Development of SST and sea-ice datasets

Philip Brohan
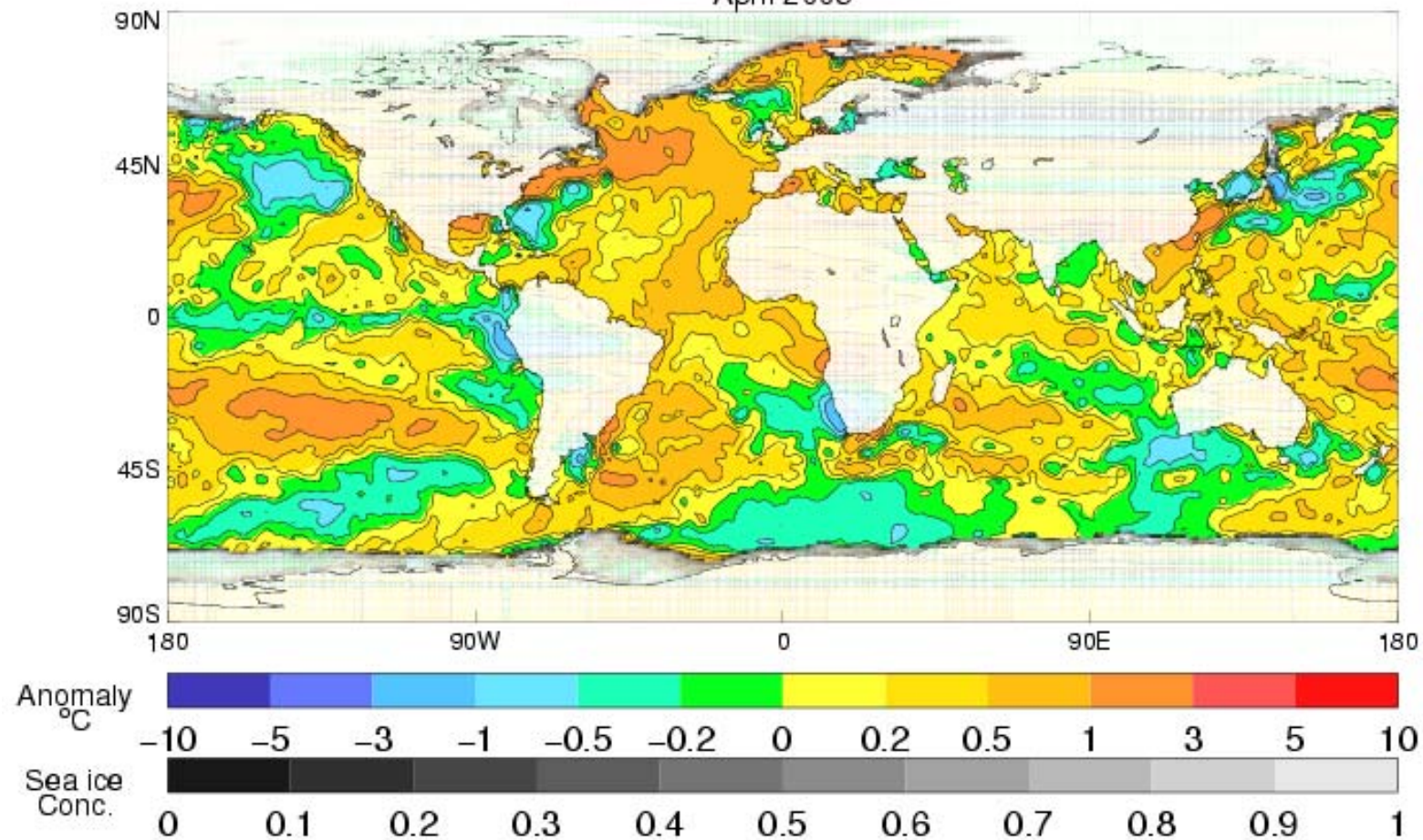
John Kennedy and Nick Rayner

How to make a SST/sea-ice boundary dataset

- Collect observations:
  - Ship, buoy, ATSR, AVHRR, SSMI, ice chart.
- Perform quality control
- Apply bias adjustments
- Interpolate values for areas with no observations.
- Blend SST and sea-ice

Existing SST and sea-ice product

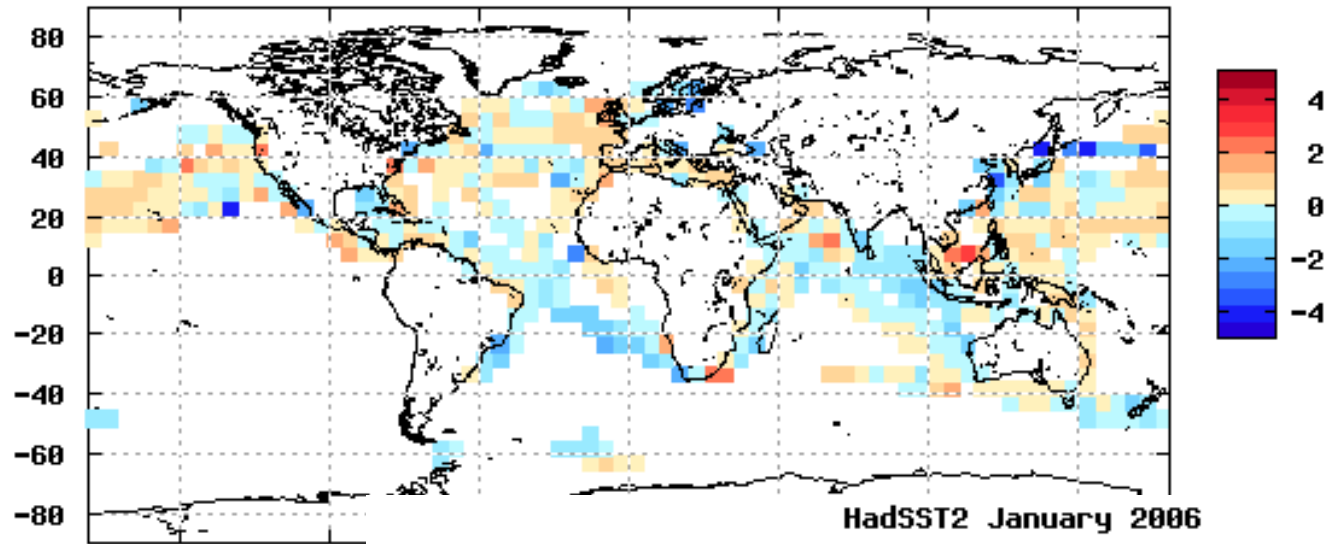HadISST SST anomaly and sea ice concentration
April 2006

How can we do better?

- **More flexible**
  - Variable resolution in time and space
- **More detailed**
  - High resolution: resolve gulf stream & tropical instability waves.
- **More accurate**
  - Better in-situ obs (icoads)
  - Better satellite data (ATSR)
  - Better bias adjustments
    - Satellites, ships, buoys
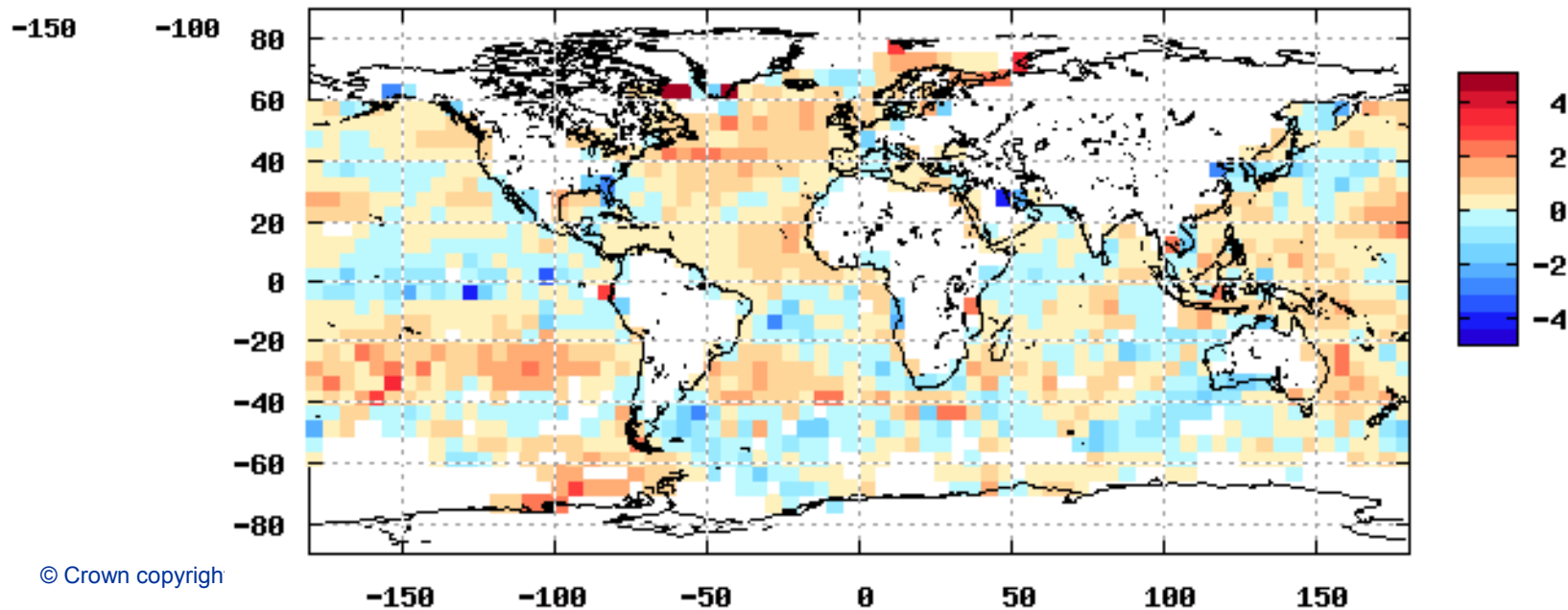 - Better statistical methods

Uninterpolated in-situ observations (HadSST2)
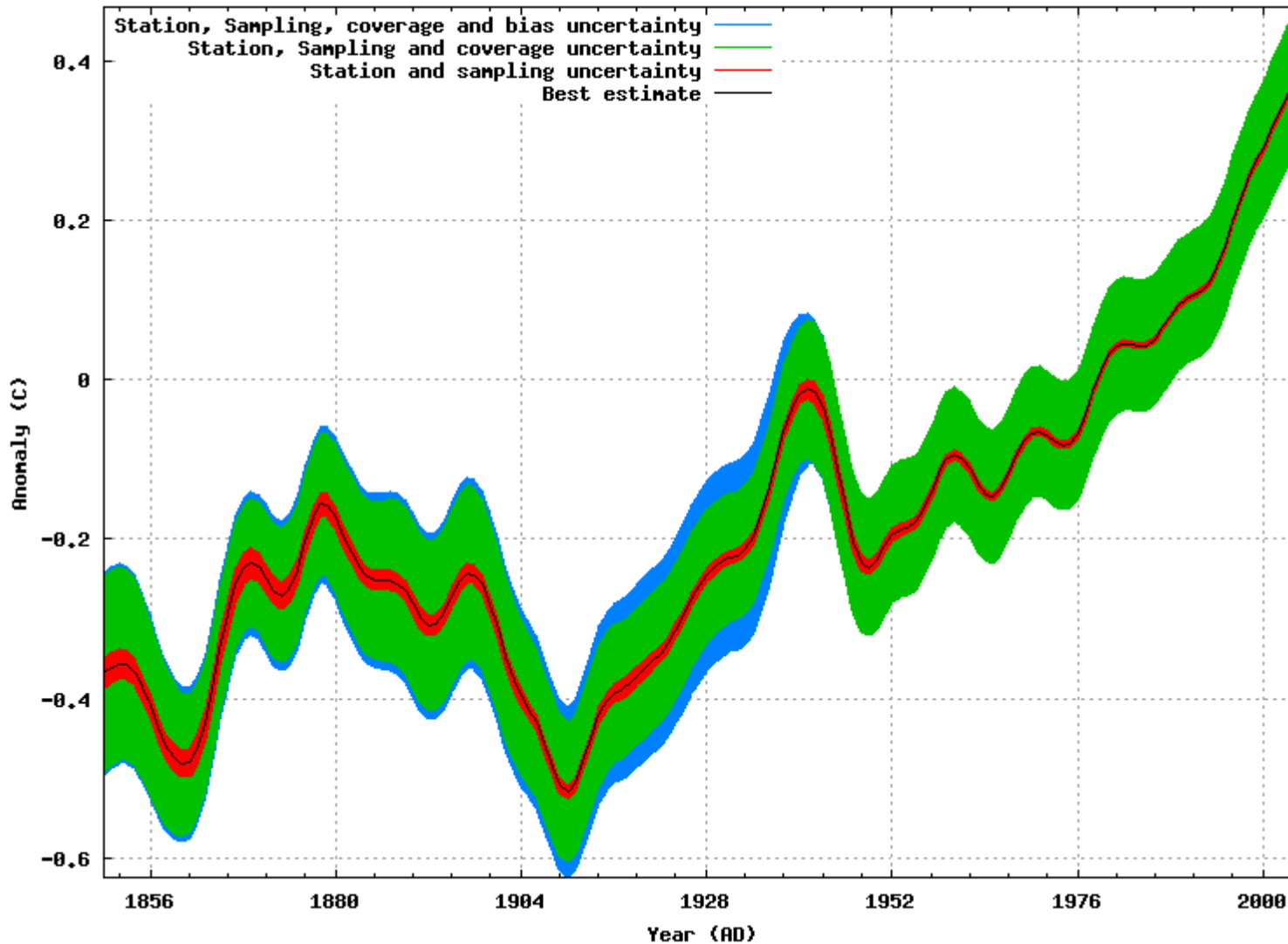

HadSST2 January 1946

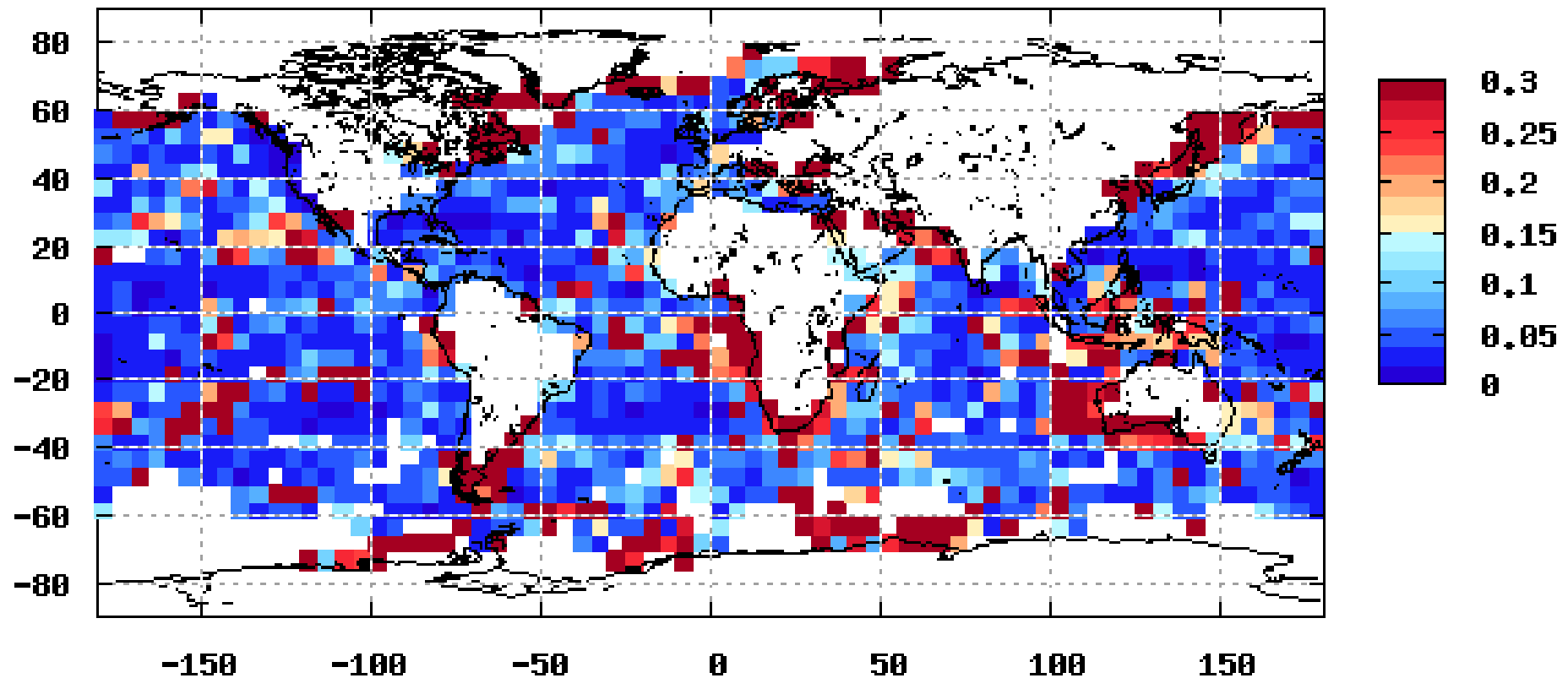HadSST2 January 2006

Uncertainties in SST datasets

HadSST2 global average (NH+SH)/2
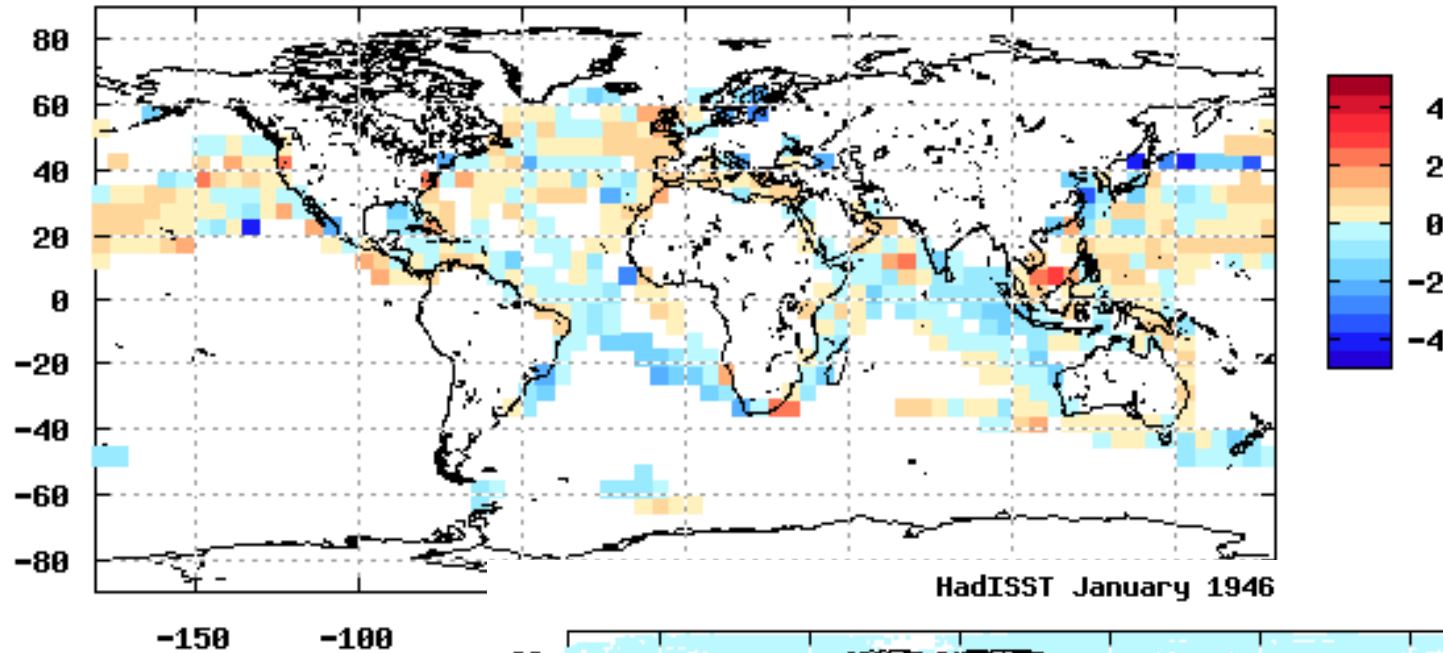
Measurement and sampling error
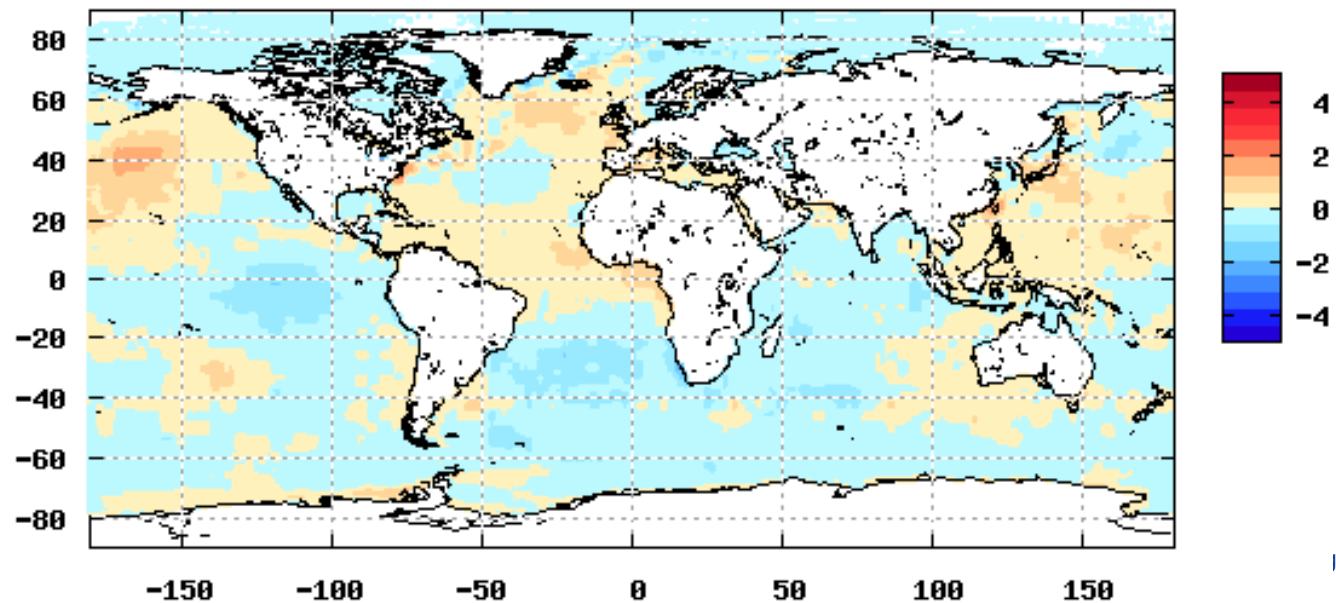

HadSST2 M+S error (January 2006)

Coverage error and Optimal Interpolation
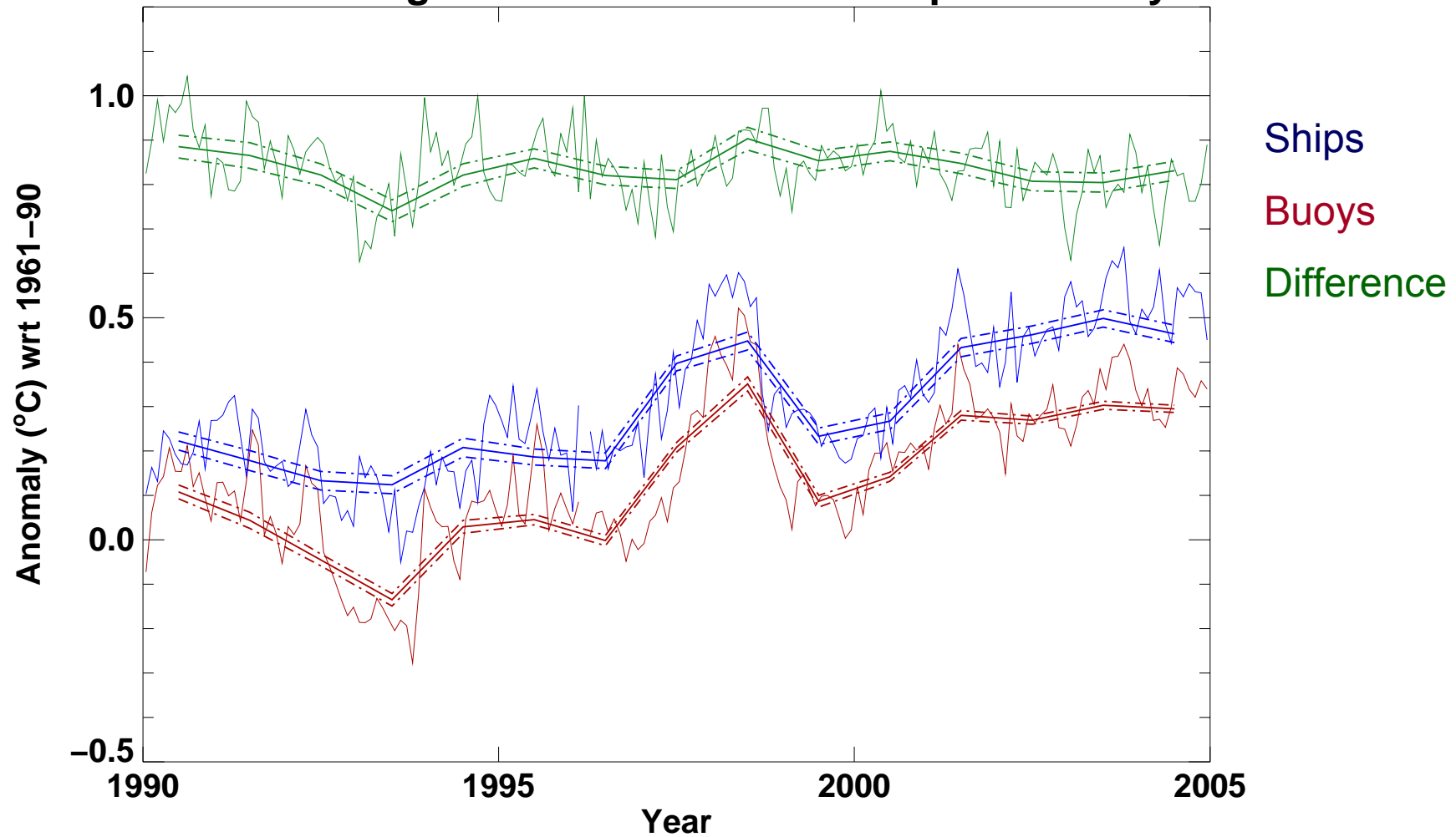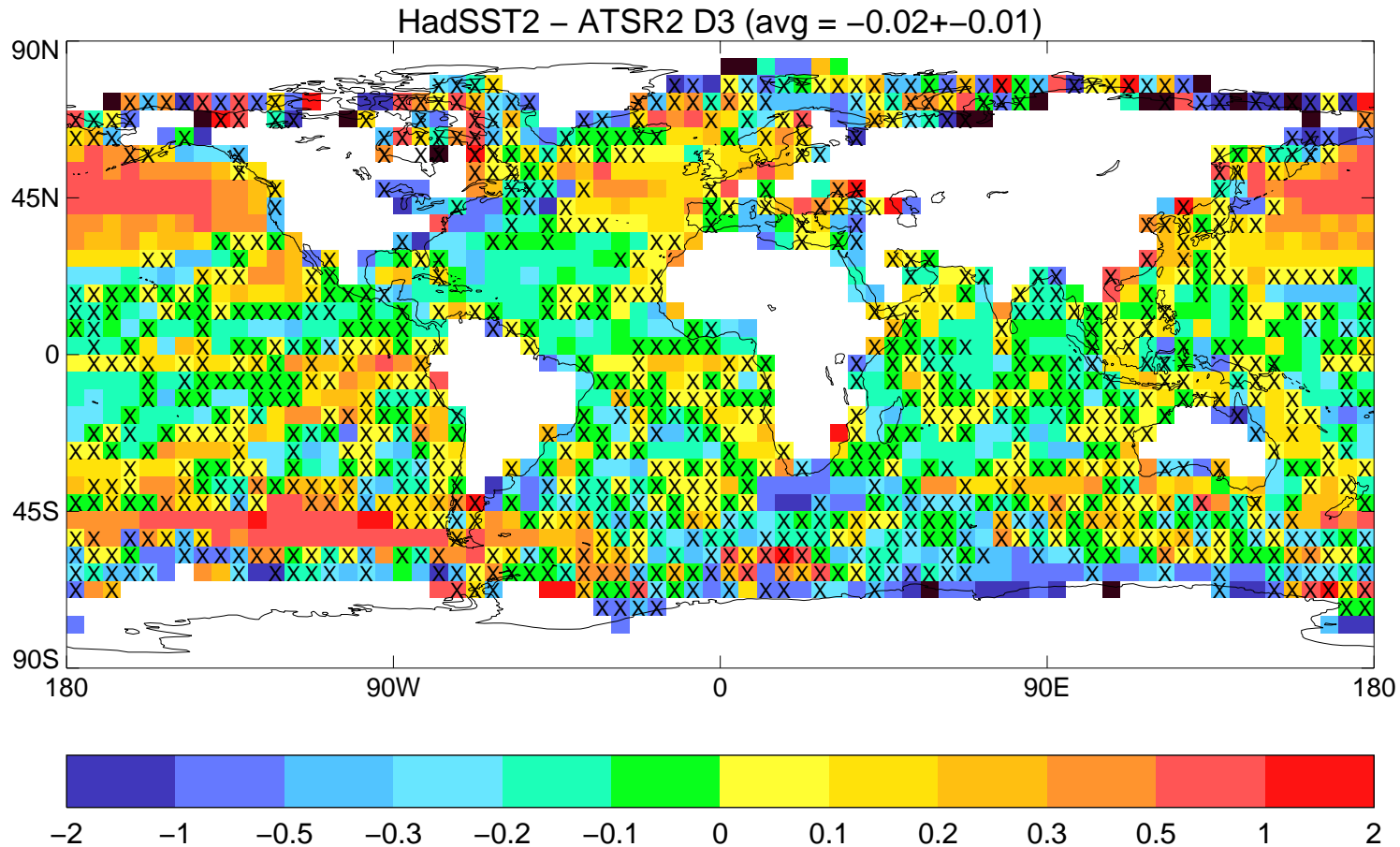

HadSST2 January 1946

HadISST January 1946

Biases (Ship SST ≠ Buoy SST ≠ Satellite SST)

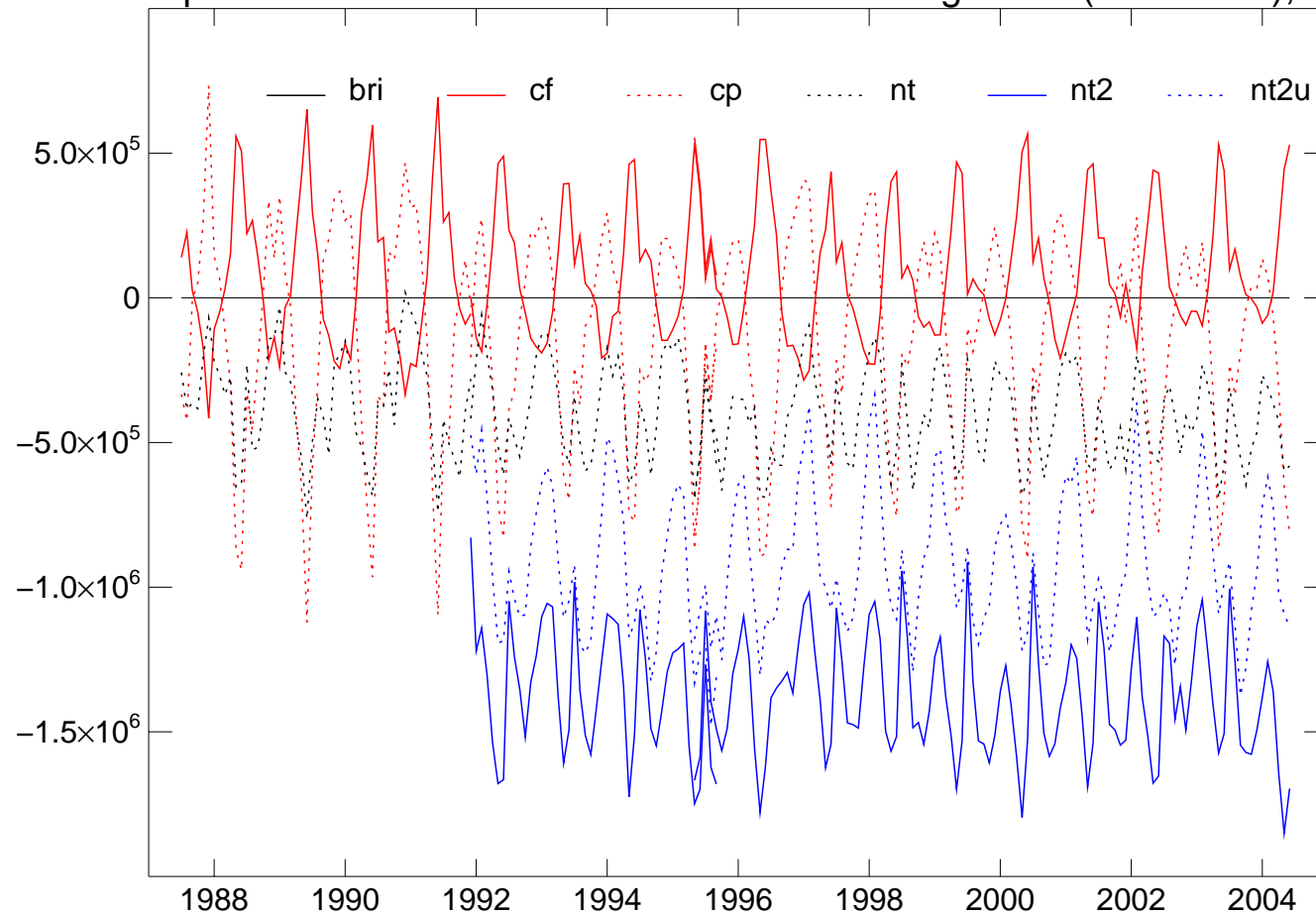Global average SST anomalies from ships and buoys

Satellites add coverage (and biases)

HadSST2 – ATSR2 D3 (avg = −0.02+−0.01)

Sea-ice has similar problems

Northern Hemisphere sea ice area deviations from Bristol algorithm (km^2 >30%), 198

Work in progress at the Hadley Centre

- **Better in-situ observations**
  - ICOADS, digitisation, ice charts
- **Extra satellite data**
  - AATSR
- **Better bias adjustments**
  - Ships, buoys, satellite, sea-ice.
- **Better interpolation methods**
  - Flexible RSOI
- **Uncertainties on everything**

Issues for discussion

- **What resolution do we need?**
  - Time
  - Space
  - SST
  - Sea-ice
- **What do we do about inhomogeneities?**
  - Statistical reconstruction in the pre-satellite era?
- **What do we do about uncertainties?**
  - An ensemble of datasets?