British Atmospheric Data Centre

NATIONAL CENTRE FOR ATMOSPHERIC SCIENCE
NATURAL ENVIRONMENT RESEARCH COUNCIL

Fast data fusion and its role in developing climate quality sea surface temperature data sets from multiple sources.

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Introduction

- Brief introduction to climate change and SST
- Analysis method
  - why?
  - how?
- Data and Uncertainties
- Conclusions/Further work

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Why is SST important

- Forcing field for atmosphere (or ocean) only models.
- Weather forecasting parameter
- Main stay of Climate Record
  - 1850 onwards
- Can be measured by satellite
  - Long term high resolution data of recent era possible.

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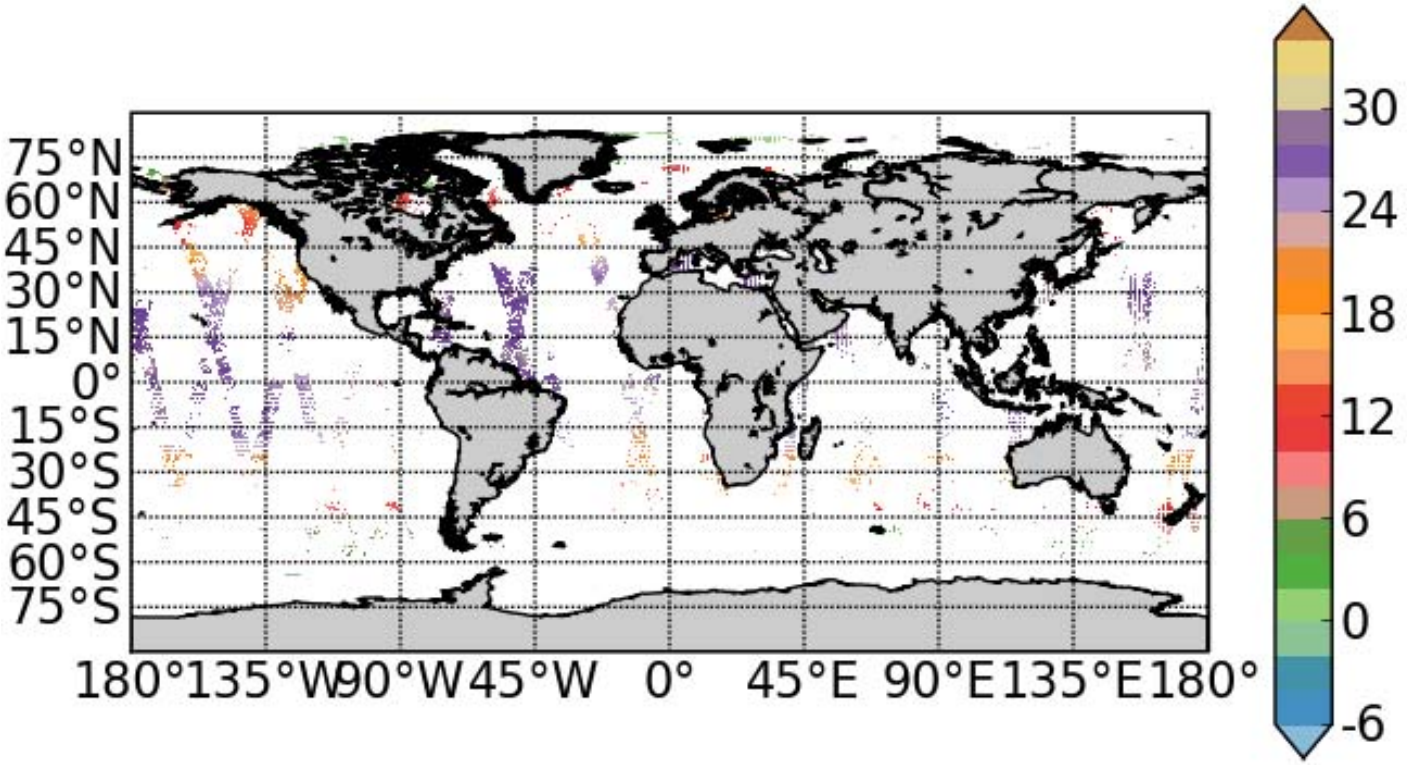
Sample satellite data - AATSR



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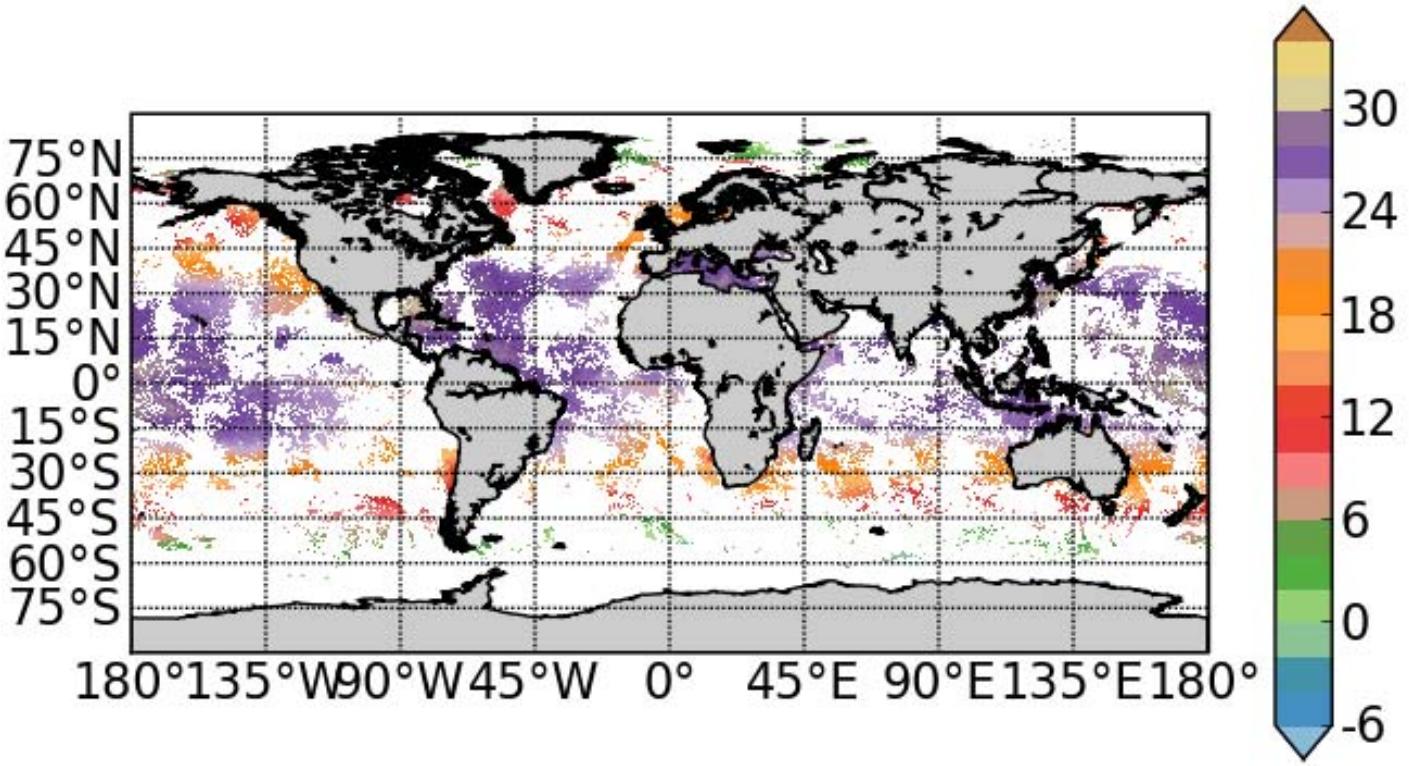
Sample satellite data - AVHRR



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Why fill in the gaps?

- Calculate regional averages
  - Trends in climate change.
    - Monitoring
    - Global and local
- Model forcing fields
  - Complete fields required
  - Higher resolution required.

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How do we fill in the gaps?

- Kalman Filter
  - Forward time direction
    - Forcast step is past time step as well as a time model.
  - Reverse time direction
    - Forecast step is future time step with a time model
  - Smoother
    - Forecast is both past and future time steps.

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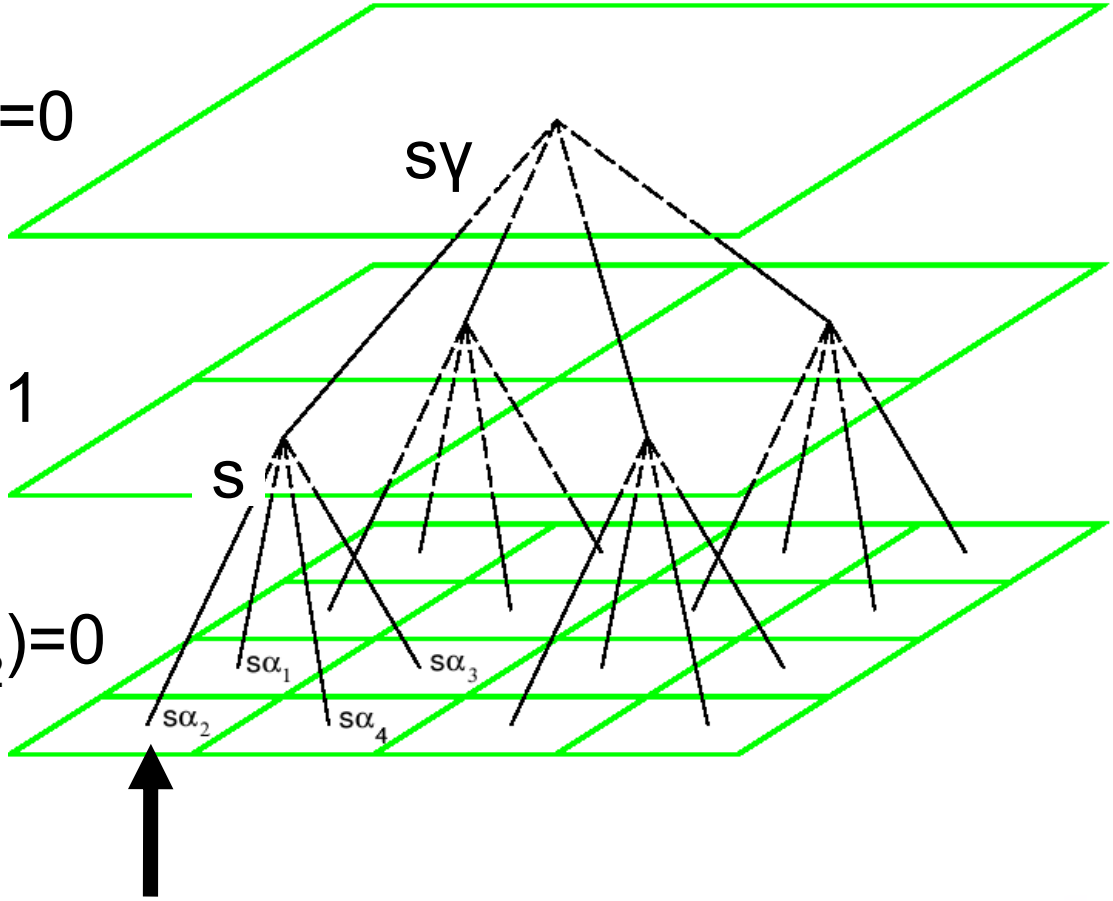
Kalman Filter Estimators

Scale m(sγ)=0

Scale m(s)=1

Scale m($s\alpha_2$)=0



$s\alpha_2$

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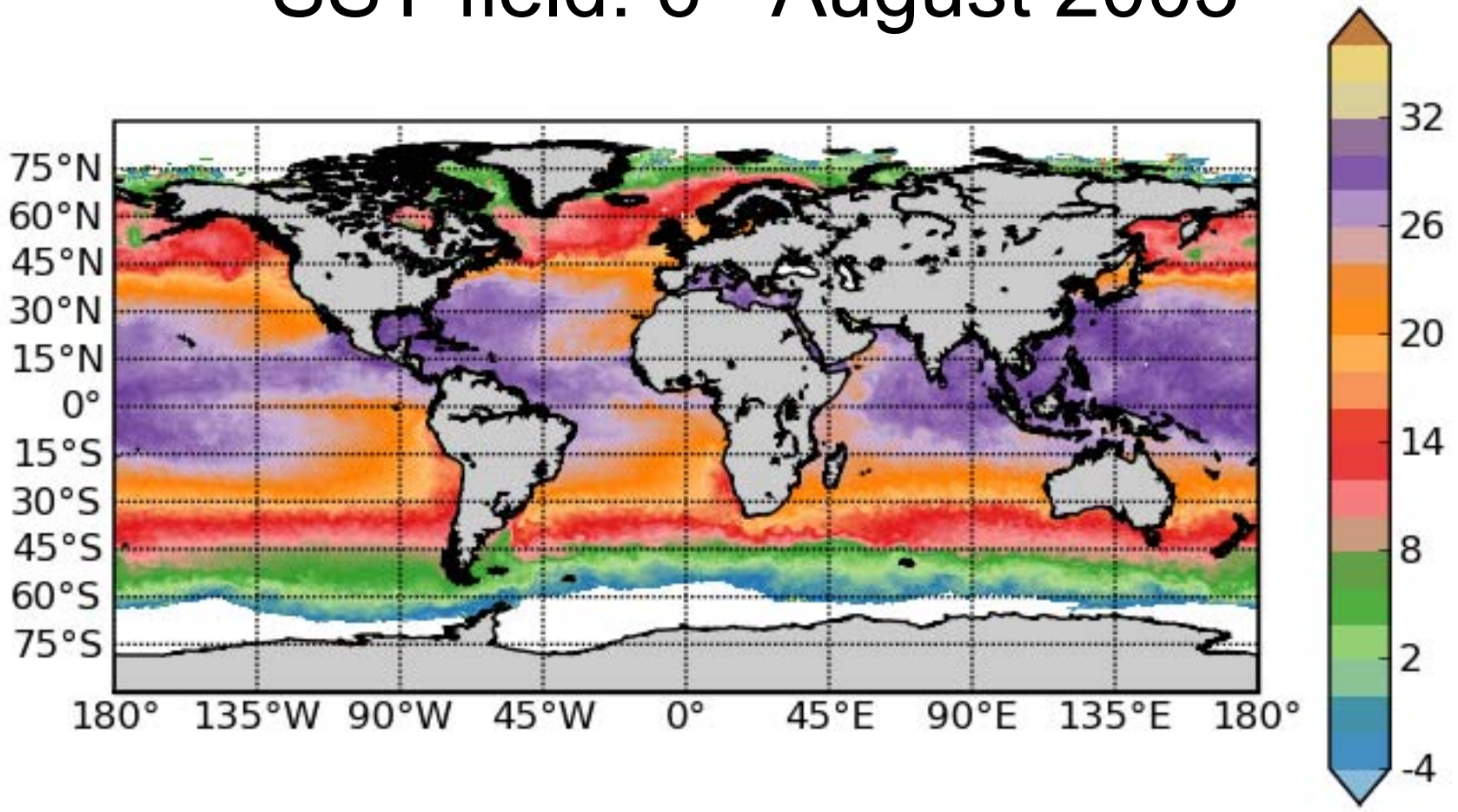
SST field: 6th August 2003



Sea Surface Temperature (SST): Near surface sea water temperature

IET Target 08: 16/04/08

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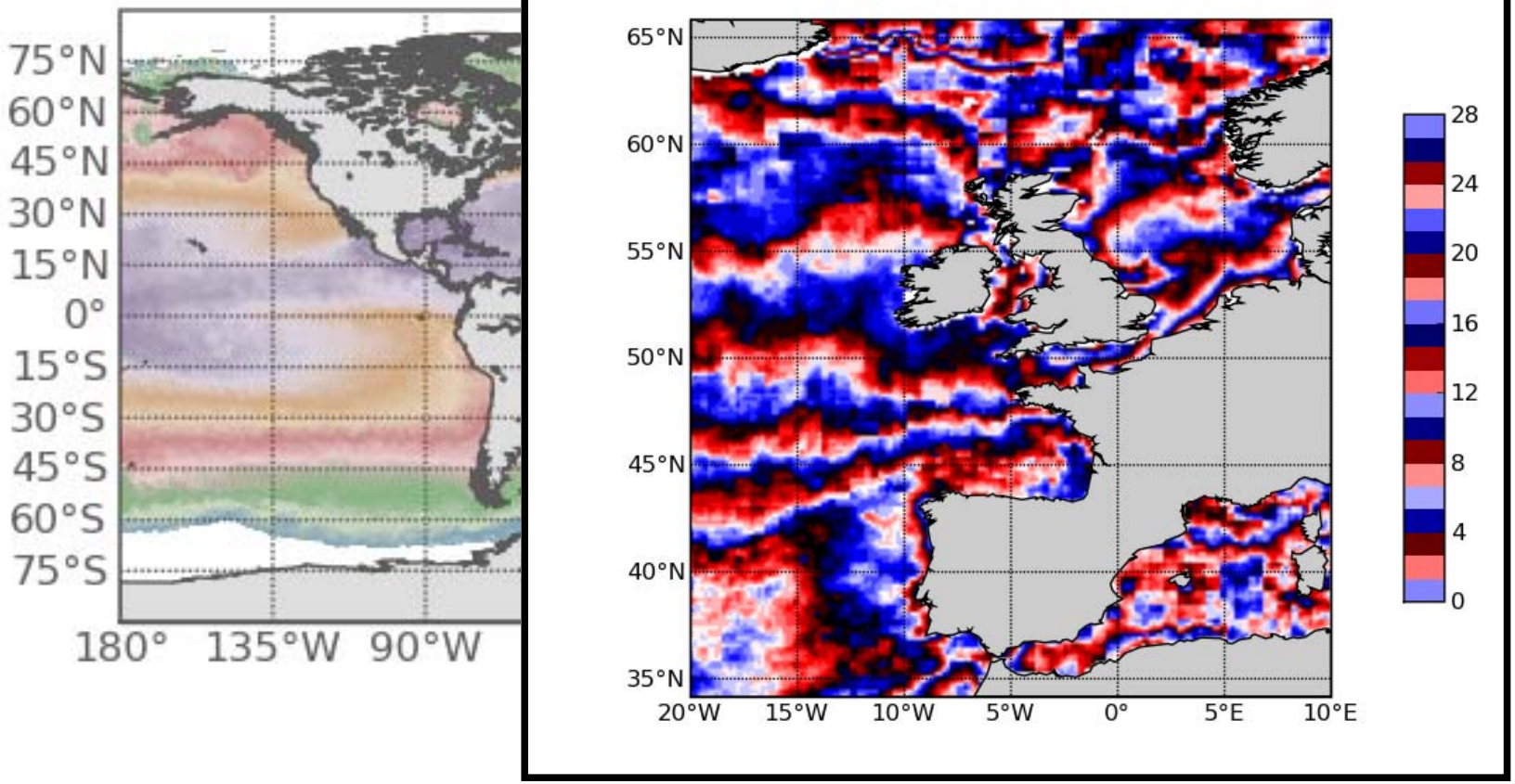
SST field: 6th August 2003



Sea Surface Temperature (SST): Near surface

sea water temperature

IET Target 08: 16/04/08

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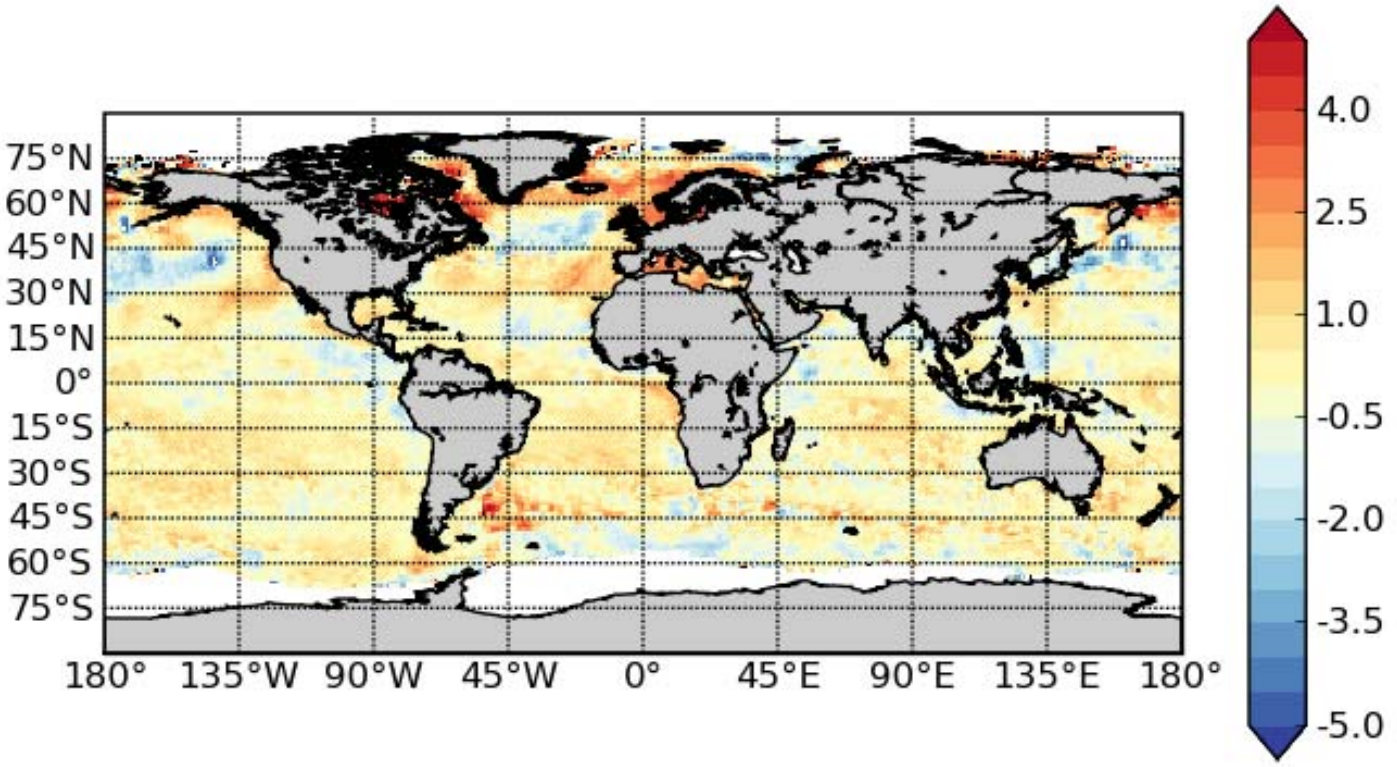
Anomaly Map



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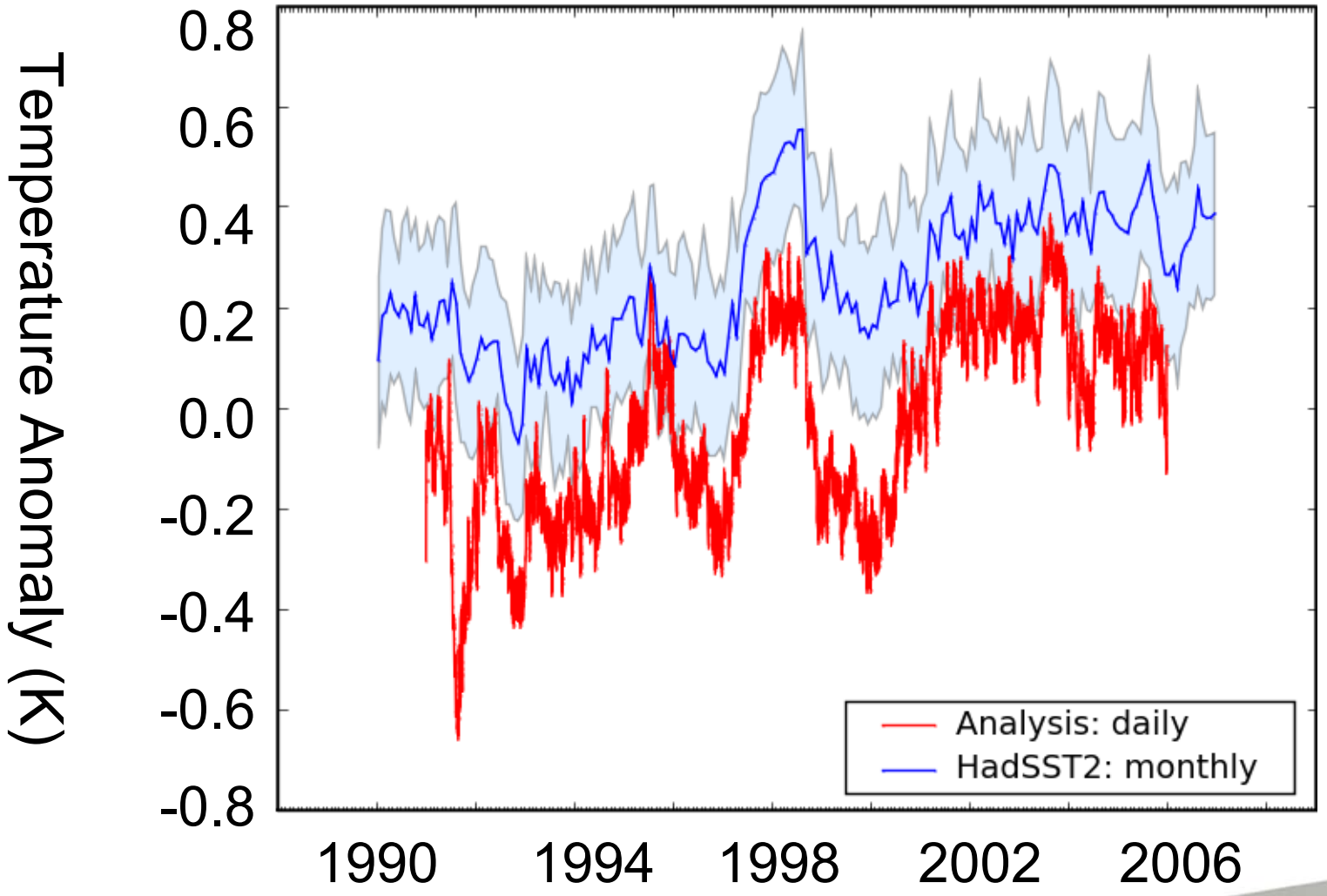
Anomaly series



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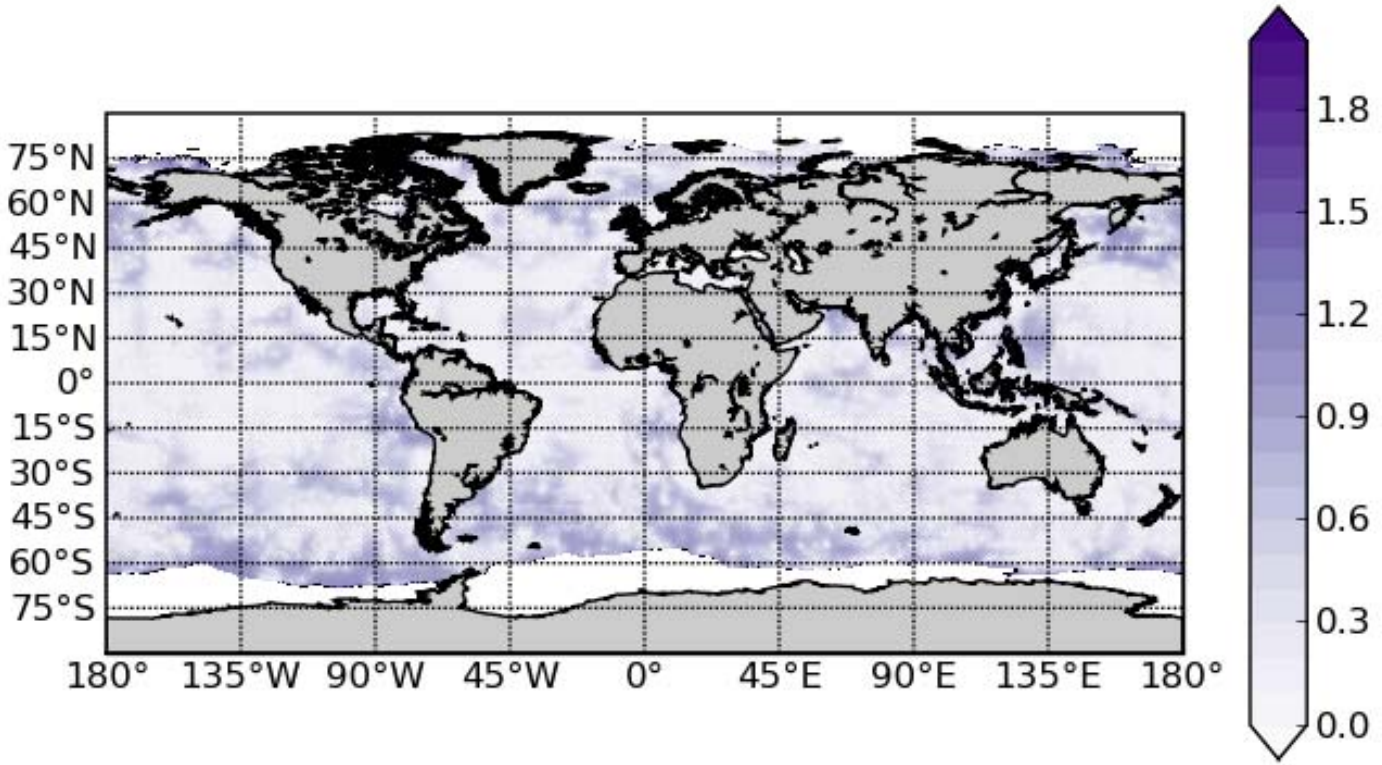
Example SSTFusion uncertainty



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How do we quantify method uncertainty?

- Observations.
  - Uncertain, biased
- Uncertainty in the filter
  - Calculated, but assumes model is true and uncertainties on obs. known
- Uncertainty in the model
  - Need to use ensembling methods to estimate this

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Conclusions

- Best estimate signal of consistent with *in situ*
- Robust uncertainty estimates required.
- Ensembles of analyses.
  - Parallelize analysis method.
  - Parameter space means large ensemble.
  - Data volumes are huge.

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Questions?

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