ADEOS-II SST and GODAE

Hiroshi Kawamura

Tohoku University
NASDA/EORC

IGOS: Integrated Global Observing Strategy (統合地球観測戦略)

Needs of Earth Observing Strategy for Global Change Monitoring

- Agenda 21
- Kyoto Protocols
- .....

CEOS/Ocean Theme and GOOS

Committee on Earth Observation Satellites

Ocean Theme

Global Ocean Observing System

GOOS, OOPC and GODAE

	1990	**2000**	Project
Open Ocean		OOPC	ARGO GODAE
Coastal Ocean	HOTO LMR C-GOOS	COOP	

GODAE: Global Ocean Data Assimilation Experiment

Integrating the present and future ocean observations, GODAE conducts the ocean forecasts during 2003-2005 to demonstrate the NEW open ocean observing system designed by OOPC

Prospectus for a GODAE SST Project (March 2000)

GODAE has a fundamental dependence of SST data and products

In particular, global perspective of GODAE demanded attention to the many gaps in present products (many not quantified) and improved representation of observational errors in data products

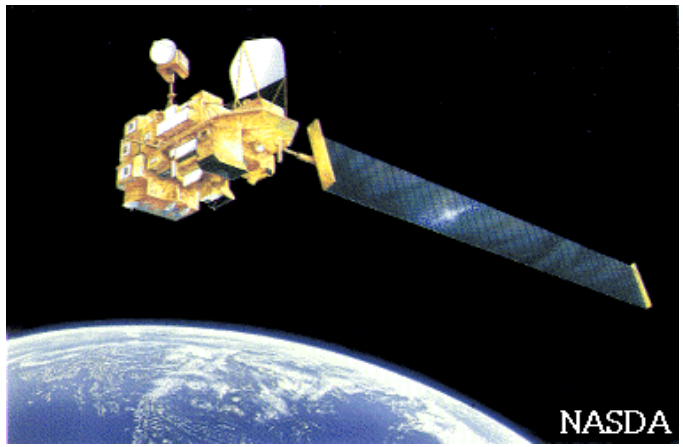
Cloud Mask for IR Measurement and Diurnal Cycling of SST (Including the Bulk-Skin Problem)

Increase its temporal and spatial resolution largely

Less than 10km and Less than 24 hours

ADEOS-II SST

ADEOS-II SST:
Combination of infrared, microwave and *in situ* SSTs (1998)



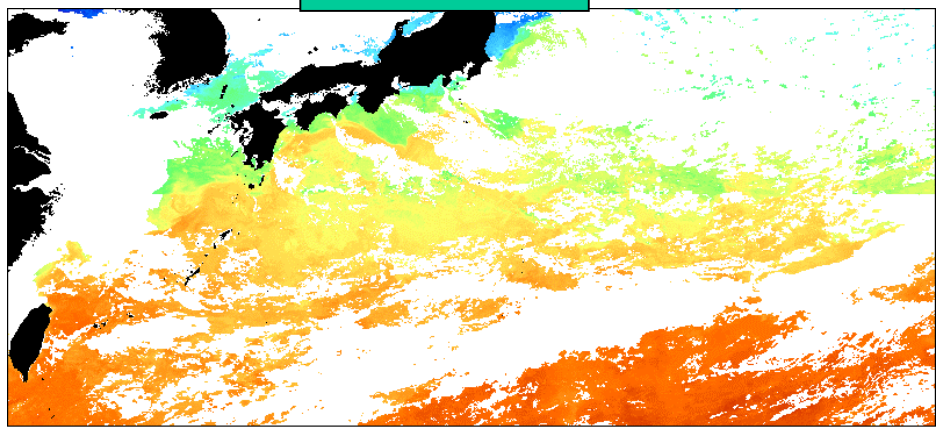
- **GLI infrared SSTs:**
  - High accuracy, fine spatial resolution, wide coverage
- **AMSR microwave SSTs:**
  - Retrieval of SSTs under clouds, wide coverage
- ***In situ* SSTs:**
  - Standard and reliable SSTs, anchor points for the satellite SSTs

SSTs of GLI and AMSR

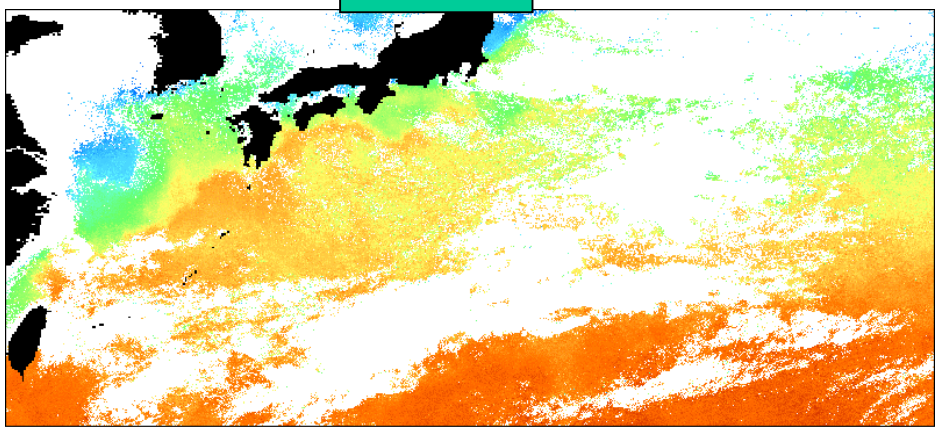
	GLI	AMSR
Spatial resolution	1km	50km
NE△T	0.1K	0.5K
SSTs under Clouds	X	O
Cloud and rain	X	X
Strong wind	O	?
Sun glitter	O	X

Comparison of Daily Mean SST Fields: 13 Feb. 2000

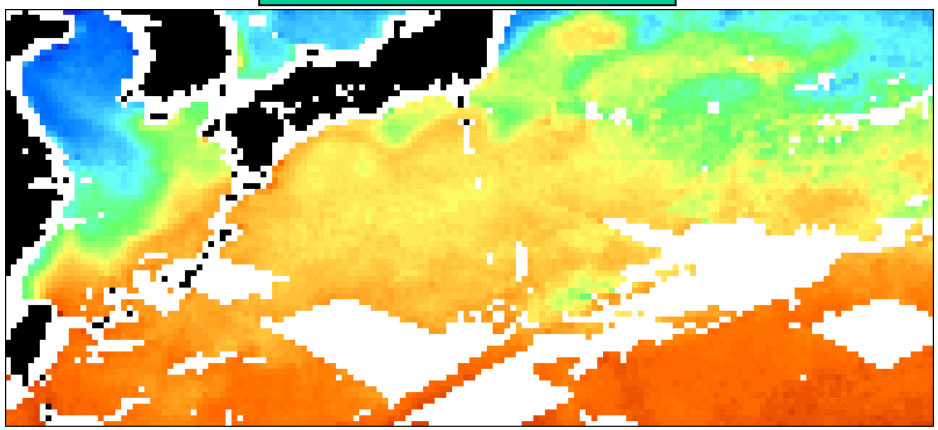
AVHRR



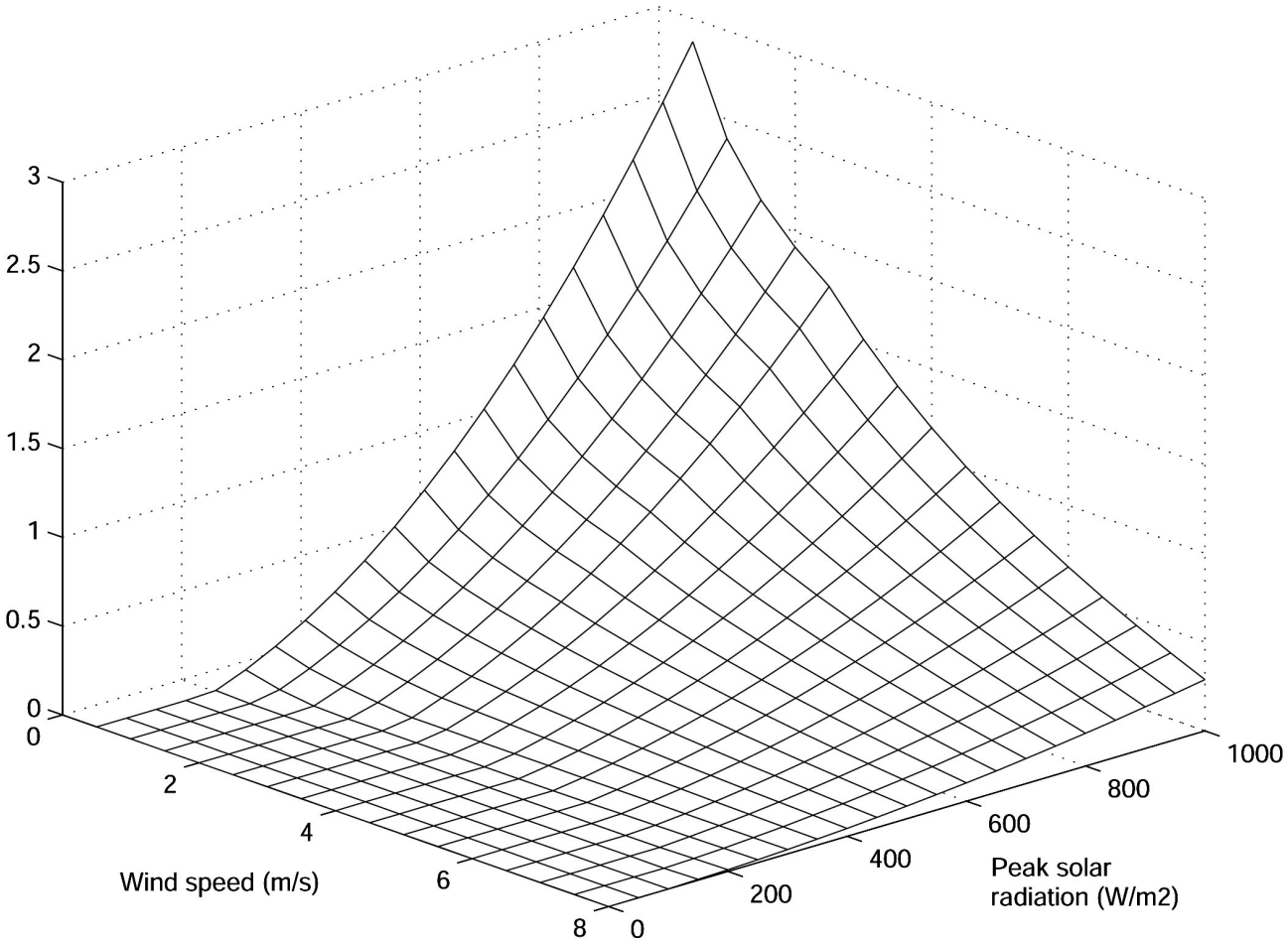
GMS



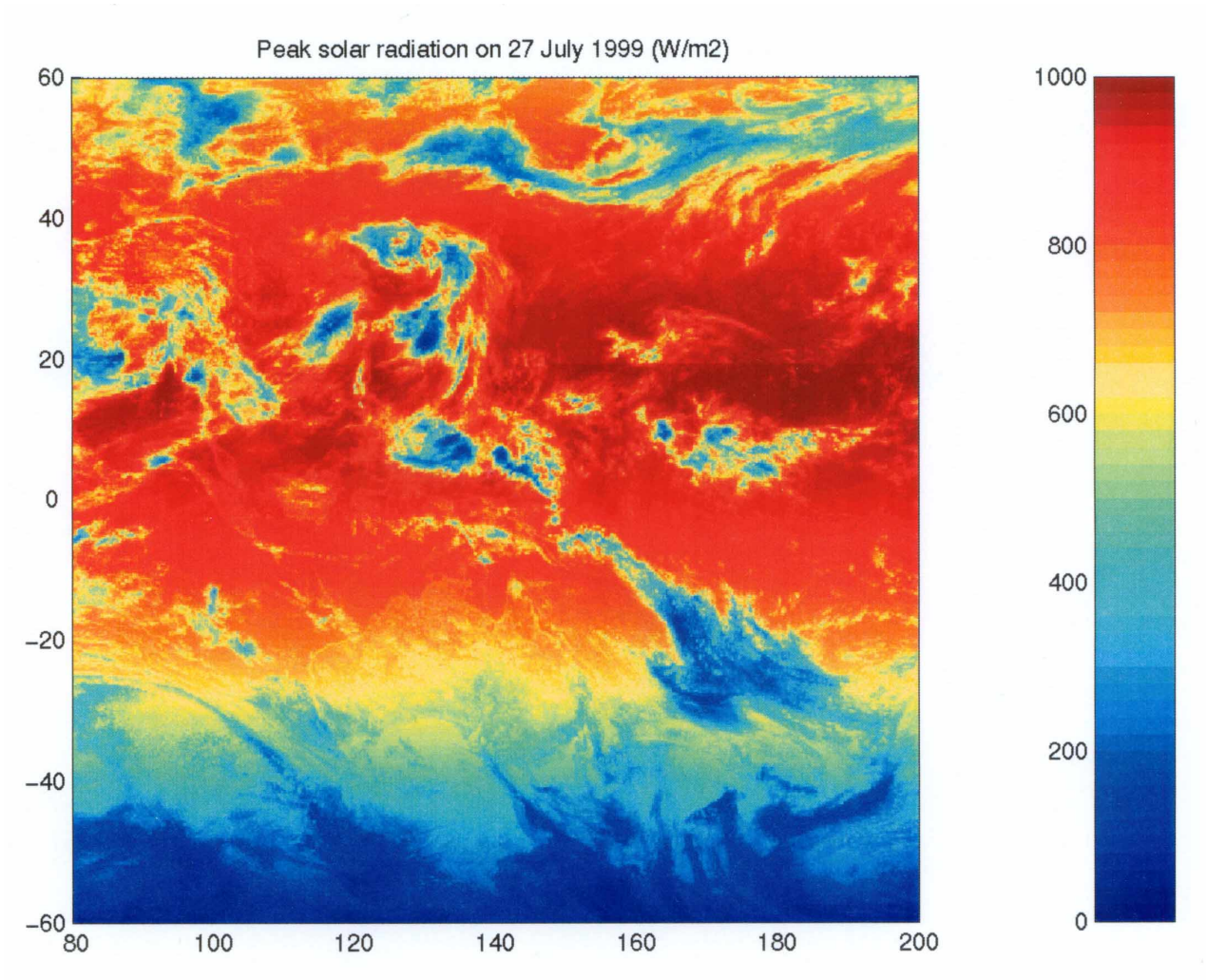
TRMM/TMI



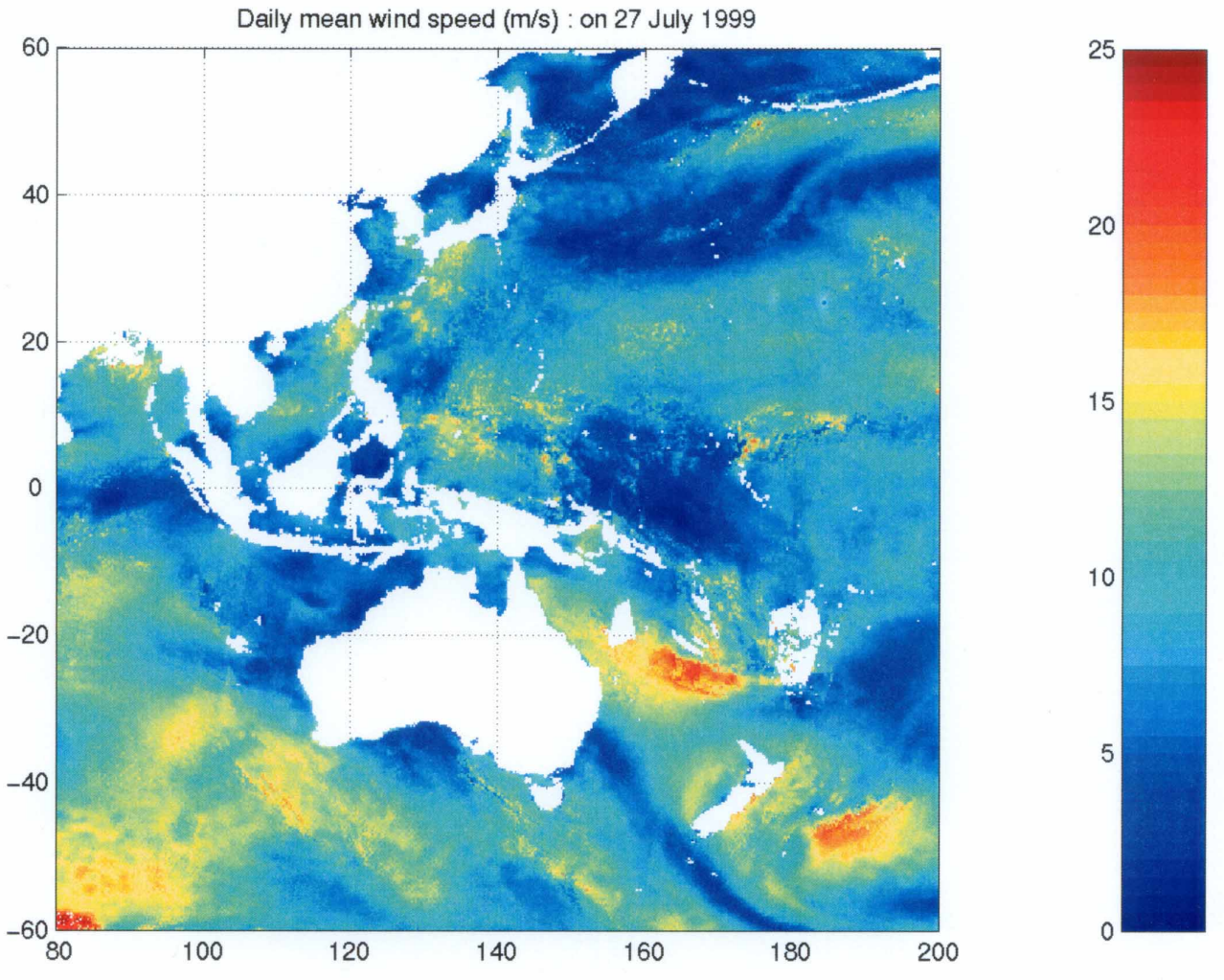
Regression equation for 1m-depth ΔSST



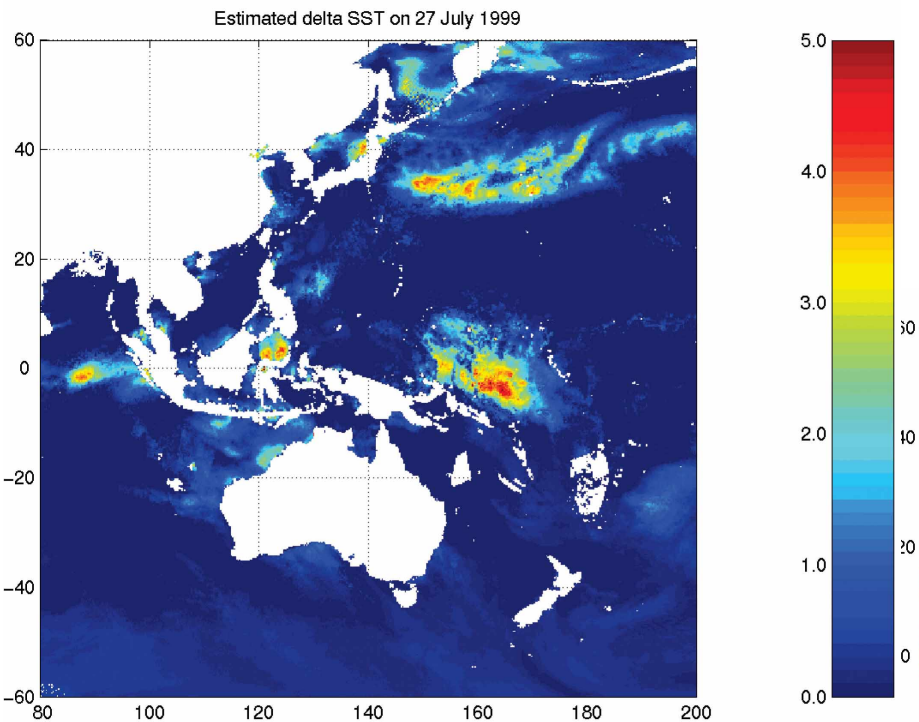
Peak solar radiation on 27 July 1999 - Produced from hourly solar radiation



Mean wind speed on 27 July 1999
- Produced from SeaWinds, TMI, SSMI

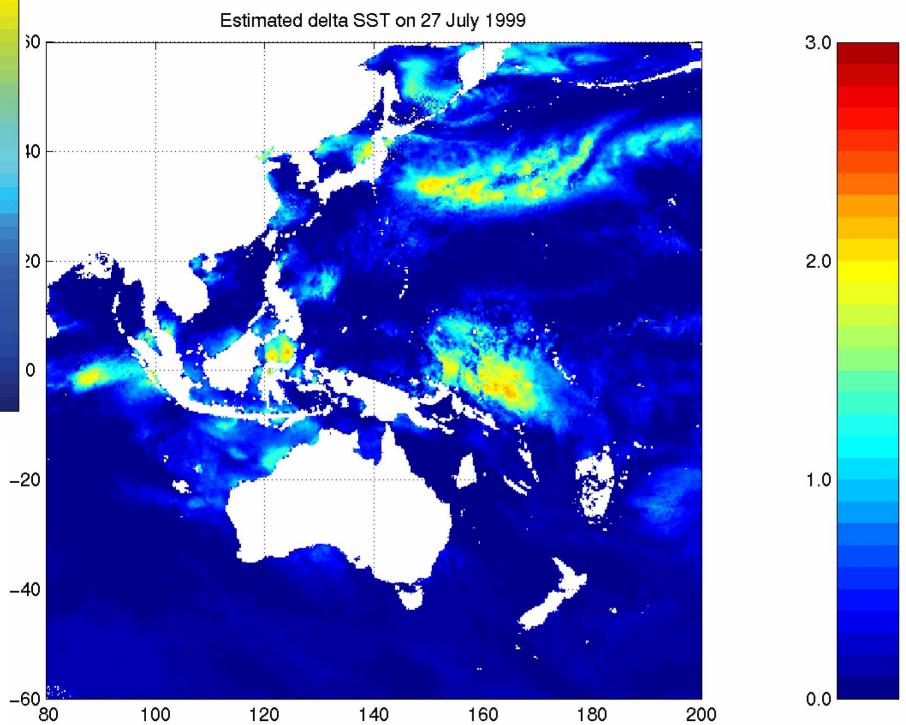


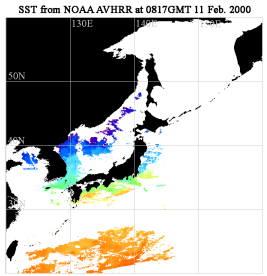
Evaluated ΔSST on 27 July 1999

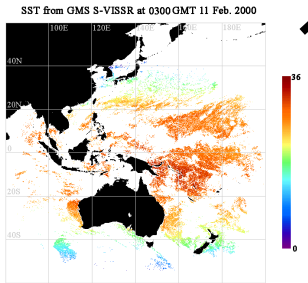


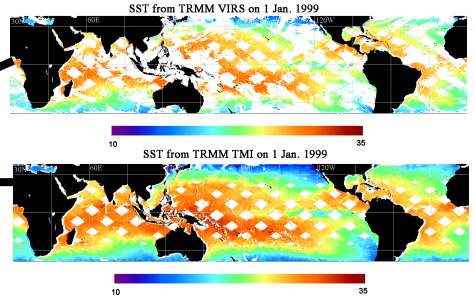
Skin

1m-depth





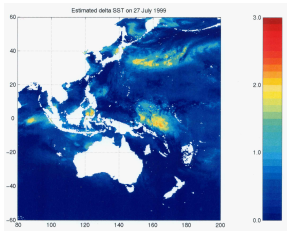


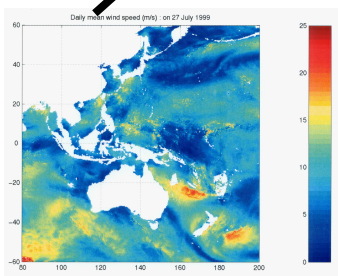


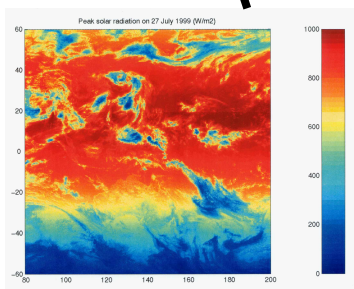
Original SST
AVHRR, VISSR,
VIRS, TMI

Diurnal Variation Correction

Solar Radiation
VISSR
Wind Speed
QSCAR, TMI, SSMI





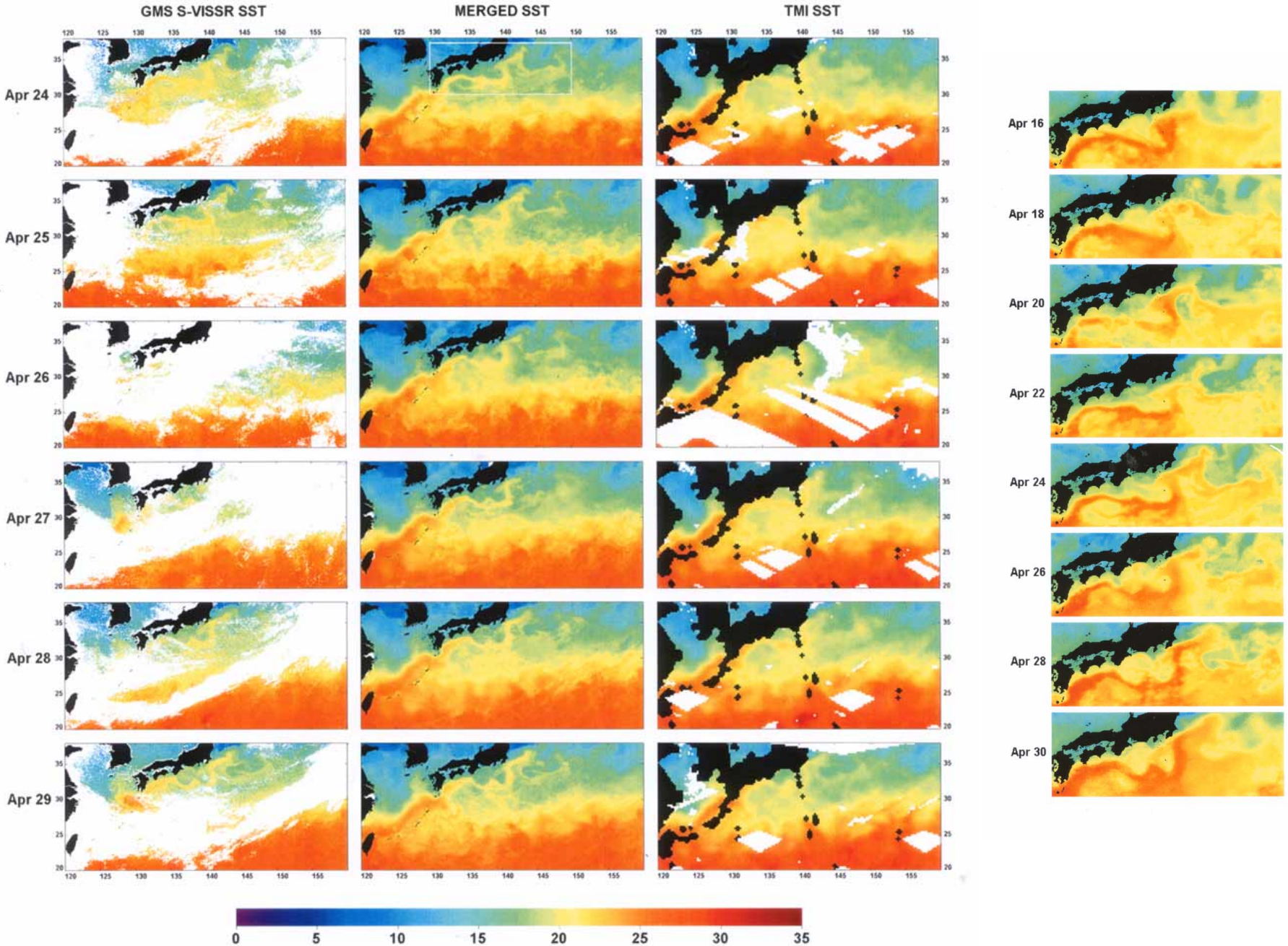


Daily Min. SST
AVHRR, VISSR,
VIRS, TMI

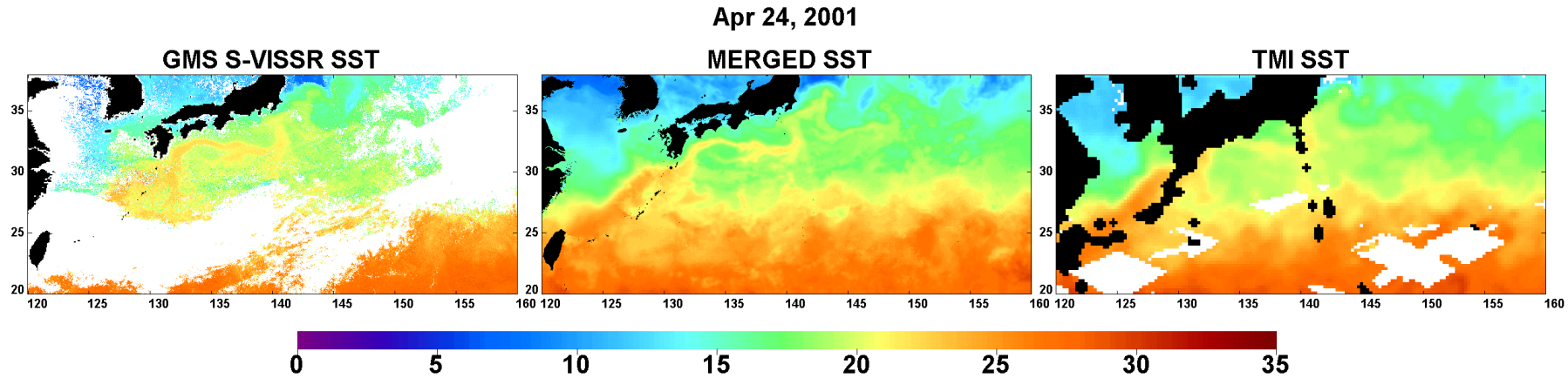
Objective Analysis

Merged SST

SST Merging Strategy

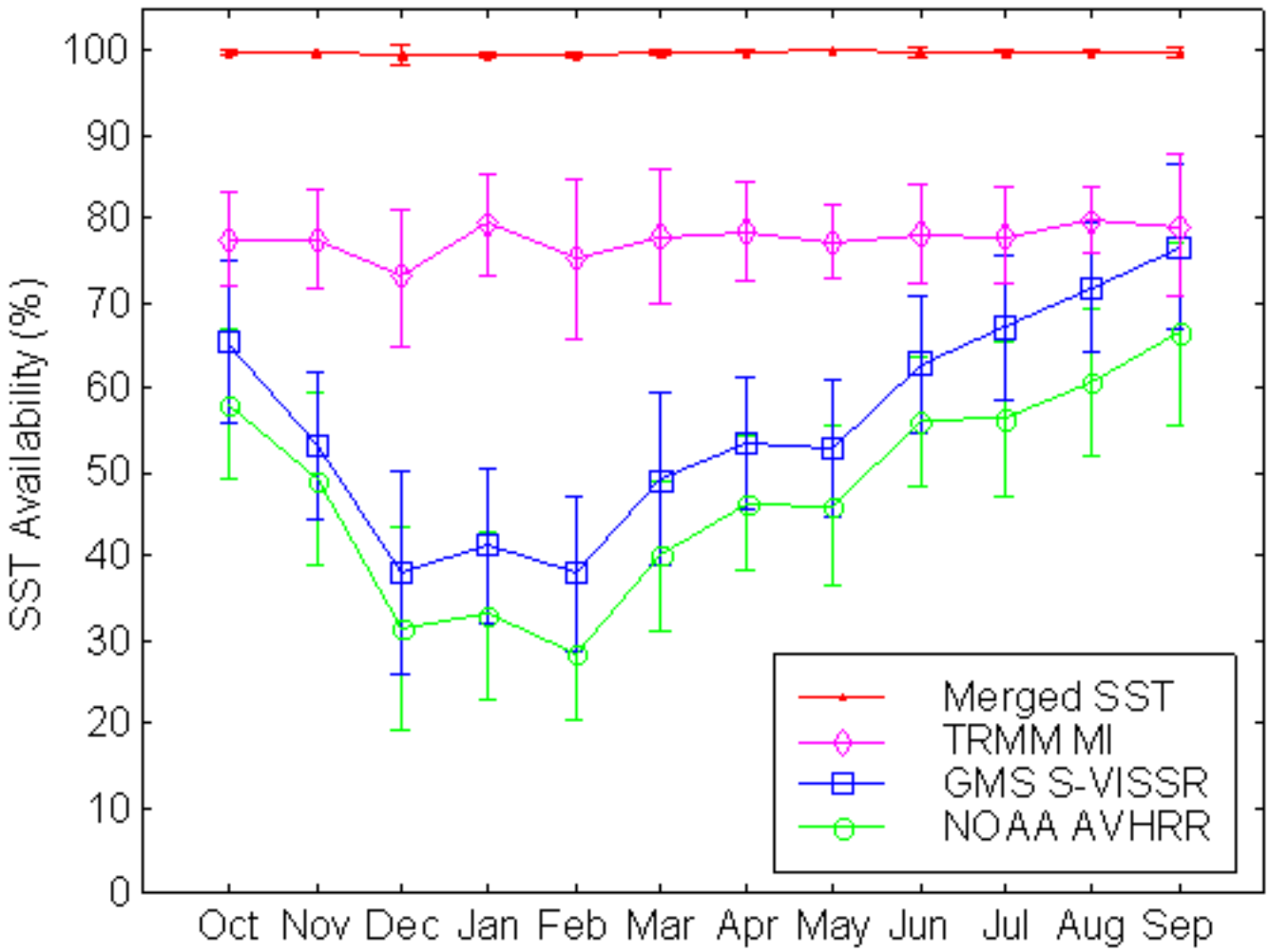

GMS S-VISSR SST
MERGED SST
TMI SST
Apr 24
Apr 25
Apr 26
Apr 27
Apr 28
Apr 29
Apr 16
Apr 18
Apr 20
Apr 22
Apr 24
Apr 26
Apr 28
Apr 30
0
5
10
15
20
25
30
35

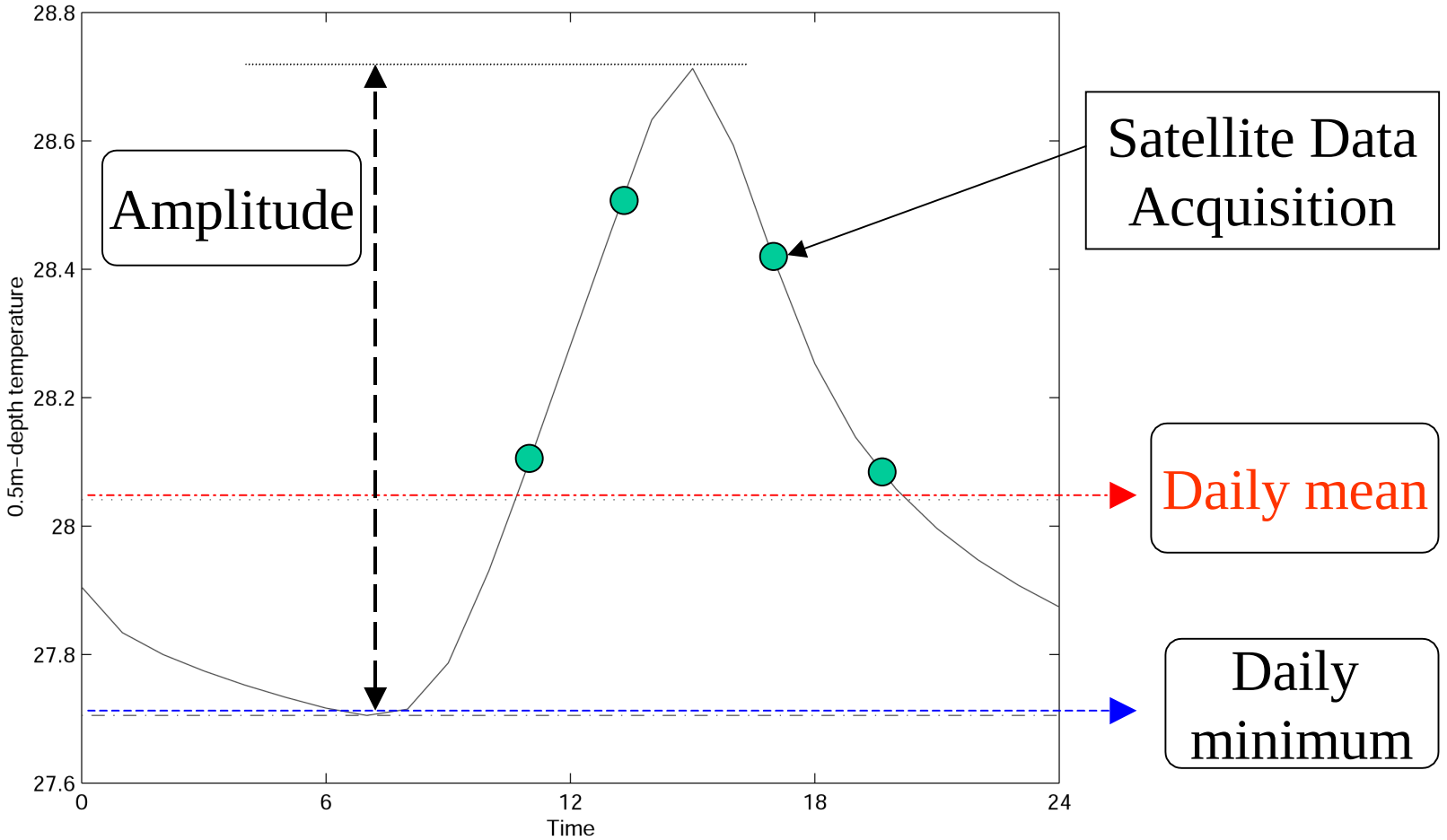
New Generation Sea Surface Temperature



High-resolution Cloud-free Daily SST Products

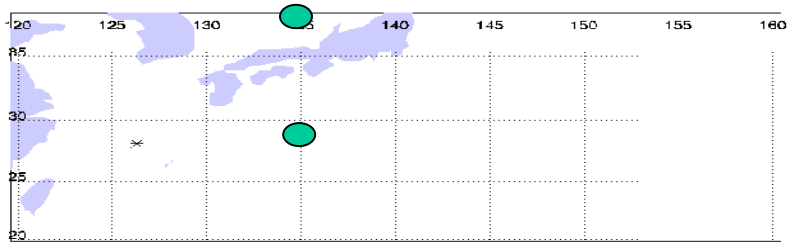
5-km spatial and 24-hour temporal resolution

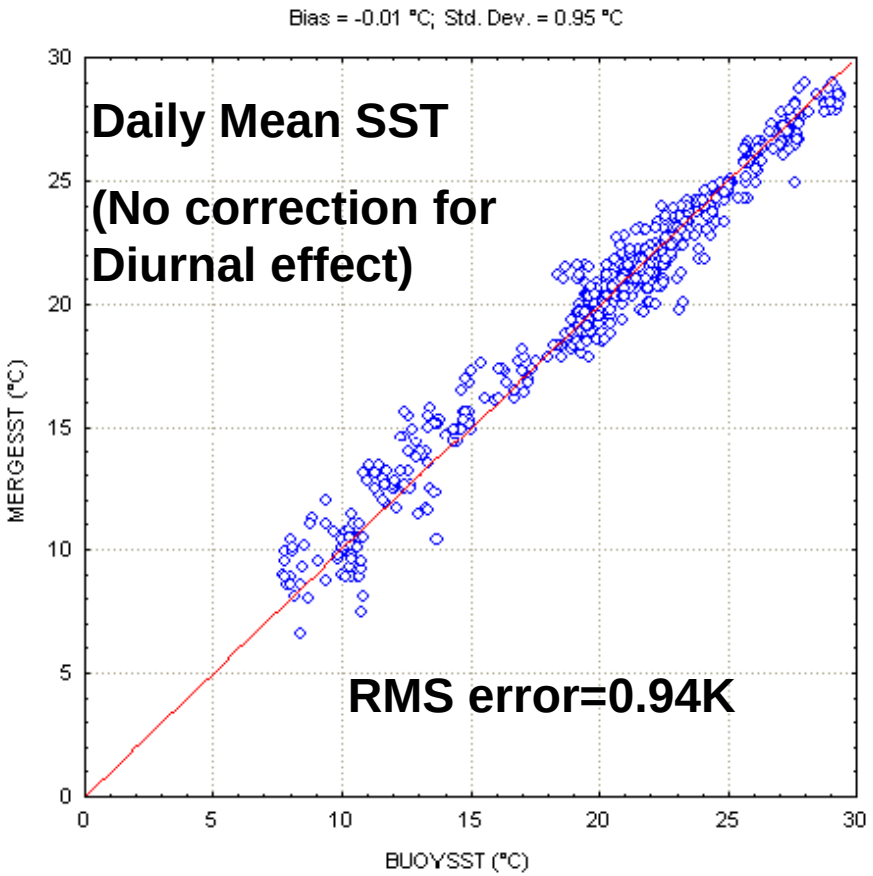

SST Availability (%)
100
90
80
70
60
50
40
30
20
10
0
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Merged SST
TRMM MI
GMS S-VISSR
NOAA AVHRR

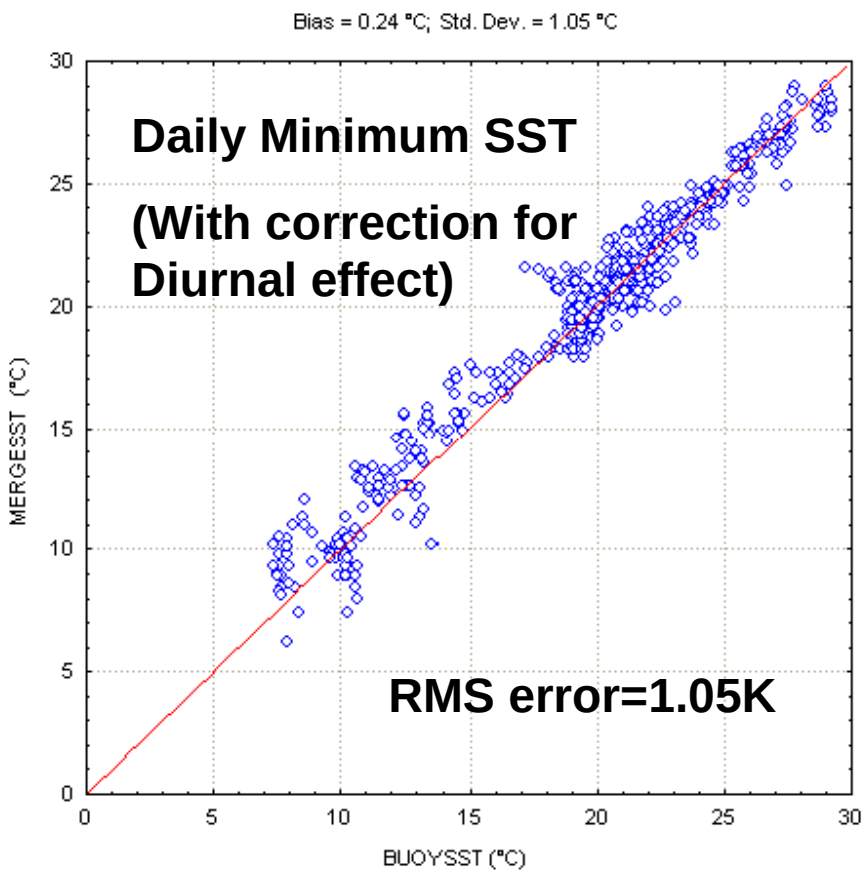


- Simulate SST diurnal variations by the one-dimensional surface-layer model (Kawai and Kawamura, 2000)
- Shift a satellite-derived SST to a daily standard value by a regression formula

Validation of the new generation SST

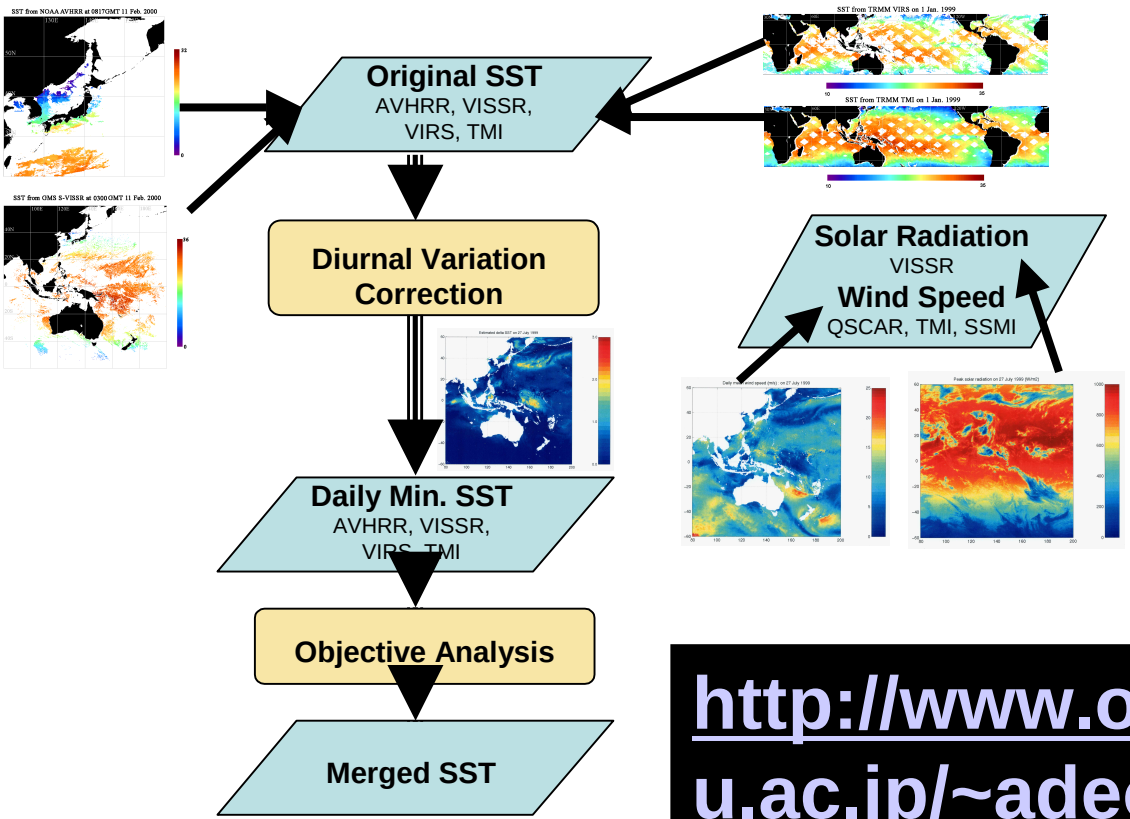




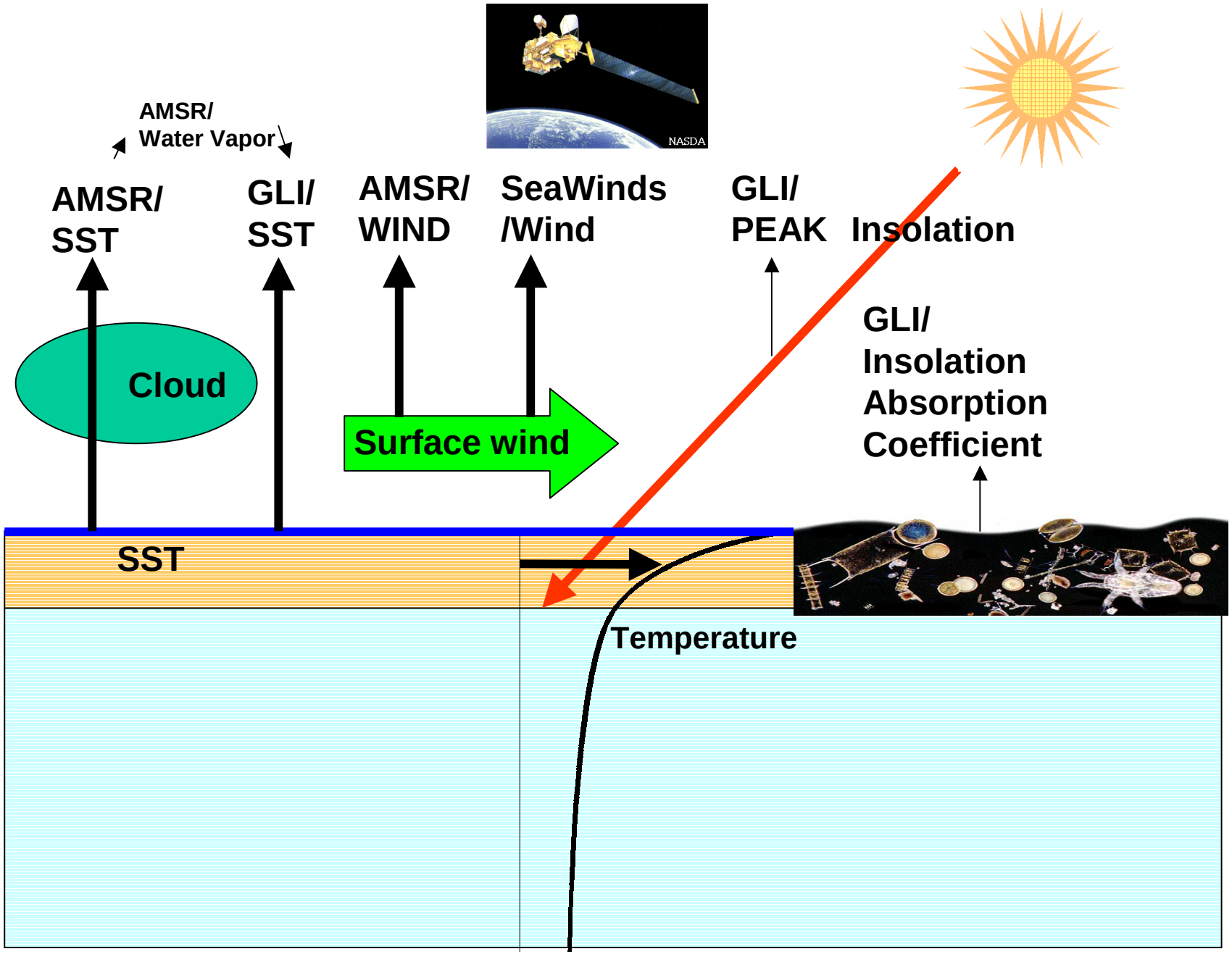


Oceanic Vartiation Reseach Section Center for Atmospheric and Oceanic Studies Faculty of Science Tohoku University

Development of the New Generation SSTs for ADEOS-II era



http://www.ocean.caos.tohoku.ac.jp/~adeos/sst/


NASDA
AMSR/
Water Vapor
AMSR/
SST
GLI/
SST
AMSR/
WIND
SeaWinds
/Wind
GLI/
PEAK
Insolation
GLI/
Insolation
Absorption
Coefficient
Cloud
Surface wind
SST
Temperature