Met Office
Hadley Centre

Isolating the signal of ocean global warming

Matt Palmer

CLIMAR 3 meeting, Gydnia, Poland, 8th May 2008

Collaborators

- Keith Haines
- Simon Tett
- Tara Ansell

Contents

This presentation covers the following areas

- Introduction
- Data & methods
- Time series
- Spatial maps
- Conclusions

Data

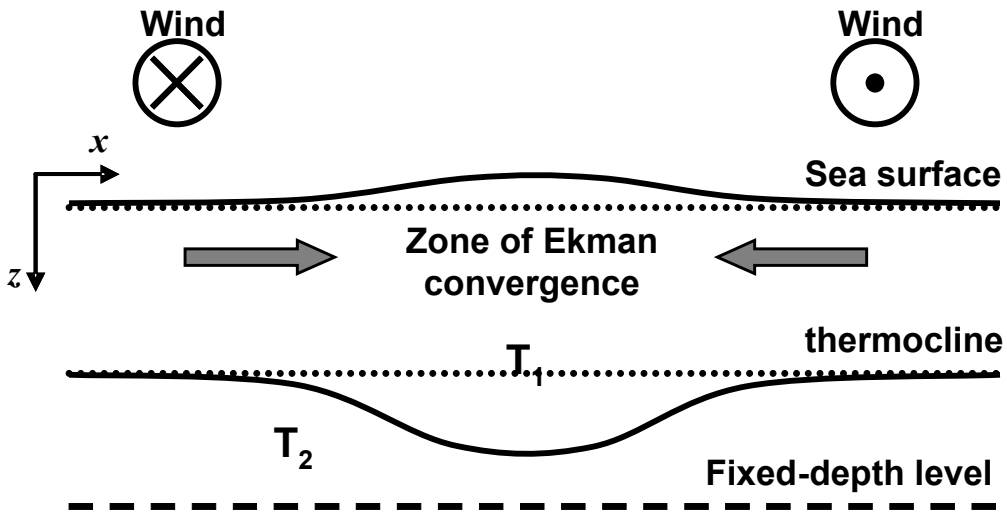
- Temperature profiles from ENACT/ENSEMBLES
- Version 2 (1956-2004) and version 3 (1950-2006)
- Based on WOD01/WOD05 with updates from Argo GDACs and GTSSP (1990 onwards)
- Available from:

http://www.metoffice.gov.uk/hadobs/en3

Method

- Create 2°×2° gridded fields for each month:
  1. Mean temperature > 14°C
  2. Mean depth of 14°C
  3. Mean temperature > 220m
- Create monthly climatology for 1956-2004
- Compute the volume-weighted mean anomaly for each month for each ocean basin.
- No in-filling. Assumption that missing grid boxes = mean value of observed grid boxes.

Why isotherms?

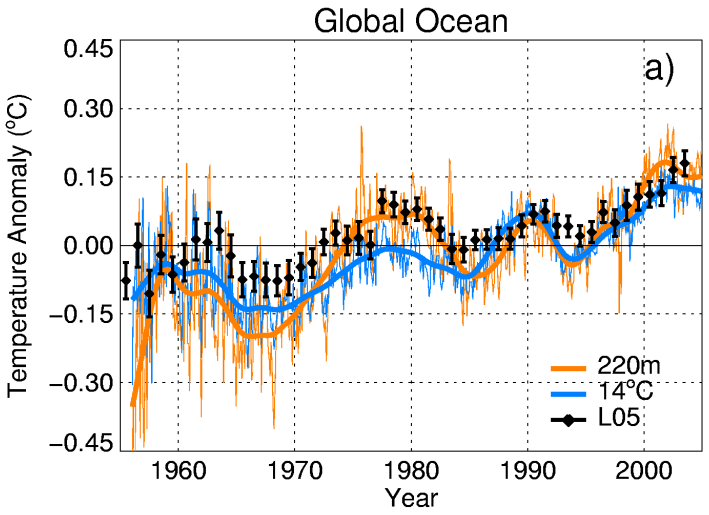


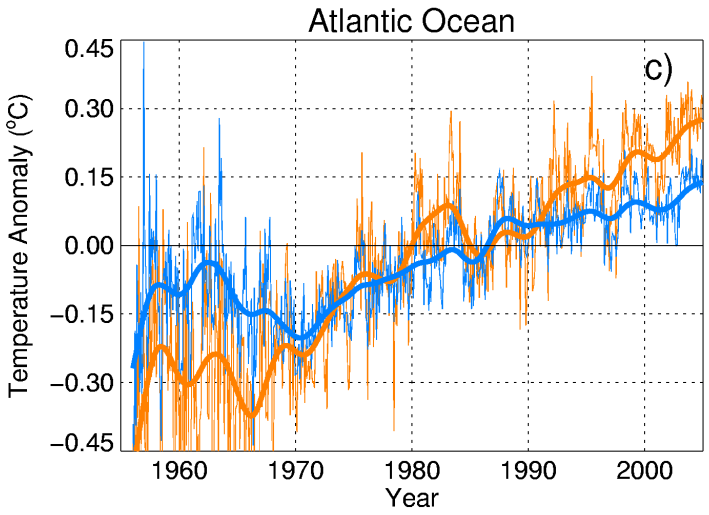
Short time-scales: waves, eddies

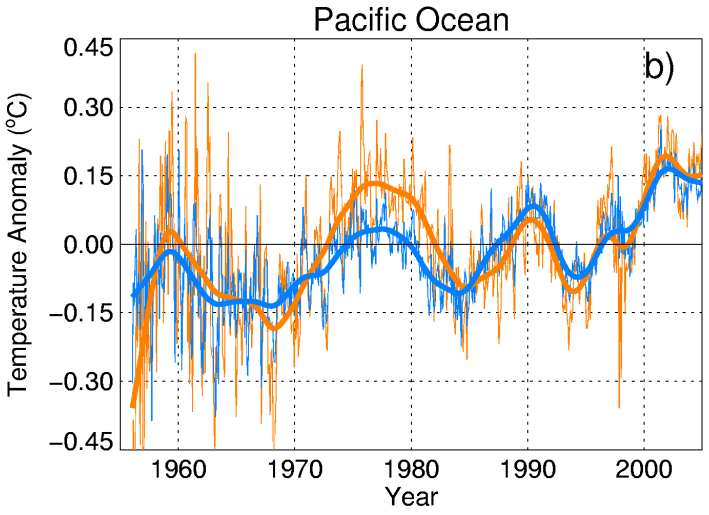
Long time-scales: mean winds, ocean advection

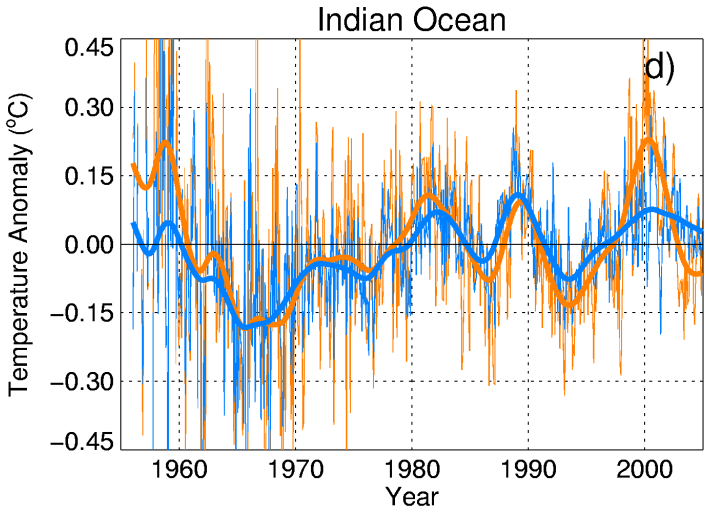
Walin [1982], Stevenson and Niiler [1983], Toole et al. [2004]

Time series



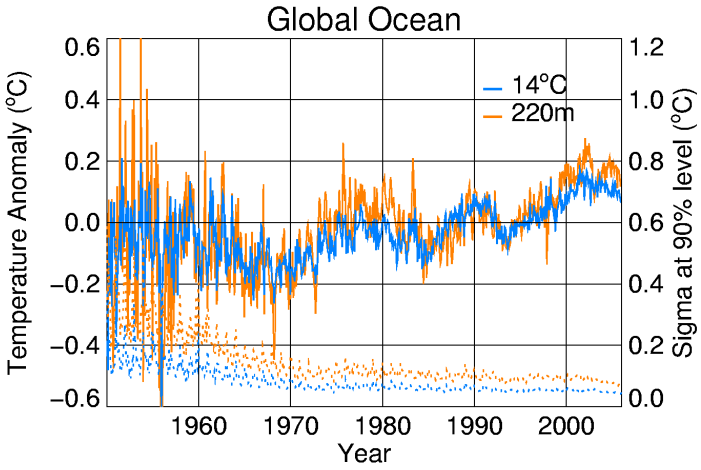


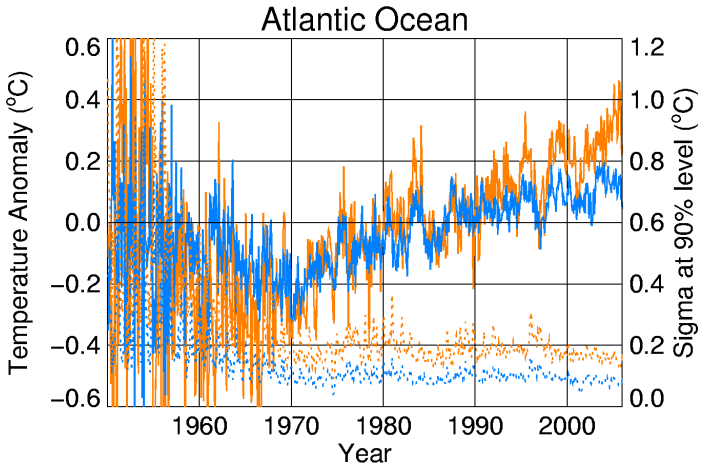


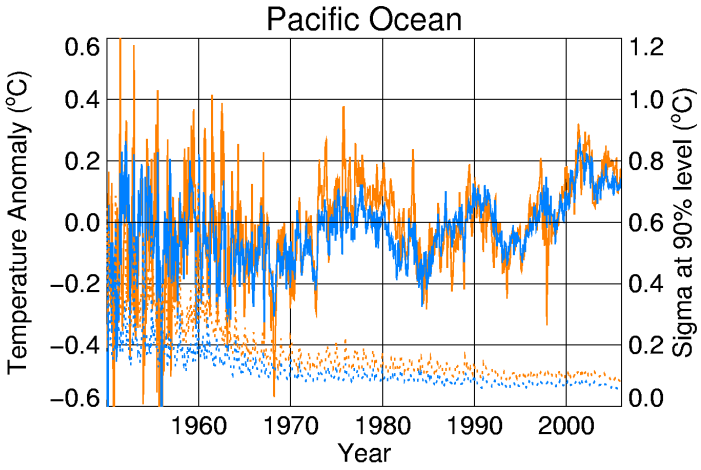


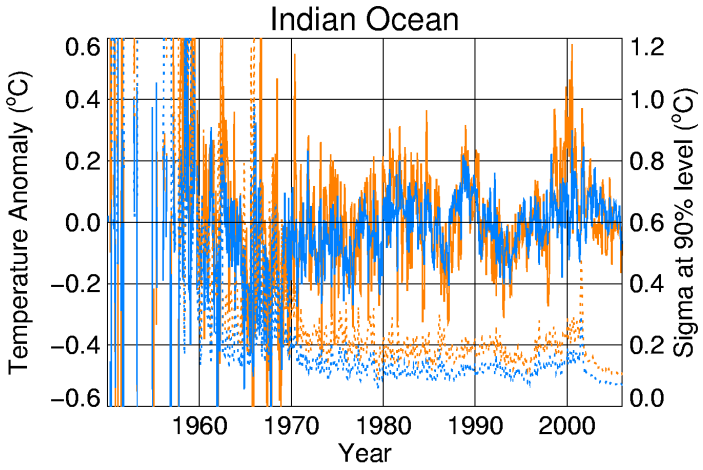
Palmer et al. [2007]

Sampling errors



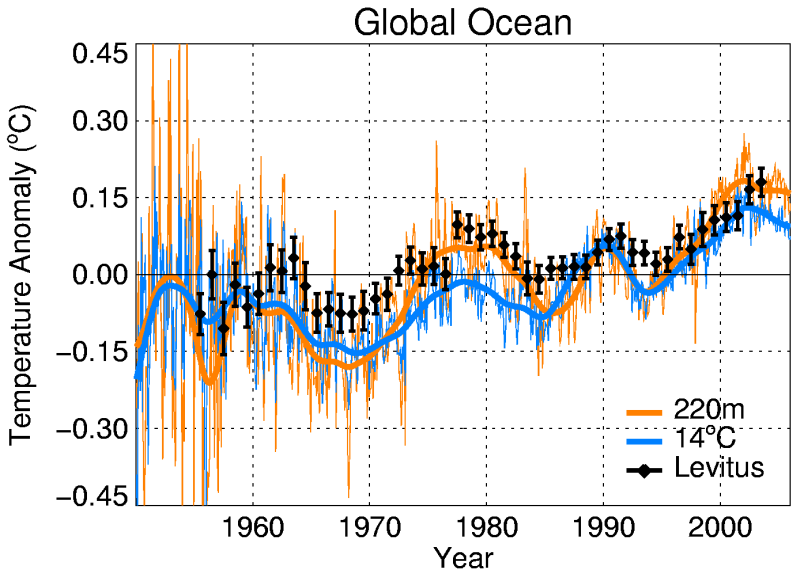




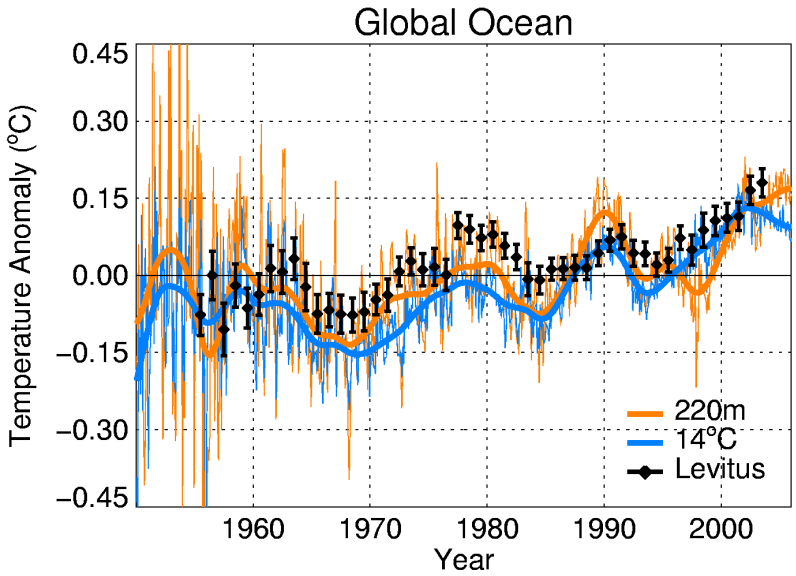


See Palmer and Brohan Poster

XBT corrections



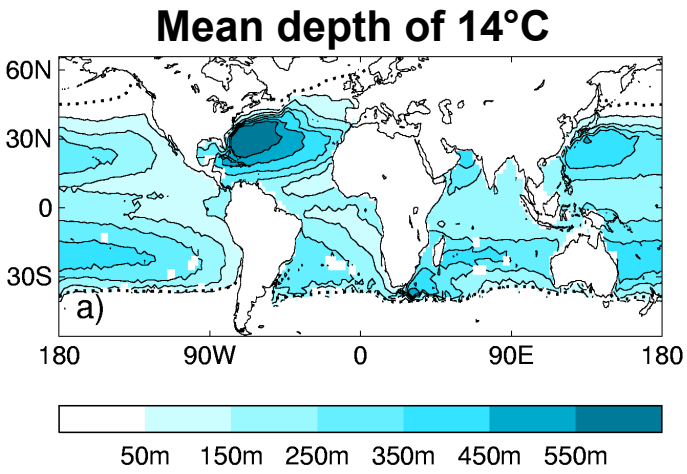
No XBT corrections

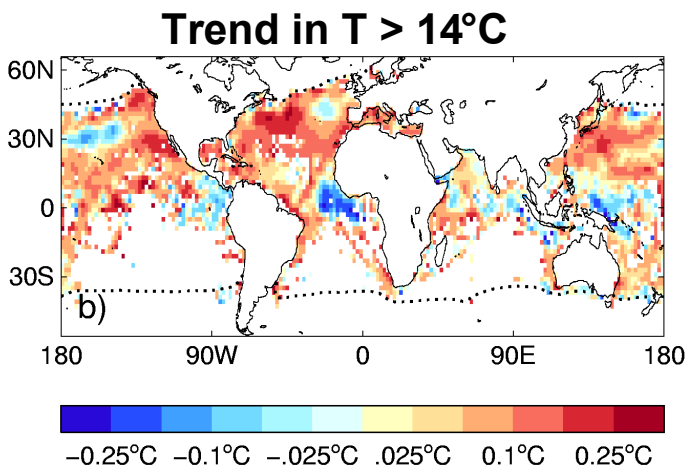


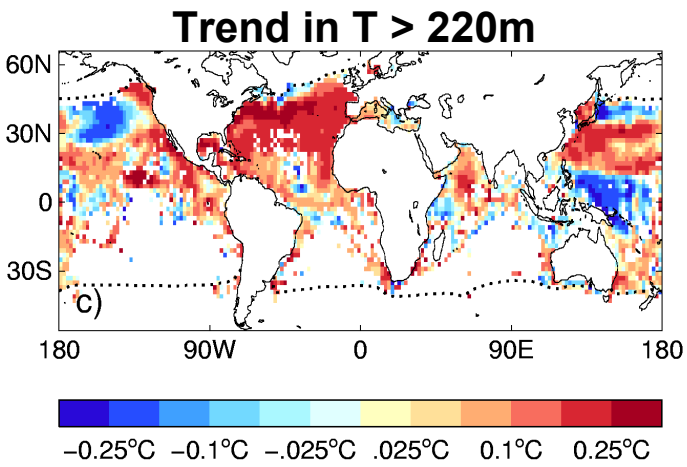
XBT corrections*

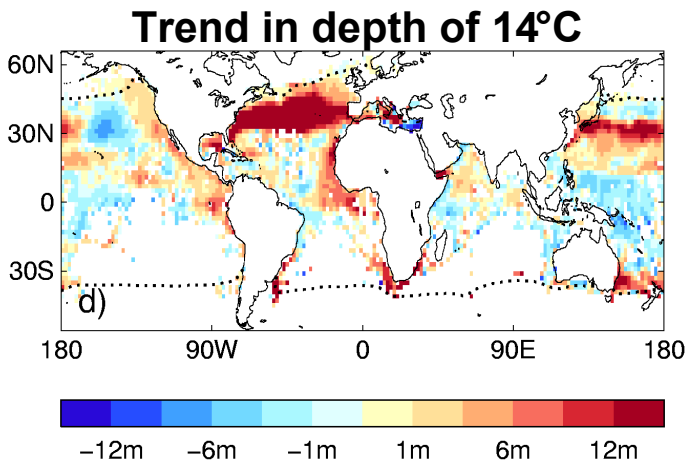
*Following Wijffels et al. [2008]

Spatial maps









Palmer et al. [2007]

Conclusions

For isotherm analyses:

- Reduction in high-freq and multi-annual variability
- More consistent warming trends among basins
- More uniform pattern of global warming
- Removal of fall-rate XBT bias
- More information to suggest possible mechanisms

Met Office
Hadley Centre

Questions and answers