



**British Atmospheric  
Data Centre**

NATIONAL CENTRE FOR ATMOSPHERIC SCIENCE  
NATURAL ENVIRONMENT RESEARCH COUNCIL

# **Using ship tracking methods to assist in bias adjusting marine observations.**

Julian Hill, Simon Maskell and  
Mathew Cole.

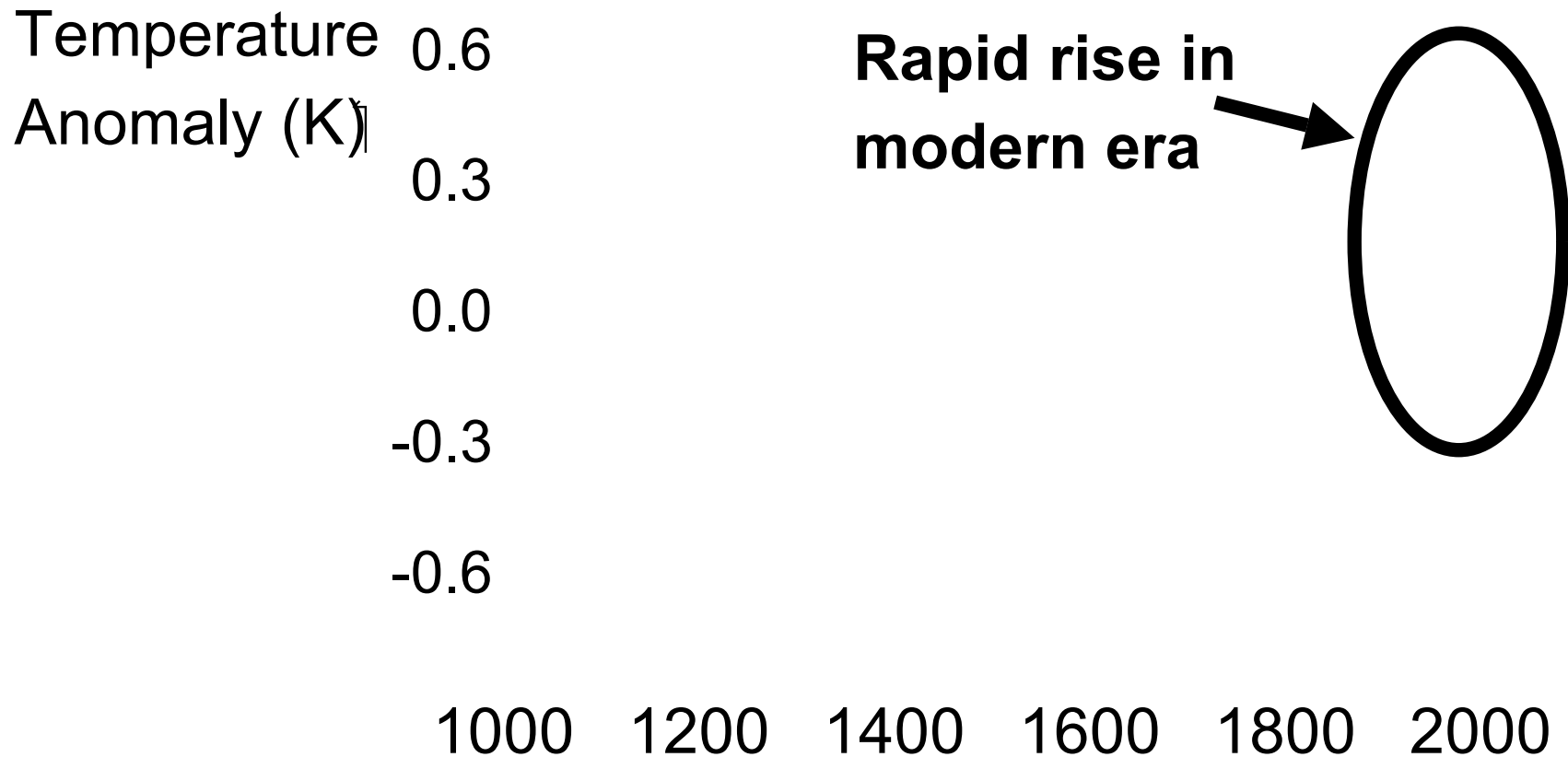


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# Introduction

- Brief introduction to climate change
- Why Marine Air Temperature (MAT)?
- How can tracking help us?
- Example:
  - Voyage of the Punjab Senator
  - Calculated track
- Conclusions/further work

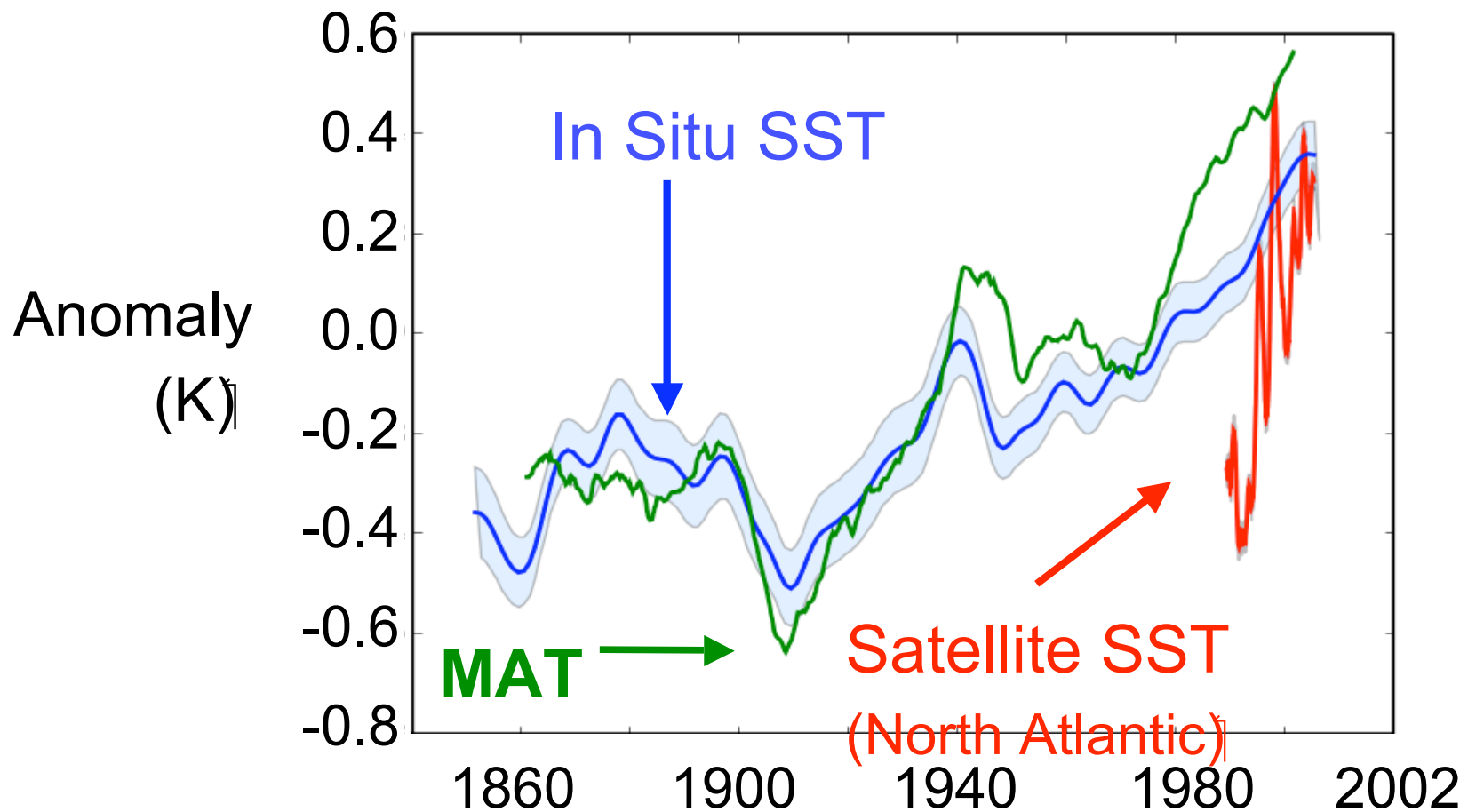
# Historic Climate Change



Source: Jukes *et al.*, CP, 2007

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# Why is MAT important?



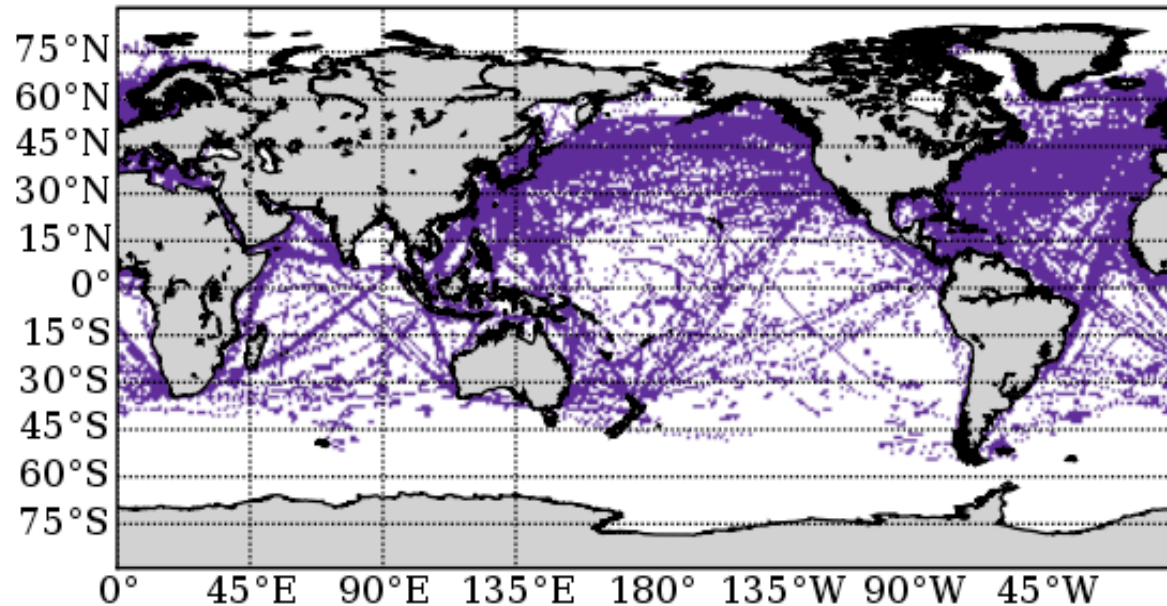
SST – Sea Surface Temperature

# What are the observing platforms?

- Ships
- Drifting buoys
- Moored buoys
- Platforms

All of these have their own biases and uncertainties

# Where are the observations?



Source: ICOADS (SST), Data for June 1998

# How can we track unidentified observing platforms?

- Platforms: ships, buoys, platforms.
- Tracking method developed by QinetiQ.
  - Uses Kinematics of the target.
  - Fast & configurable
  - Able to track 100,000 simultaneous targets

# How will tracks help?

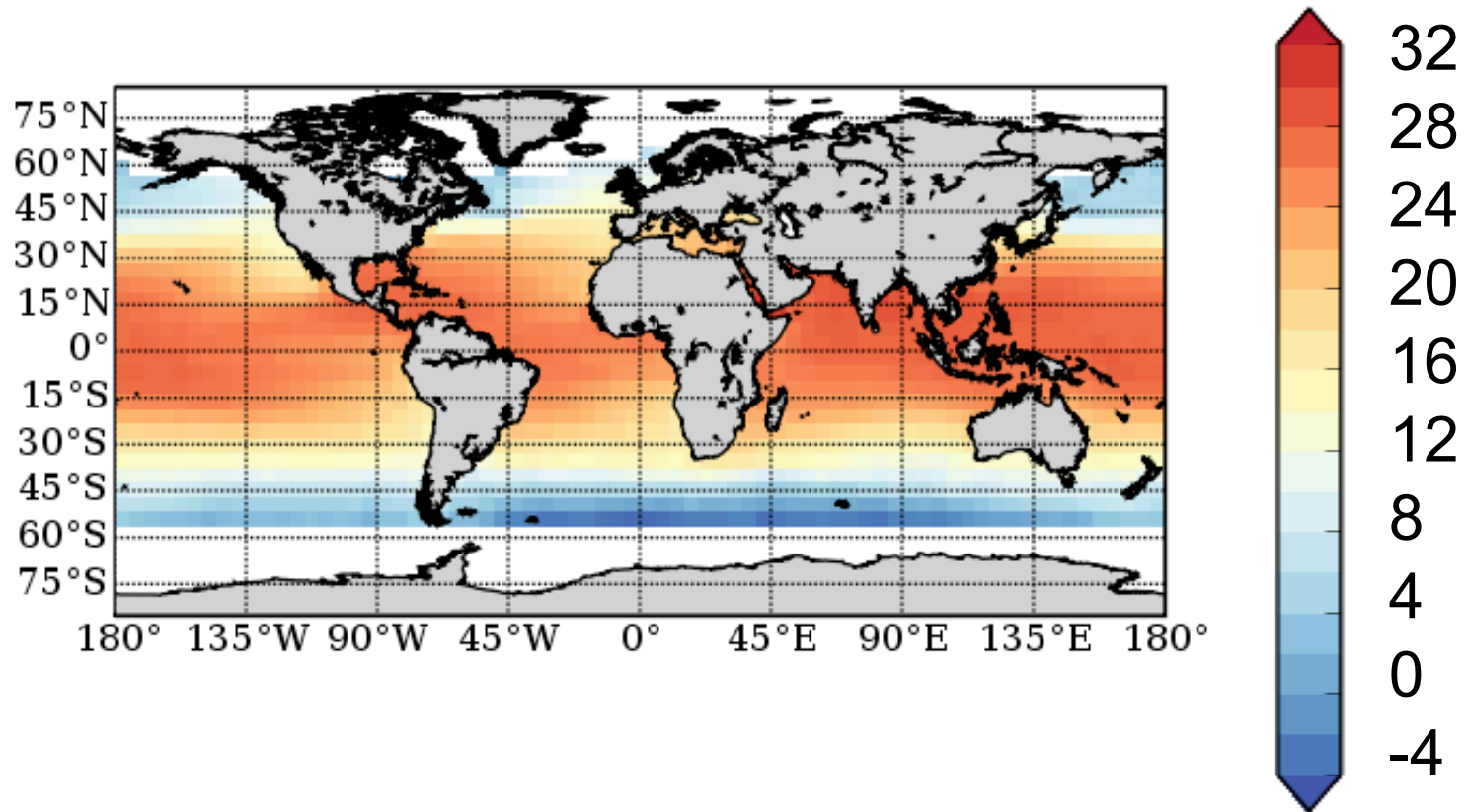
- The shape of the track will help identify the class of platform
- Ship's physical parameters are very unlikely to change during a voyage.
  - Approximate unknown metadata
- Possible to use voyage based bias adjustments.



# Voyage based bias adjustments

- Observations grouped by voyage
  - Voyages broken down into regions (**5° lat by 15° long**)
- Climatology (MOHMAT)
- Anomalies are compared to **annual SHIP anoms.** in region (MOHMAT)
- Based on obs. at **12:00 Local Noon.**

# Climatology for June

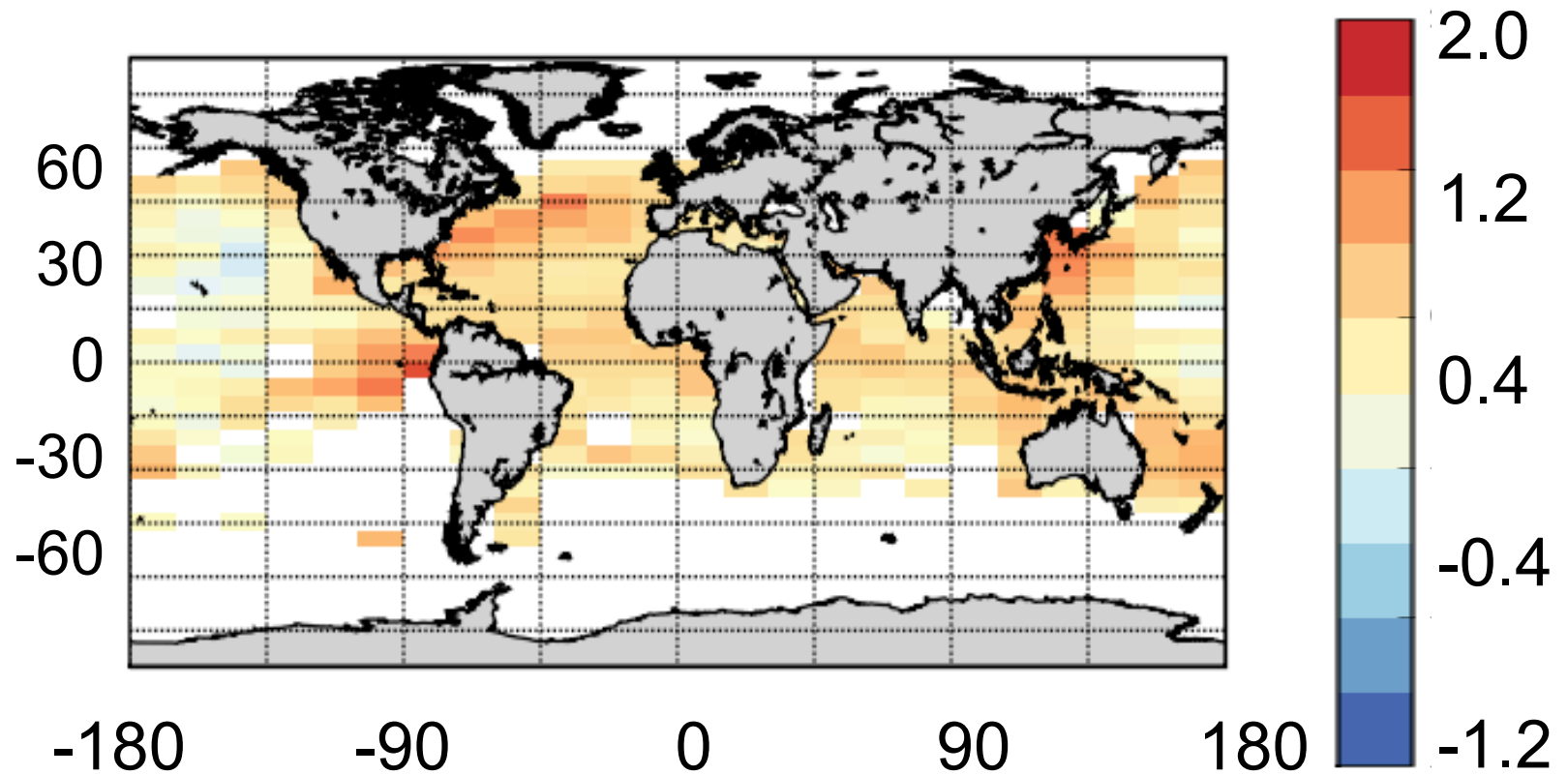


Source: mohmat43n <http://www.hadobs.org>

Reference: Rayner et al., 2003, JGR

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# Anomalies for 1998

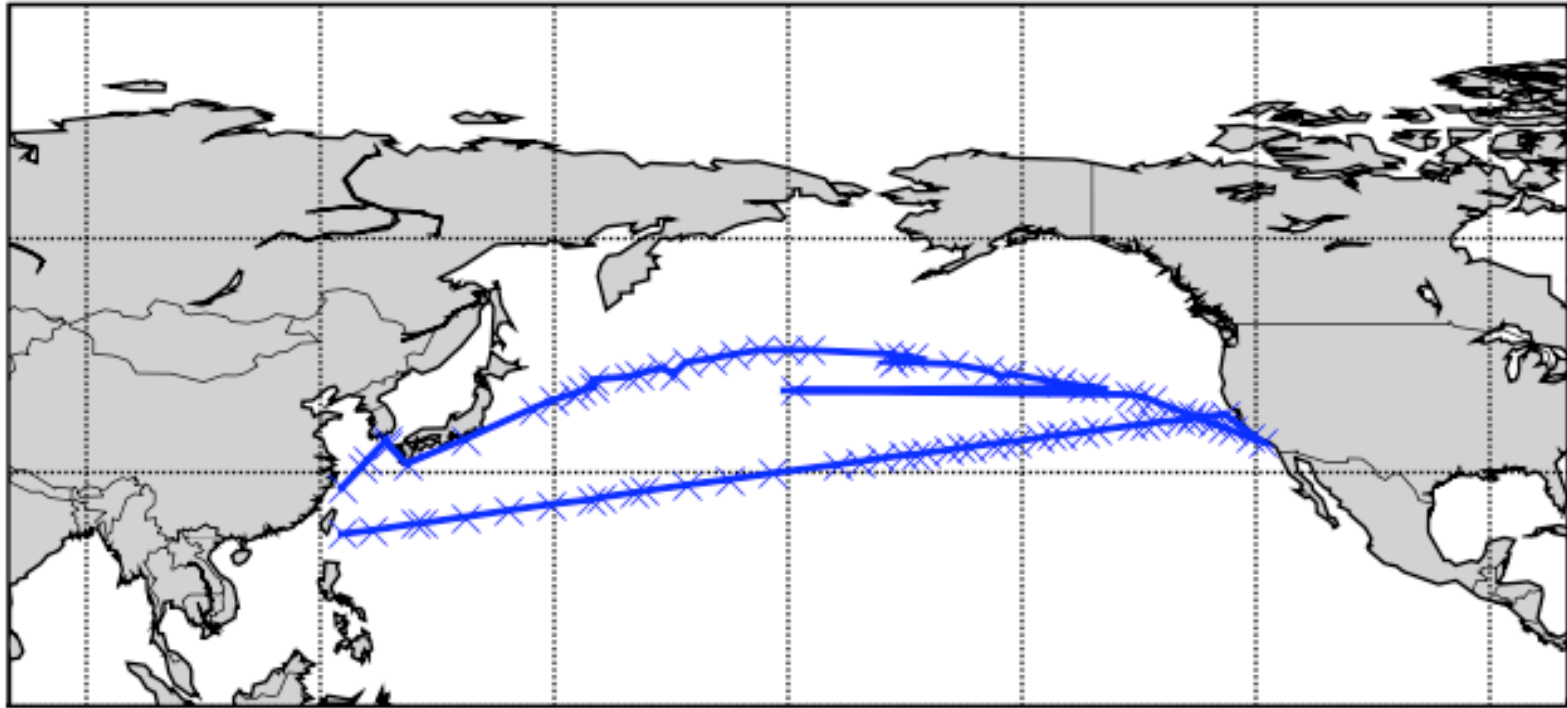


Source: MOHMAT43N <http://www.hadobs.org>

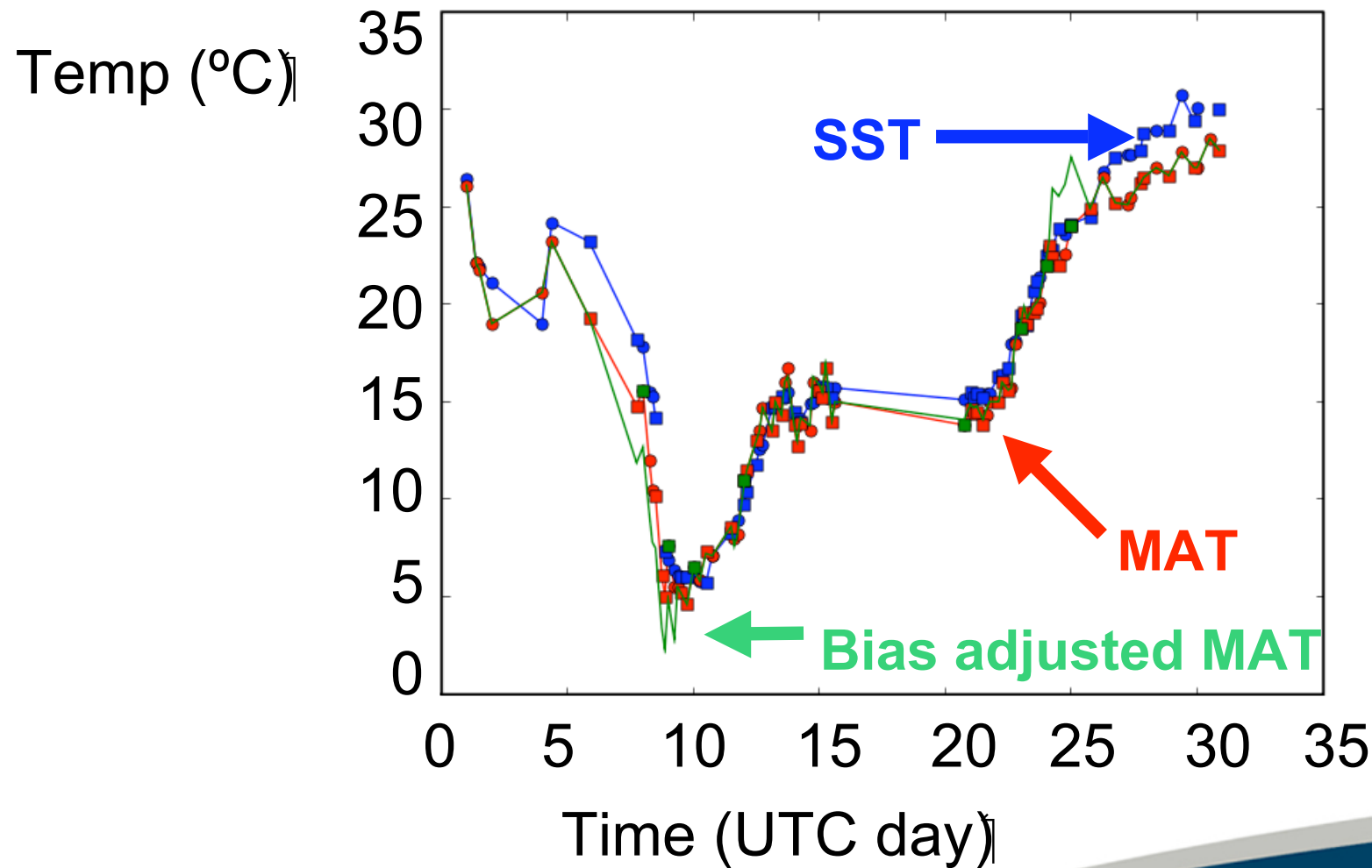
Reference: Rayner et al., 2003, JGR

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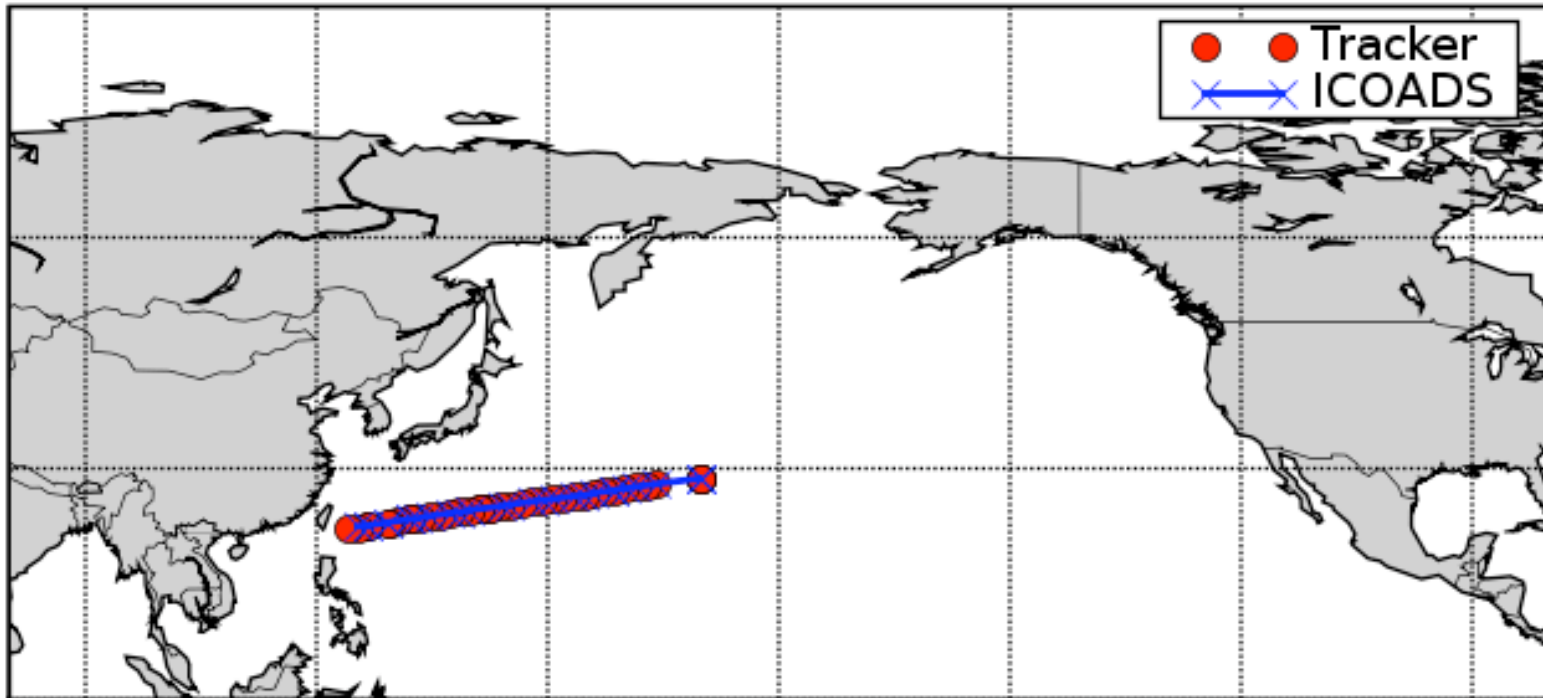
# Voyage of the Punjab Senator



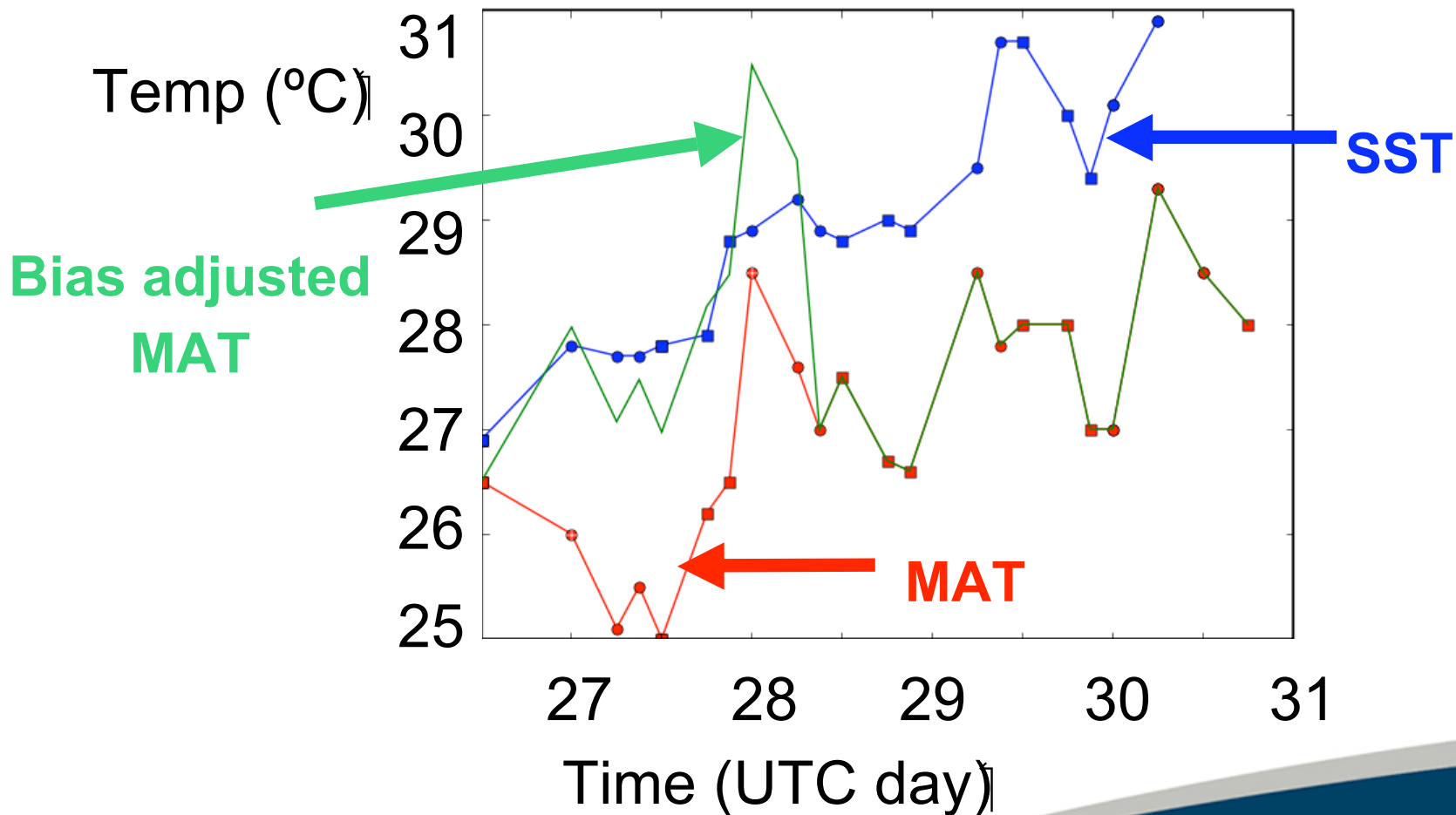
# Along voyage MAT and SST



# A track.



# Along track MAT and SST



# What could we use the data for?

- Point comparisons with satellite observations.
- Form part of an estimate of a global high resolution field.
  - Data fusion (Kalman Filter/Smoothing)
- Used by multi-variate reanalysis schemes.
  - produces a self consistent best estimate of the past climate by using climate models and variational data assimilation



# Conclusions

- Tracking is possible (old news).
- Voyage based bias adjustments can be used on tracks.
- Further development
  - Improve tracker to better understand observing network.
  - Explore other track/voyage based bias adjustments
  - Expand period of study (to whole ICOADS?)

# Questions?