Use of VOS Data in Climate Products

David I. Berry[1], Scott Woodruff[2] and Elizabeth C. Kent[1]

1) National Oceanography Centre, Southampton
2) NOAA Earth System Research Laboratory

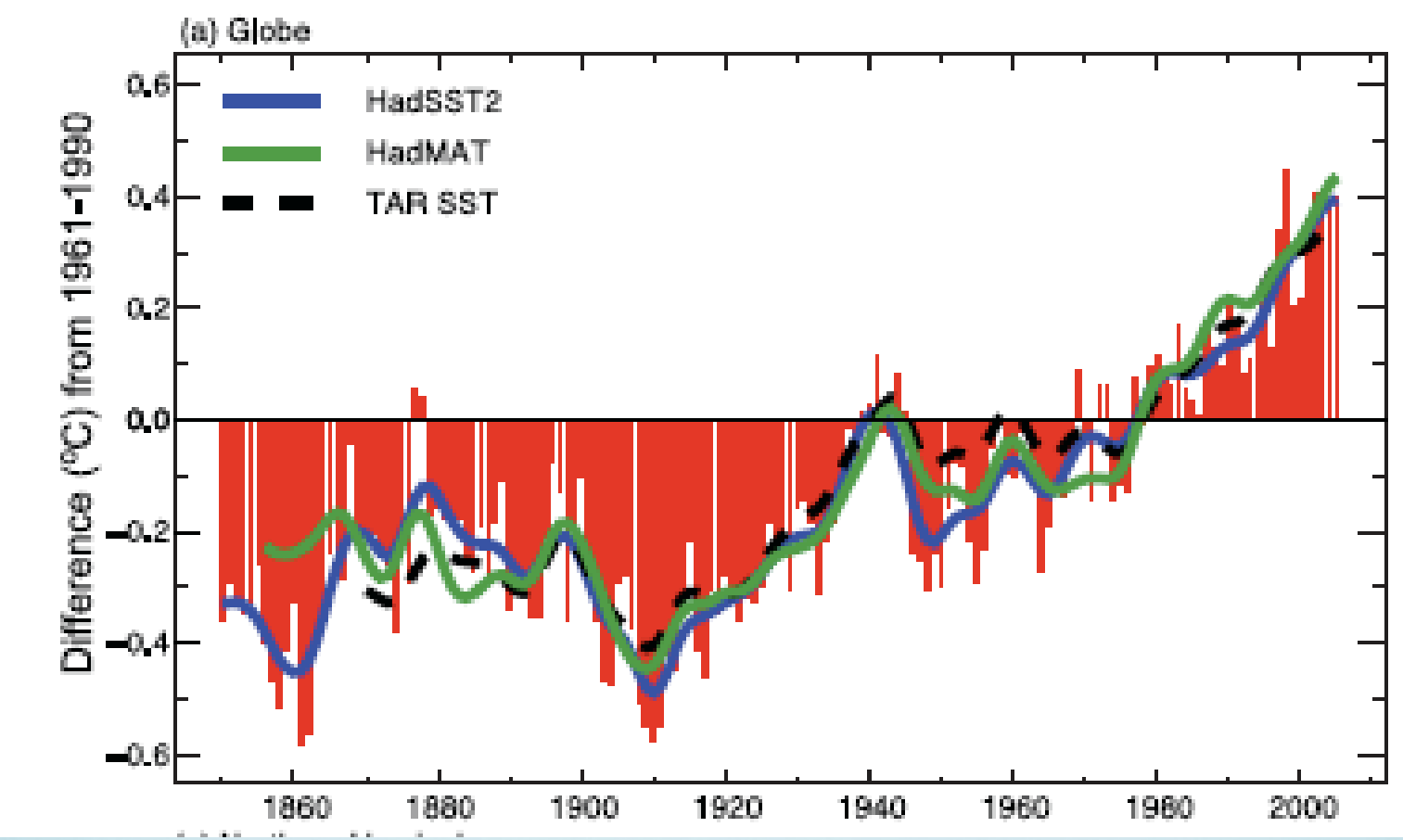
Outline

- Recent uses of VOS data in climate research
- Outcome of Third JCOMM Workshop on Advances in Marine Climatology (CLIMAR-III) Conference in Poland, May 2008
- OceanObs09
- GTS Comparison
- Issues related to climate applications

Recent uses of VOS data in climate research

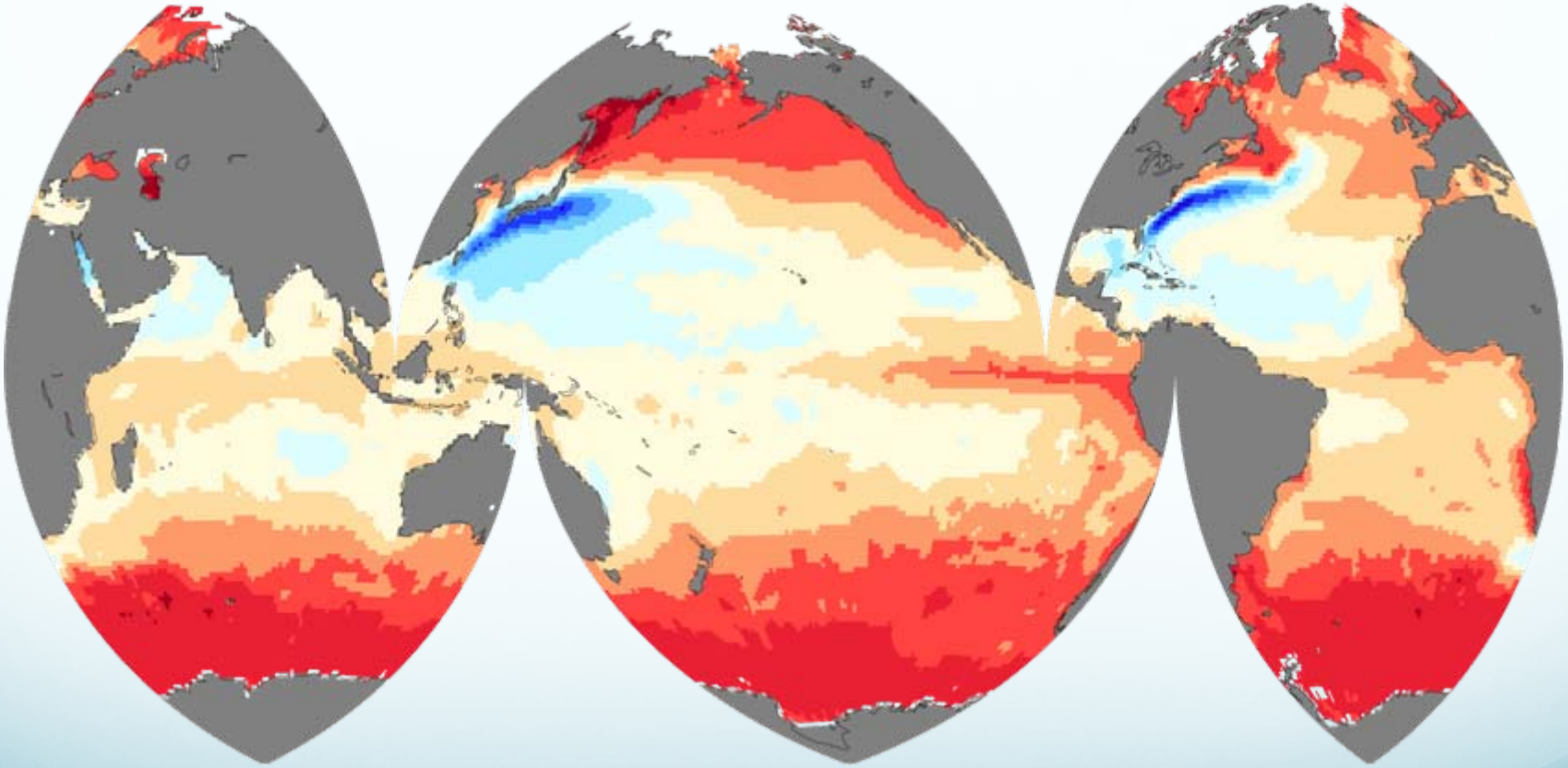
- Climate change assessment and detection
  - IPCC AR4
  - US NCDC “State of the Climate”
  - UK MCCIP Annual report card
- Air – sea interaction studies
  - NOCS surface flux dataset
- Reanalysis model input
- Satellite validation and verification
  - Atmospheric corrections

Recent uses of VOS data in climate research



Global temperature trends using VOS data (source - IPCC AR4)

Recent uses of VOS data in climate research



Mean winter latent heat flux (DJF, 1973 – 2006)
(Source – NOCS Surface Flux Dataset 2.0)

CLIMAR-III, Gdynia, Poland, May 2008

- International conference on marine climatology
- 69 participants from 19 countries (representing all but one WMO regional assembly)
- 6 Different sessions, 43 talks and 32 posters
  - Characteristics of observational data
  - Data management
  - Product development
  - New climate products and inter-comparisons
  - Observation based analyses of climate variability and change
  - New Initiatives

CLIMAR-III, Gdynia, Poland, May 2008

- Special issue of the “International Journal of Climatology” on the conference
- JCOMM Technical Report (CD-ROM and online) including presentations and abstracts
- Oral and posters also available online at
  - http://icoads.noaa.gov/climar3/
- Series of recommendations made on all topics, VOS specific included
  - Importance of VOS highlighted (including manual observations)
  - Availability of metadata (Pub. 47) and ability to link to observations
  - Disconnect between operational and research communities recognized
  - Importance of both real time and delayed mode data stated

OceanObs09
(Venice, September, 2009)

- Conference on global ocean observing system, repeat of highly successful OceanObs99 conference. 2 main aims:
  - Celebrate progress in implementing the existing initial ocean observing system, realizing societal benefits from it and highlighting its potential.
  - Develop a process for building consensus for sustaining and evolving systematic and routine global ocean observations over the next 10 years in support of societal benefits
- 9 Community White Papers and submissions that include the the VOS or VOSClim.

OceanObs09 – VOS Related (Venice, September, 2009)

- Belbeoch; The JCOMM in situ Observing Platform Support Centre: A decade of progress and remaining challenges
- Fairall; Observations to Quantify Air-Sea Fluxes and Their Role in Climate Variability and Predictability
- Kent; The Voluntary Observing Ship Scheme
- Rayner; Evaluating climate variability and change from modern and historical SST observations
- Smith; Automated Underway Oceanic and Atmospheric Measurements from Ships
- Smith; The Data Management System for the Shipboard Automated Meteorological and Oceanographic System (SAMOS) Initiative
- Woodruff/Scott; Surface In situ Datasets for Marine Climatological Applications
- Worley; The Role of ICOADS in the Sustained Ocean Observing System
- Hall; The Voluntary Observing Ship Climate Project (VOSClim)

Comparison of GTS data streams for December 2007

- GTS data streams checked
  - NCDC
  - ECMWF
  - JMA
- Reports matched based on location, time and main parameters
  - Duplicates and masked data merged
  - Number of unique reports for each stream and in total calculated
- Ongoing comparison (other streams to be included but problems with different formats / coding)

Comparison of GTS data streams for December 2007

- Number of unique reports across data streams

Data Stream	Number of unique reports
ECMWF	97004
NCDC	91761
JMA	94753
Combined	100941

Comparison of GTS data streams for December 2007

- Effect of combining pairs of data streams (percent of total number of observations)

	ECMWF	NCDC	JMA
ECMWF	96.1	-	-
NCDC	99.7	90.9	-
JMA	99.7	94.2	93.9

- ECMWF most complete stream, however, issues with callsign masking and duplicates
- Benefits from merging streams, up to ~10% more data

Issues related to climate applications: Callsign masking

- Identifiers needed to:
  - Apply QC and monitoring
  - Associate metadata for bias adjustment
  - Assess independence of observations in climate datasets
- Generic callsigns mean data are less useful
- GTS data archived at Met Office suggests proportion of generic callsigns (e.g. SHIP) have risen from 3 to 4 %, substitute callsigns now represent over 20 % of ship observations
- All information should be made available in delayed mode
- Presently unclear how many observations have been lost due to concerns over ship security

Other issues

- Pub. 47 availability. Most recently available data – 2nd quarter of 2008
- Data continuity issues surrounding transmission to BUFR
- Mechanism being put in place to form single point of contact for data issues
- New approach outlined in OceanObs09 CWP by TT-DMVOS and TT-MOCS

Recommendations

- WMO Publication No. 47 metadata should be available promptly
- All ship identifiers should be made available in delayed mode and as many as possible in real time
- The efforts of the JCOMM data management co-ordination group to develop a consistent approach to the development of data codes within WMO should be welcomed
- Invite team to support the ETMC proposal for modernizing the delayed mode VOS data flow