Variability in Satellite SST Data
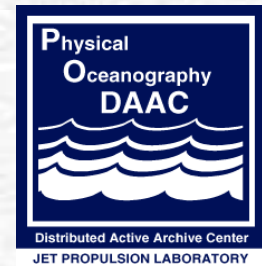
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Topics

- Global 1 degree comparisons between AVHRR SST data sets

- "Performance characteristics" of SST data sets using *in situ* observations

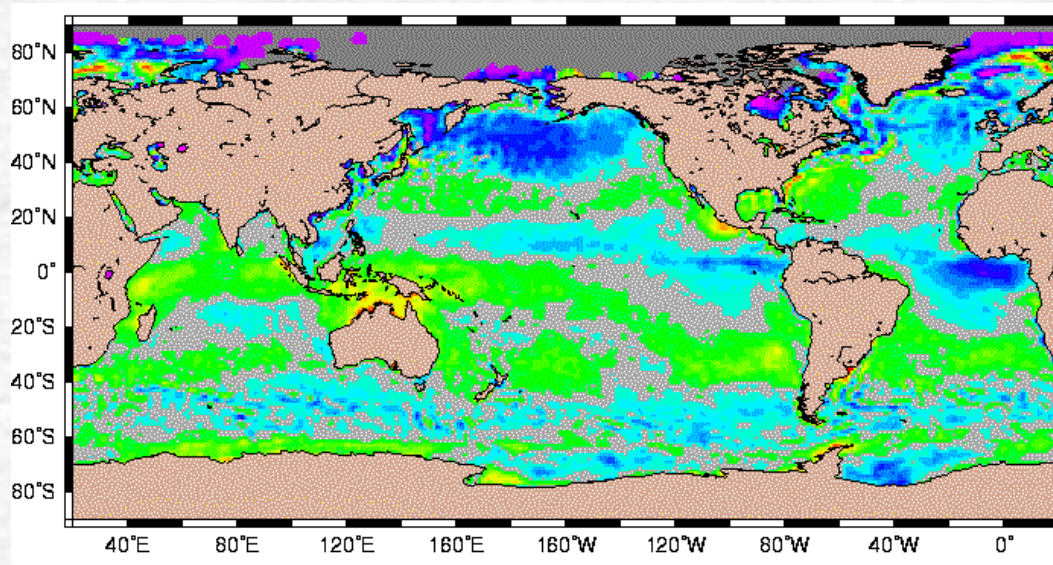- Future work: Comparisons among other satellite datasets

Data Sources

- AVHRR satellite SST
  - Modified Pathfinder SST (MPSST)
  - Operational NOAA SST (ONSST)
- Analysis SST
  - NOAA Optimal Interpolation SST (OISST)
 - and others …… (2DVAR, HADISST, GISST)

Comparison methodology

- Globally regrid daily satellite SST data to 1 degree resolution on monthly time scales for 1985-1997.
- Determine the monthly differences between SST data sets on common 1 degree squares.
- For the entire time series, compute standard statistics for differences on monthly scales for mean bias, RMS, correlation etc.
- Daytime and nighttime satellite results compared separately.
- *Caveat: Map results depicted here will be based on statistics for the entire data set, i.e., there is no monthly component.*
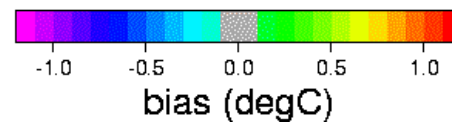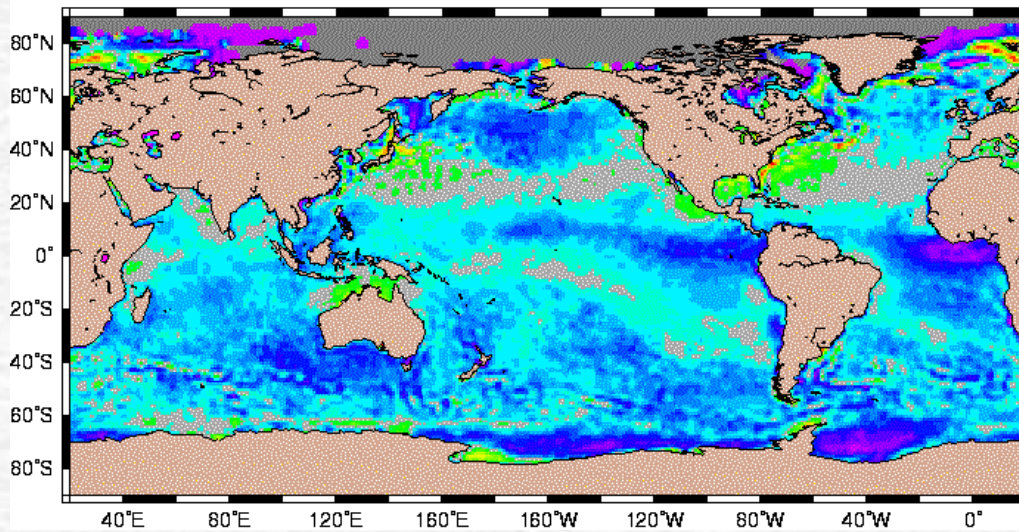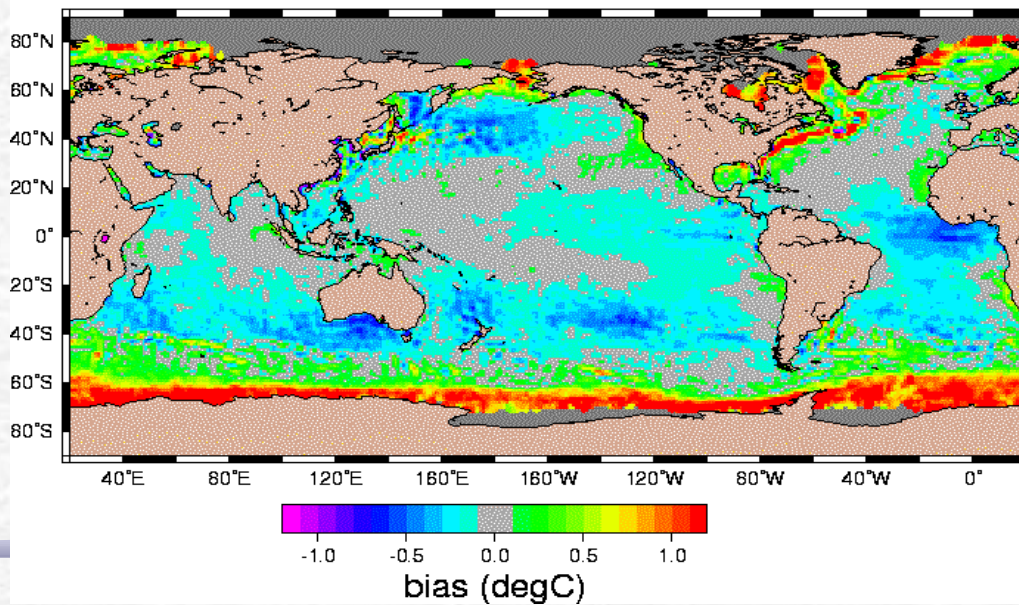
Daytime bias maps

MPSST-OISST

ONSST-OISST

bias (degC)
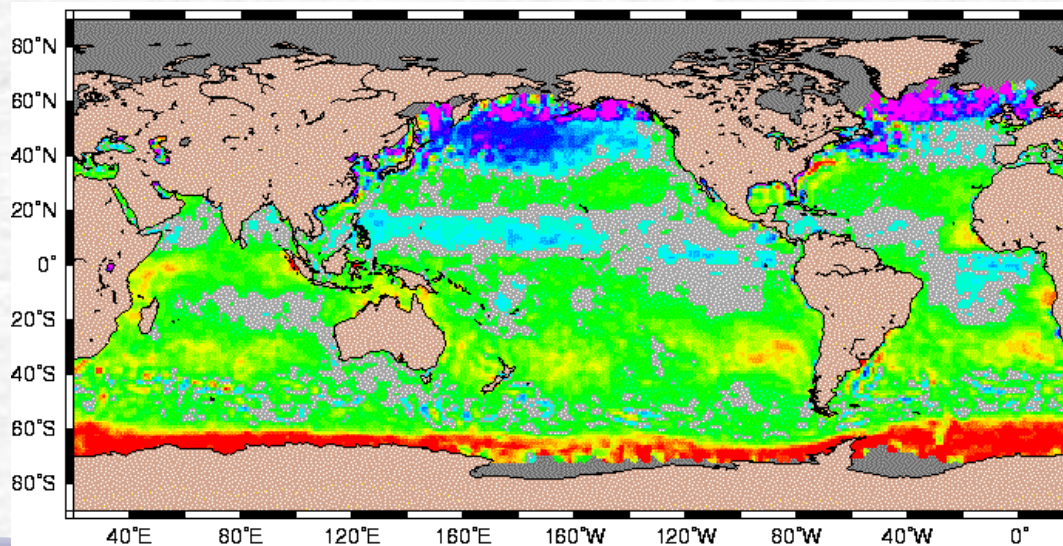
Nighttime bias maps
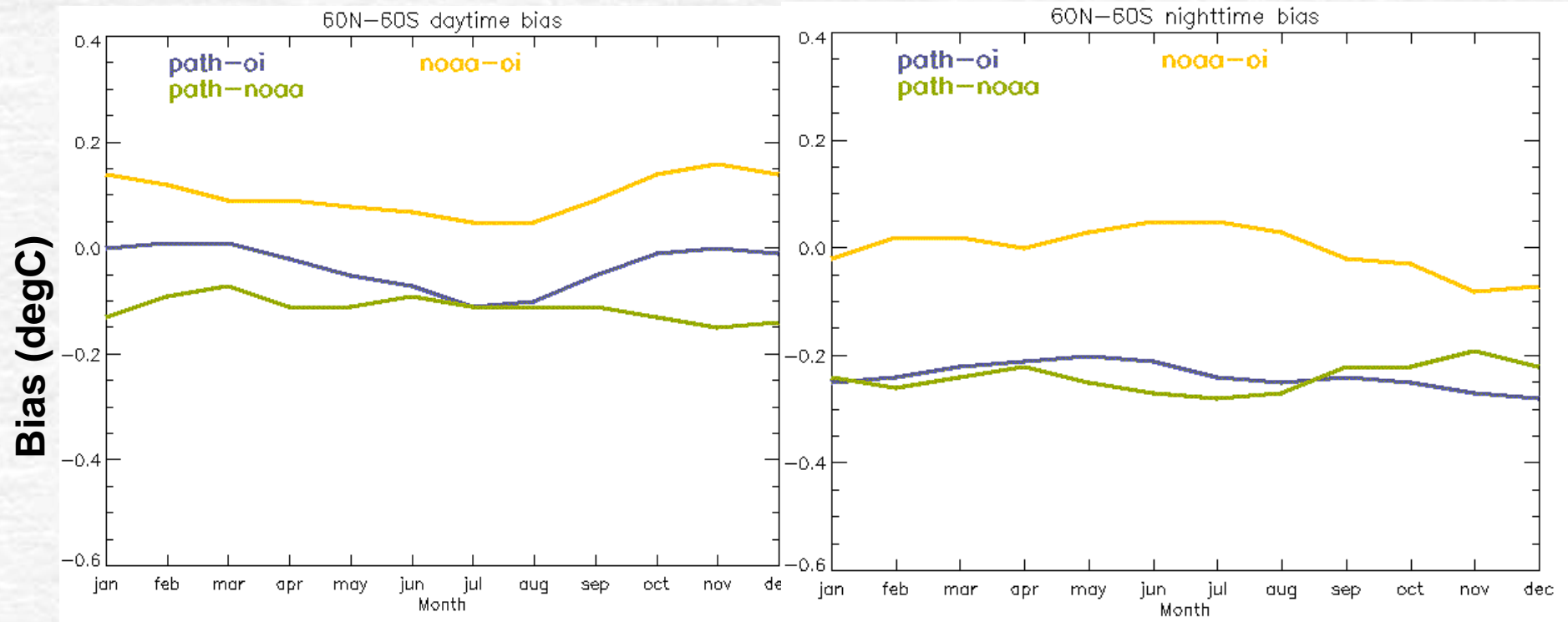

MPSST-OISST

ONSST-OISST

Monthly averaged bias values (60N-60S)

Day   Night

Daytime RMS maps

MPSST-OISST
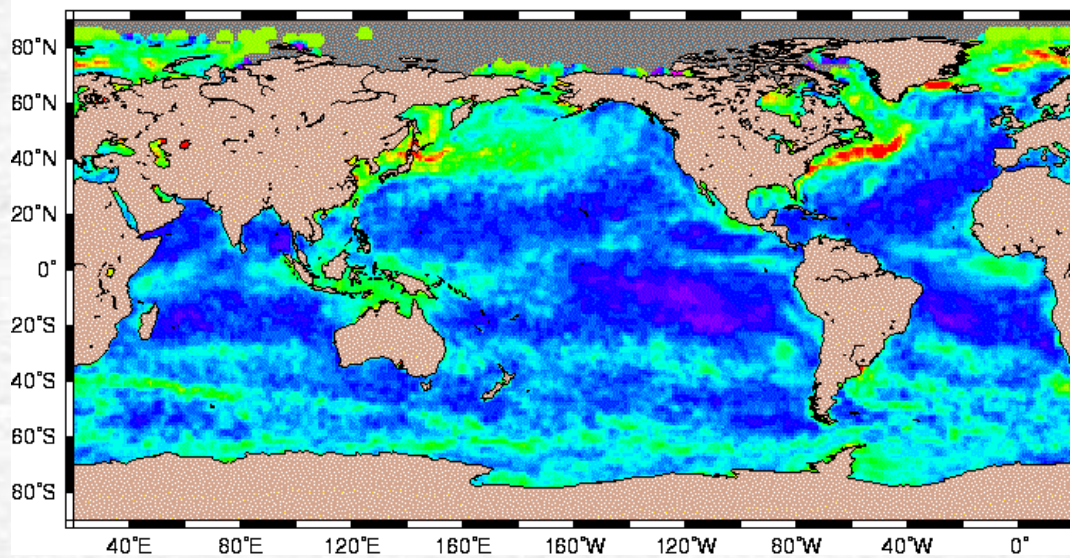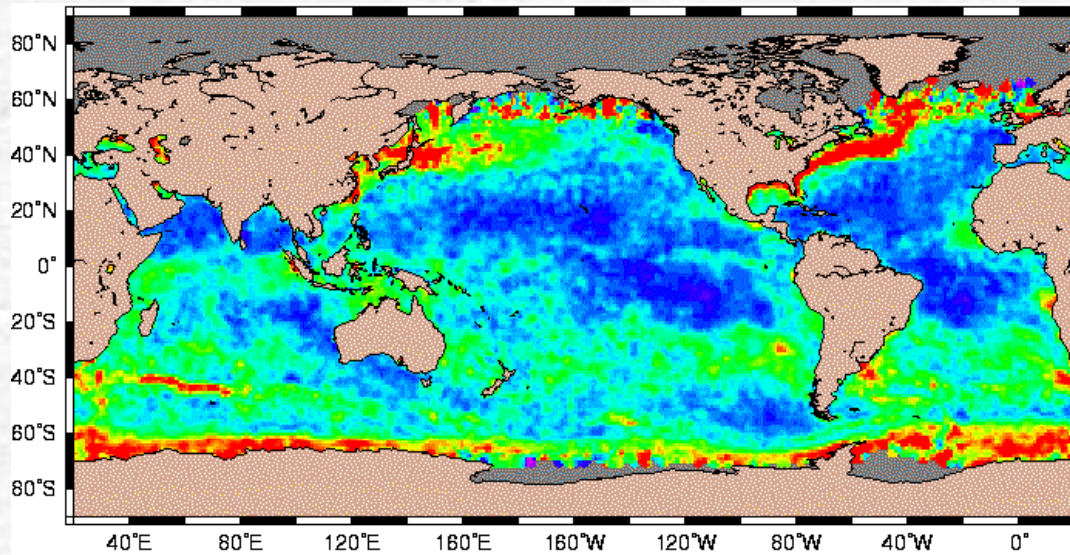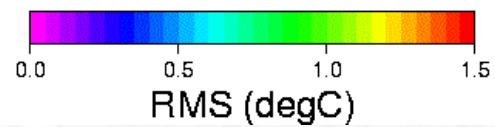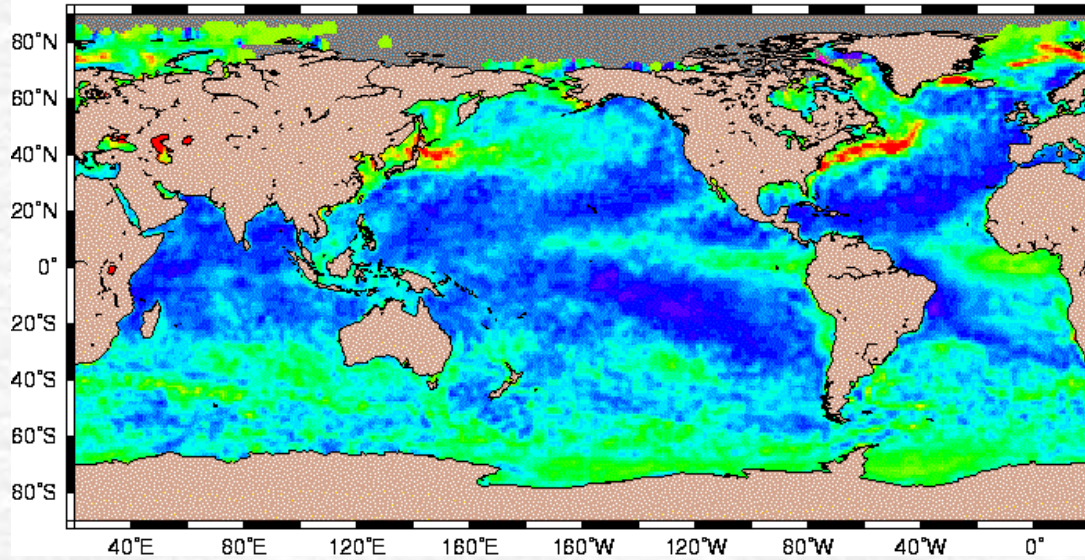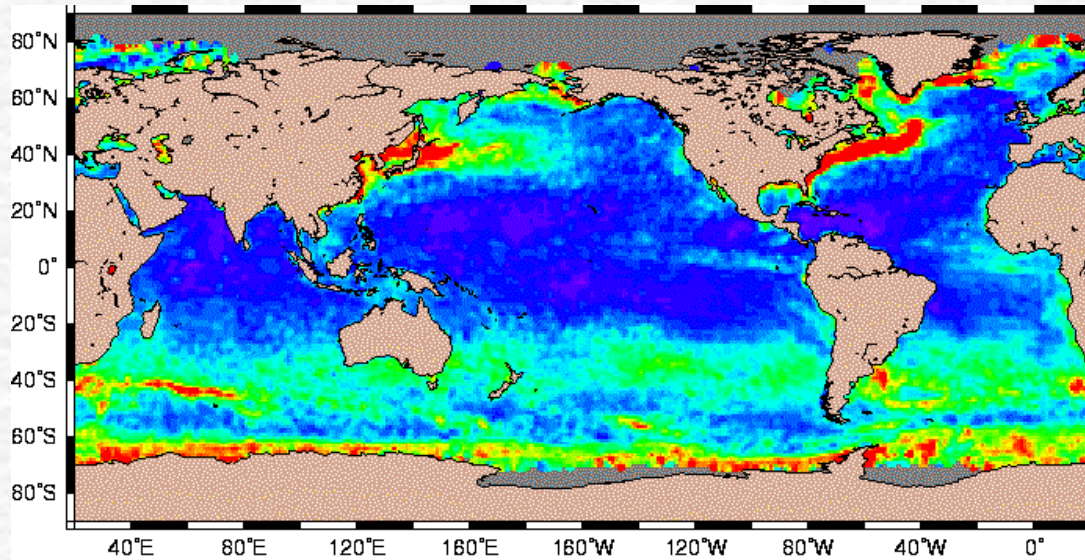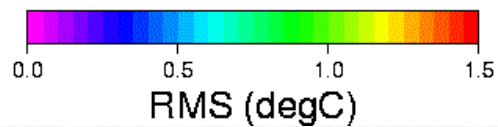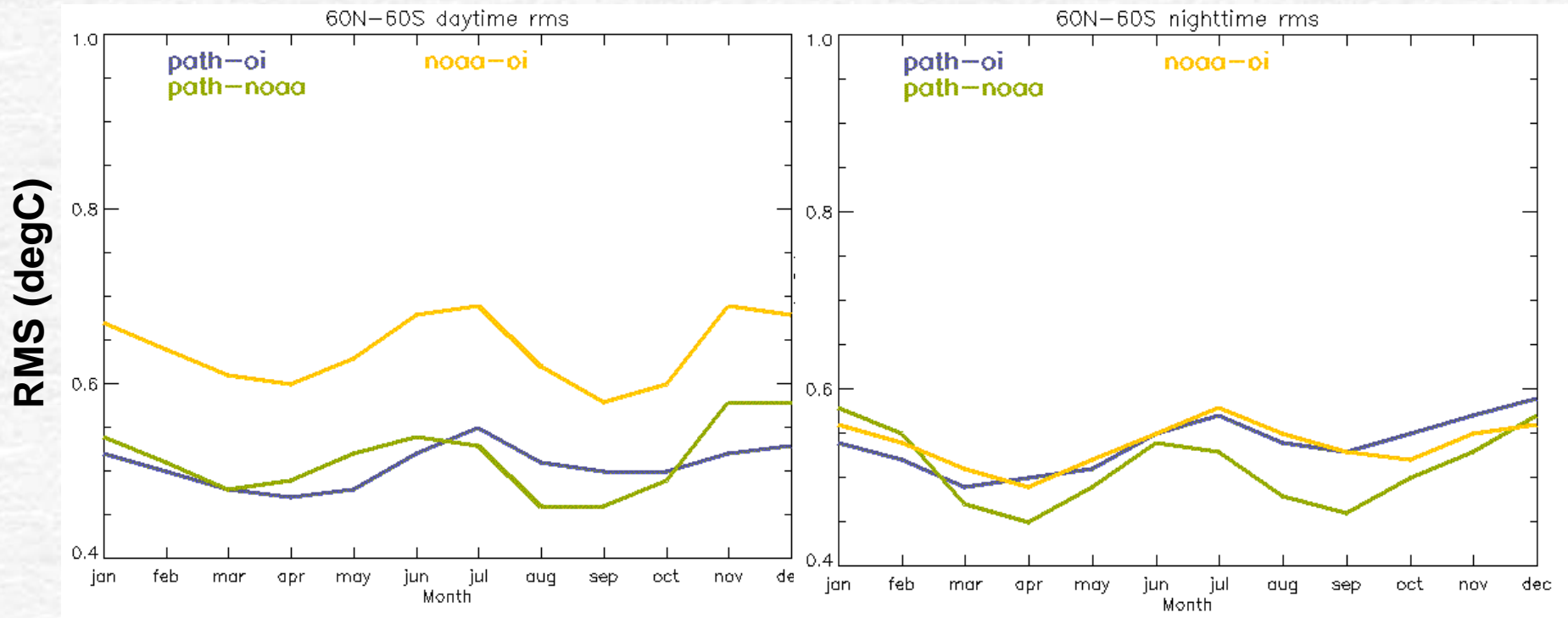
ONSST-OISST

Nighttime RMS maps

MPSST-OISST

ONSST-OISST

Monthly averaged RMS values (60N-60S)

Day

Night

Monthly anomaly time series

60N–60S SST anomaly
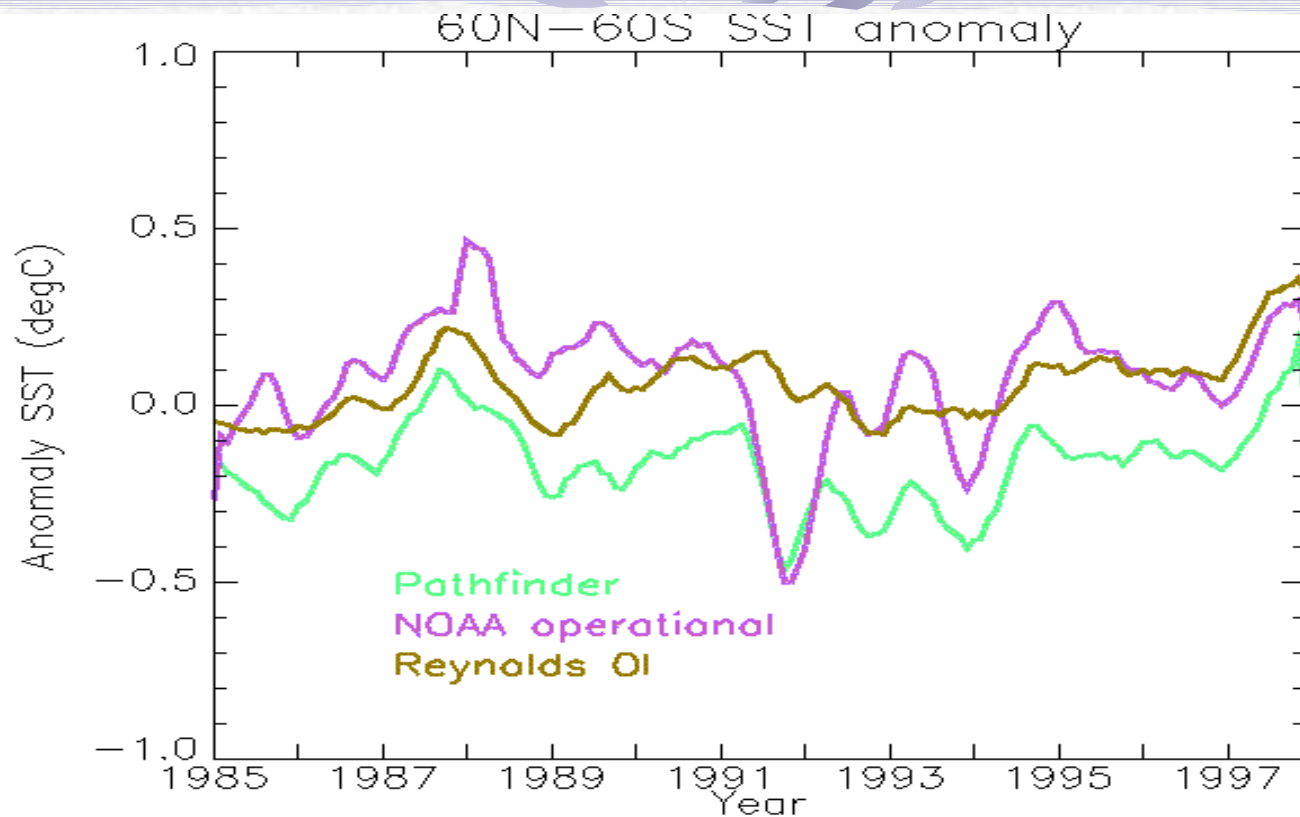
- Time series of monthly MPSST, ONSST, and OISST minus WOA98 climatological SST.
- Satellite data are nighttime values.

SST time series stats: SST data (85-90, 93-97) - WOD98 *in situ* SST

	Pathfndr SST		NOAA SST		OI SST		# obs
	Mean	SD	Mean	SD	Mean	SD	(K)
60N-60S	-0.16	1.18	0.09	1.27	0.02	1.19	530K
20N-60N	-0.08	1.40	0.21	1.52	0.07	1.43	309K
20N-20S	-0.28	0.70	-0.08	0.70	-0.02	0.65	167K
20S-60S	-0.23	0.91	0.0	1.0	-0.10	0.95	54K

Summary

- Daytime MPSST-OISST bias values are closer to zero than ONSST bias values while the reverse it true at night. Nighttime MPSST appears to biased 0.2 degC cool.

- MPSST nighttime cool bias is confirmed by comparing to the independent WOA98 climatology.

- RMS difference results indicate a lower value for MPSST than ONSST for daytime results, and about equal at night.

- MPSST 1 degree time series reflects actual *in situ* SST variation (WOD98 SST) very well in the mid-high latitudes. OI SST does a better job in the low latitudes.

- We are investigating comparisons of MPSST to other datasets such as ATSR SST and MODIS SST.

Pathfinder SST – ATSR2 SST statistics

Pass	Mean (°C)	Std Dev (°C)
Daytime	0.51	0.42
Nighttime	0.32	0.35
Daytime (1999)	0.25	0.39
Nighttime (1999)	0.08	0.35

MODIS SST – Pathfinder SST daytime bias
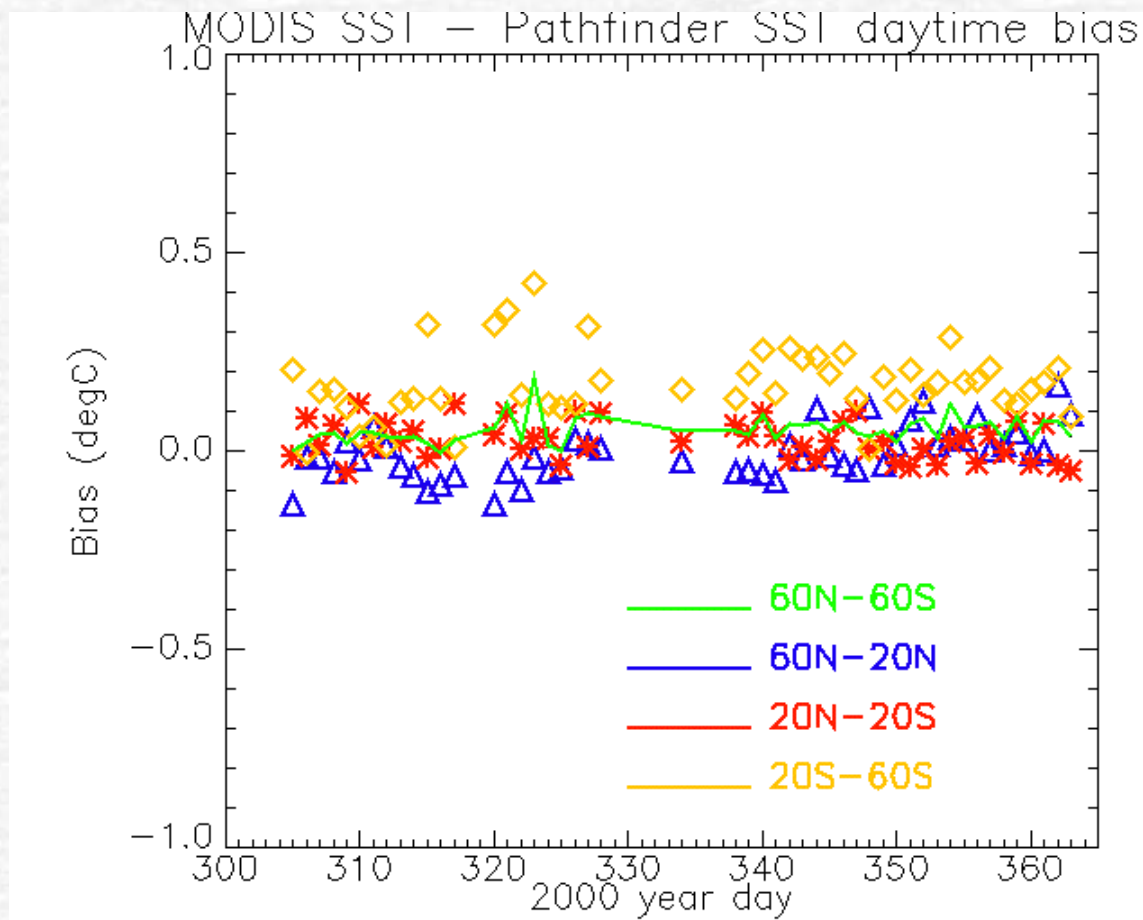
MODIS SST – Pathfinder SST nighttime bias

MODIS SSI – Pathfinder SSI nighttime bias