[https://suzaku.eorc.jaxa.jp/cgi-bin/gcomw/validation/gcomw\\_validation\\_ssti1.cgi](https://suzaku.eorc.jaxa.jp/cgi-bin/gcomw/validation/gcomw_validation_ssti1.cgi)



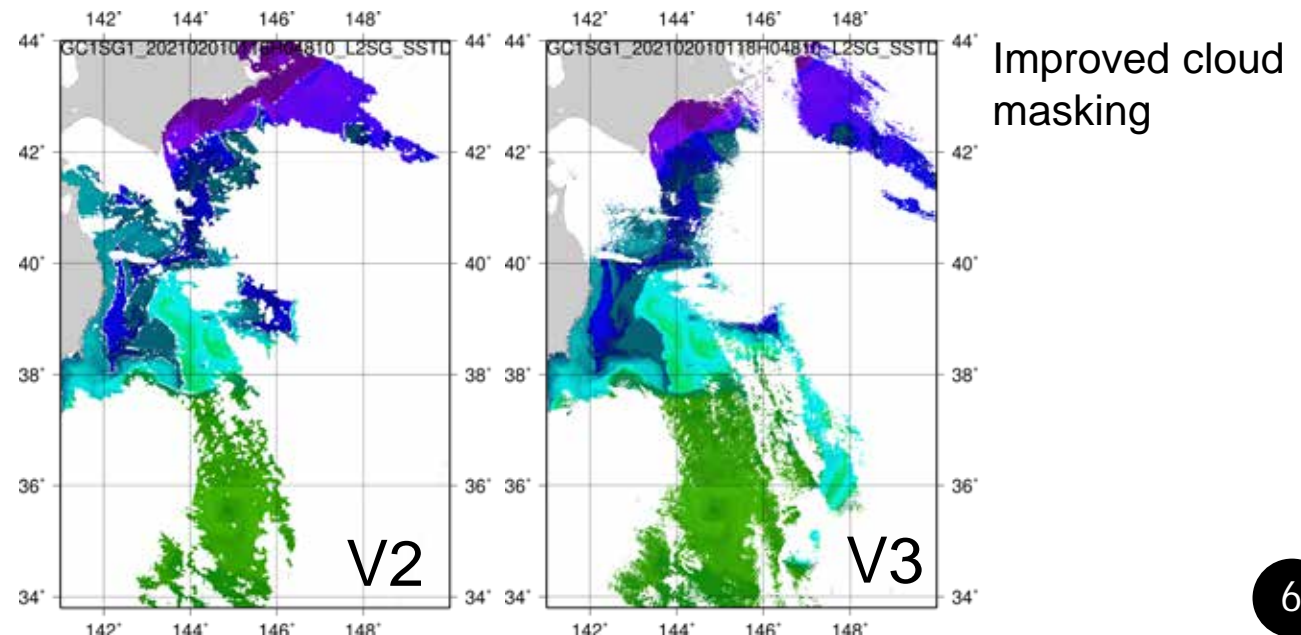
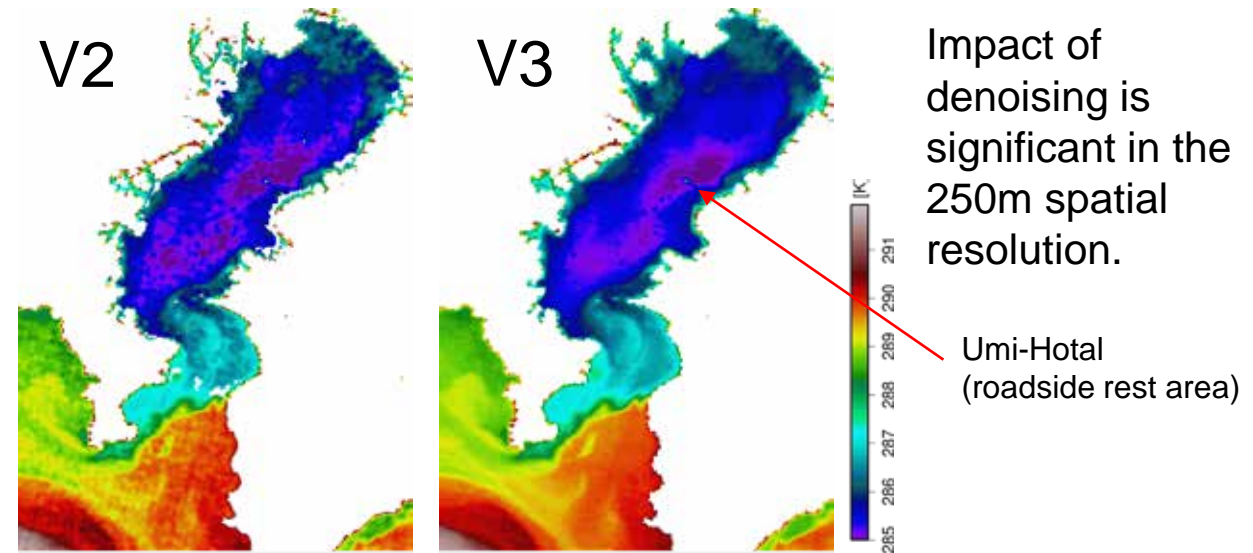
# Update of GCOM-W/AMSR2 SST (2/2)

- Improvements in Ver.4.1 are;
  - more detailed calculation of land emission;
  - modified wind correction to retrieve SST over windy region;
  - modified atmospheric correction to retrieve SST over weak rain region;
  - correction of TB trends; and
  - revision of RFI detection method.
- In Ver.4.1;
  - less missing area due to retrieval of windy/rainy pixels with “acceptable quality”;
  - improved RMSE and bias in 10N-40N regions; and
  - nearly equal accuracy in global compared to V4.0.
- To release **Ver.4.1 in the end of July**



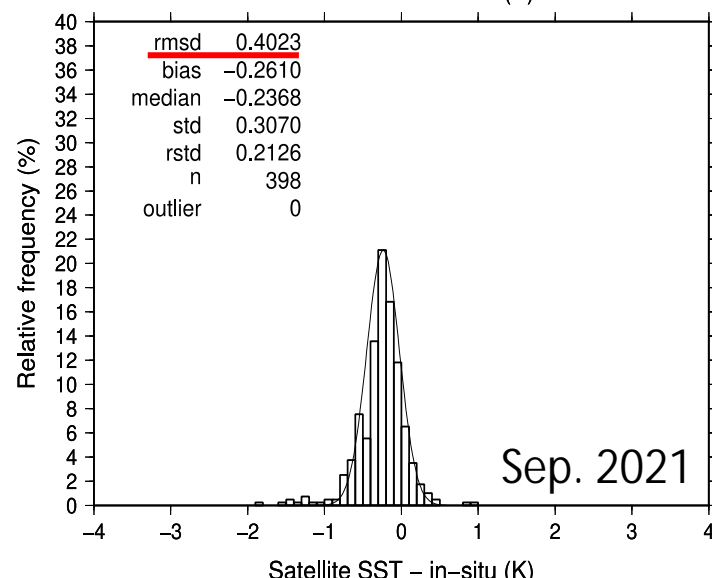
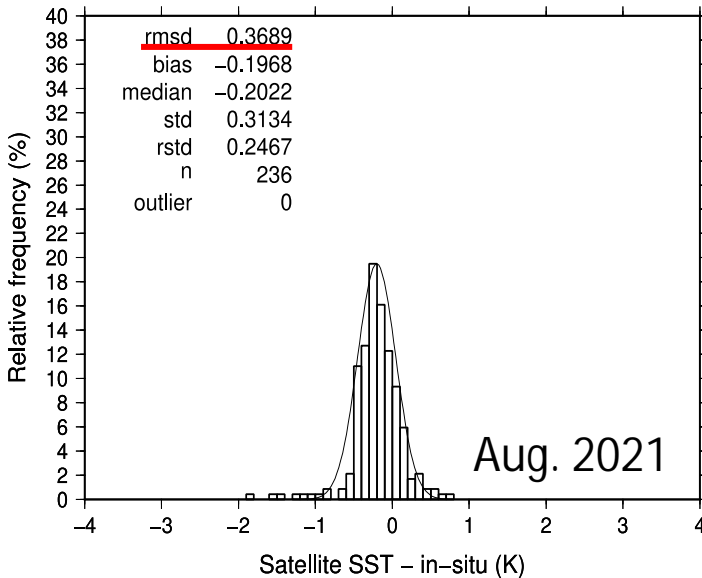
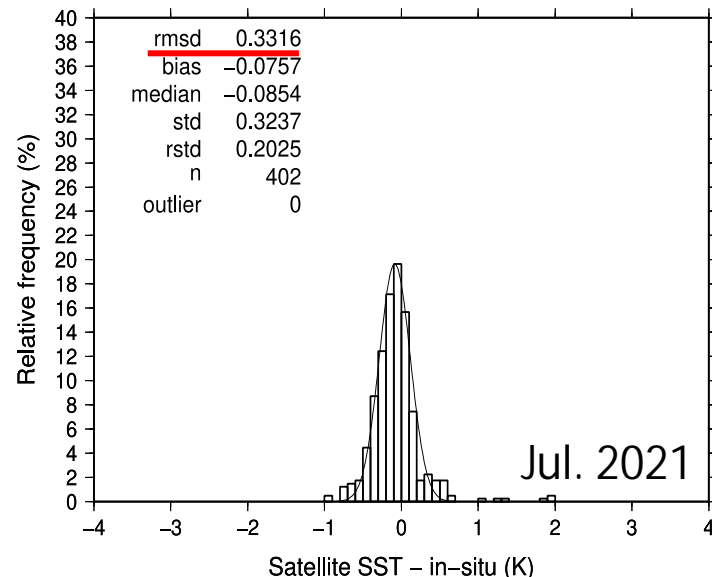
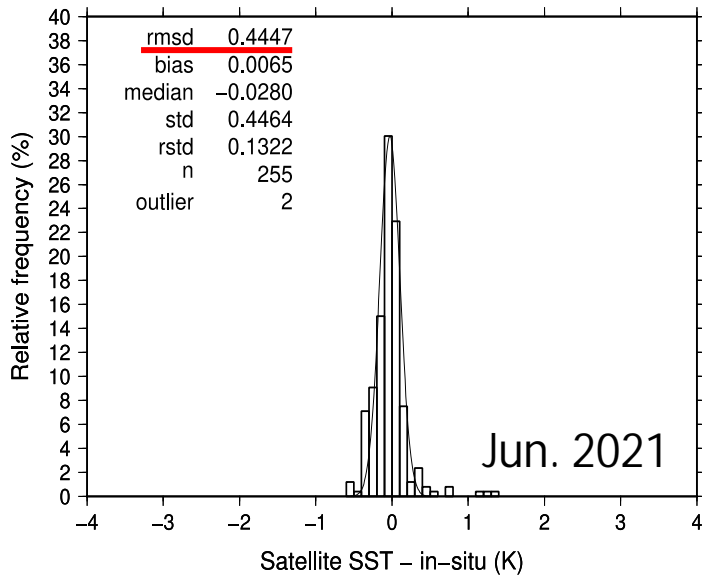
# Update of GCOM-C/SGLI SST (1/2)

- SGLI SST V3 was **released in Nov. 2021**.
- Improvements in V3 are;
  - stripe- and random-noises by introducing a new split-window data filter;
  - daytime cloud masking above turbid waters by using 1.6  $\mu\text{m}$  data, around SST fronts by improved SST front detection, and above inland waters by using NDWI;
  - nighttime cloud masking by changing the quality level classification and thresholds; and
  - no change on the SST method (Q-method).
- Quality monitor is available;
  - [https://suzaku.eorc.jaxa.jp/cgi-bin/gcomc/validation/gcomc\\_validation\\_sst\\_iv2.1.cgi](https://suzaku.eorc.jaxa.jp/cgi-bin/gcomc/validation/gcomc_validation_sst_iv2.1.cgi)



# Update of GCOM-C/SGLI SST (2/2)

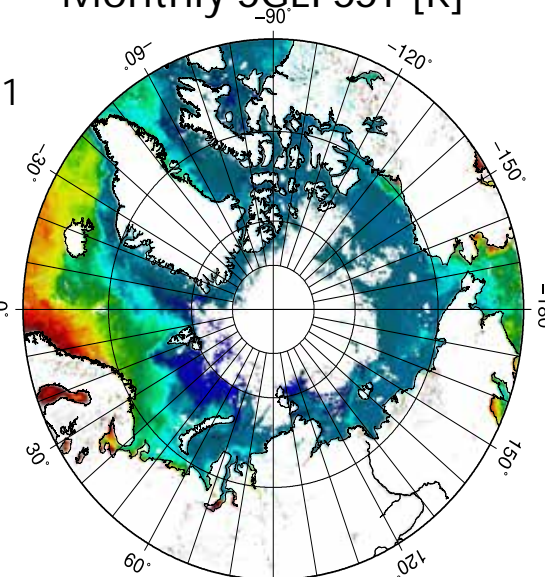
PDFs of SGLI V3 SST accuracy (satellite - buoy) in the Arctic in Jun.-Sep. 2021



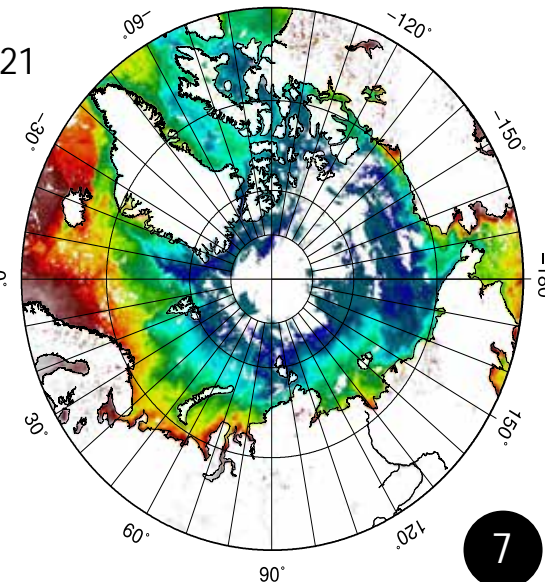
SGLI SST V3 (QL>=4) vs. buoy (Lat > 70N)

Monthly SGLI SST [K]

Jun. 2021



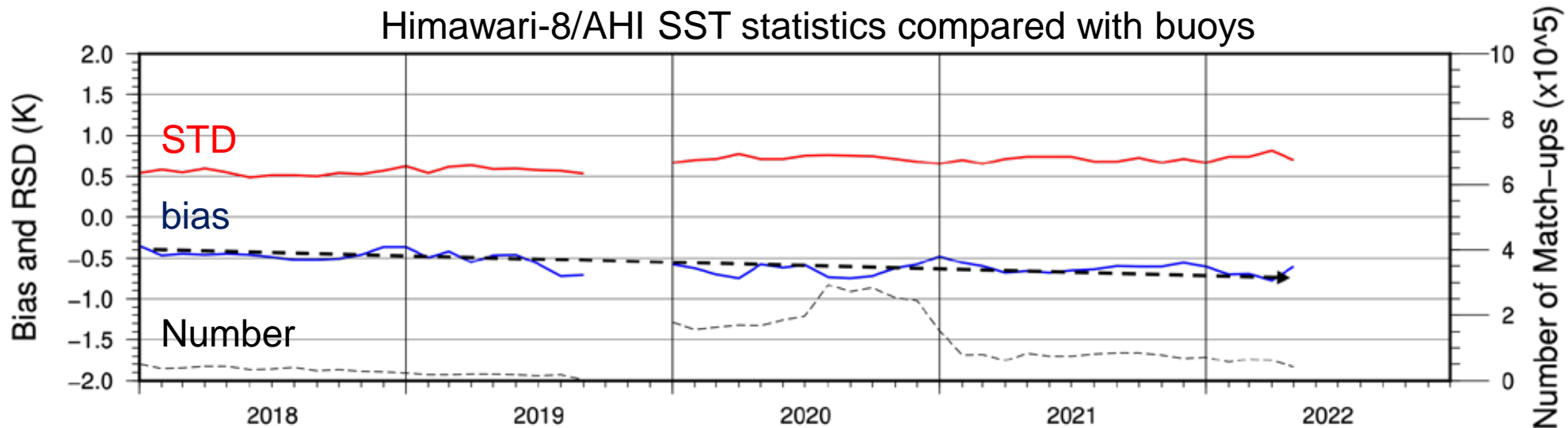
Aug. 2021





# Update of Himawari/AHI SST

- Himawari-8 SST
  - A significant long-term trend is observed in bias in Himawari-8/AHI SST.
  - This trend will be corrected in CDR after transfer from the Himawari-8 to Himawari-9 satellite.
- Himawari-9 SST
  - JMA will replace the Himawari-8 satellite to the Himawari-9 satellite in December 2022 with some overlap period.
  - JAXA plans replace Himawari-8 SST to Himawari-9 SST at the same time to continue the Himawari SST product

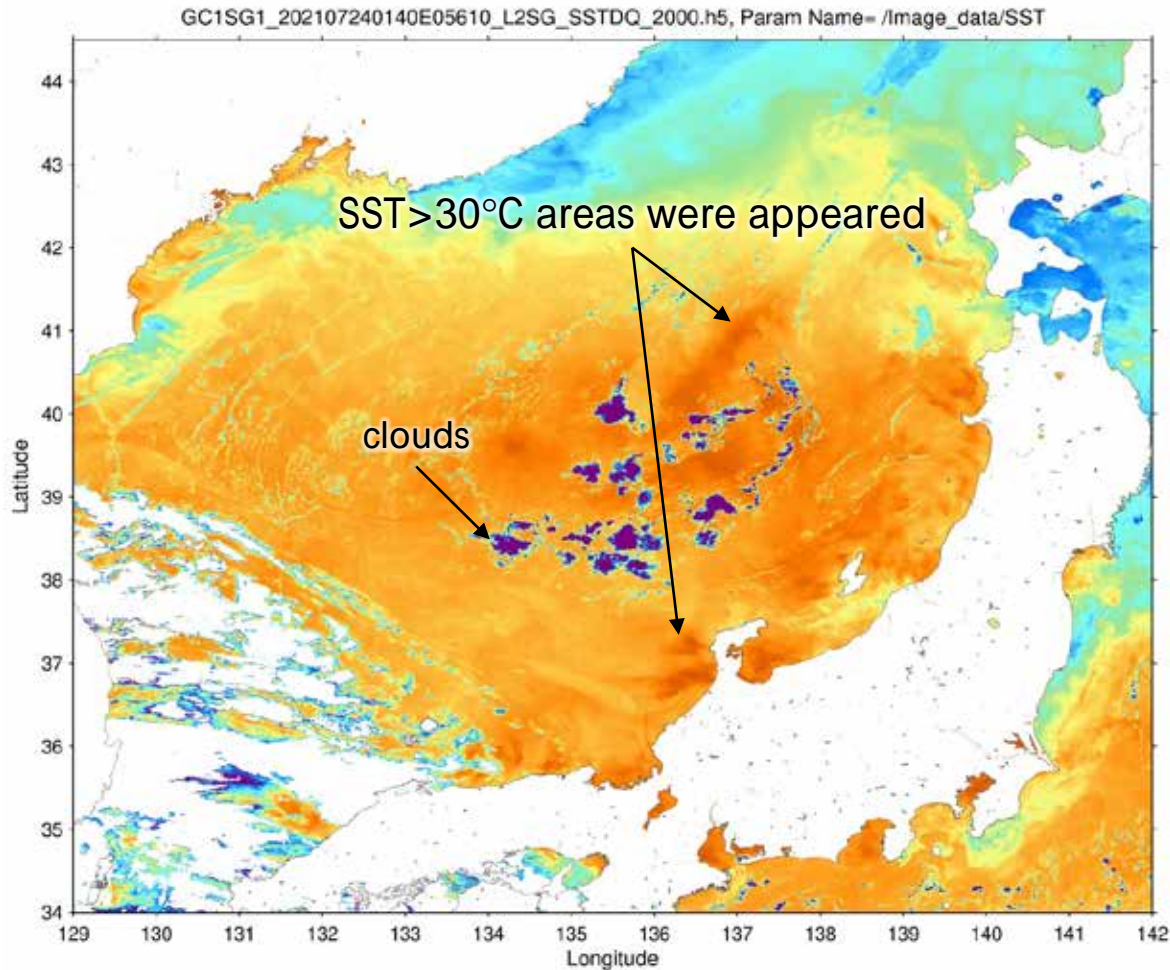


Statistics are calculated using buoy data from NOAA iQuam.

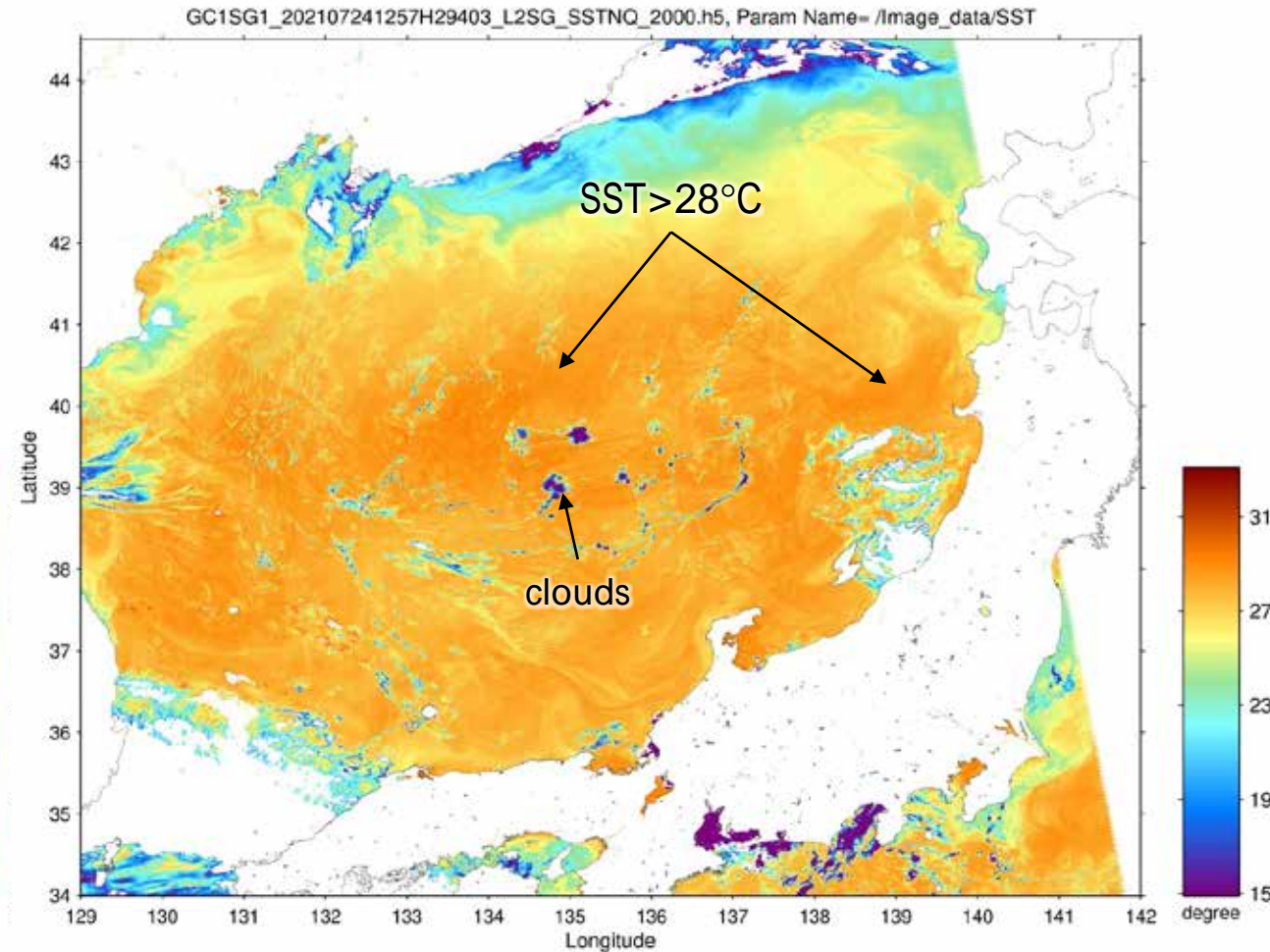


# Unusual high SST in the Japan Sea in Jul. 2021 (1/2)

SGLI sea surface temperature (SST)  
2021/07/24 01:40 UT (daytime)

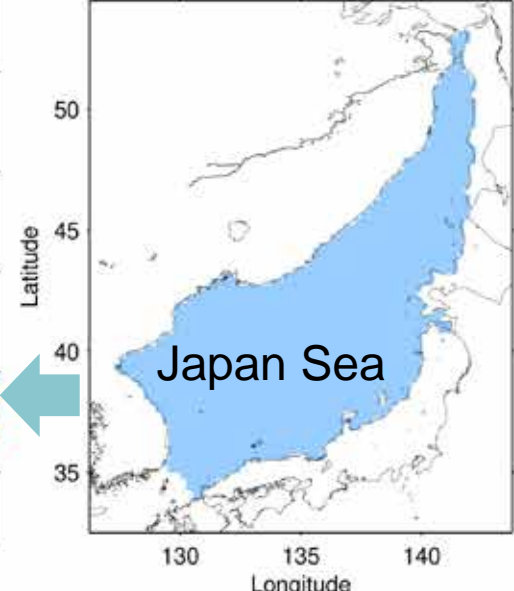
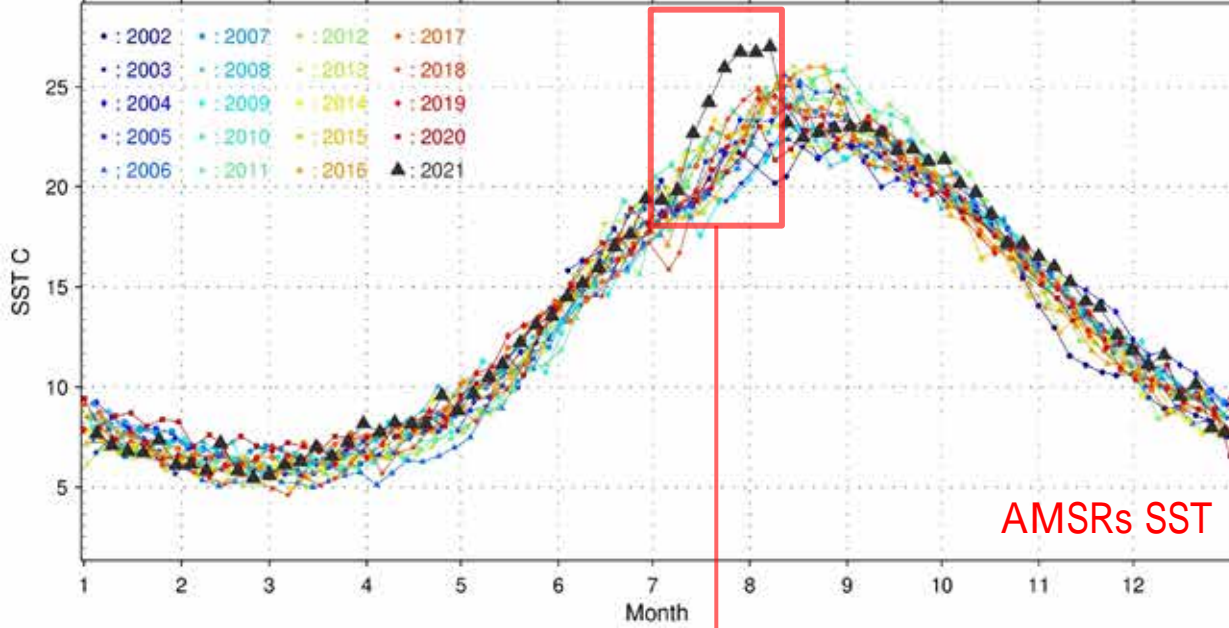


SGLI sea surface temperature (SST)  
2021/07/24 12:57 UT (nighttime)



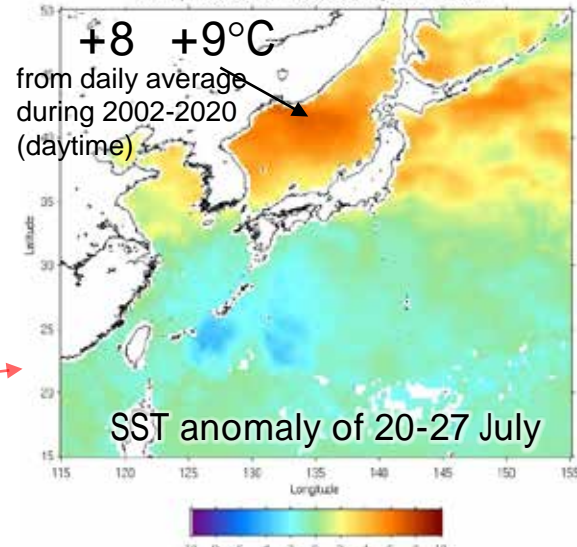
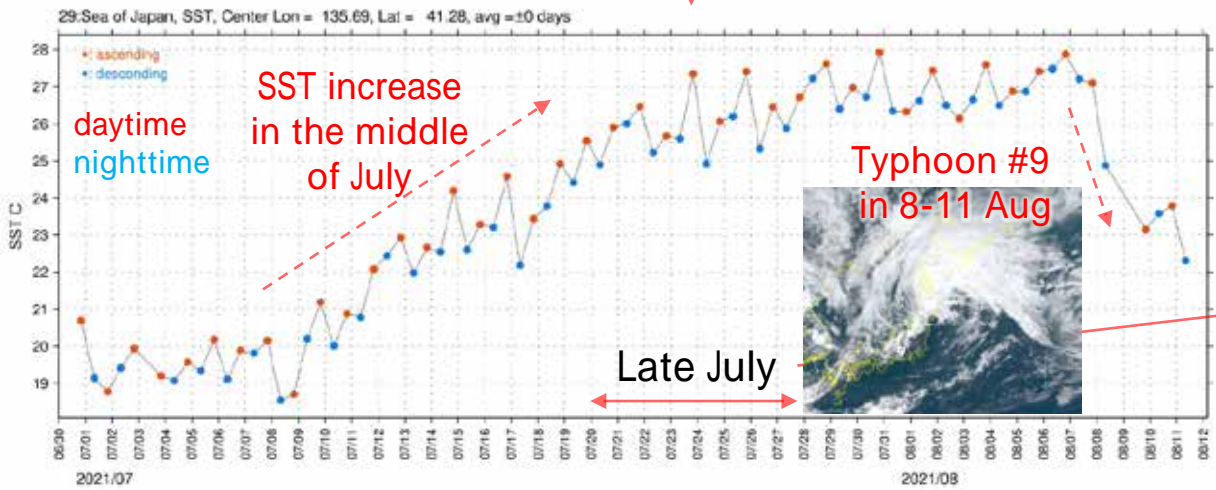
# Unusual high SST in the Japan Sea in Jul. 2021 (2/2)

AMSRs SST in 2002 2021 ( $\pm 2$  days average)



- Comparison of seasonal changes in AMSR-E & AMSR2 indicates SST in July 2021 is anomalous during the past 20-year.
- Both day & night SST increased from the middle of July and reached to peak in late July.

AMSR2 SST in 7/1-8/10 2021

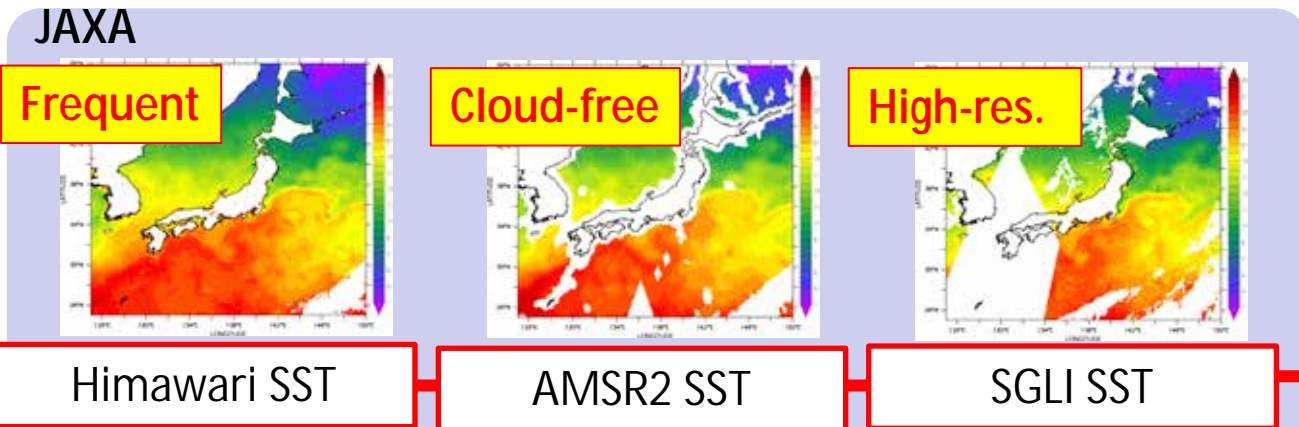
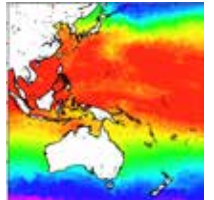
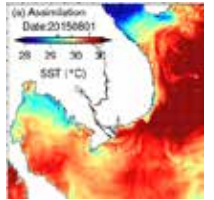


- +8~+9 degC in daytime
- Less wind & less clouds over this area in July
- When Typhoon No.9 passed the area in 8-9 Aug., SST was dropped down to normal state.
  - Temperature under skin may not be warmed up

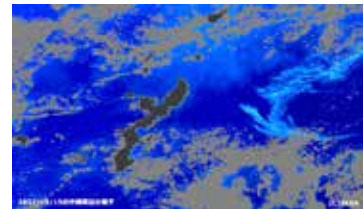
# Merging MW, LEO-IR & GEO-IR SSTs

- JAXA and JAMSTEC are developing the ocean data assimilation system to conduct **short-term forecast of ocean status**
  - Assimilating satellite SST data high-frequently
  - Output temperature, salinity, ocean currents in 46-layer and sea-level height
  - Operational processing at JAMSTEC to provide current status & forecast
  - Provide model output images and SST from JAXA Himawari Monitor

JAXA also collaborates with RIKEN to develop ocean data assimilation system on JAXA supercomputer in order to produce **long-term ocean dataset**  
Plan to distribute past period data since 2015



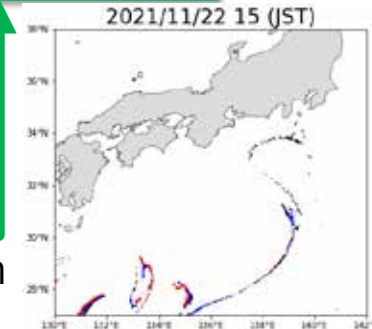
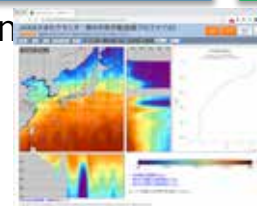
Observation of pumice stones by SGLI, ALOS-2



Demonstration at domestic fishery centers

Transfer simulation of pumice by ocean volcanic eruption

3-D ocean data in high-frequent & without missing



\*Planning higher resolution grid 1km grid, 200m downscaling

Transfer simulation by ocean model

# Summary

- JAXA produces & distributes MW, LEO-IR, and GEO-IR SSTs as GRSST Dataset.
  - Himawari/AHI SST in GDS format is available at: <https://www.eorc.jaxa.jp/ptree/>
  - Other SSTs in GDS format is available at: <https://suzaku.eorc.jaxa.jp/GHRSST/>
- AMSR2 SST
  - V4.1 will be released in the summer 2022 with improved RMSD & bias in the Northern subtropics and introduction of retrievals of windy/rainy pixels
  - Preparation for AMSR3 to be launched in JFY2023
- SGLI SST
  - V3 was released in Nov. 2021 with improved cloud masking and reduced random noises
  - There are some remained issues, including high bias under high WV, negative bias caused by aerosol or volcanic ash, and sea ice mask.
- AHI SST
  - Himawari-8 will be replaced by Himawari-9 in Dec. 2022 and resultingly AHI SST will be also replaced.
  - Current long-term trends in Himawari-8 SST will be corrected in CDR after the satellite transfer.
- Recent activities related to SSTs
  - Anomalous SST increase in the Japan Sea in Jul. 2021
  - Ocean data assimilation and its application