

# Examining the Long Term Stability of Sea Surface Temperature Measurements made by Drifting Buoys

**Rob Smith**, John Kennedy and Nick Rayner  
([nick.rayner@metoffice.gov.uk](mailto:nick.rayner@metoffice.gov.uk))



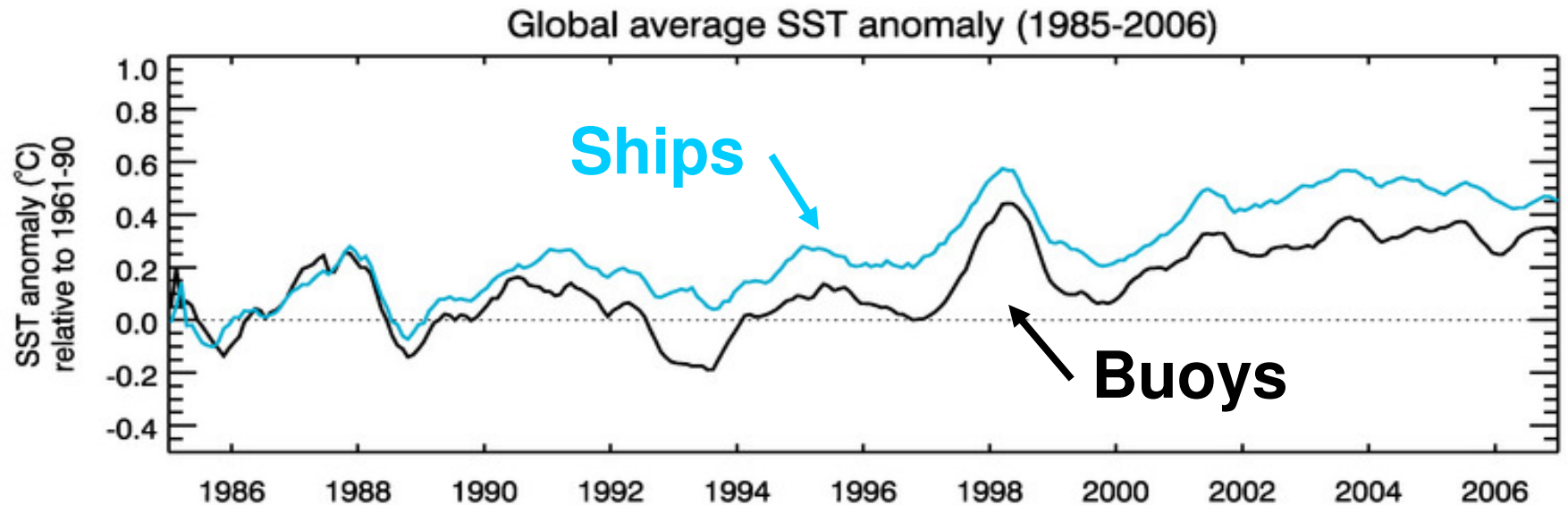
# Contents

This presentation covers the following areas

- Introduction
- ATSR Re-analysis for Climate (ARC)
- Matchup Data Base
  - Validation of the ARC data set
- Matchup Results
- Conclusions

# Introduction

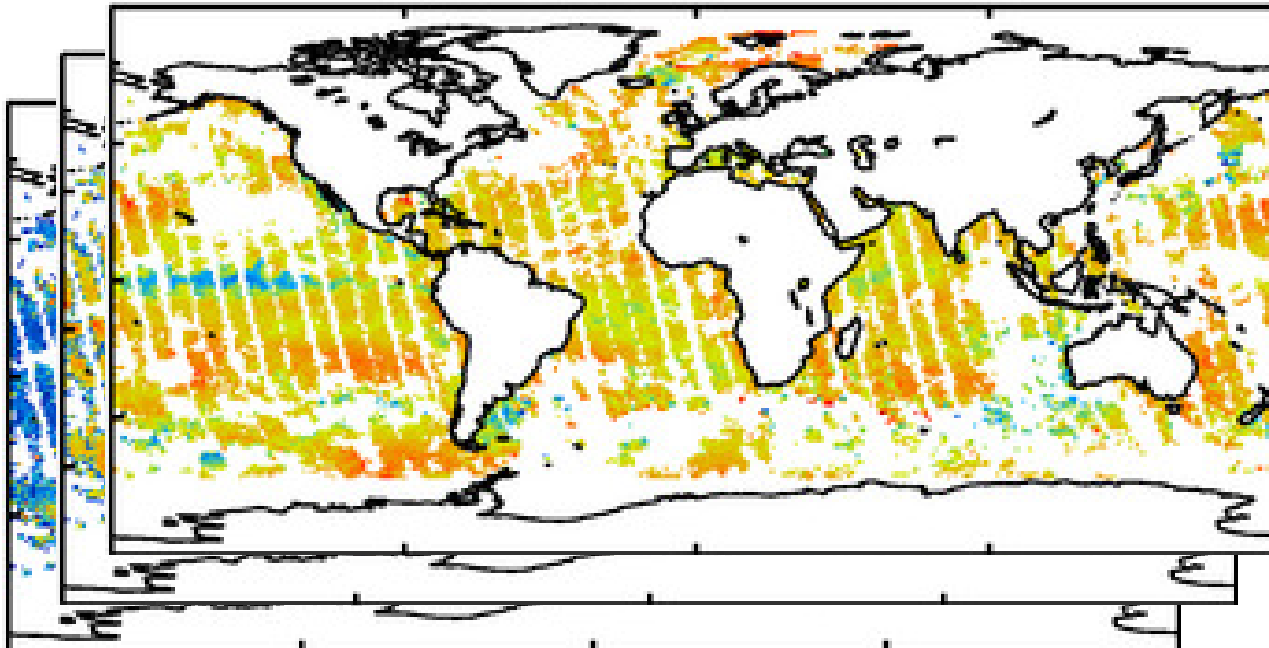
## Drifting buoys as part of the Global Observing Array



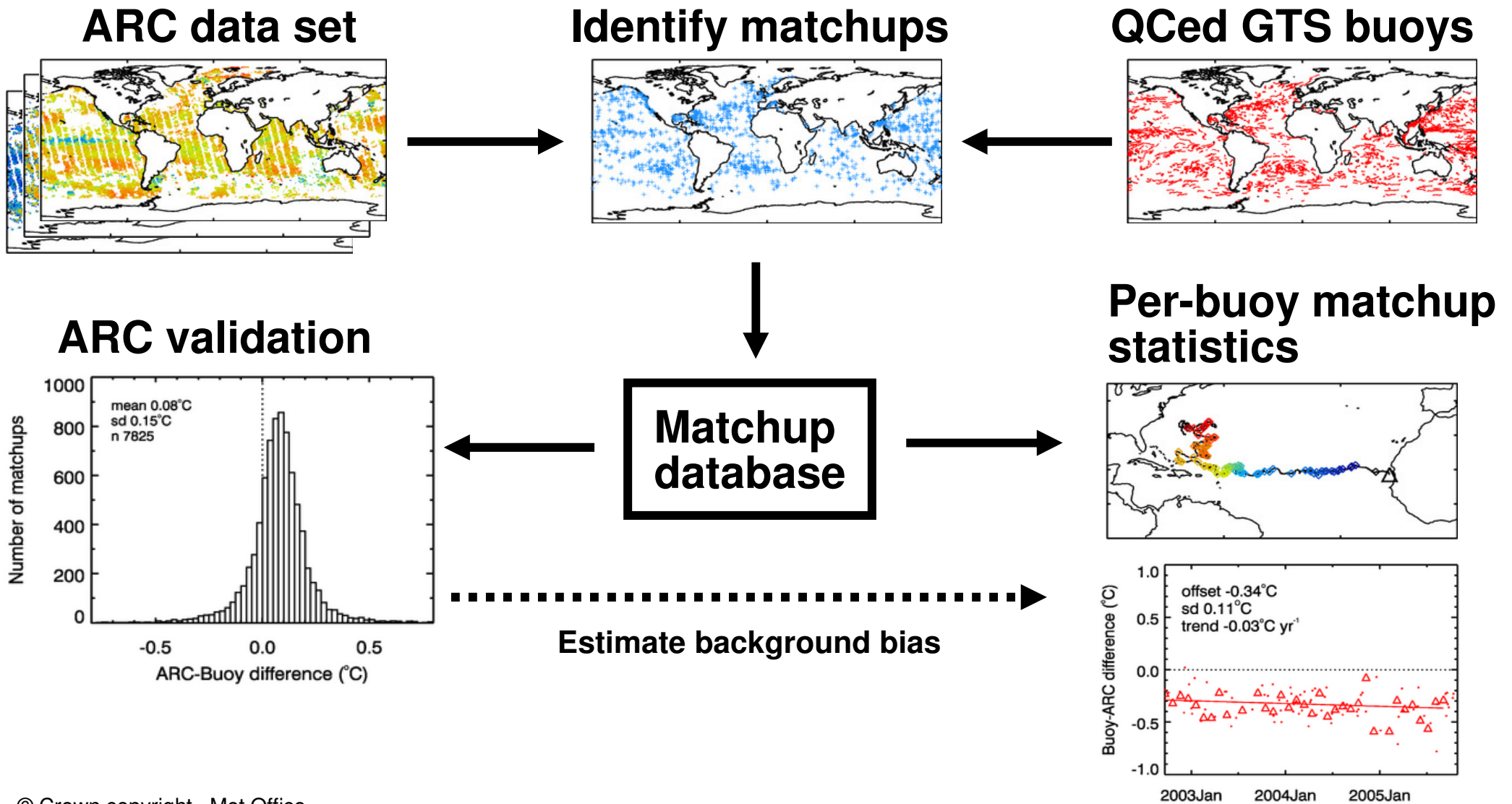
- Global Drifter Program
- Drifting Buoy design
- Cooler than ship SSTs
- Not routinely recovered

# The ATSR Reanalysis for Climate (ARC) project

- Climate quality SST record
- Test dataset covering period 1995-2009
- Independent of drifting buoys

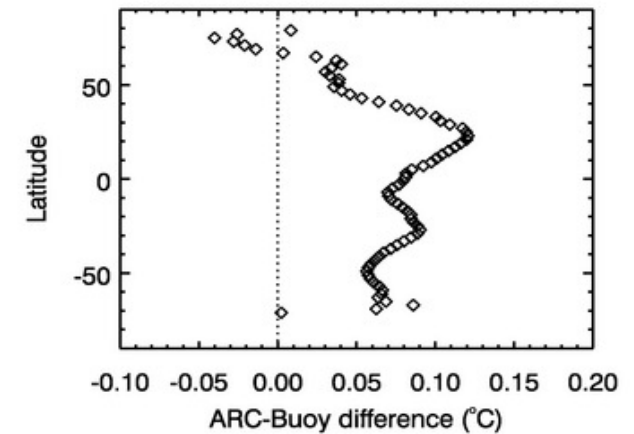
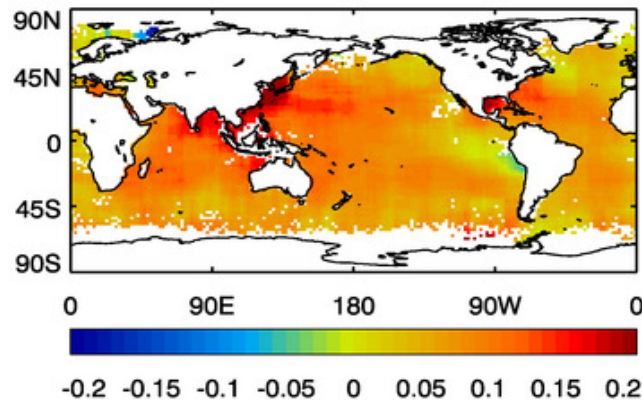
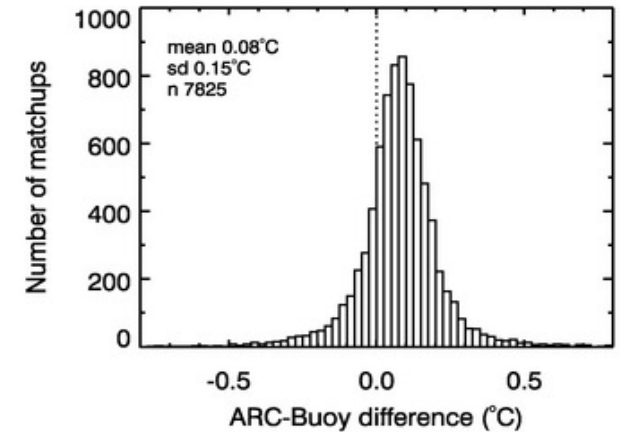
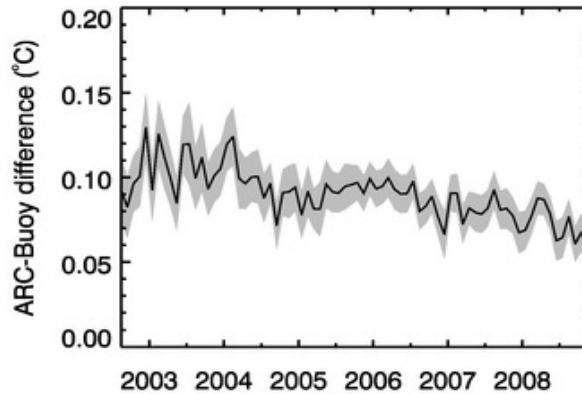


# ARC-Buoy matchup approach



# Validation of the ARC test data set

- Validation using co-incident ARC SST retrievals and drifting buoy SST measurements

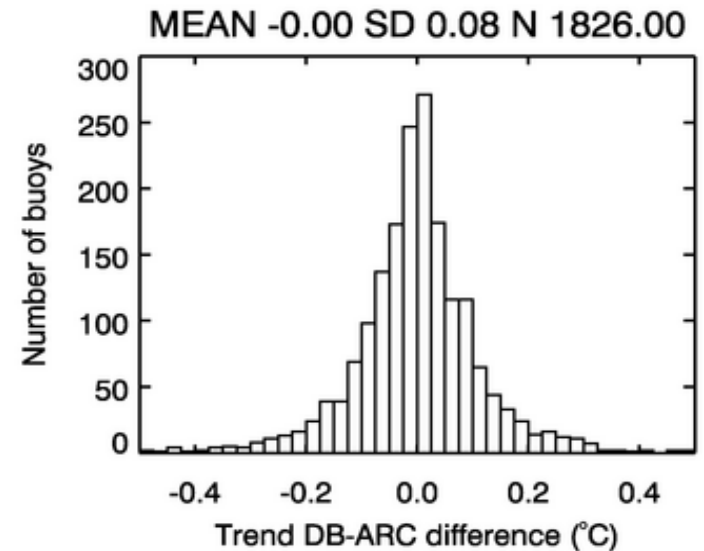


# Result 1

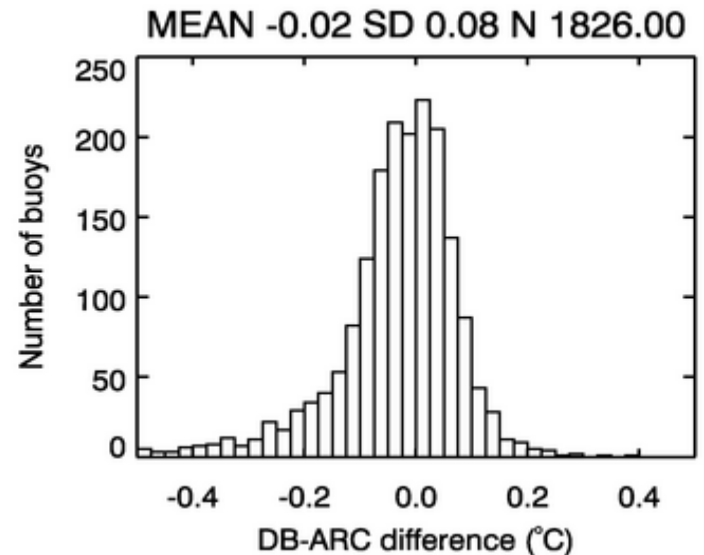
## Stability of Drifting Buoy SSTs – Persistent Offsets

- Examined per-buoy biases for manufactures and buoy types
- No significant biases between drifting buoys
- No evidence for a relative cold bias in the buoy data

Mean 0.00 °C  
SD 0.08 °C



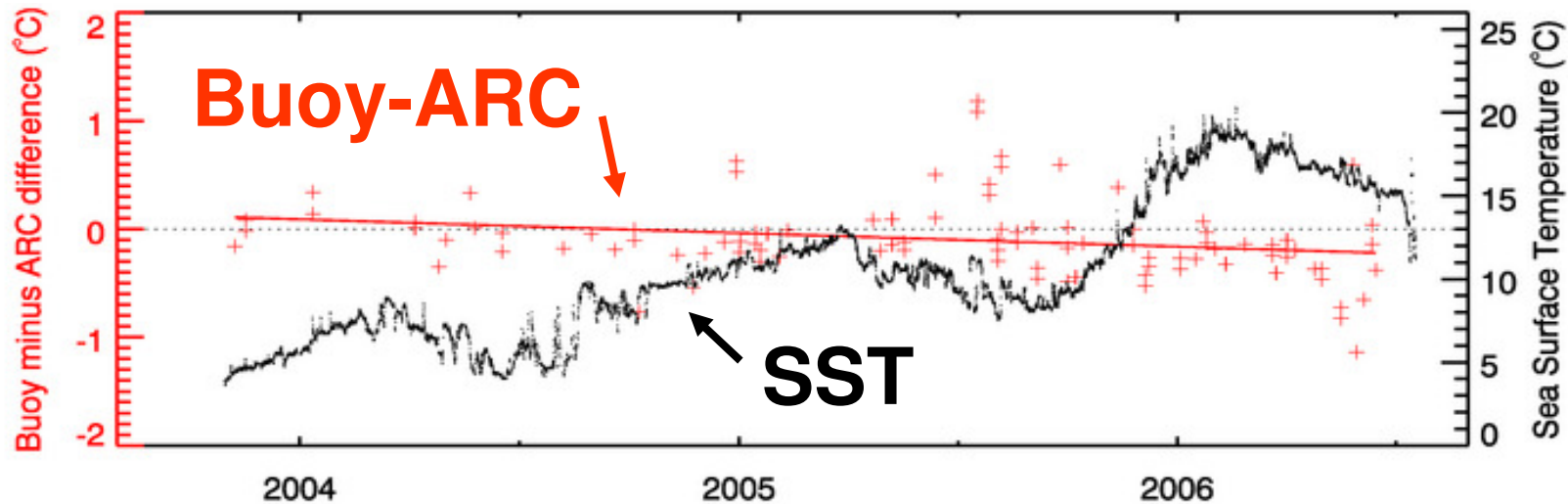
Mean -0.02 °C  
SD 0.08 °C



# Result 2

## Stability of Drifting Buoy SSTs – long term drifts?

Example of ‘suspect’ buoy

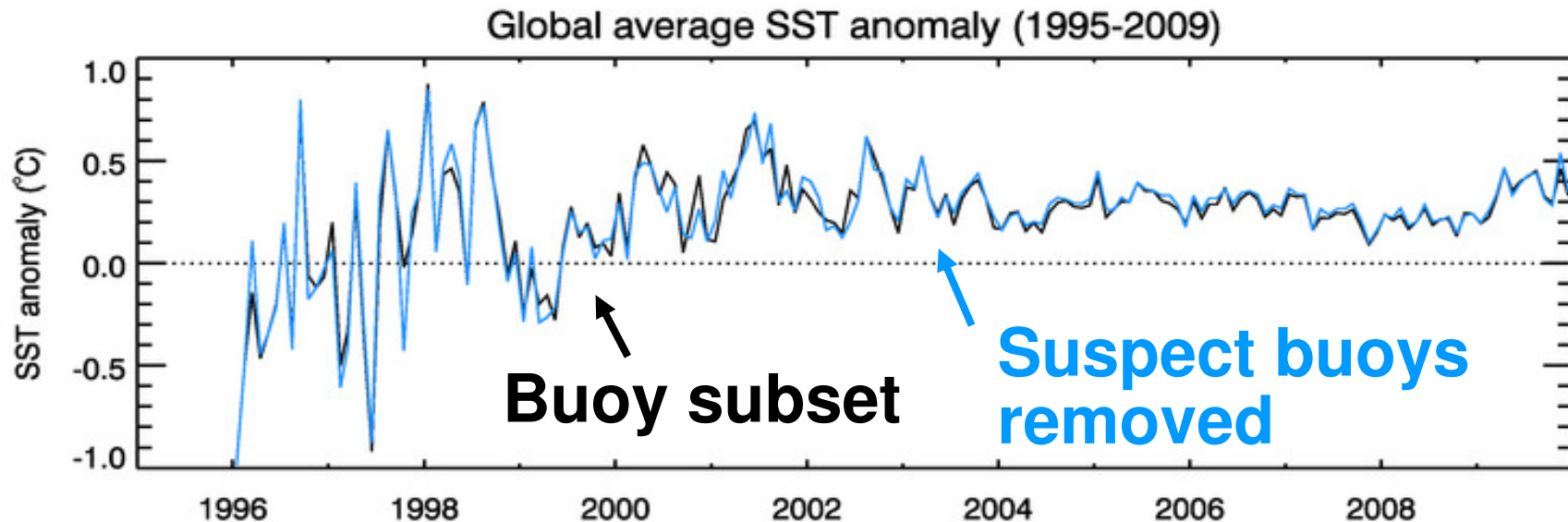


- Sample of 2067 buoys with matchups covering at least 1 year
- 25% of buoys have drifts in temperature measurements exceeding  $\pm 0.05^{\circ}\text{C yr}^{-1}$
- No overall preference between warm or cold drifts



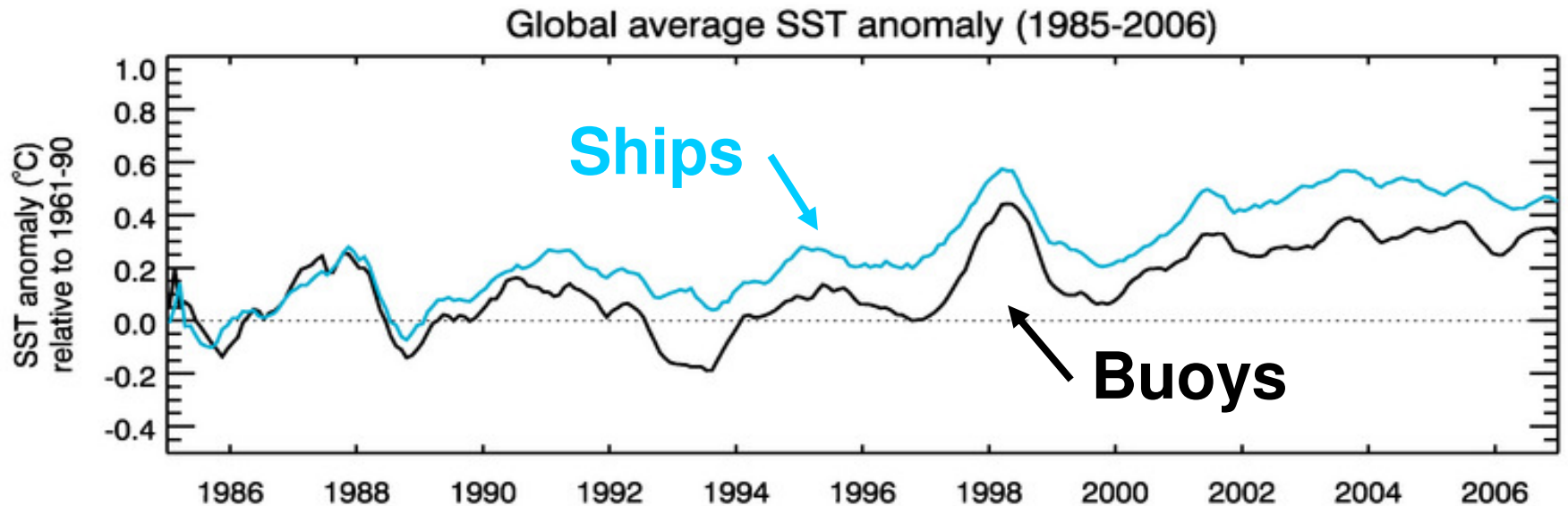
# Result 3

Quantifying effect of 'suspect' buoys



- Create SST record from buoy matchup subset
- Remove or correct 'suspect' buoys from this record
- No significant change in estimate of global or regional SST variability

# Relevance to Climate Data Records

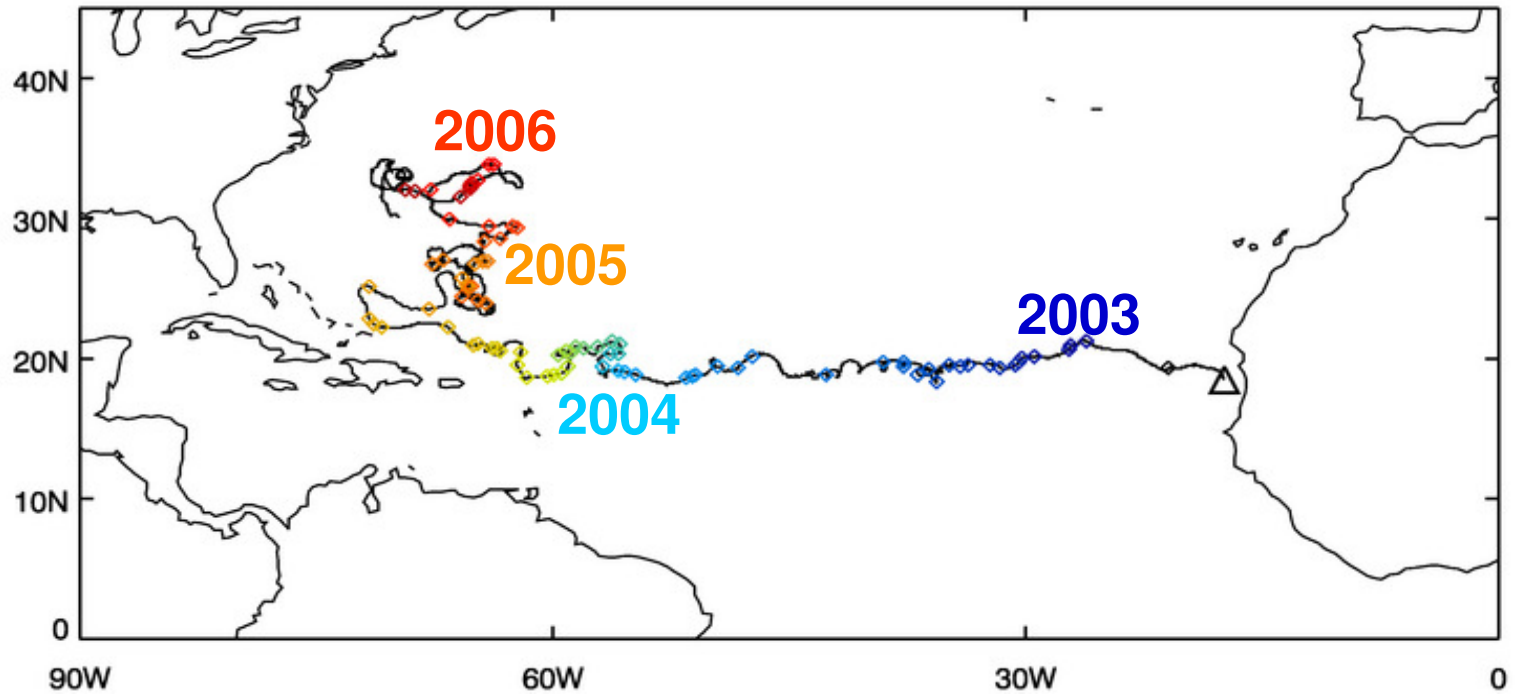


- Climate monitoring
- AVHRR retrieval coefficients
- Satellite validation statistics
- New approach to quality control of drifting buoys

# Conclusion

- ARC SST estimates provide an independent baseline to compare drifting buoy SSTs too
- Issues of instrument stability are identified in 10% of a **sample** of the drifting buoy population
- Drifting buoys agree more closely with ARC data than they do with ships
- Per-buoy post calibration now possible
- Encourage post-recovery calibration comparisons!
- For further discussion, please contact [nick.rayner@metoffice.gov.uk](mailto:nick.rayner@metoffice.gov.uk)

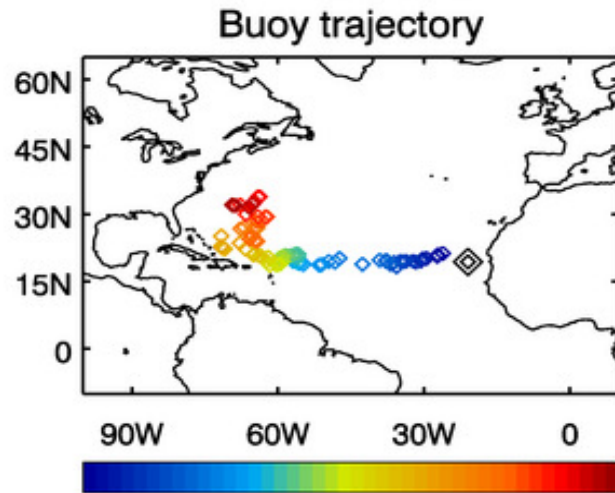
# Monitoring of Drifting Buoy SSTs



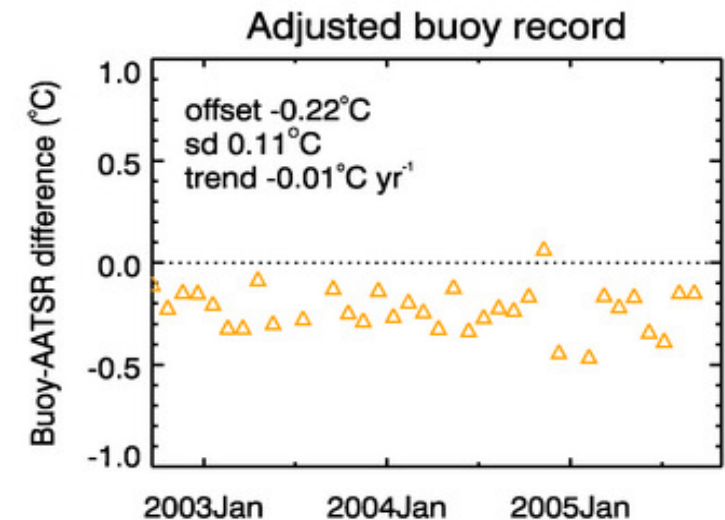
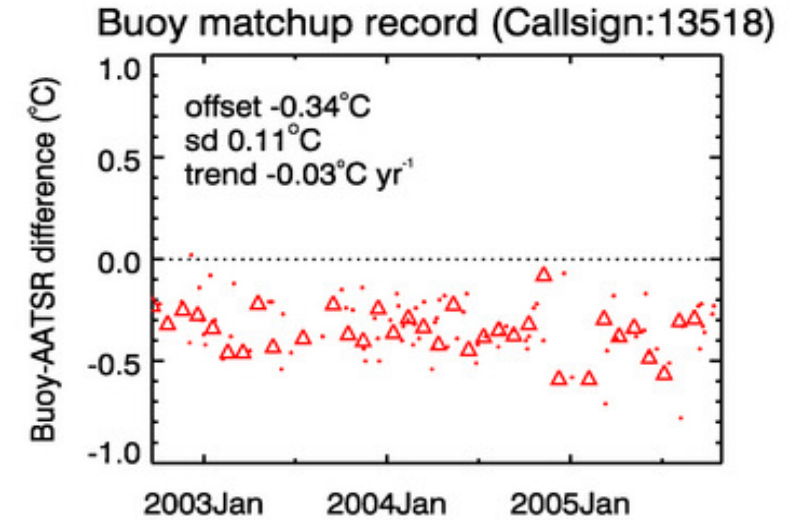
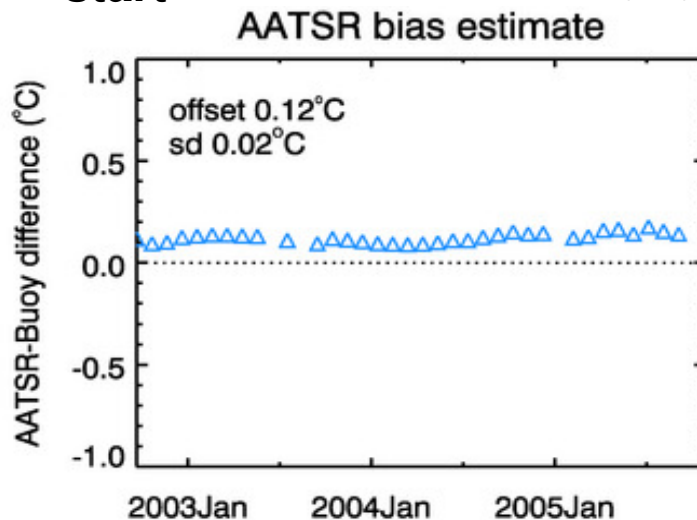
— Trajectory of drifting buoy 13518

 AATSR matchup locations

# Monitoring of Drifting Buoy SSTs



start end



# Monitoring of Drifting Buoy SSTs

