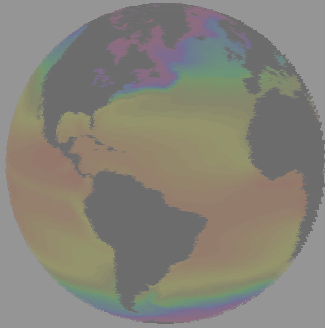




Comparing SST Climatologies From a New High-Resolution Satellite Dataset and I-COADS

Kenneth S. Casey
NOAA National Oceanographic Data Center

November 2003
CLIMAR-II



The Approach

- Compare climatologies with 1942-1997 *in situ* observations from I-COADS Release 2.0 [Woodruff et al. (1998), *Phys. Chem. Earth*, vol. 23.]
- Lowest standard deviation of differences indicates best descriptor of mean SST conditions [Casey and Cornillon (1999), *J. Climate*, vol 12.]



The Climatologies

ERSST v1

- monthly, 2-degree, 1971-00 base
- Smith and Reynolds (2003), *Journal of Climate*, vol 16.

COADS

- Monthly, 2-degree, 1950-79 base

Operational NESDIS

- monthly, nighttime, 50 km, 1984-93 base, also gap-filled version
- created with operational AVHRR SSTs, used in coral “hotspots”

NOAA/NASA AVHRR Pathfinder (v4)

- pentad, 9 km, 1985-00 base, day and night, also “eroded” version
- Casey and Cornillon (1999), and (2001), *Journal of Climate*, vol 14.

RSMAS/NODC AVHRR Pathfinder (v5)

- pentad, 4 km, day and night, 1985-99 base



RSMAS/NODC AVHRR Pathfinder 4 km



Improvements over older 9 km Pathfinder:

- Created at GAC (~4km) resolution
- Improved land mask
- Includes sea ice info
- Includes inland waters
- Provides additional quality info and parameters
- Eventually will span 1981-near present
- Other improvements underway (e.g., aerosol flagging)

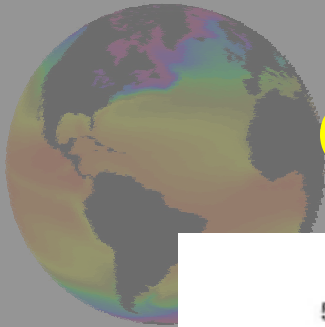


...To create a *Climate Data Record*

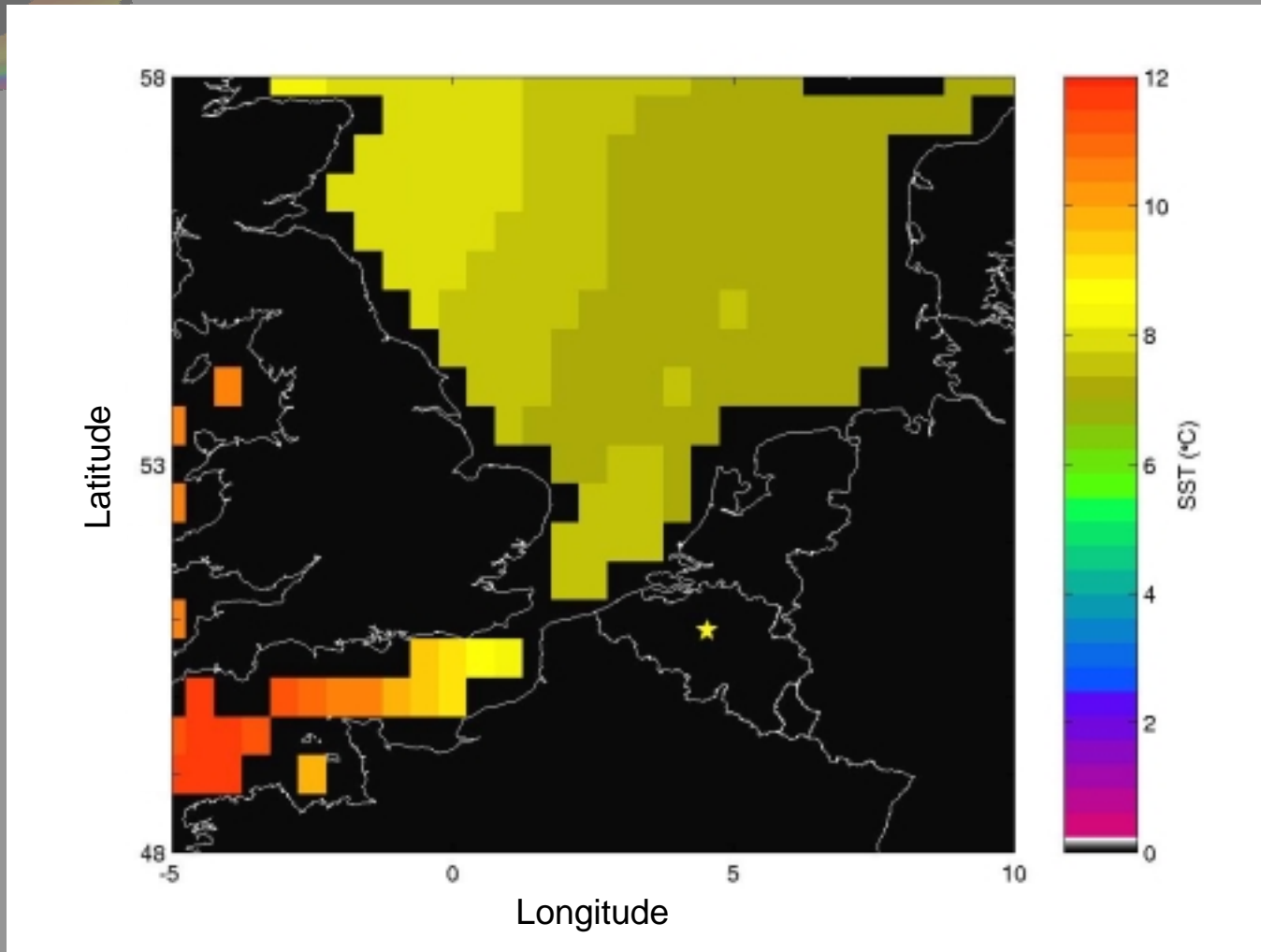


The Bottom Line

- Pathfinder climatologies generally outperform the others
- 4 km Pathfinder has some distinct advantages over 9 km Pathfinder
- NESDIS operational climatology could be dramatically improved

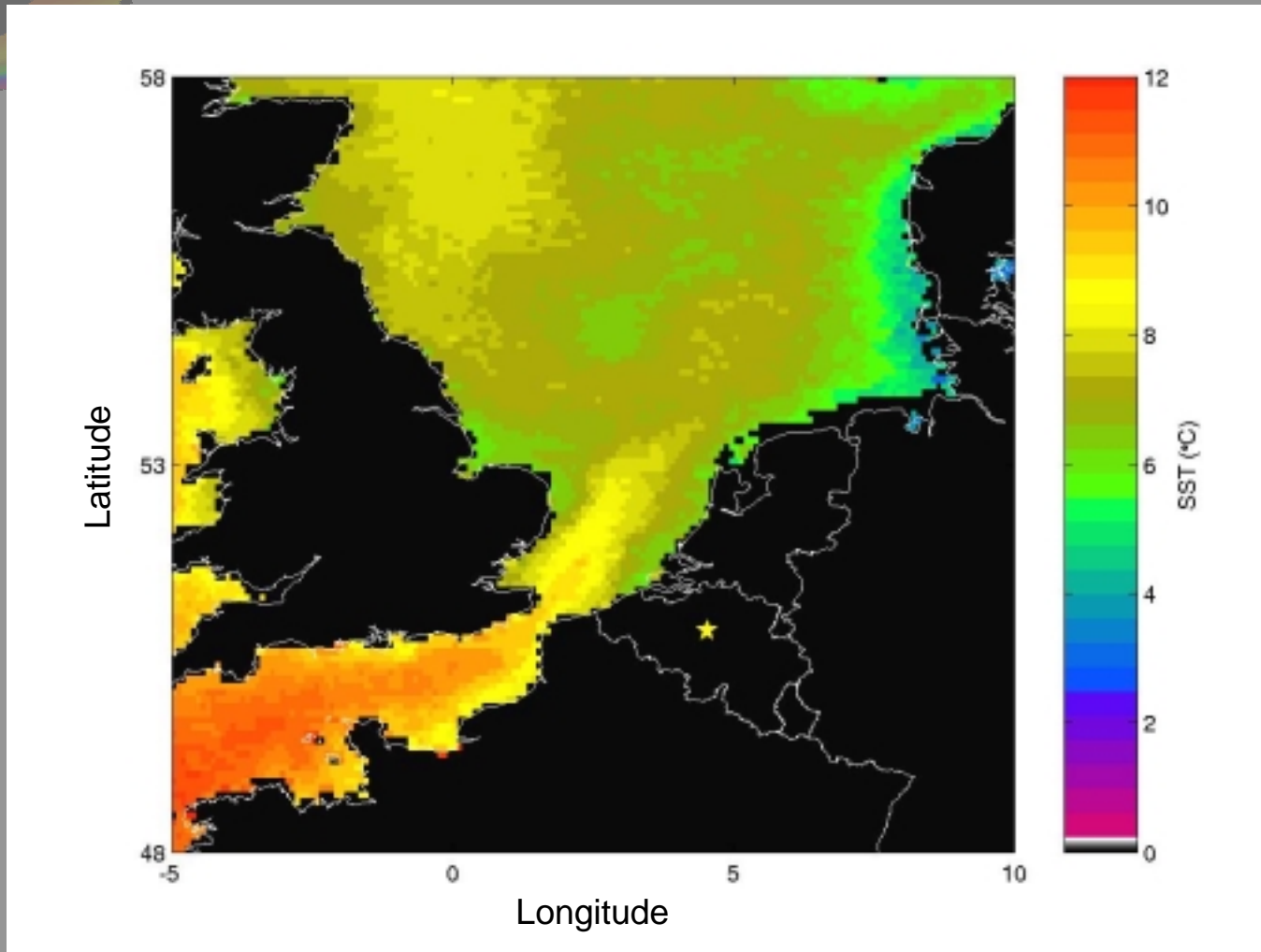


Operational NESDIS 50 km

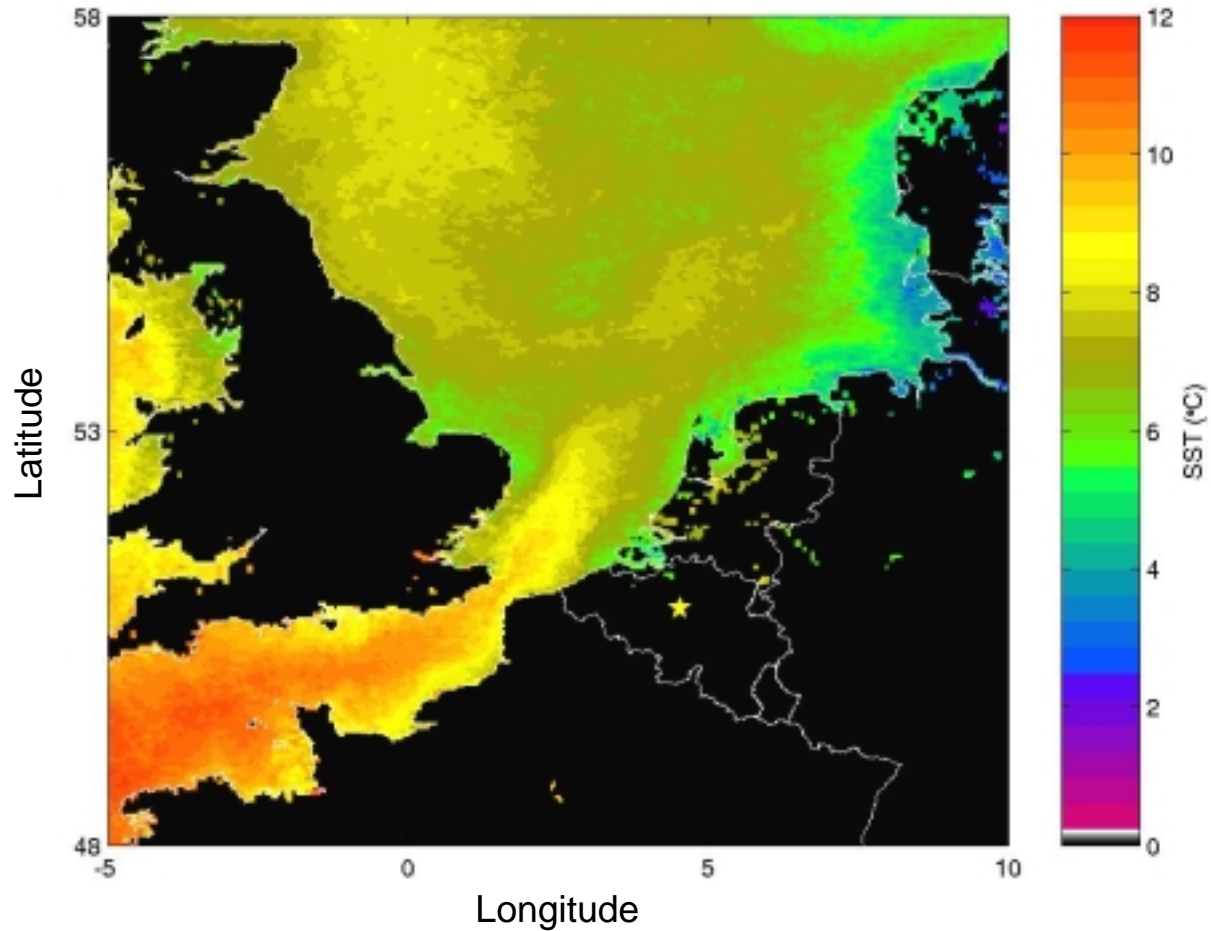


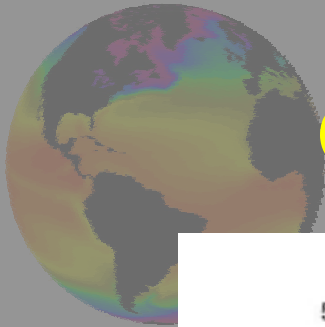


NOAA/NASA AVHRR Pathfinder 9 km

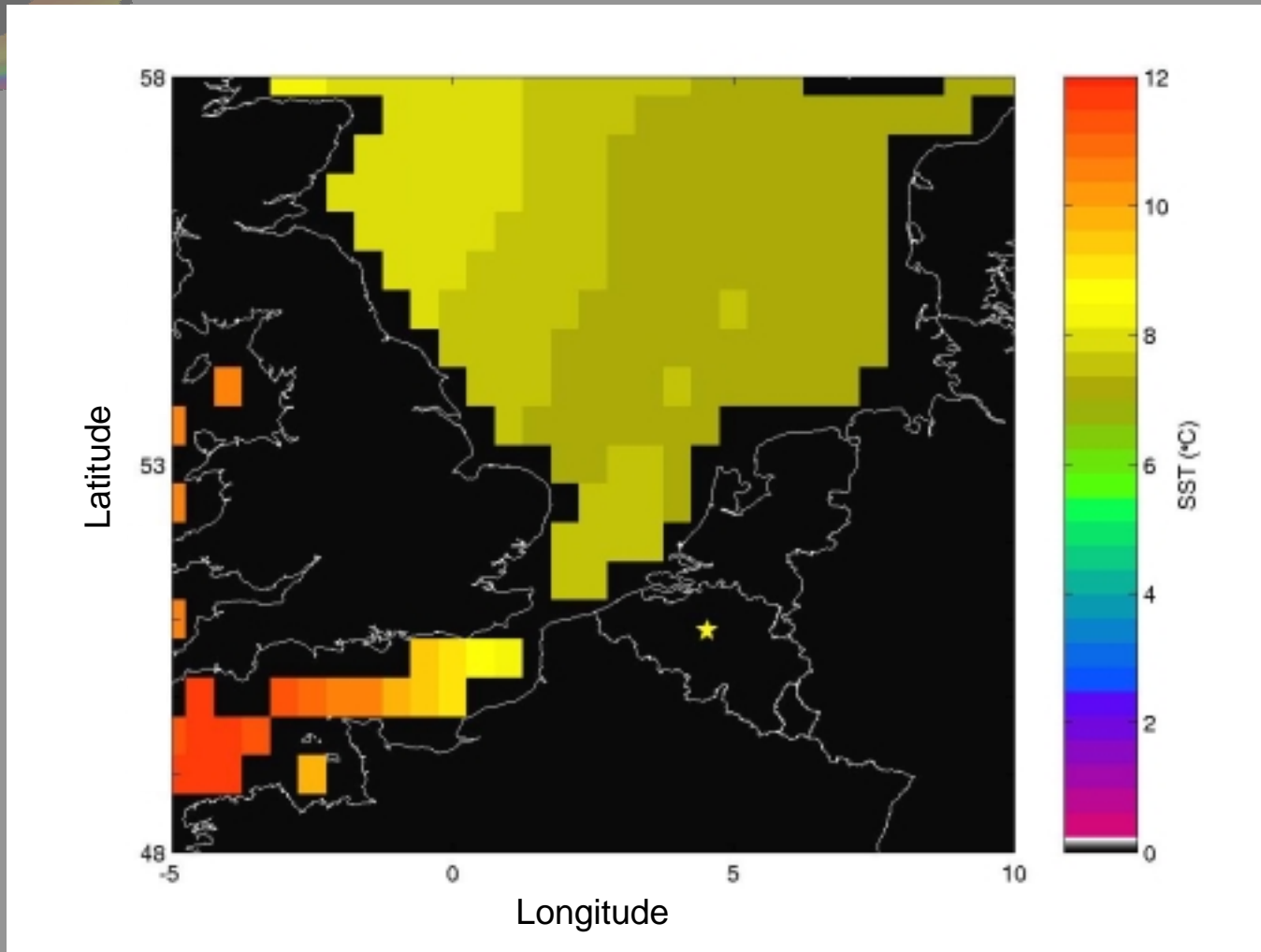


RSMAS/NODC AVHRR Pathfinder 4 km



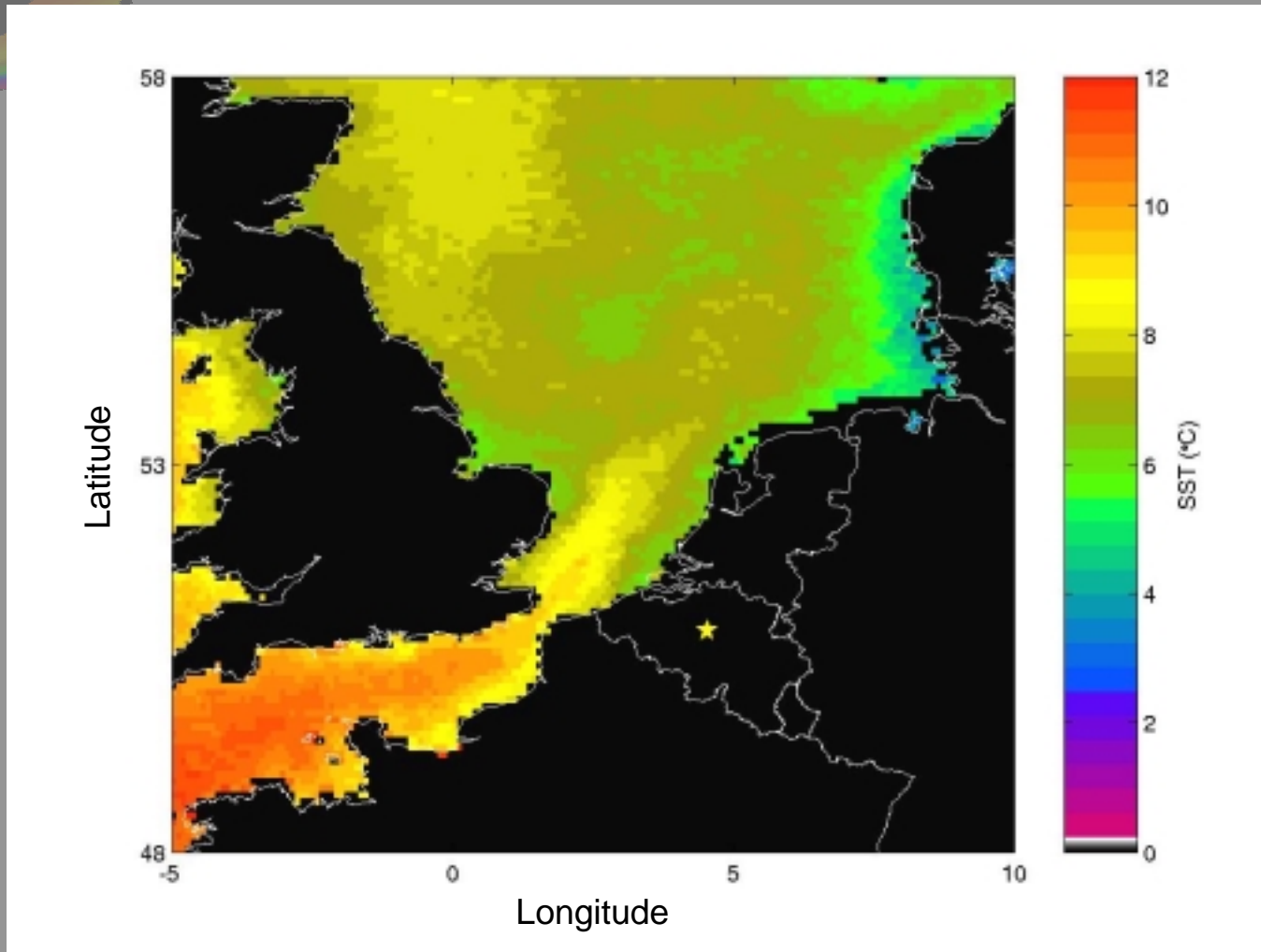


Operational NESDIS 50 km

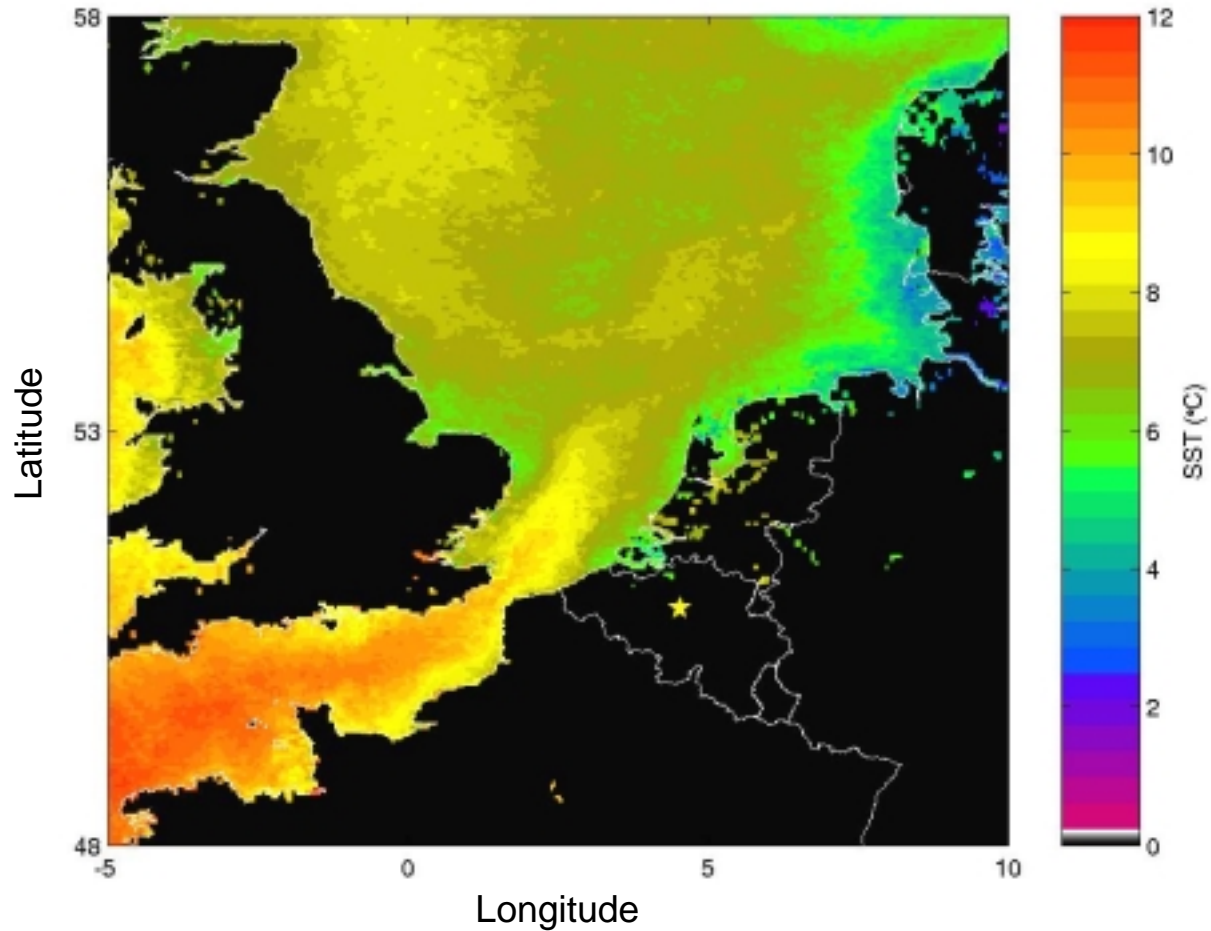


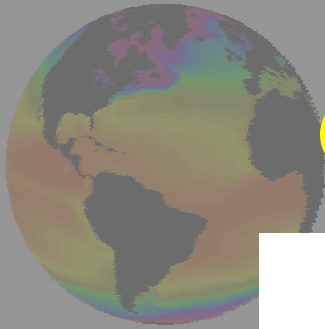


NOAA/NASA AVHRR Pathfinder 9 km

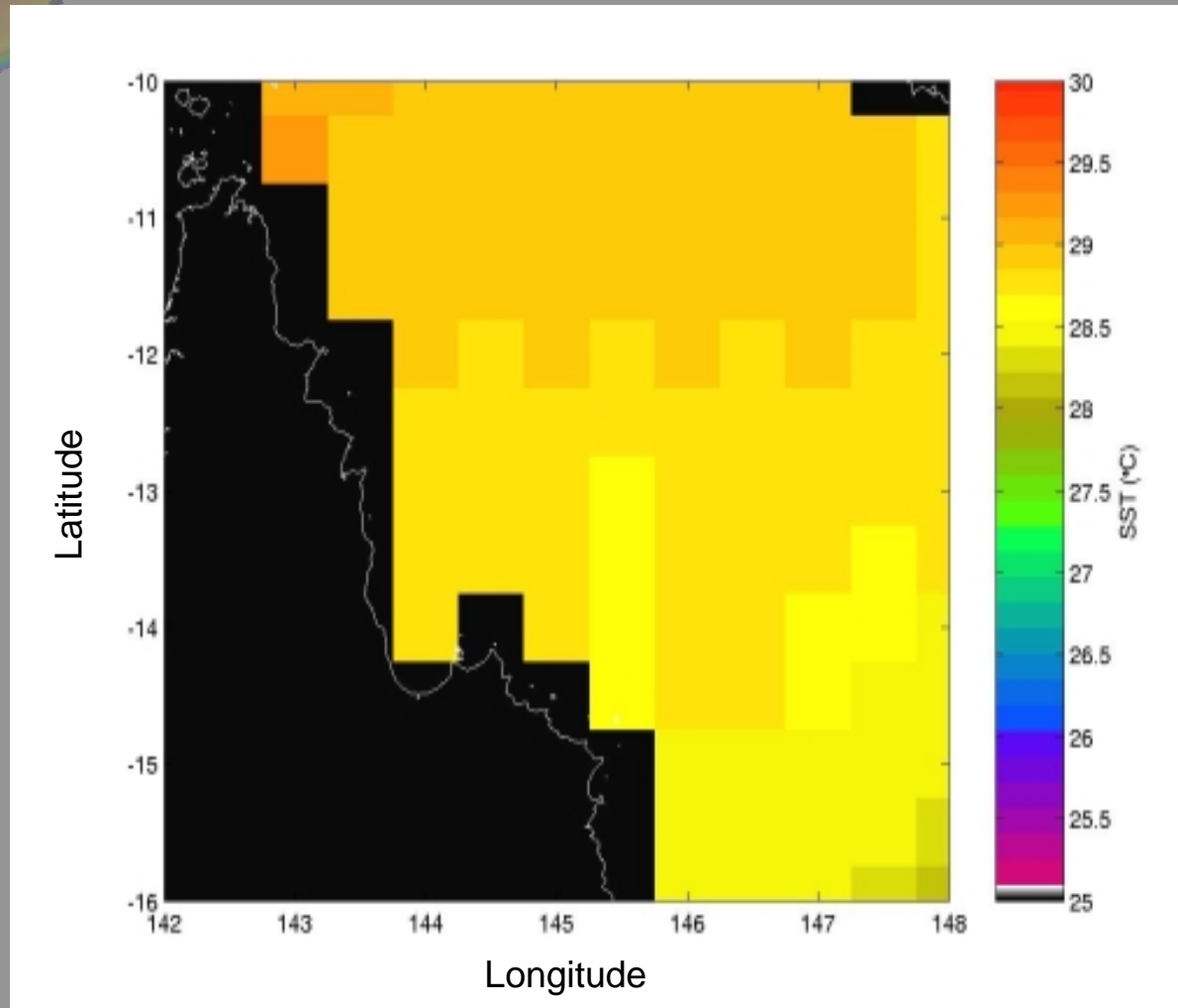


RSMAS/NODC AVHRR Pathfinder 4 km



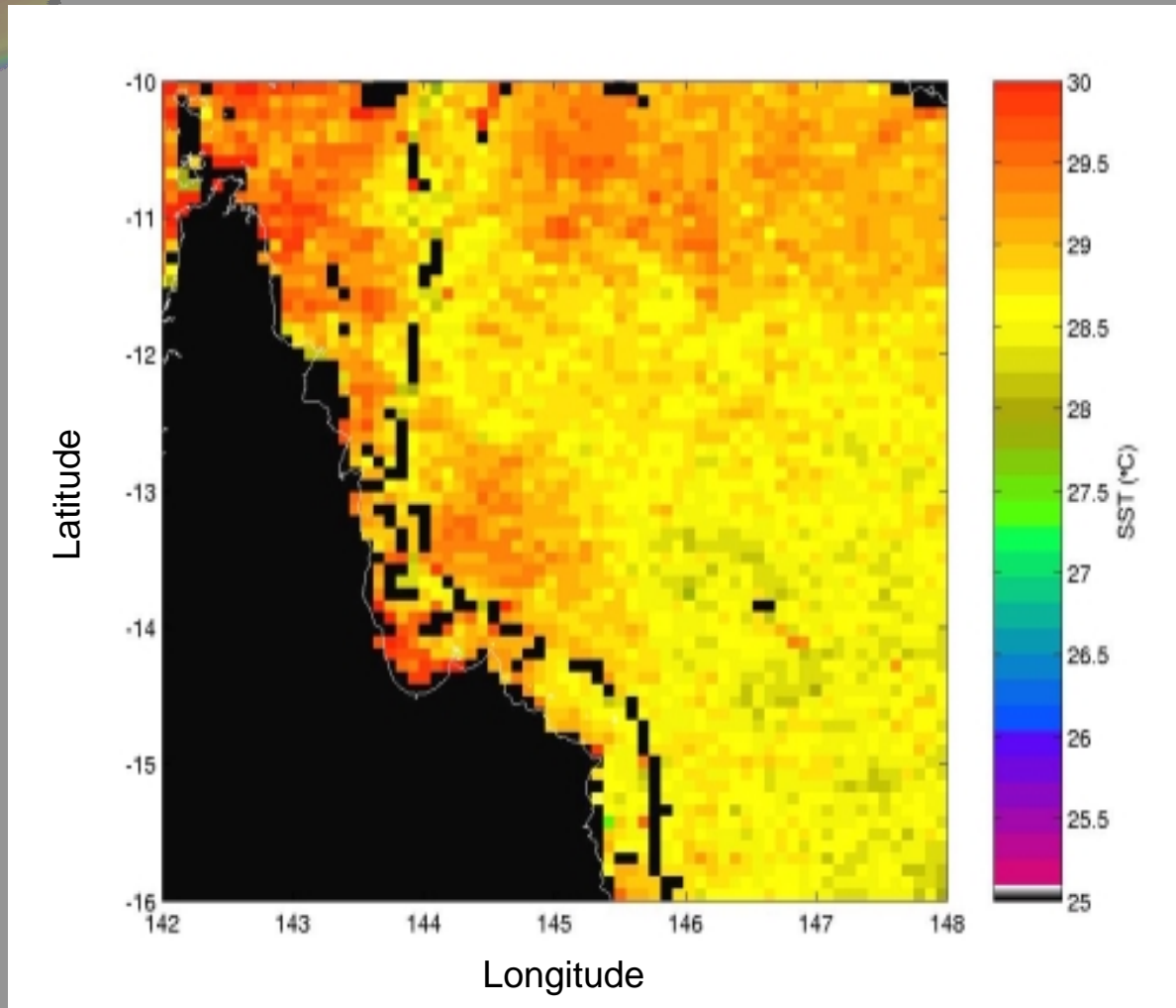


Operational NESDIS 50 km



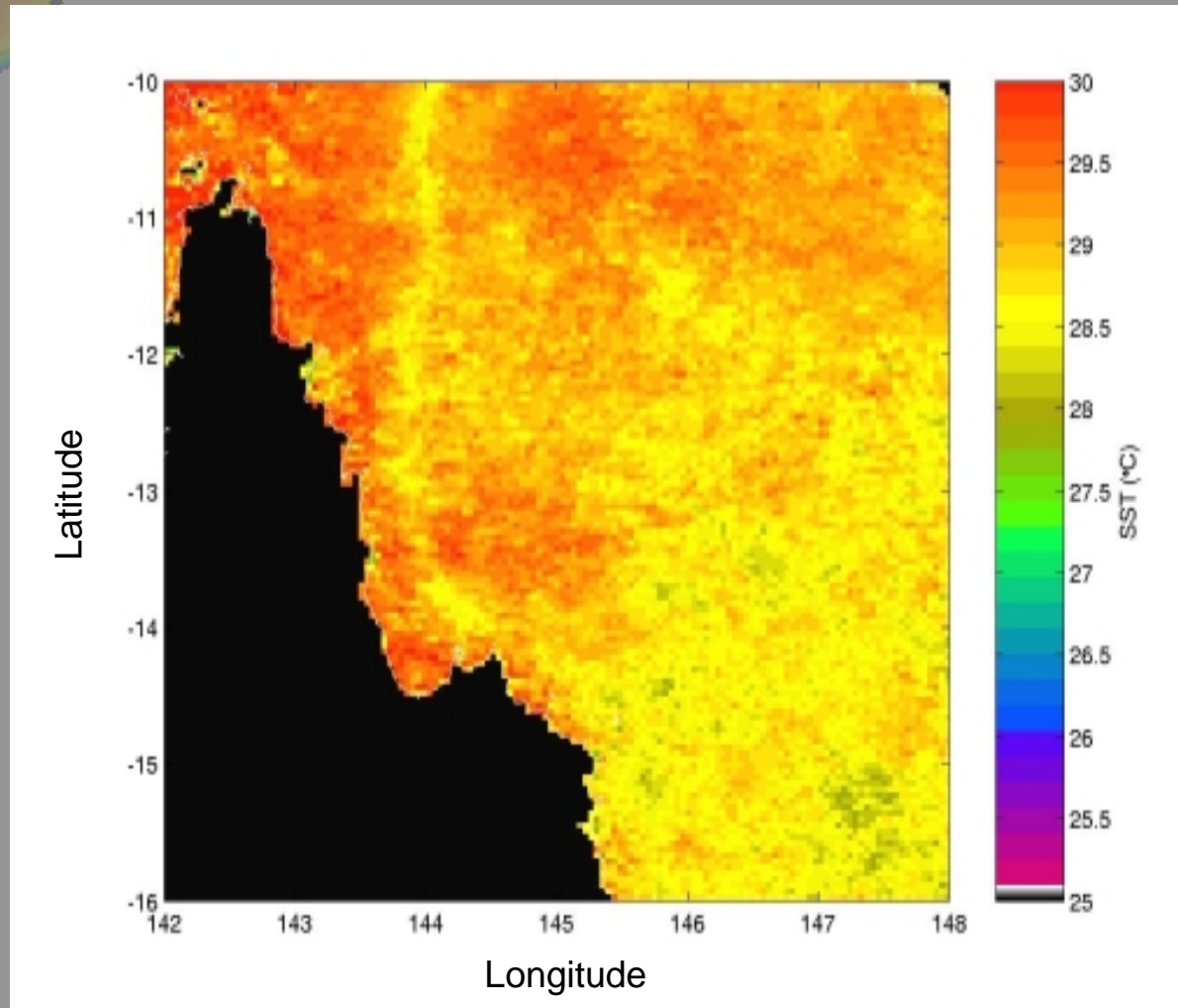


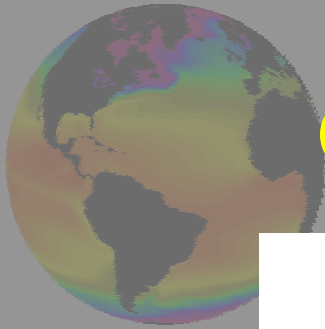
NOAA/NASA AVHRR Pathfinder 9 km



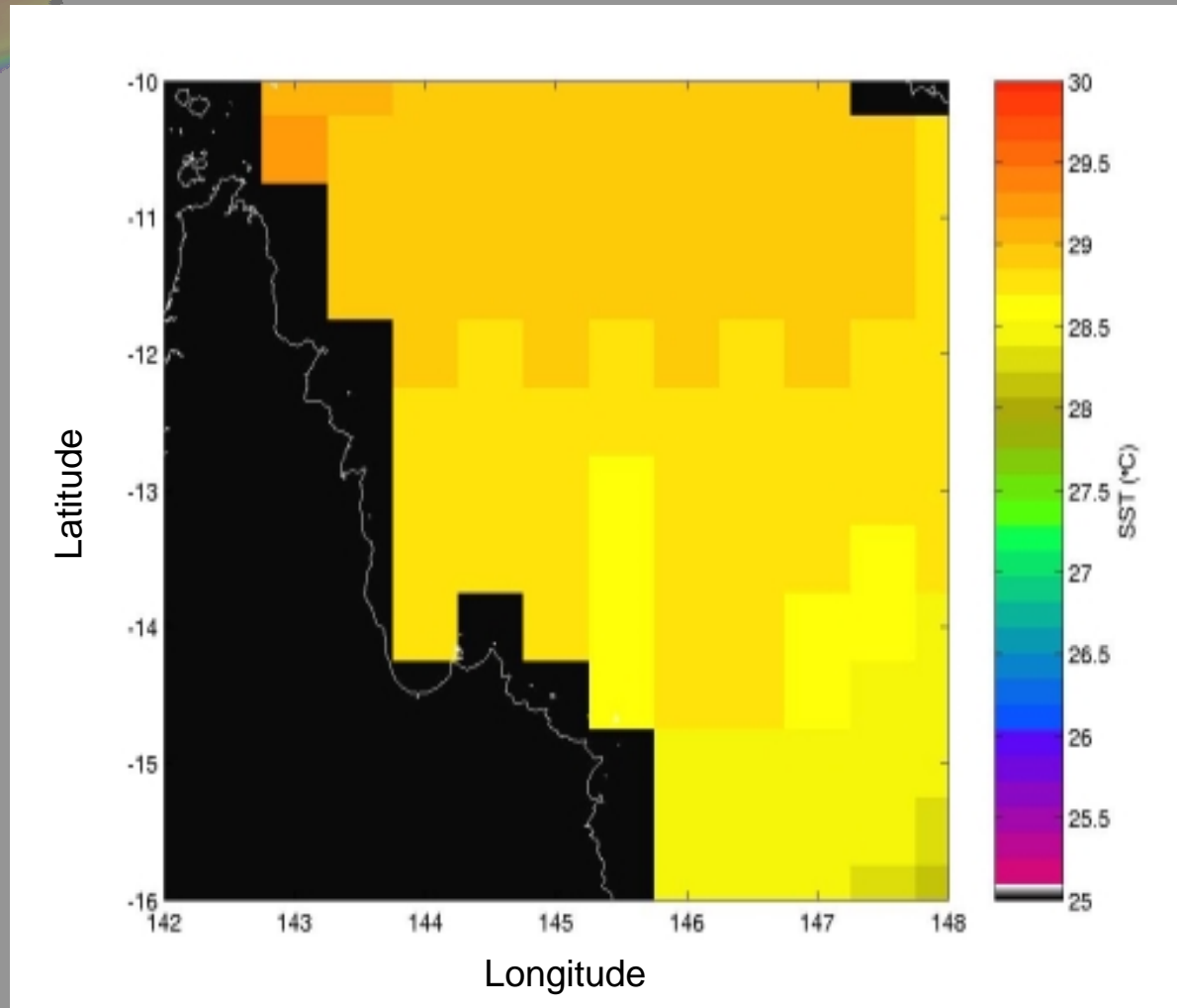


RSMAS/NODC AVHRR Pathfinder 4 km



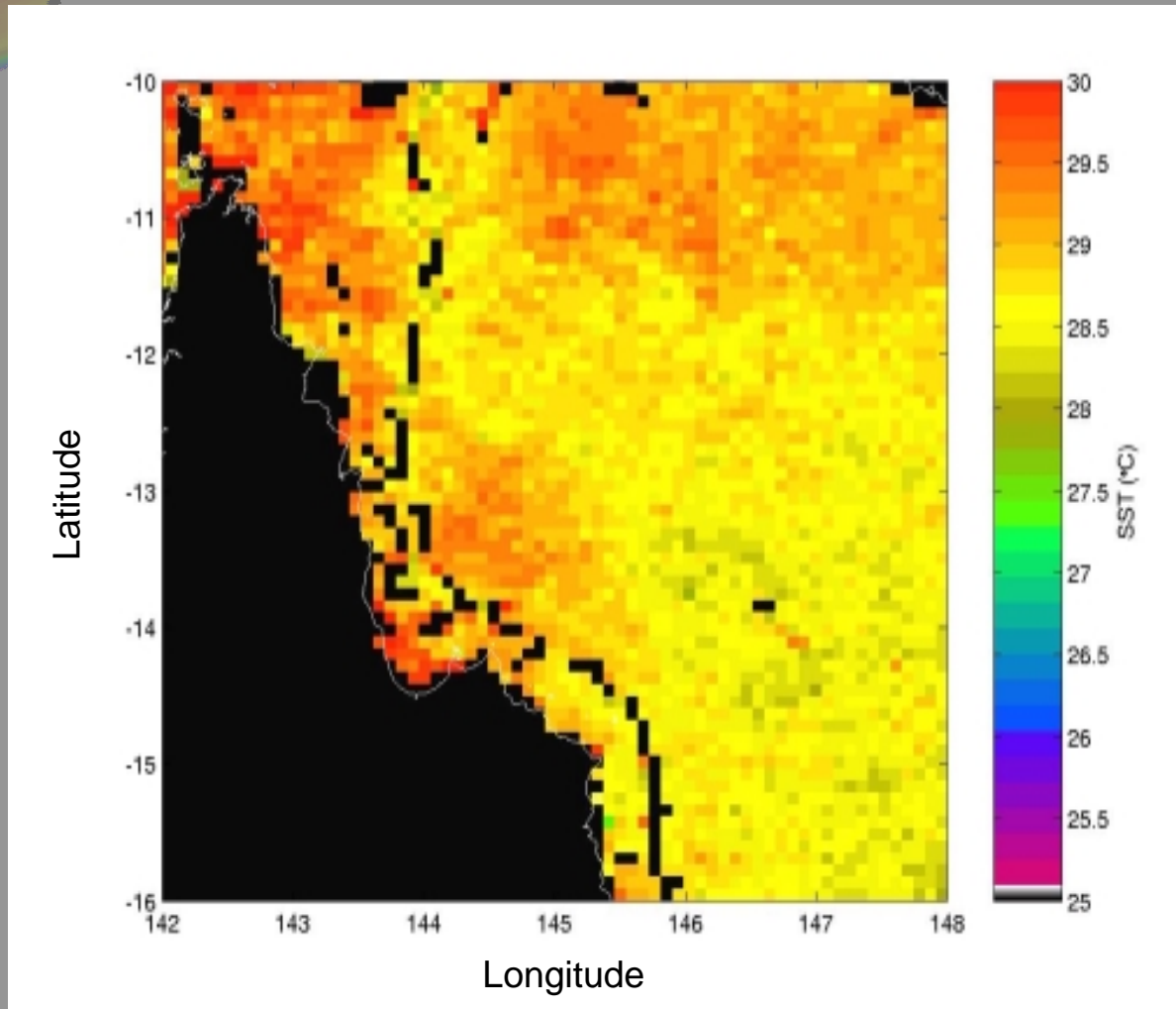


Operational NESDIS 50 km



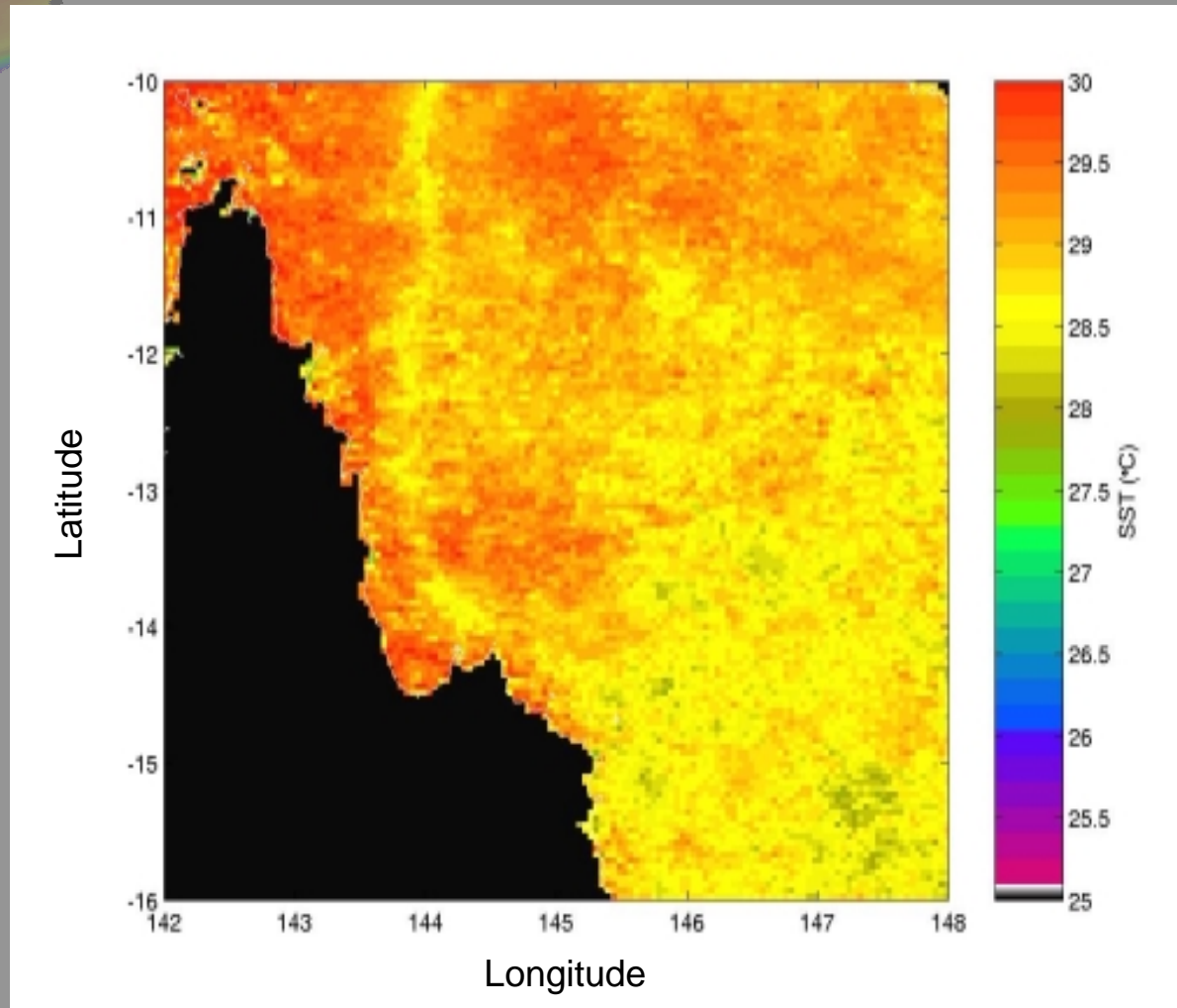


NOAA/NASA AVHRR Pathfinder 9 km



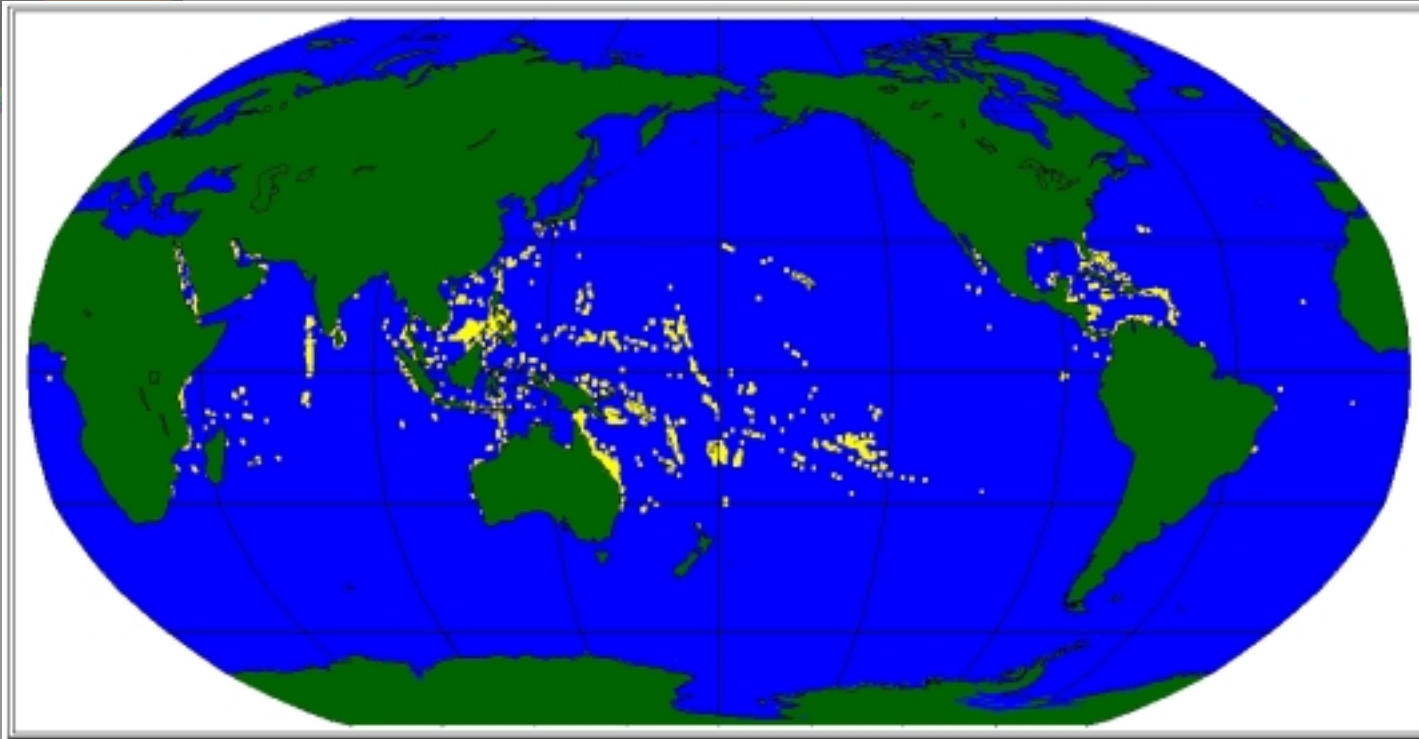


RSMAS/NODC AVHRR Pathfinder 4 km

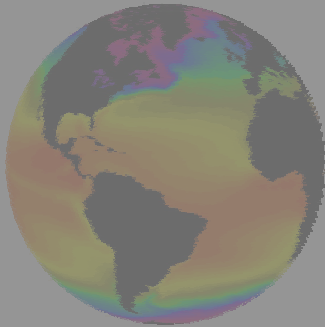


Improved Coastal Coverage

Graphic by Andrew Barton, NODC



- 🌐 ReefBase reef location database ~ 8000 sites
- 🌐 9 km Pathfinder coverage only 61%
- 🌐 4 km Pathfinder coverage: **98%**



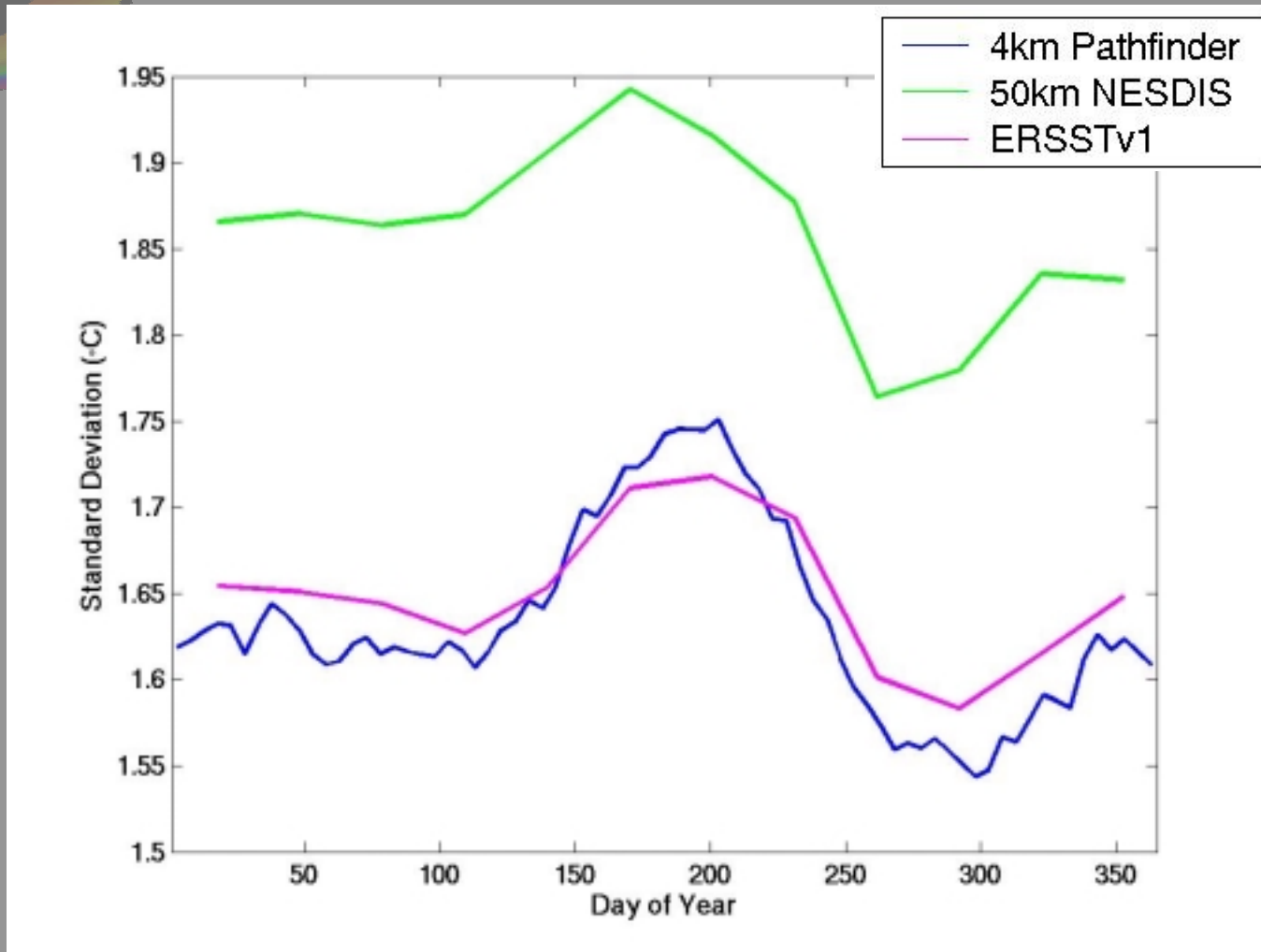
Overall Results

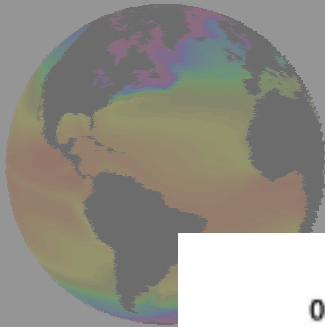
In situ SST – Climatological SST
1942-1997

Climatology	Number	Std. Dev. (°C)	Bias (°C)
4km Pathfinder	100M	1.64	-0.02
9km Pathfinder	98M	1.61	0.05
9km Pathfinder+Ero	97M	1.62	-0.06
2° ERSST v1	100M	1.65	-0.03
2° COADS	100M	1.66	-0.04
50km NESDIS	87M	1.78	-0.04
(Gap-filled)	(98M)	(1.86)	(-0.10)

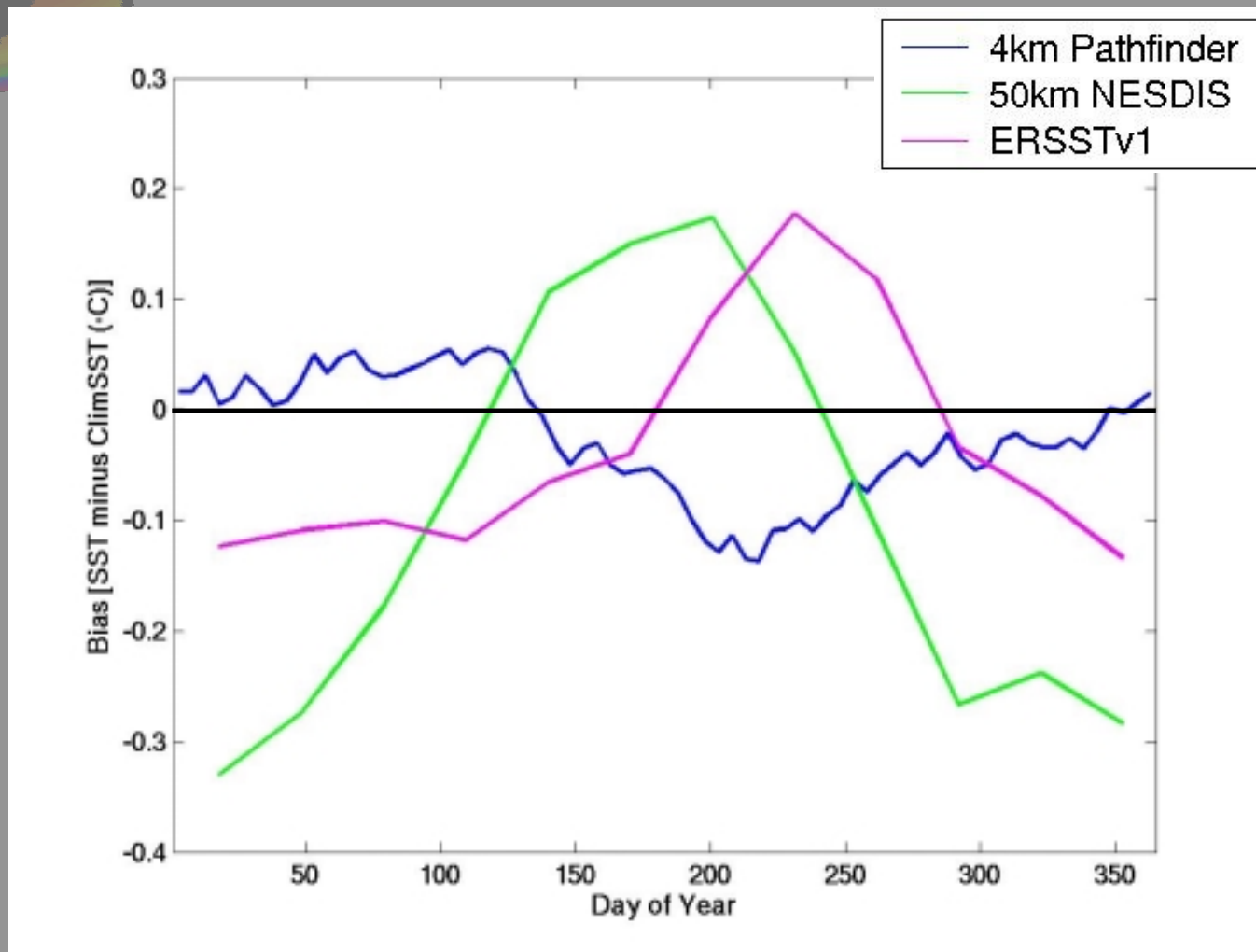


Standard Deviation vs. Time of Year





Bias vs. Time of Year

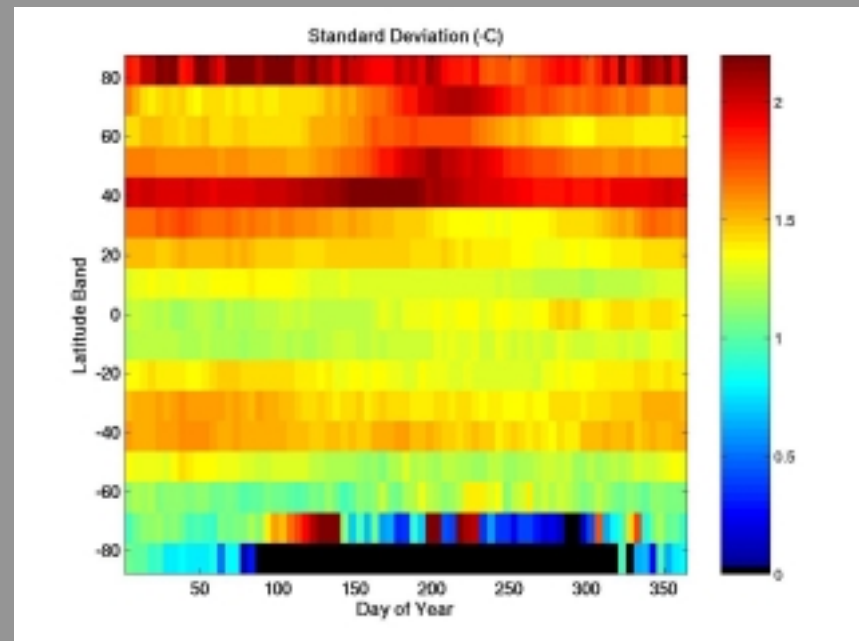
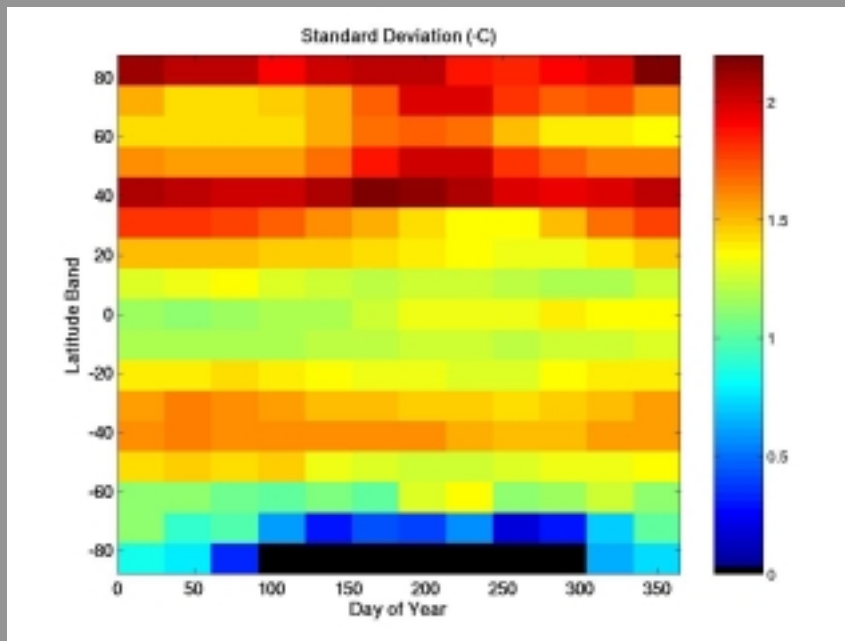




StdDev By Time of Year and Latitude

ERSSTv1

4km Pathfinder

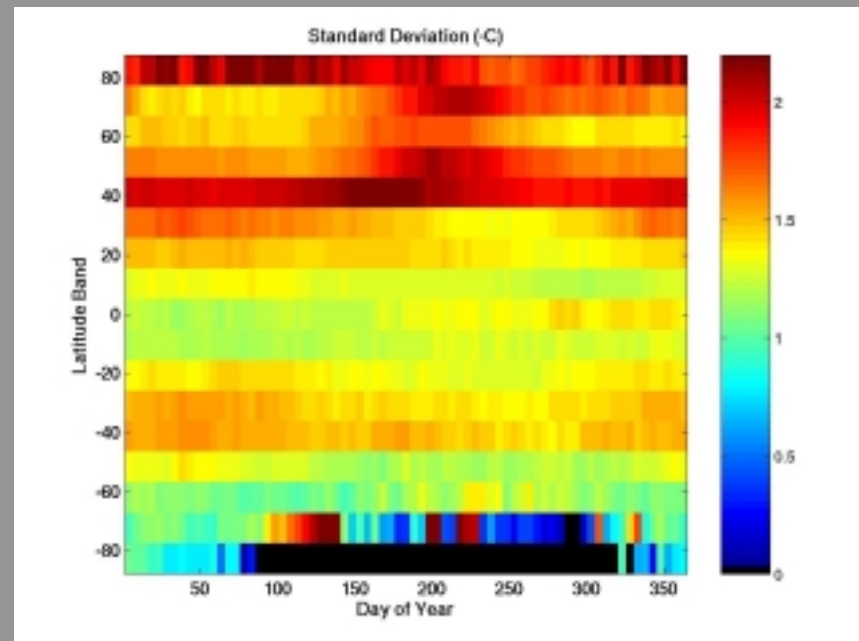
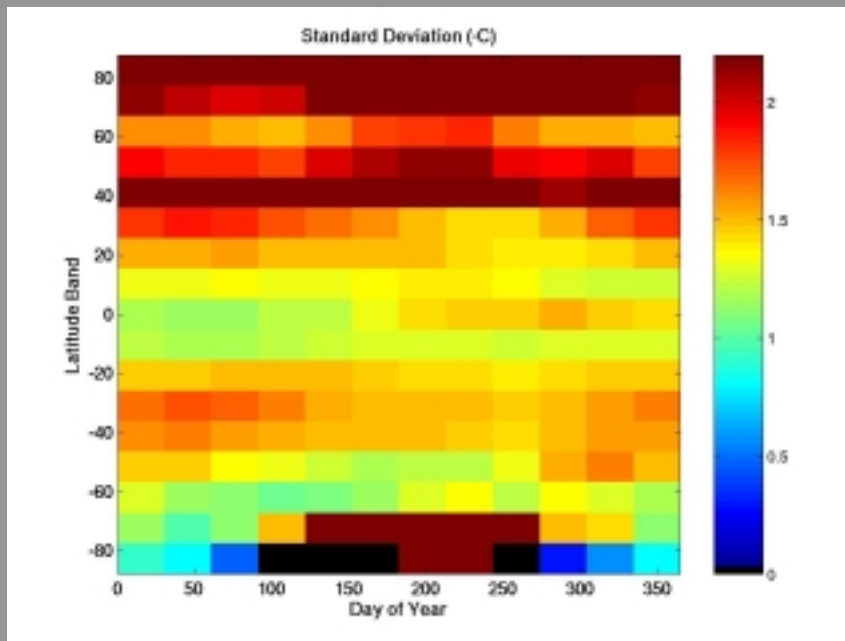




StdDev By Time of Year and Latitude

50km NESDIS

4km Pathfinder

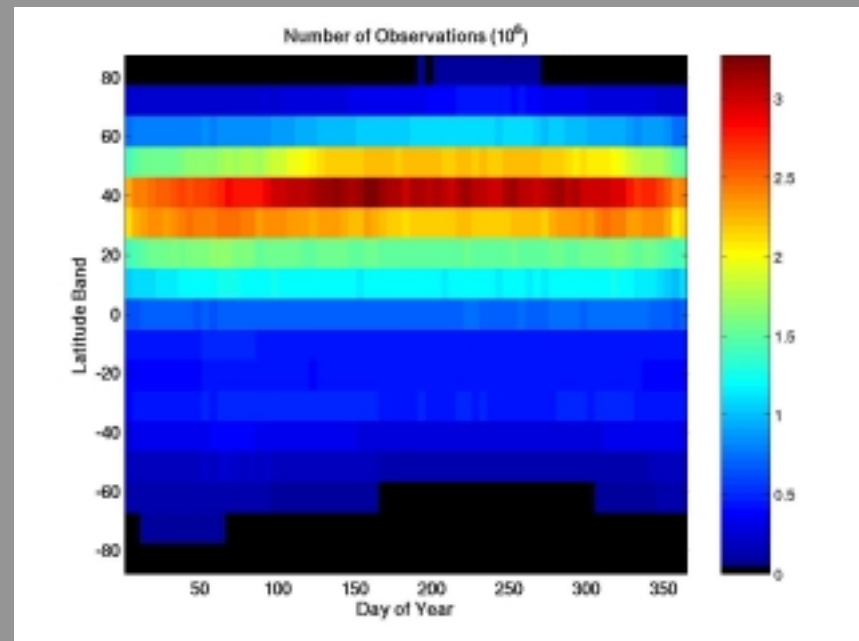
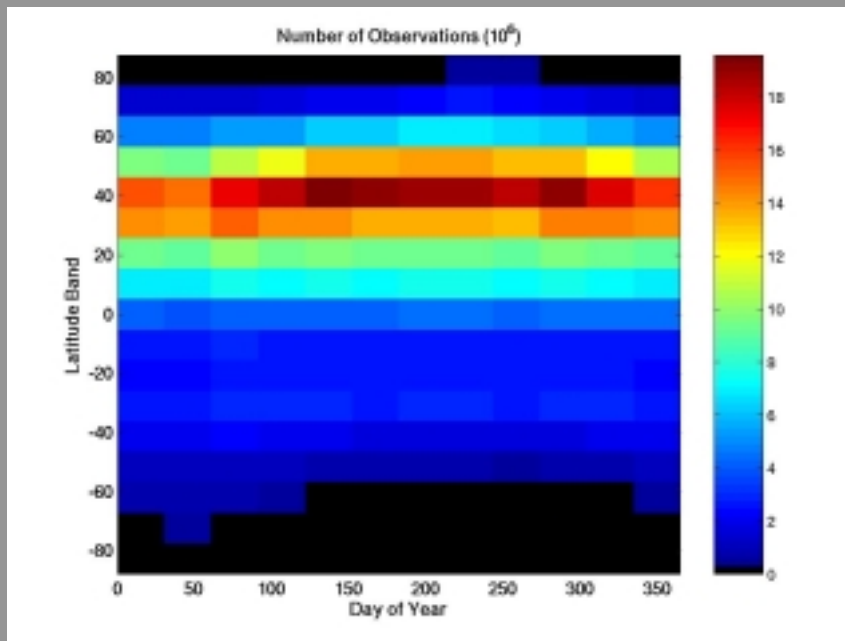




NumObs by Time of Year and Latitude

ERSSTv1

4km Pathfinder

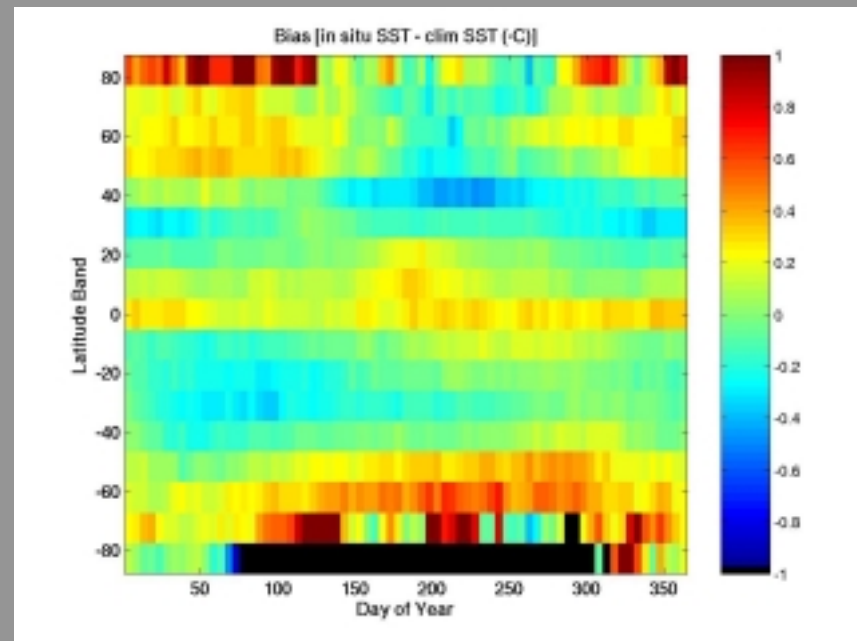
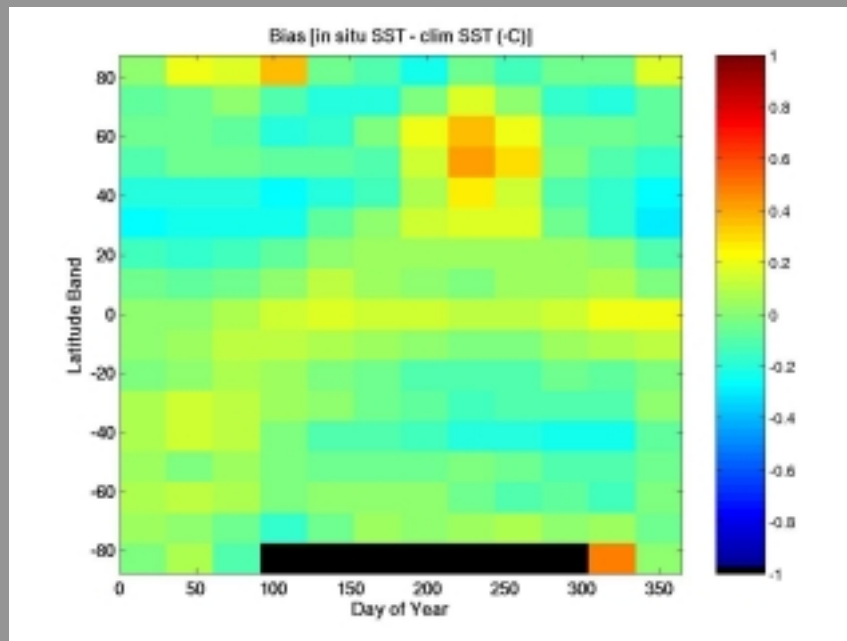




Bias by Time of Year and Latitude

ERSSTv1

4km Pathfinder

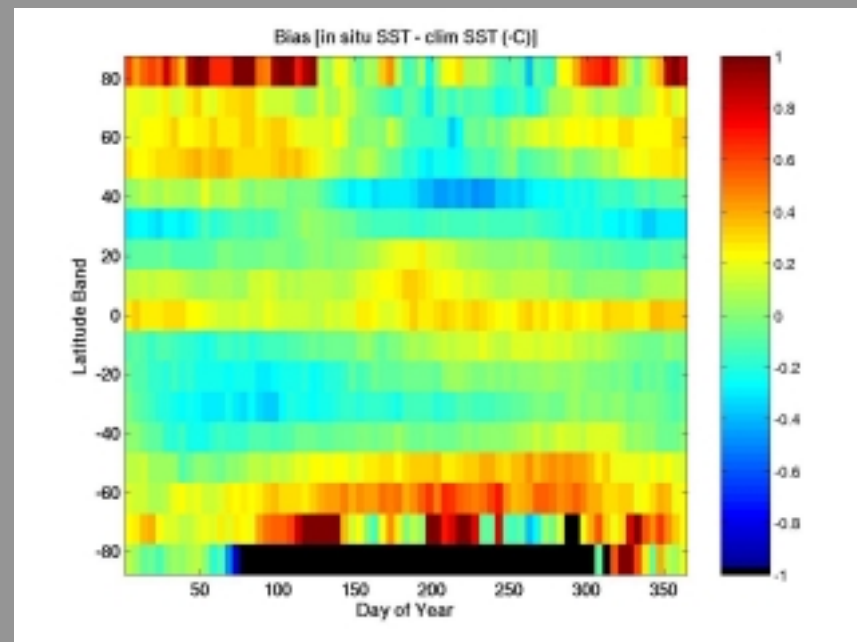
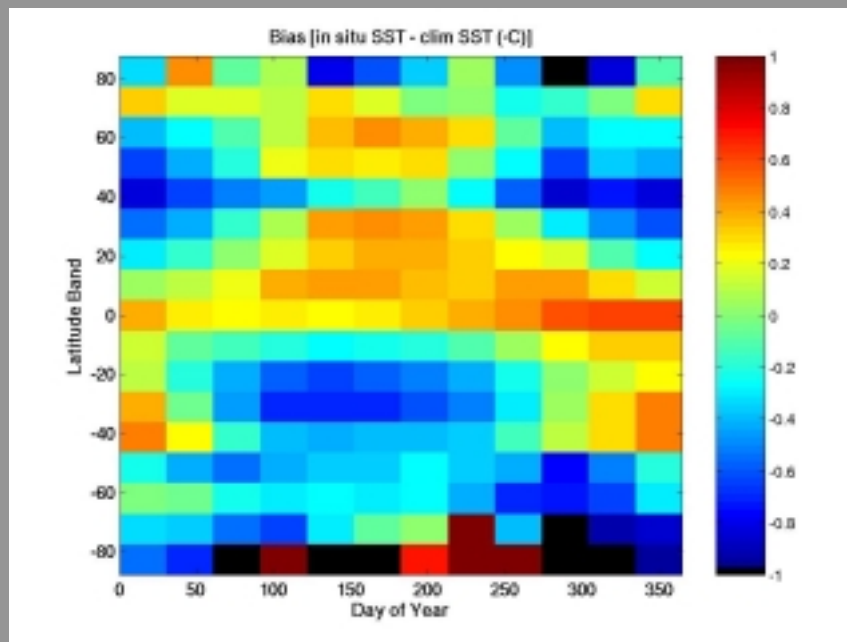




Bias by Time of Year and Latitude

50km NESDIS

4km Pathfinder





The Bottom Line (again)

- Pathfinder climatologies generally outperform the others
- 4 km Pathfinder has some distinct advantages over 9 km Pathfinder
- NESDIS operational climatology could be dramatically improved



Future Activities

Produce 4 km Pathfinder Version 5.1:

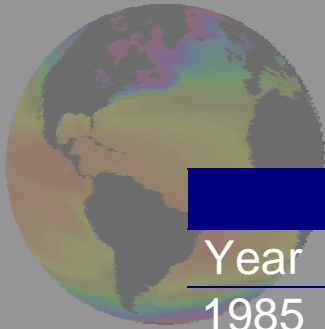
- Improved first-guess SST
- Improved quality info: aerosols, water vapor, distinct sea ice
- Add 1981-1984 and interim 2002-2003
- Provide AVHRR Level-0 data online
- Improved, FGDC-compliant metadata

Continued investigation of NESDIS operational vs. Pathfinder climatologies

- Compare against operational SST fields
- Potentially “upgrade” to newer climatologies

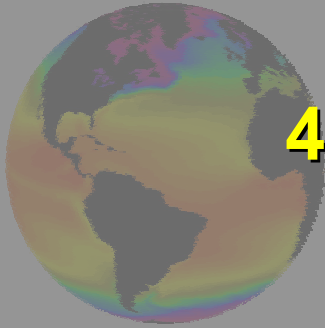
Test other climatologies

- JPL's, HadISST, Andy's RTM?
- Refinements to current 4 km climatology
- Develop and test QF=7 climatologies



4 km Pathfinder Status

4 km SST Data Available						
Year	Daily	5-day	7-day	8-day	Monthly	Yearly
1985						
1986						
1987						
1988						
1989						
1990						
1991			Complete			
1992						
1993						
1994						
1995						
1996						
1997						
1998						
1999						
2000						
2001						



4 km Pathfinder SST Data Access

http, ftp

<http://data.nodc.noaa.gov>

OPeNDAP

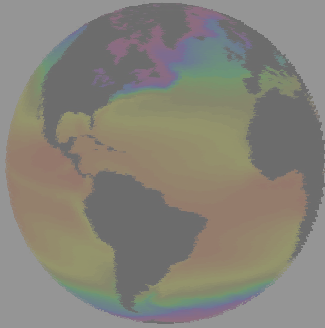
<http://data.nodc.noaa.gov/cgi-bin/nph-dods/>

Experimental Live Access Server (LAS):

<http://stout.pmel.noaa.gov/nodc>

For more info:

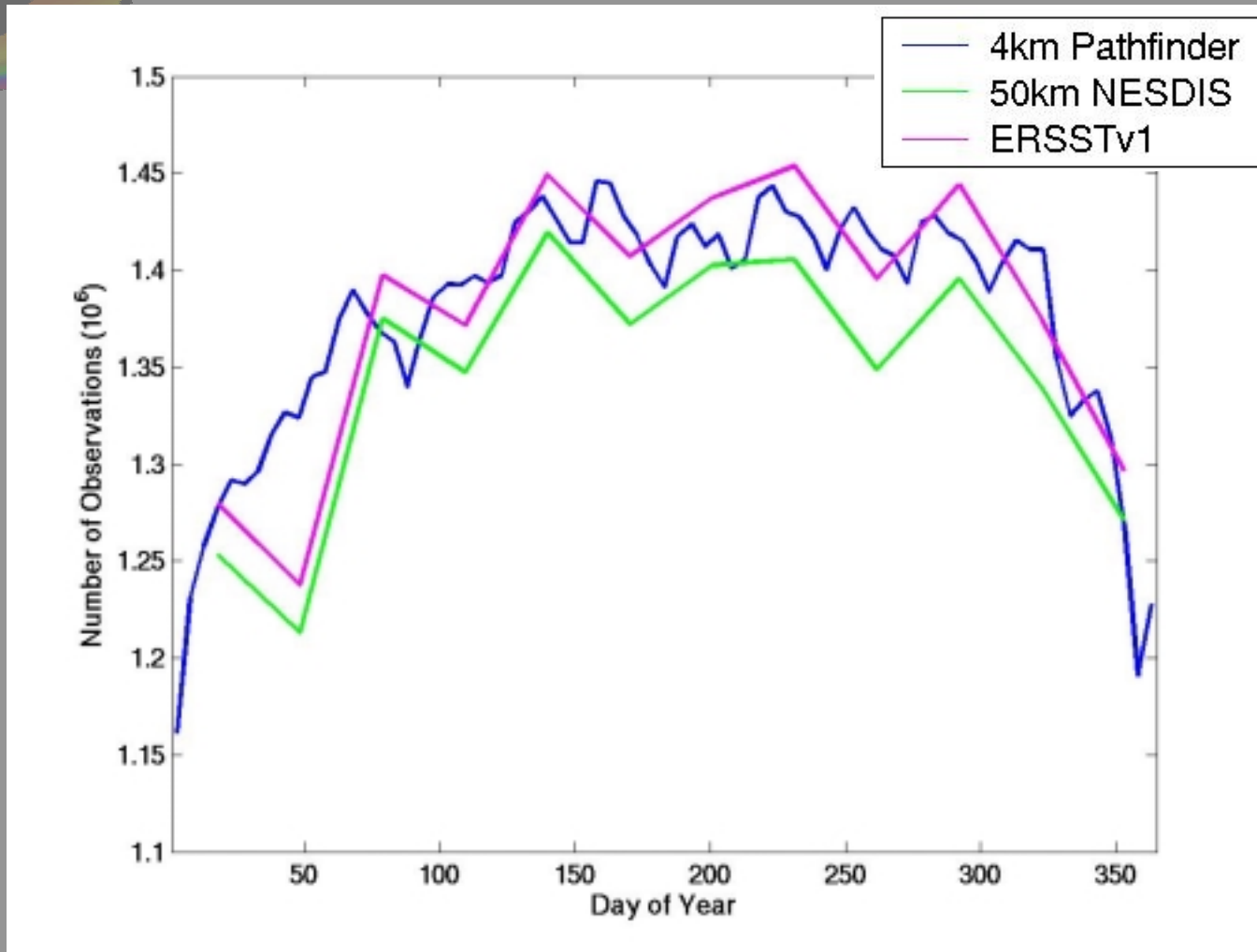
<http://www.nodc.noaa.gov/sog/pathfinder4km>

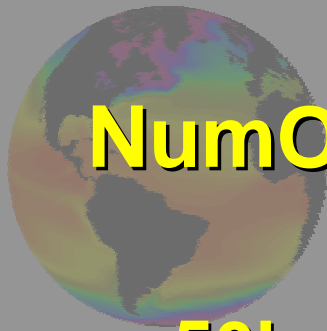


Thank-you!



Number of Obs vs. Time of Year

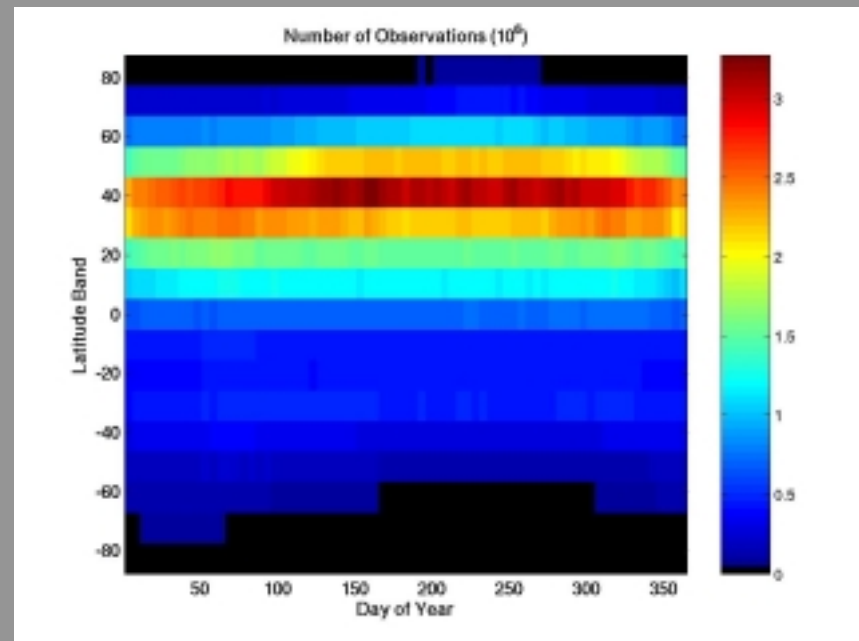
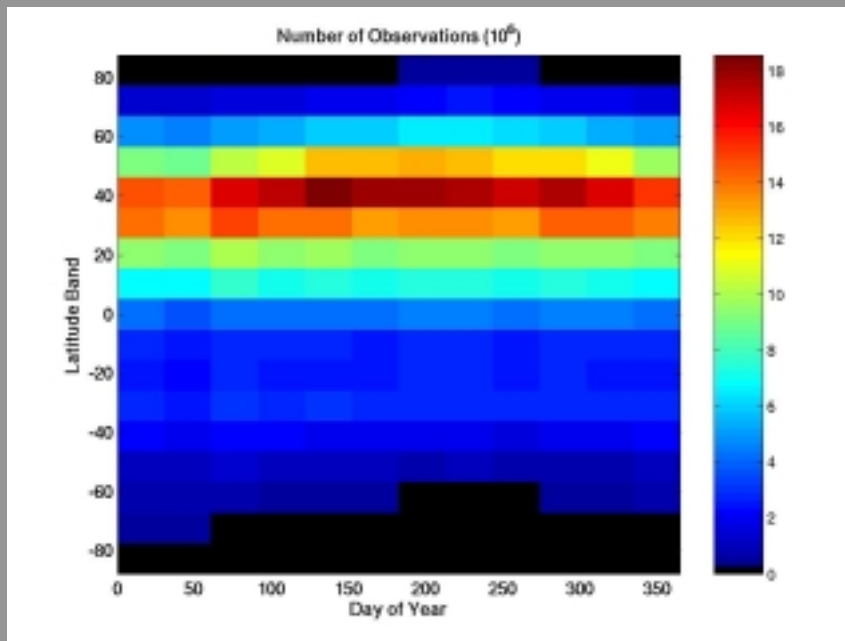




NumObs by Time of Year and Latitude

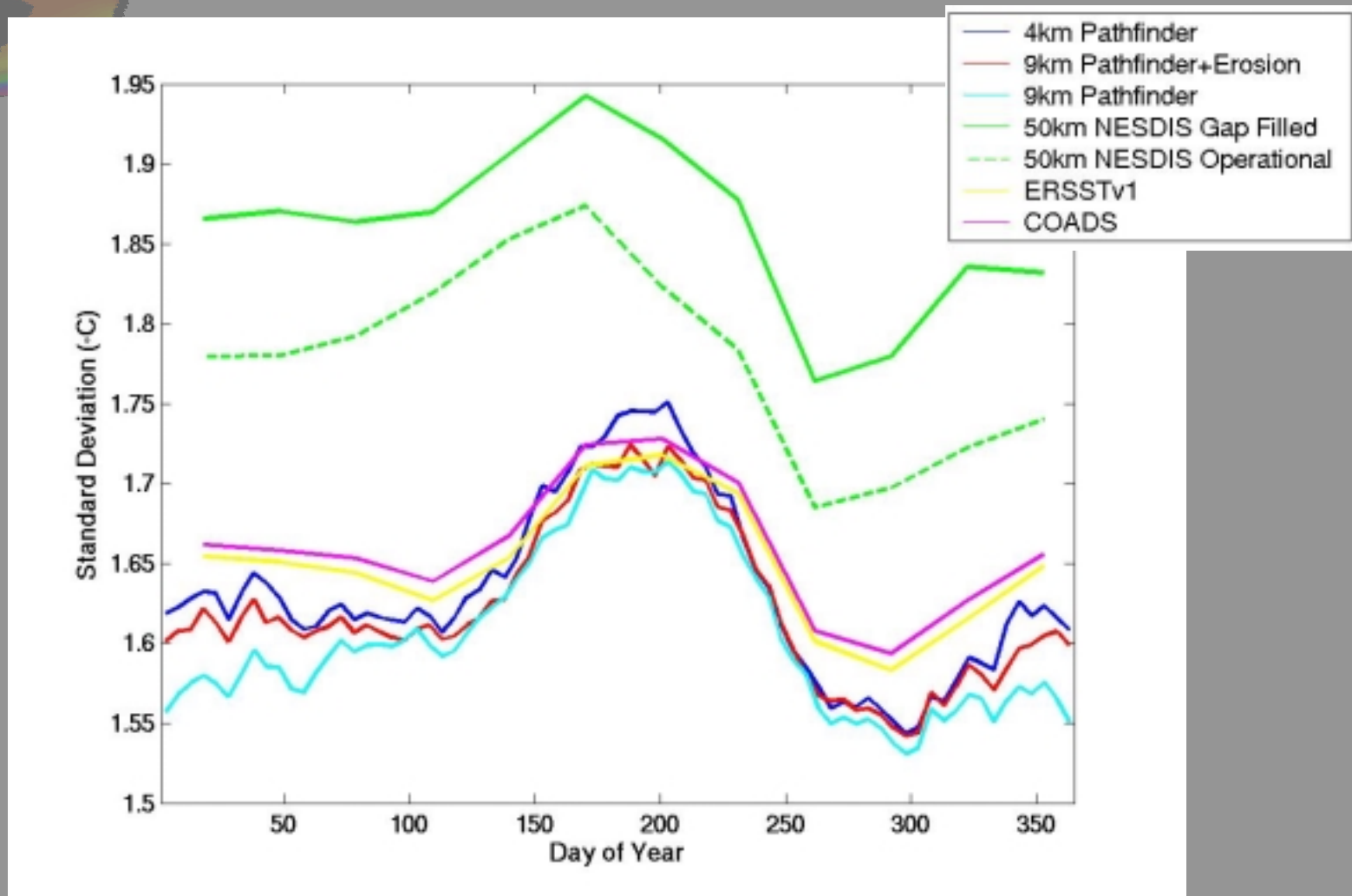
50km NESDIS

4km Pathfinder



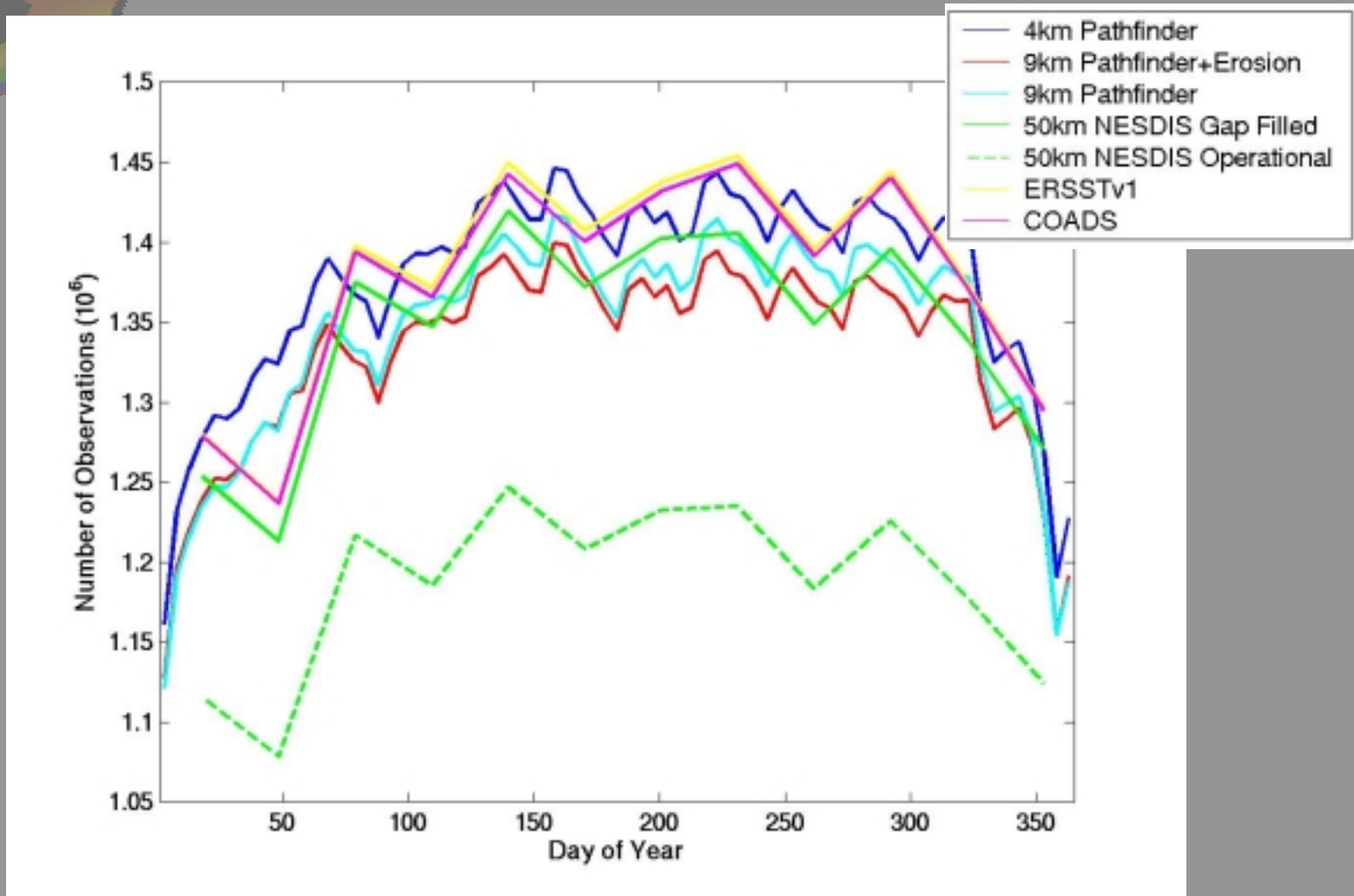


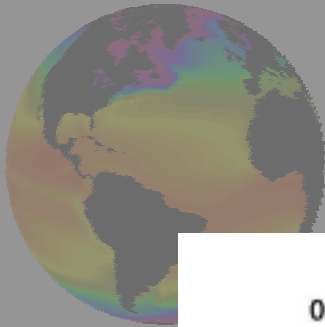
Standard Deviation for All Climatologies



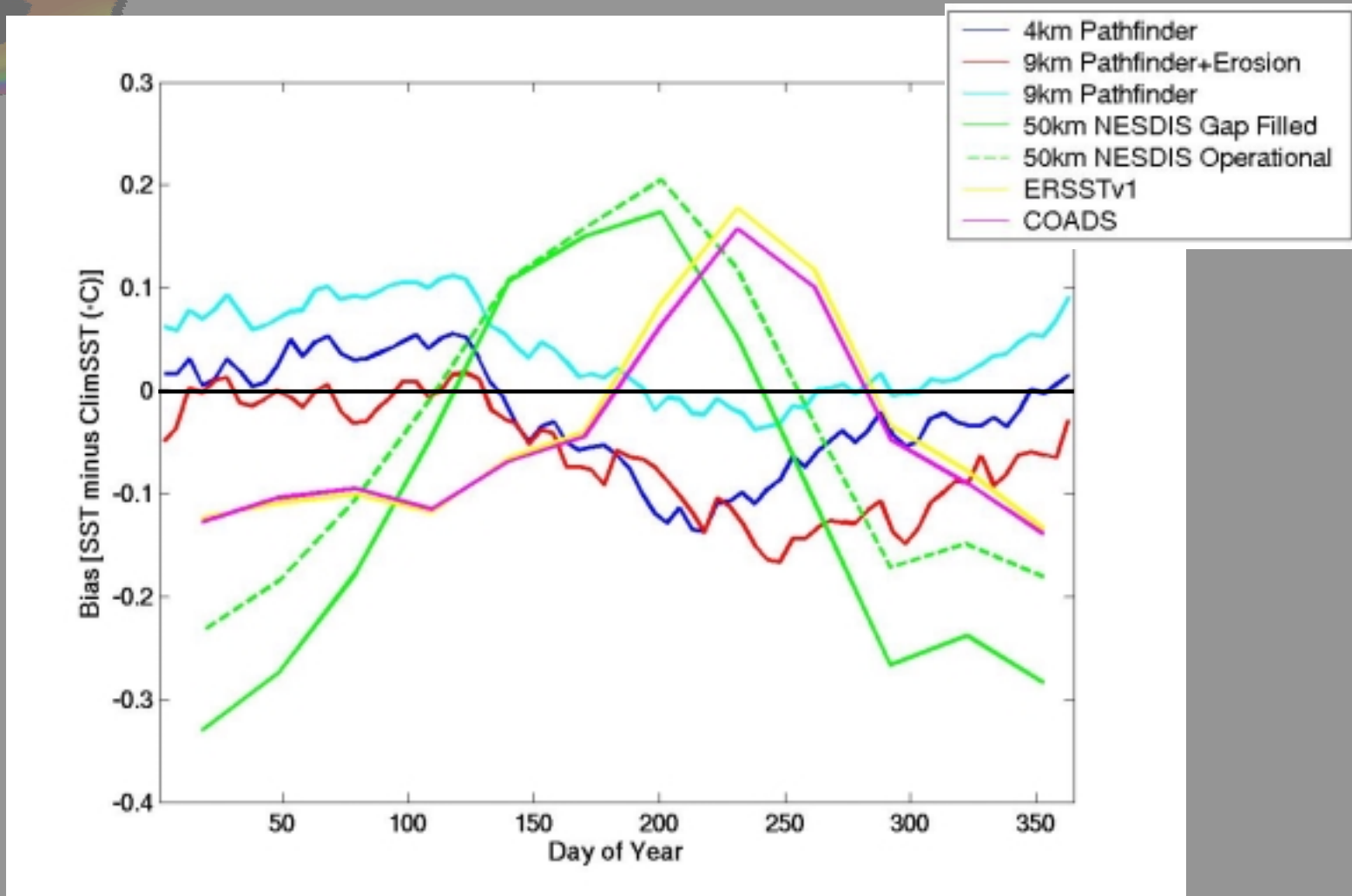


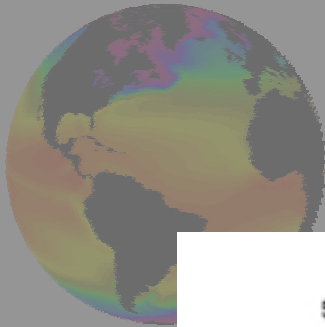
Number of Obs for All Climatologies





Bias for All Climatologies





ERSST 2-Degree

