Uncertainties in SST and sea ice analyses

Nick Rayner, Tess Brandon, Ken Casey, Craig Donlon, Alexey Kaplan and Liz Kent

Outline

- Who are the GCOS SST & SI WG?

- Why do we exist?

- Progress towards achieving our aims

- Future plans

WG members

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ToR and foci

- 1. To record and evaluate the differences among historical and near real time SST and SST/SI analyses
- 2. To identify the sources of differences in the analyses
- 3. On the basis of comparison of those differences with the expected climate signals in the SST patterns, to recommend actions needed to ensure the quality and consistency of the SST and SST/SI analyses
- 4. To establish criteria to be satisfied by SST and SST/SI analyses to ensure the quality and consistency required by the Global Climate Observing System (GCOS)
- 5. Liaise with all appropriate bodies
- 6. To report annually to AOPC and OOPC on progress and recommendations

- Inter-comparisons are motivated in particular by the necessity to evaluate:
    - Accuracy of products (as distinct from relative differences)
    - Uncertainties, climatologies and the effectiveness of bias corrections
    - Impacts of assumptions of stationarity of means and covariances and of other a priori assumptions
    - Representations of secular and interannual variability
    - Effects of applying different QC methodologies to common input data.
    - The driving consideration behind these is the need to accurately define the climate change signal.

Intercomparisons

- A number of SST data sets have been assembled for 1981 onwards & put into a common format
- A preliminary set of diagnostics have been calculated:
  - Global and hemispheric time series of anomalies relative to a common climatology
  - Time/latitude plots
  - Maps of rms differences
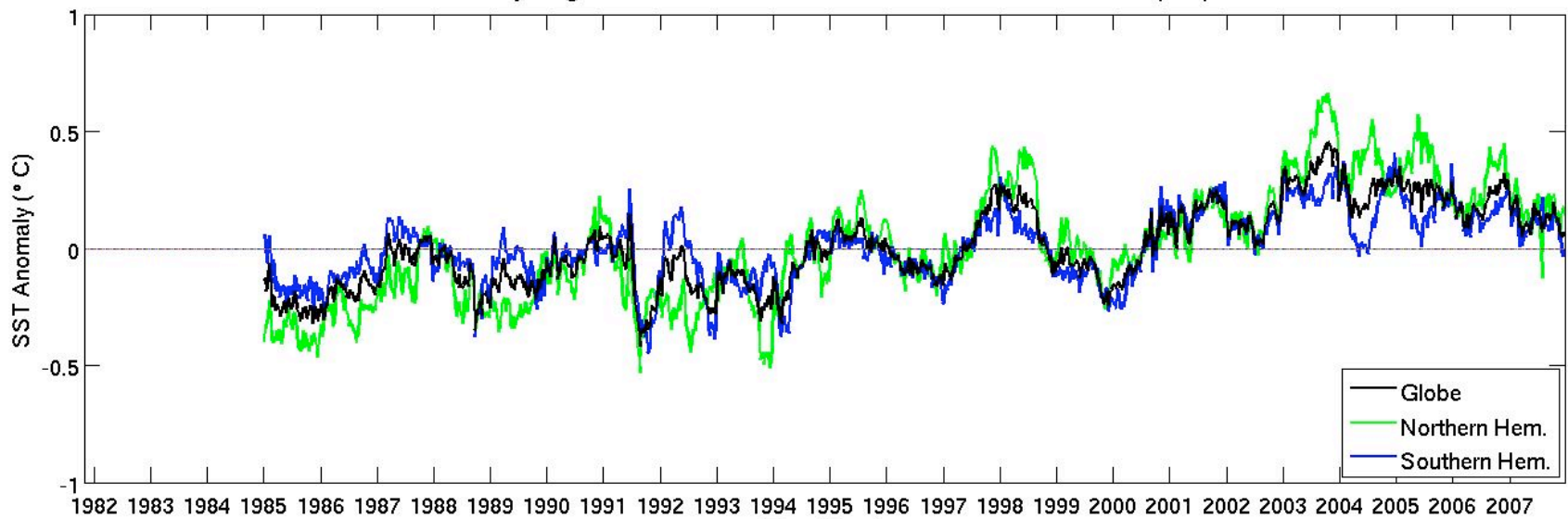- These were discussed at a meeting in Gdynia, 5th May 2008

GCOS SST & SI WG
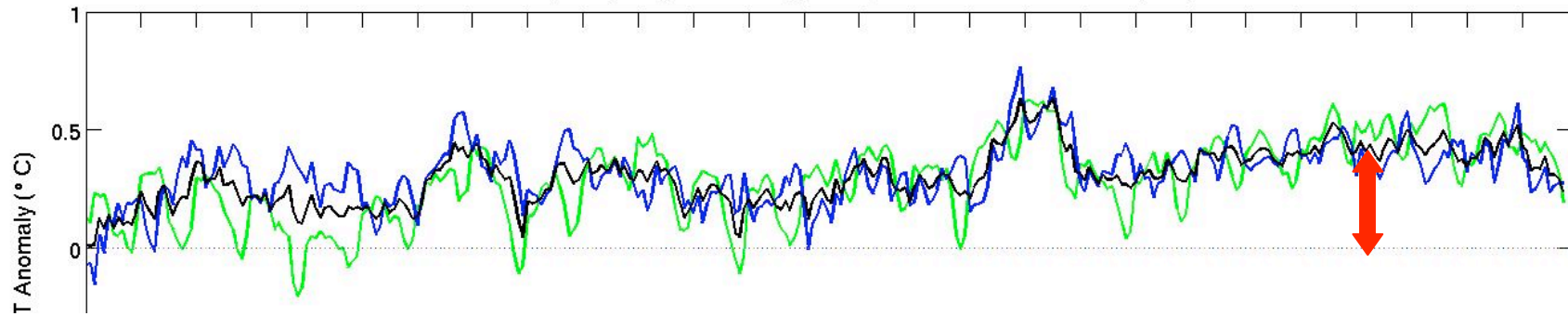
Weekly Nighttime Hadley Centre SST Anomalies (° C)   **(HadSST2)**
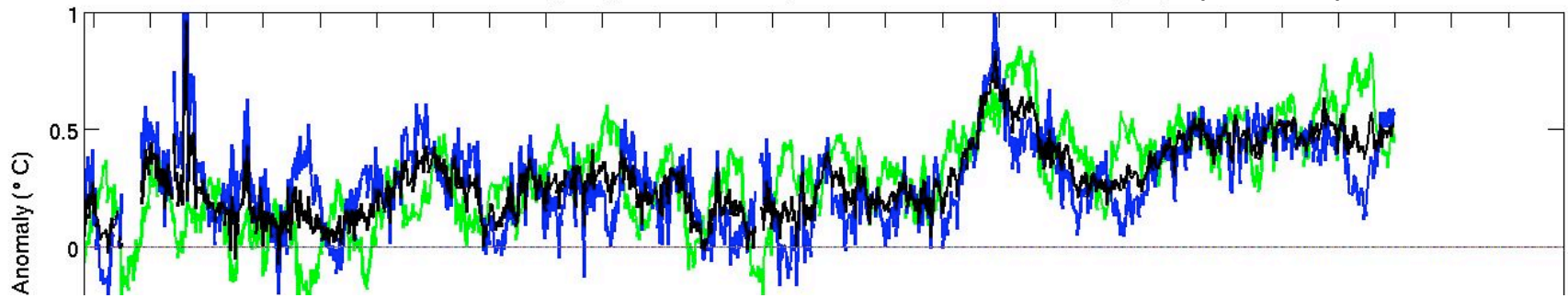
Weekly Nighttime Operational AVHRR SST Anomalies (° C)
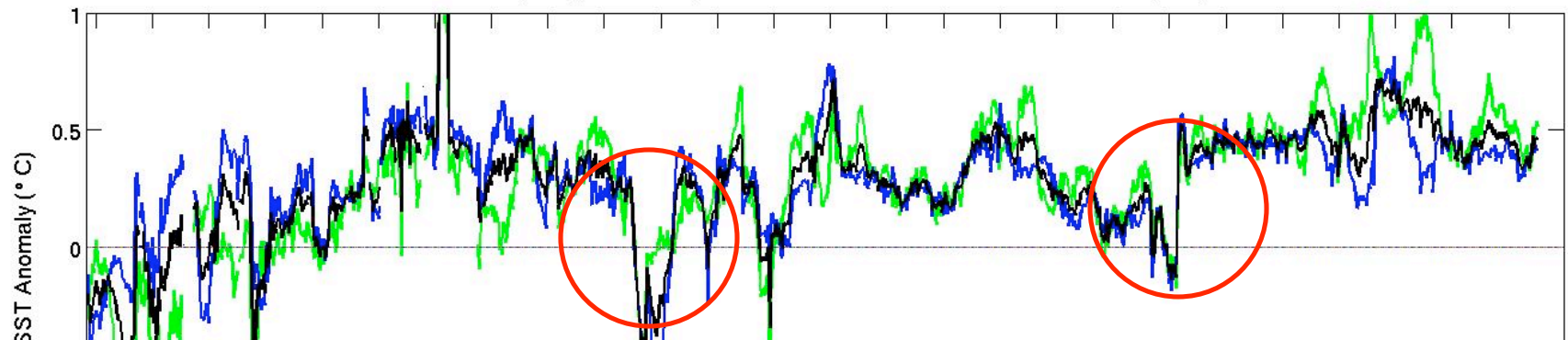
Weekly Nighttime Pathfinder Version 5 SST Anomalies (° C)

Monthly Day/Night Average Kaplan SST Anomalies (° C)

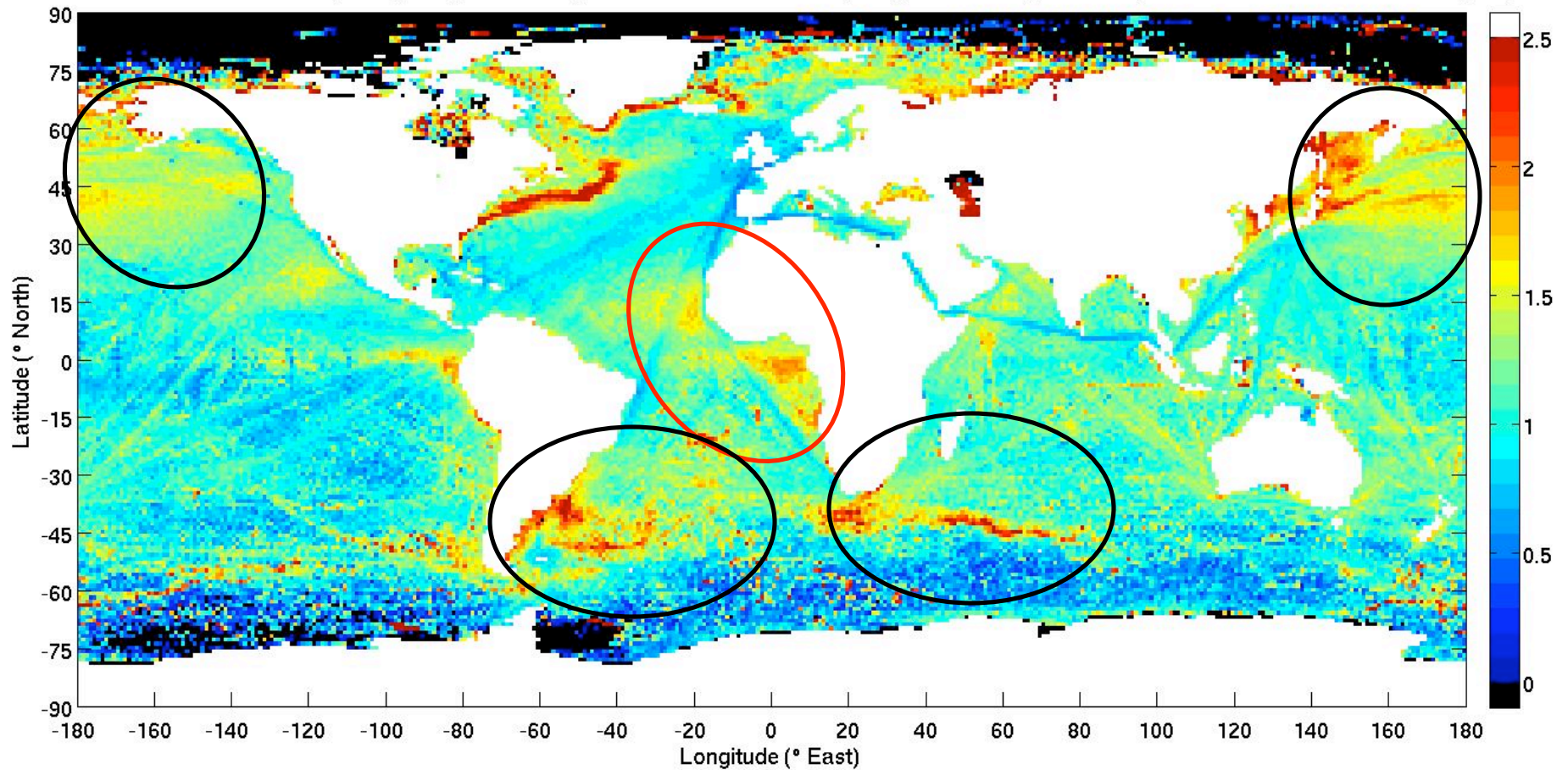Monthly Day/Night Average Hadley Centre SST Anomalies (° C) **(HadSST2)**
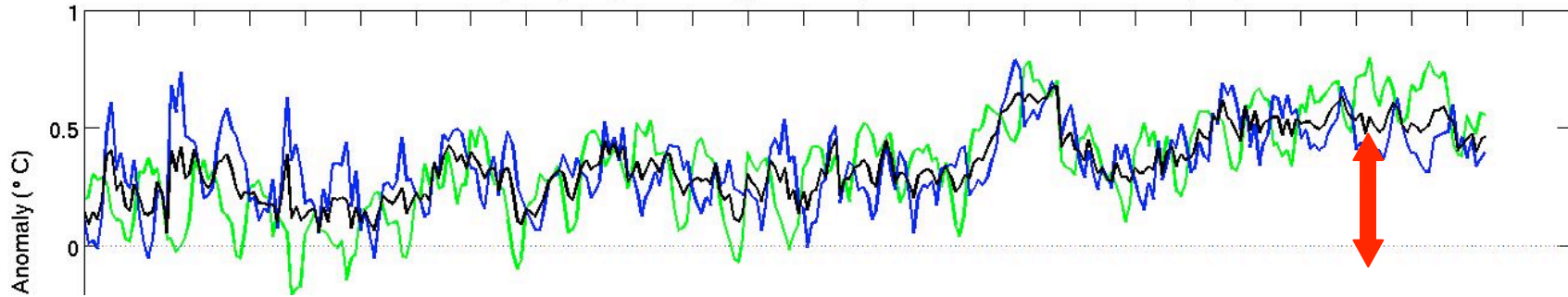
Monthly Day/Night Average Pathfinder Version 5 SST Anomalies (° C)
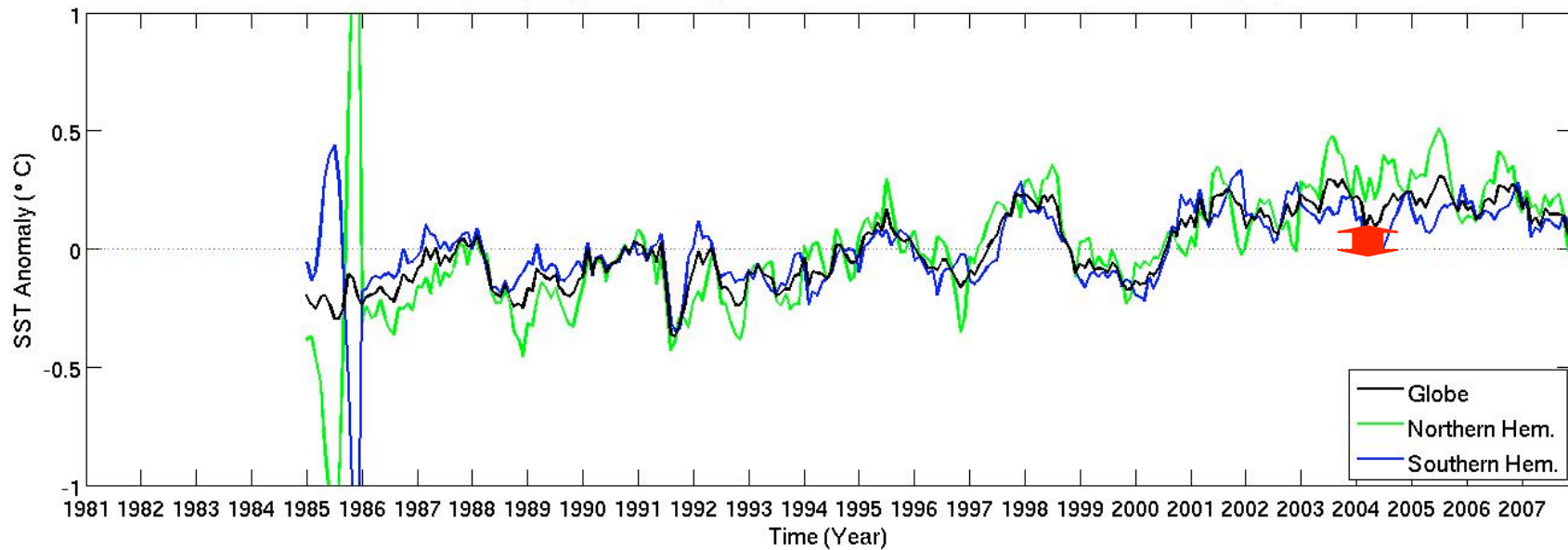
Monthly Day/Night Average Extended Reconstruction SST Anomalies (° C)
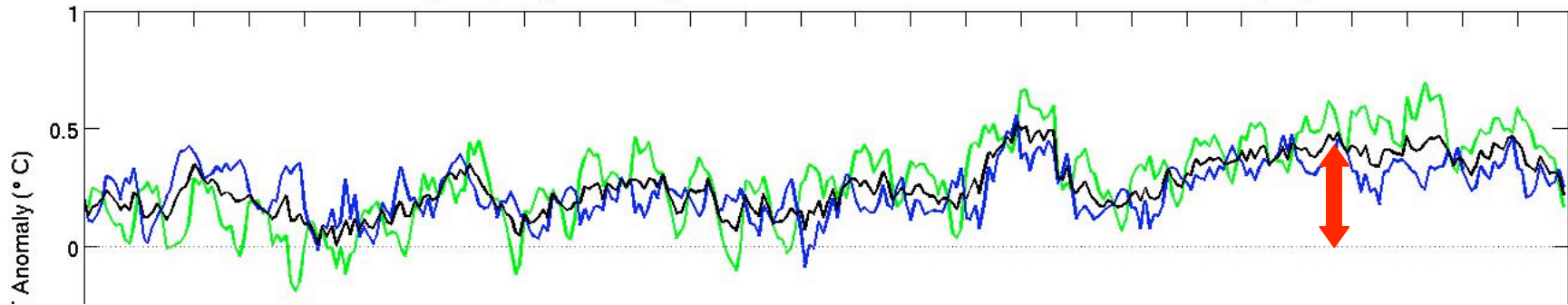
Monthly Day/Night Average HadISST SST Anomalies (° C)
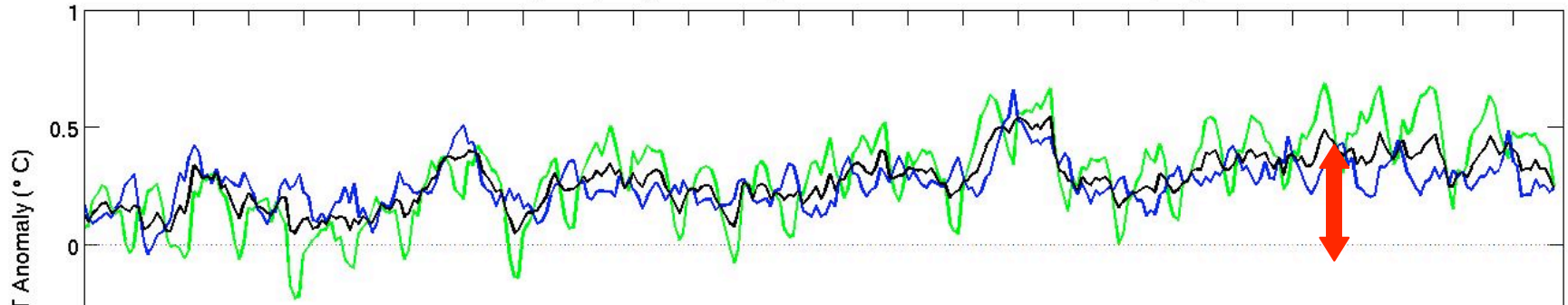
Monthly Day/Night Average Optimum Interpolation Version 2 SST Anomalies (° C)
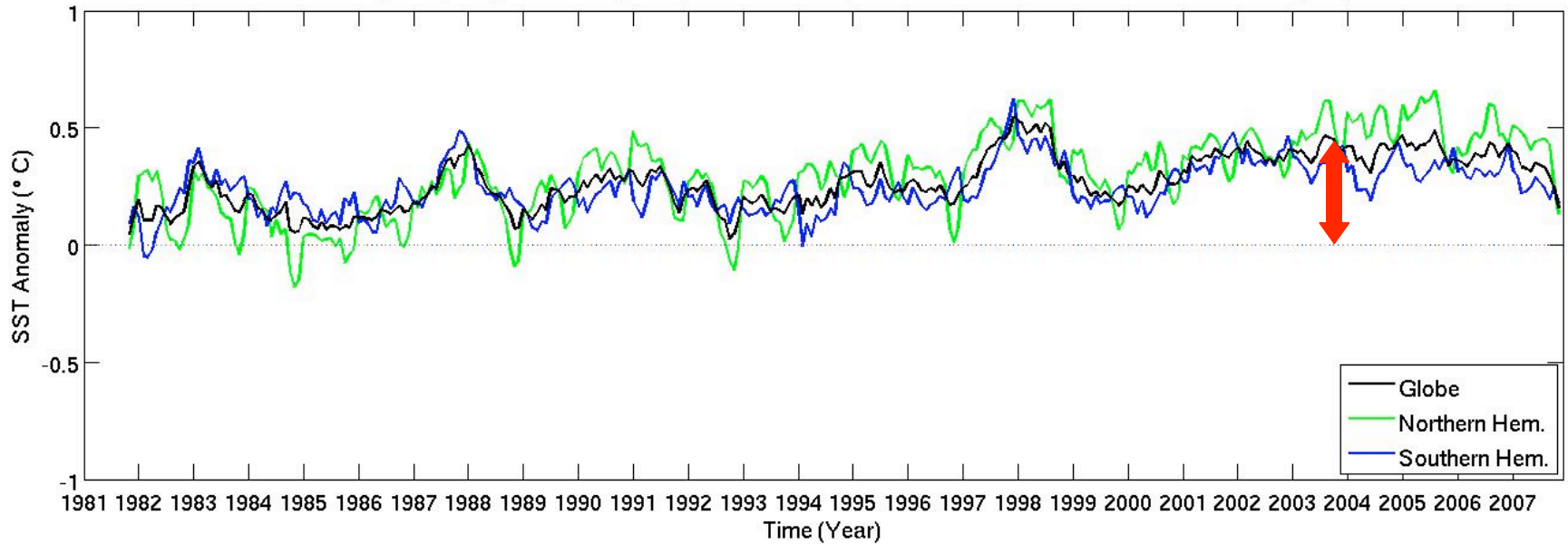
Weekly 1° rms differences

RMS Differences: Weekly Day/Night Average Pathfinder and Day/Night Average Hadley Centre SST Anomalies (° C)

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Weekly 1° rms differences

Differences: Weekly Day/Night Average Hadley Centre and Day/Night Average Daily Optimum Interpolation SST Anomalies
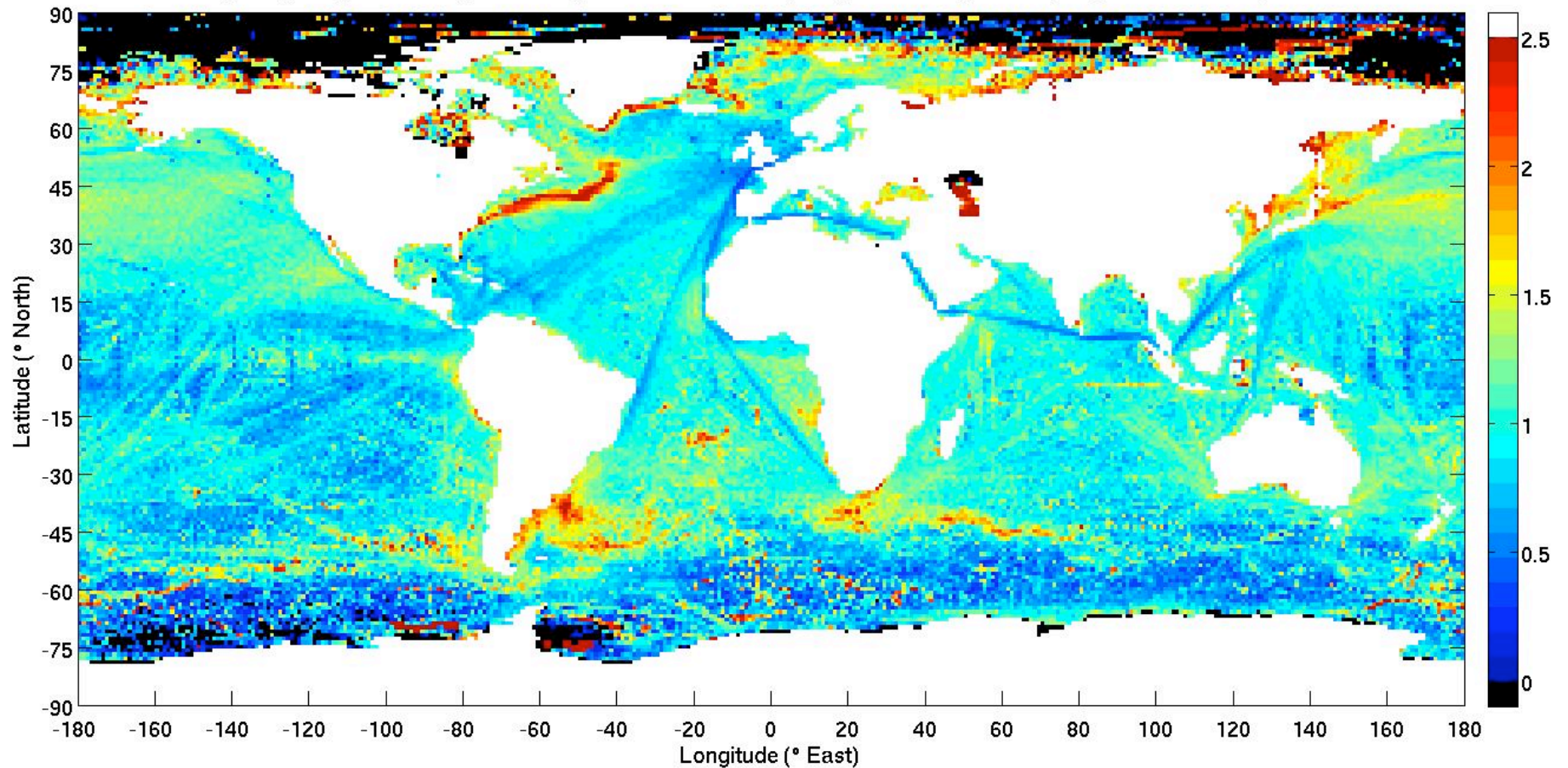
GCOS SST & SI WG

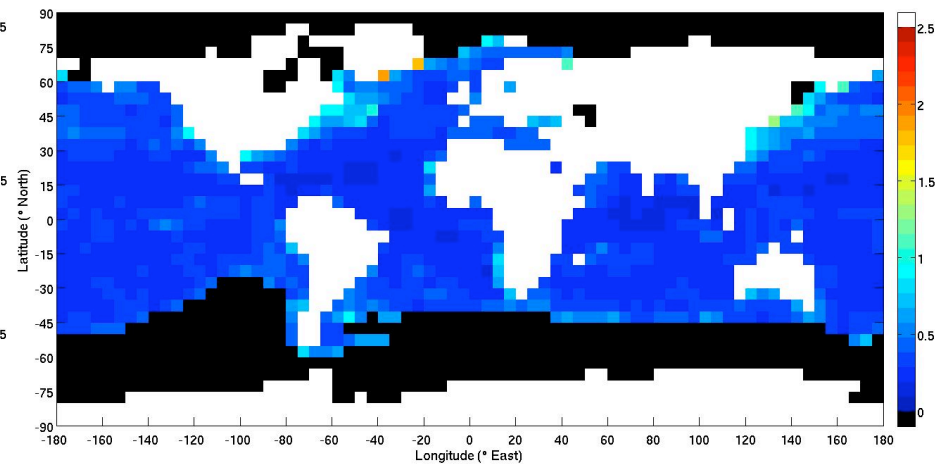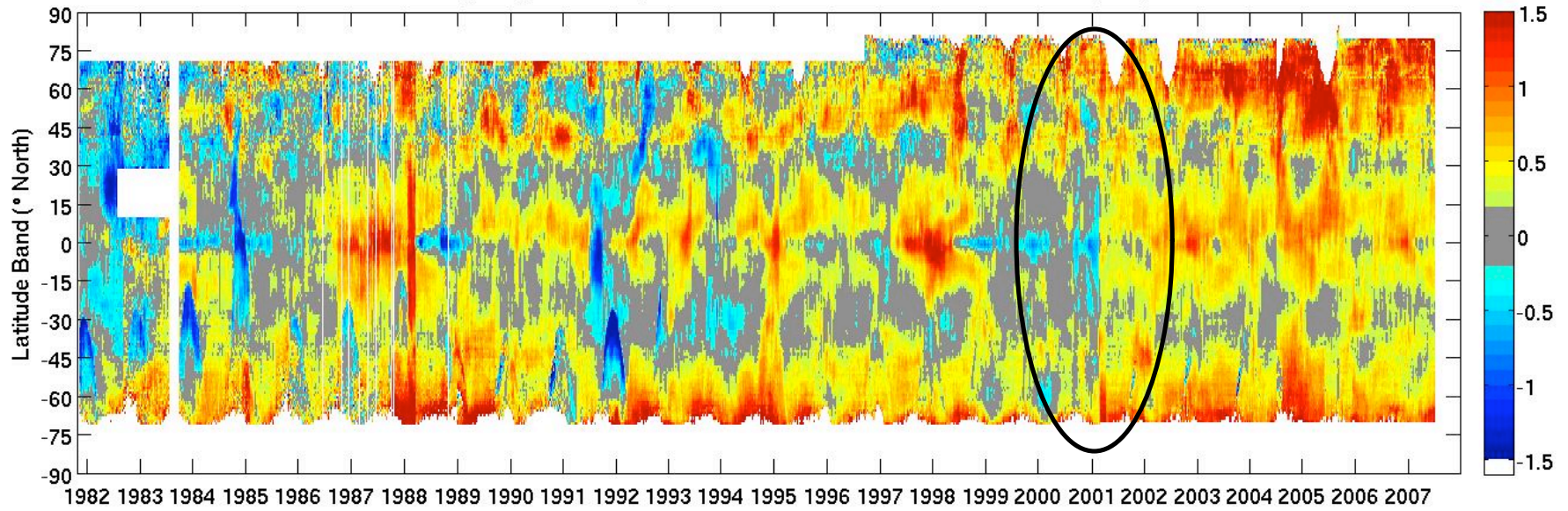# Monthly 5° rms differences

ERSST / HadISST1
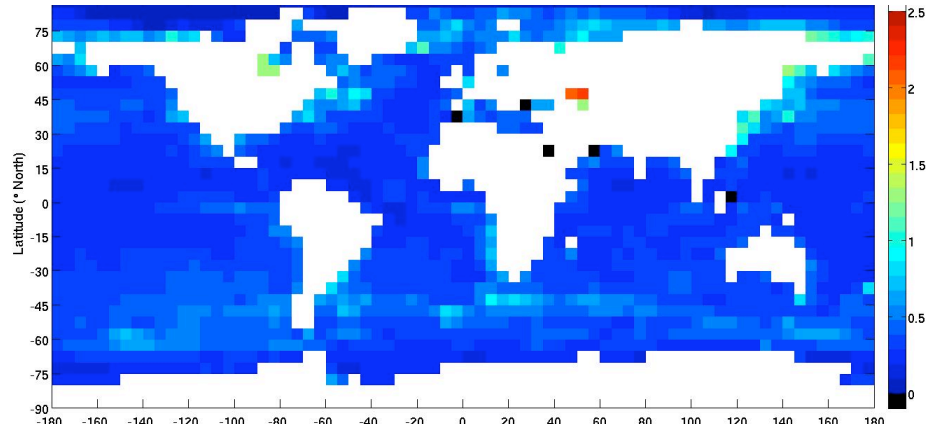
ERSST / Kaplan
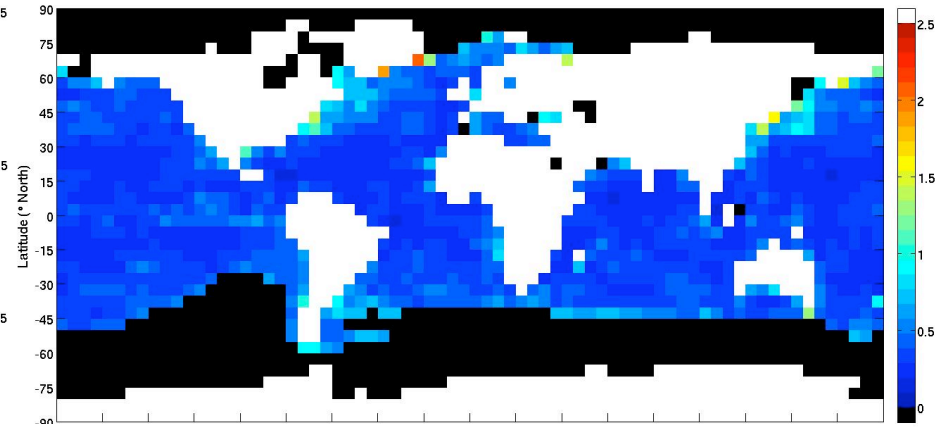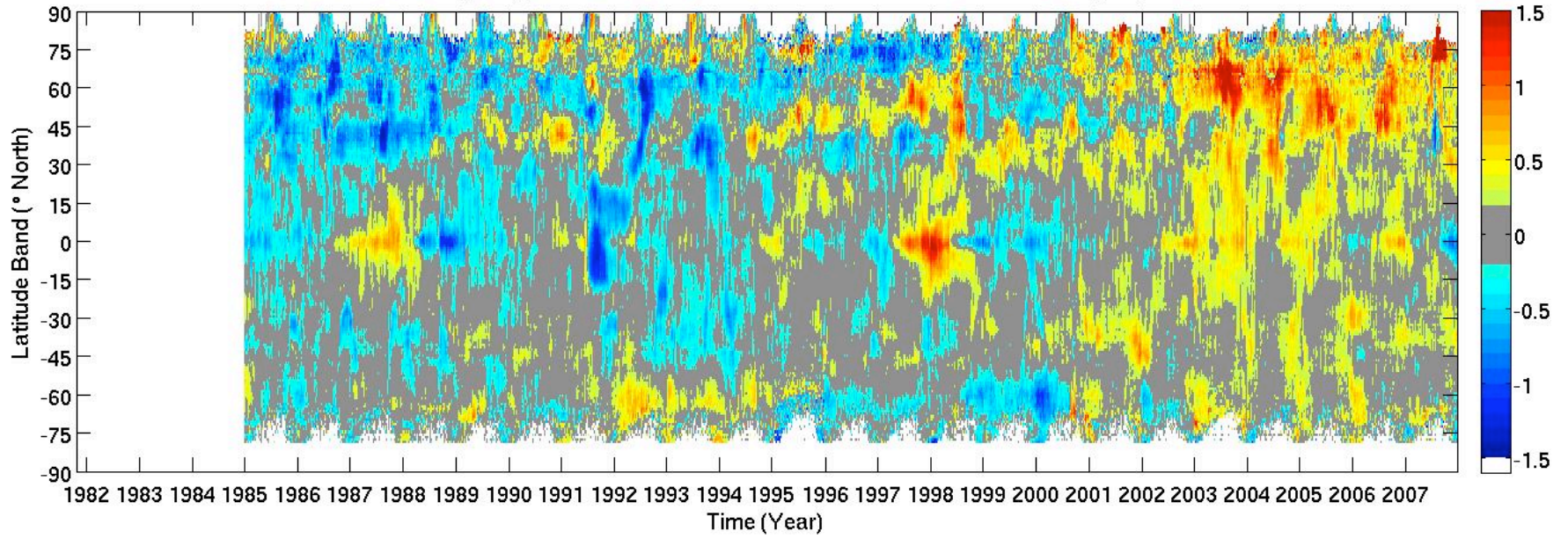
ERSST / OIv2
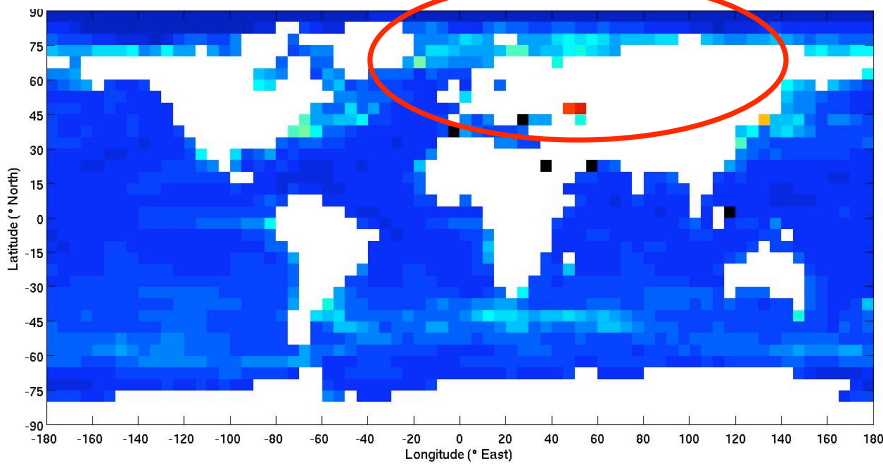
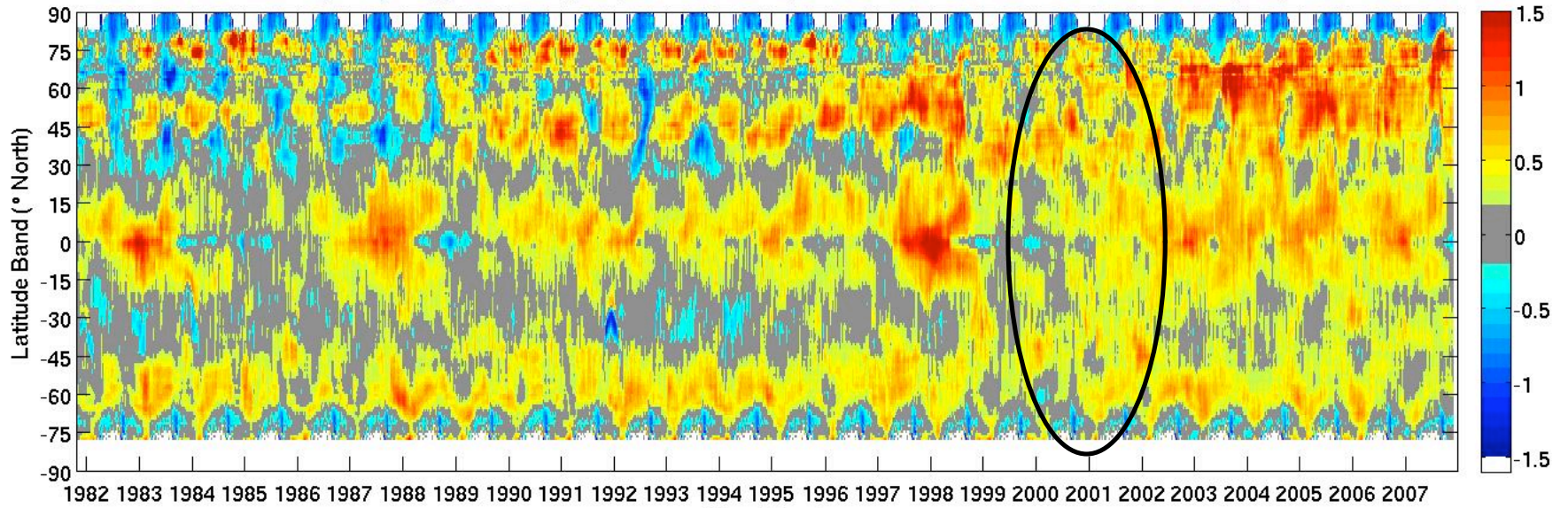HadISST1 / Kaplan

Weekly Nighttime Operational AVHRR SST Anomalies (° C)

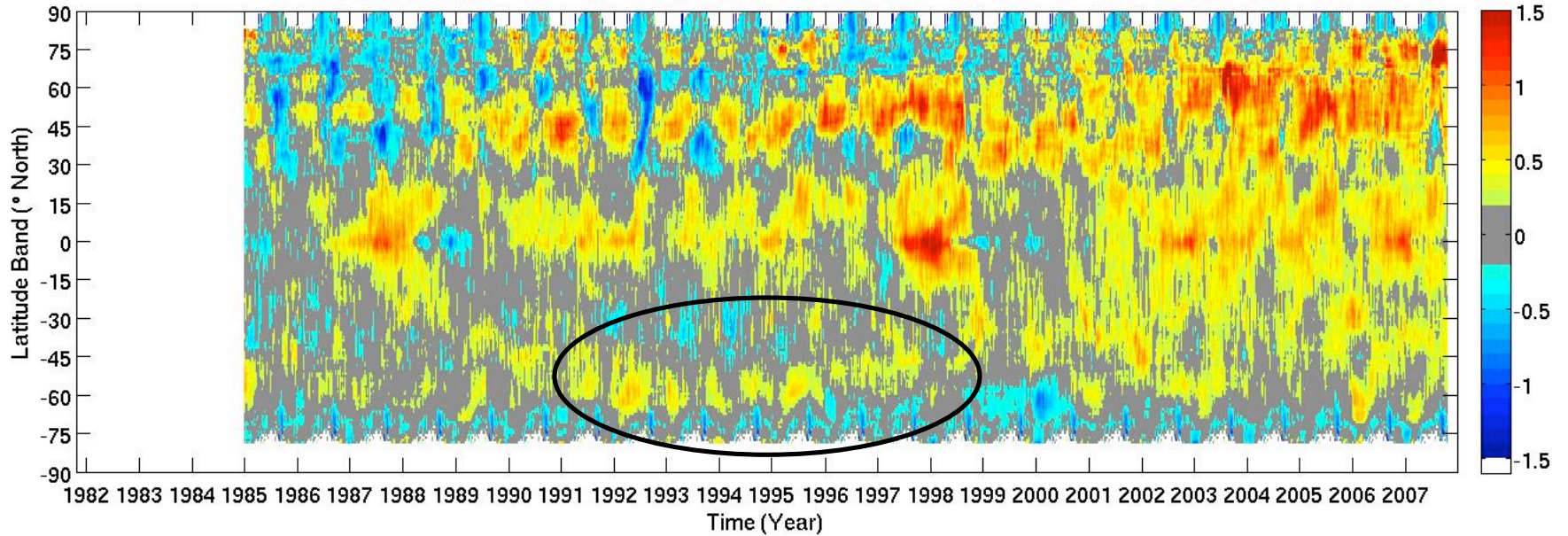Weekly Nighttime Pathfinder Version 5 SST Anomalies (° C)

GCOS SST & SI WG

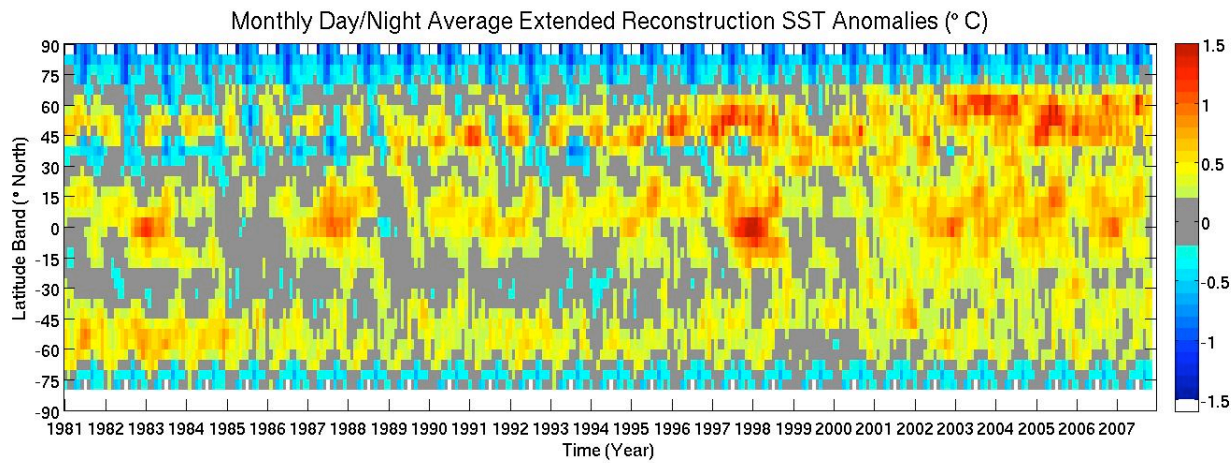Weekly Day/Night Average Optimum Interpolation Version 2 SST Anomalies (° C)

Weekly Day/Night Average Daily Optimum Interpolation SST Anomalies (° C)

GCOS SST & SI WG

Monthly Day/Night Average Extended Reconstruction SST Anomalies (° C)

Monthly Day/Night Average Kaplan SST Anomalies (° C)
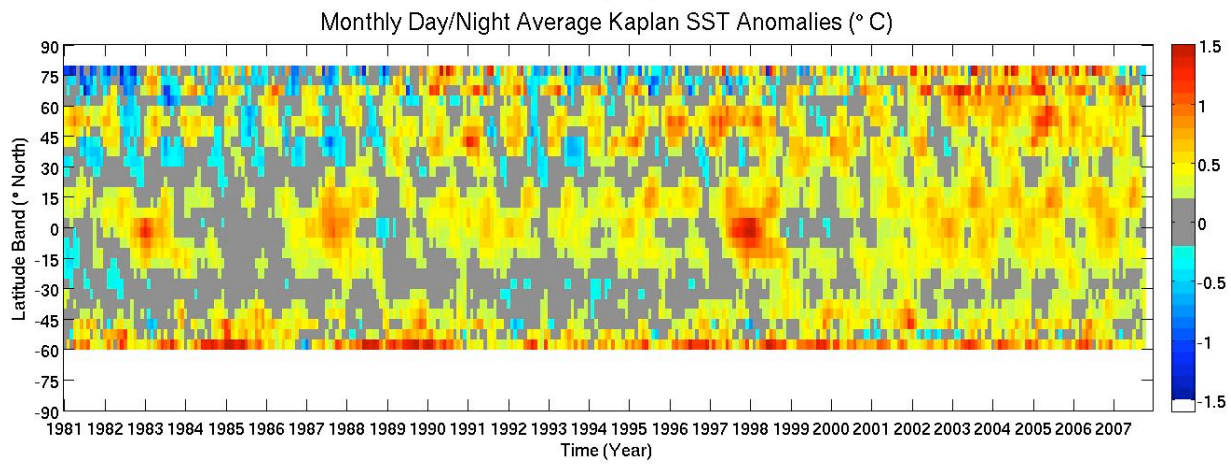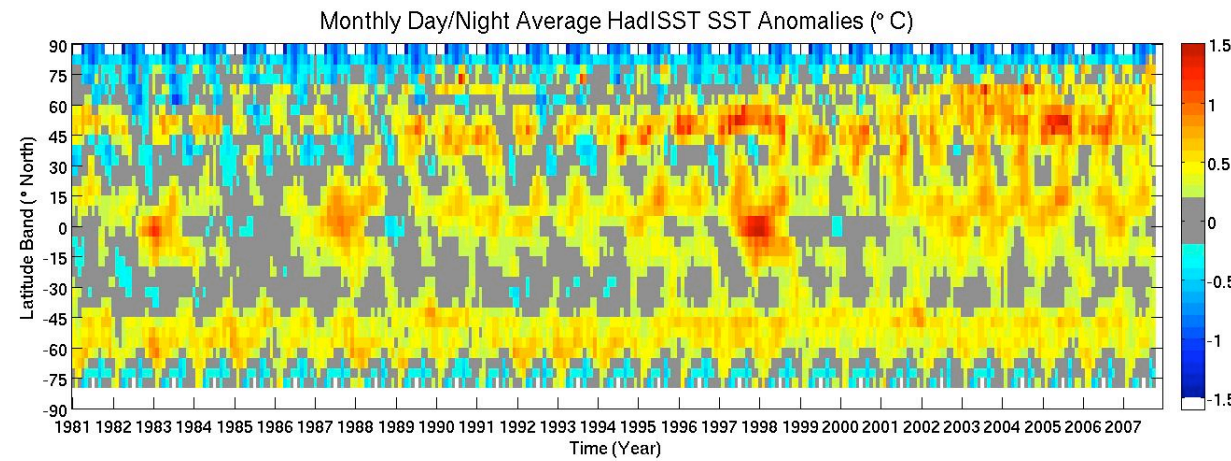
Monthly Day/Night Average HadISST SST Anomalies (° C)
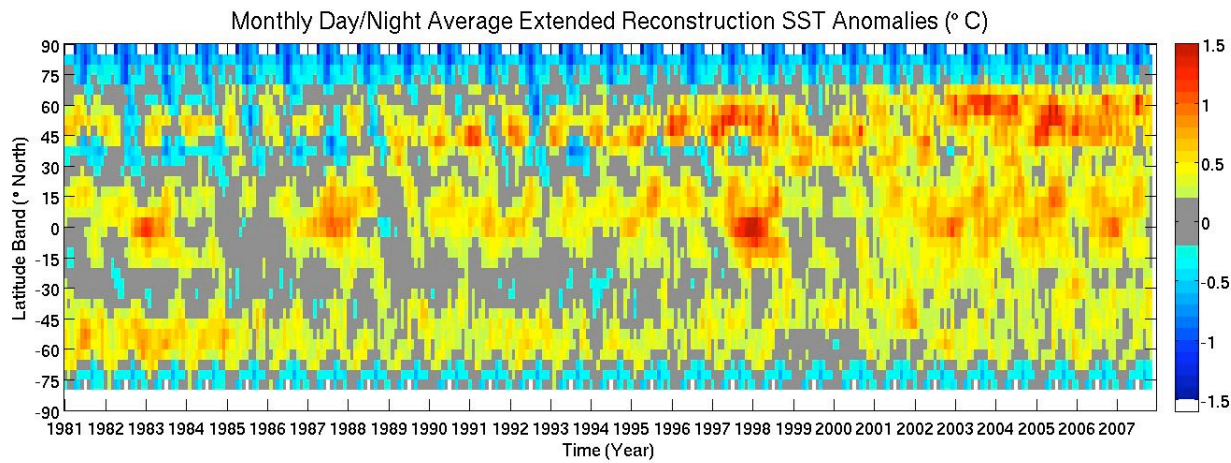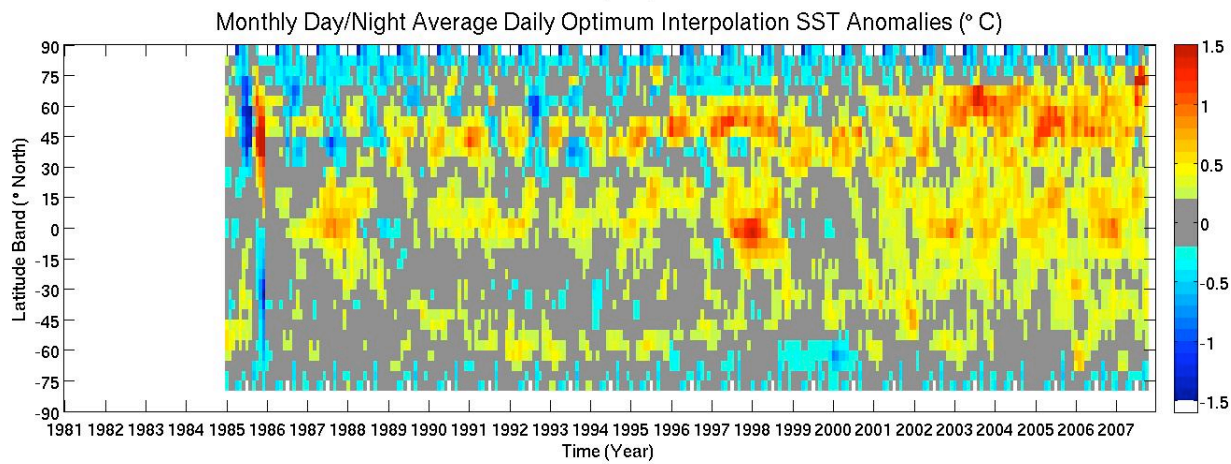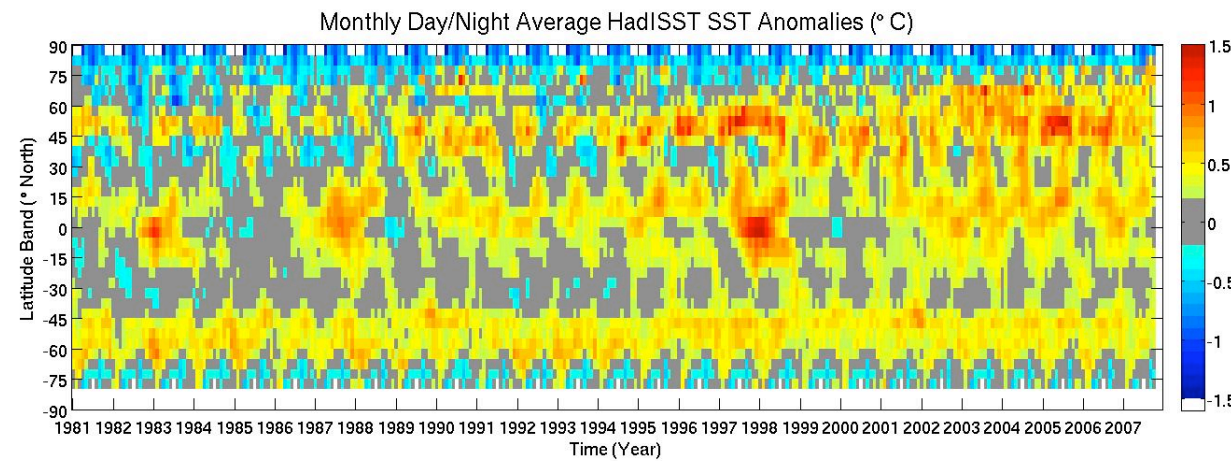
Monthly analysis

ERSST

Kaplan

HadISST1

Monthly analysis

ERSST

Daily OI

HadISST1

Plans *[to end Sept 2008]*

- Further diagnostics:
  - Time series of anomalies relative to individual climatologies
  - Calculation of linear trends and lag1 autocorrelation maps
  - Time averaged difference maps
  - Summary global and hemispheric time series
- Addition of NOCS and ICOADS
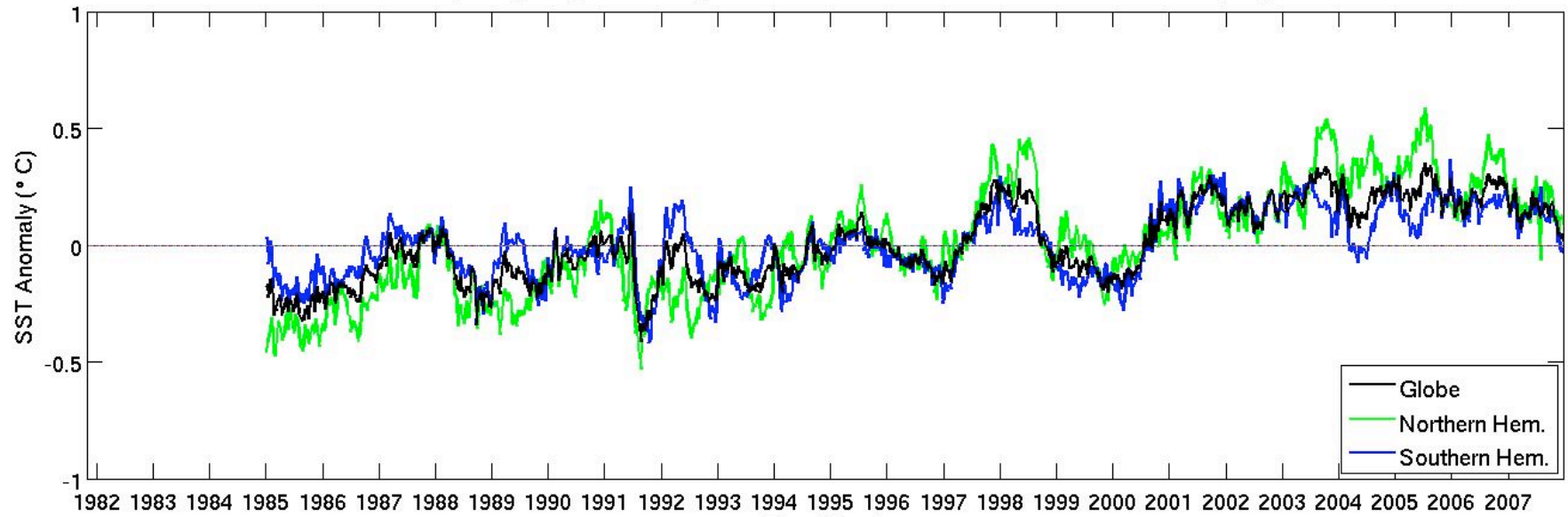- Extension back in time for a few data sets
- Discuss

Further Plans

- Publish inter-comparisons
- Explore effect of analysis methodology using "ideal world" approach
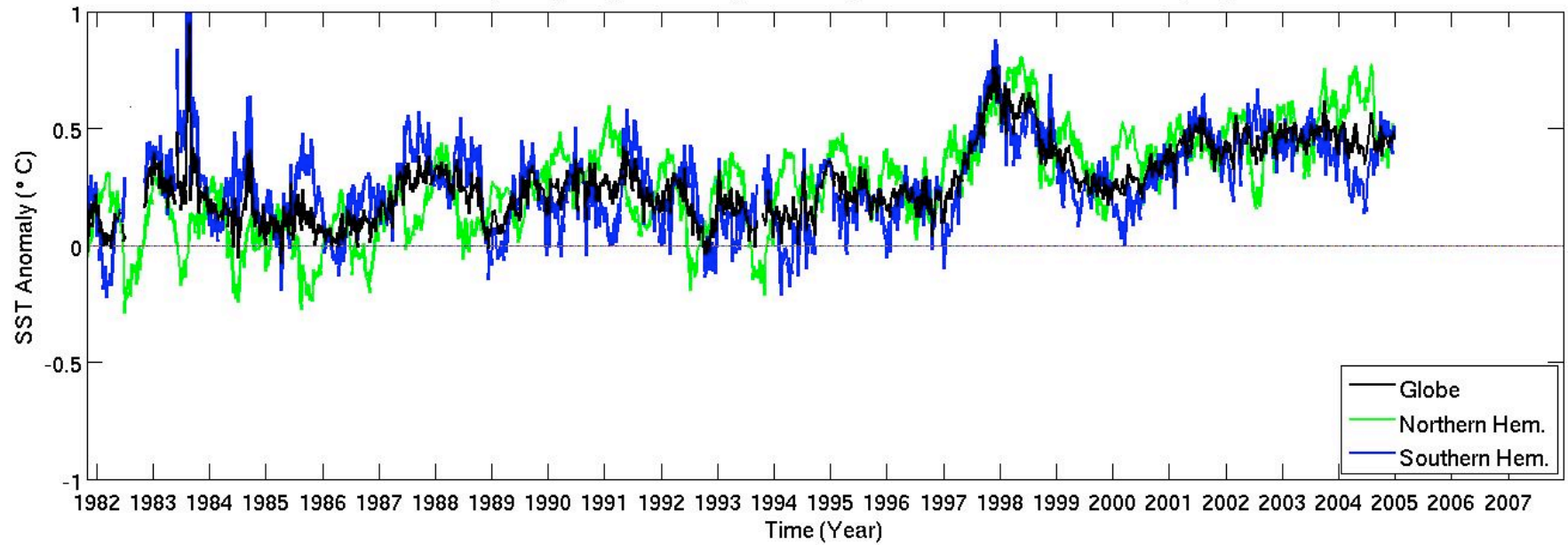- Prepare recommendations for OceanObs 2009

RMS Differences: Weekly Nighttime Pathfinder and Nighttime Hadley Centre SST Anomalies (° C)
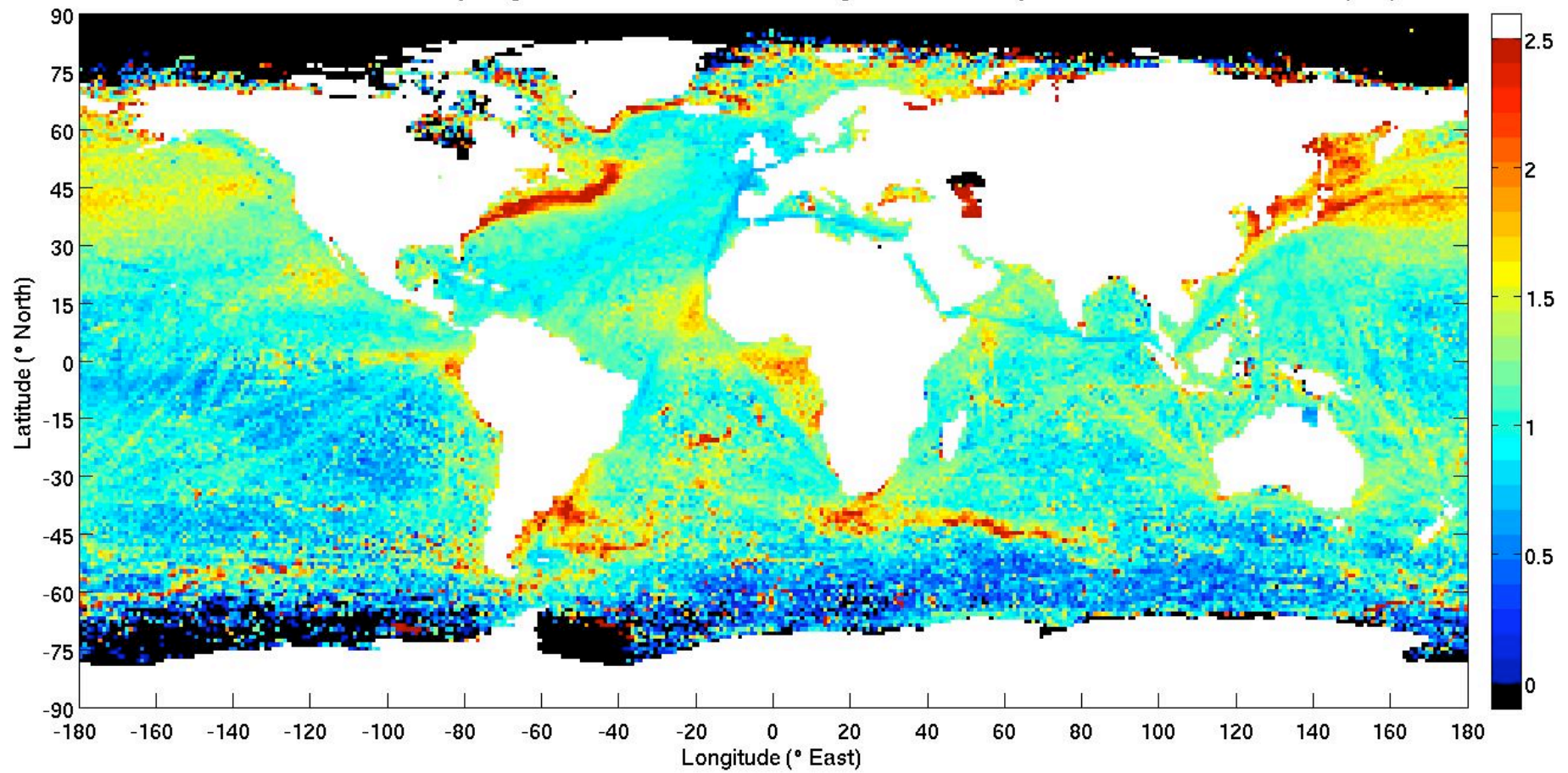
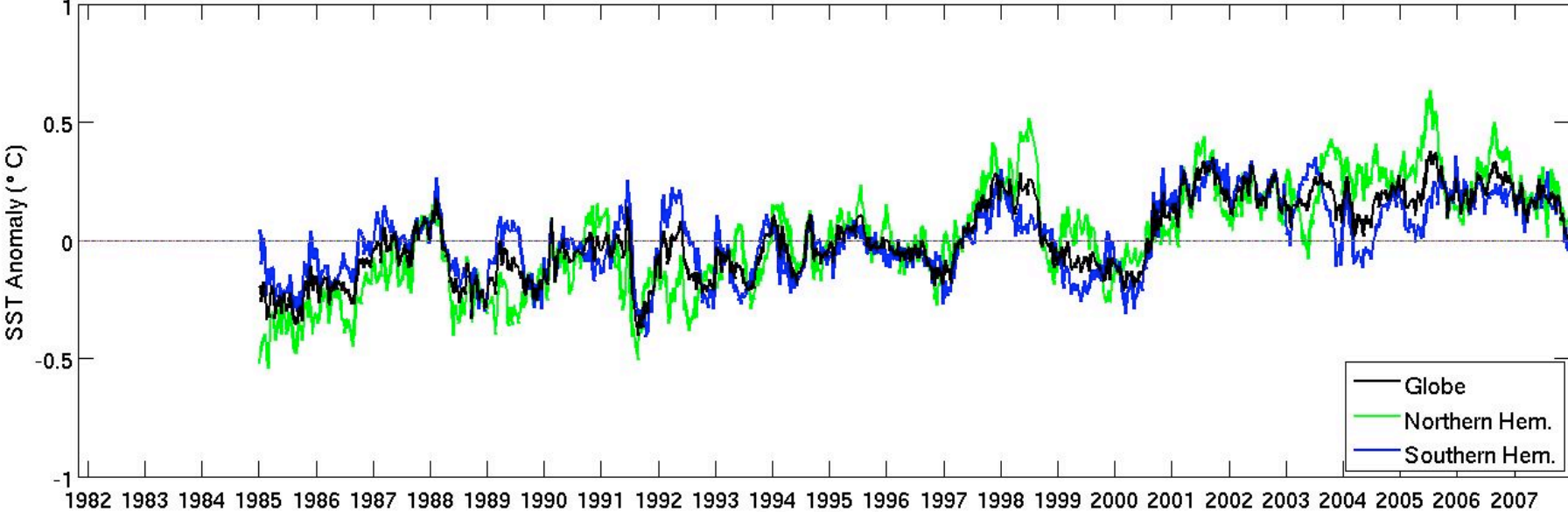**Weekly Day/Night Average Pathfinder Version 5 SST Anomalies (° C)**

Weekly Day/Night Average Hadley Centre SST Anomalies (° C)

Weekly Daytime Pathfinder Version 5 SST Anomalies (° C)

Weekly Daytime Hadley Centre SST Anomalies (° C)