ICOADS the Global Marine Surface Reference Dataset

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Topic Outline

International Comprehensive Ocean-Atmosphere Data Set (ICOADS)

- Status, Current and future Releases
- ICOADS Value Added Database (IVAD)
- Data Access
Current Release, 2.5, 1662-2013

- Delayed Mode Processed Data, 1662-2007
  - 50 + historical data sources
- Near Real-time Processed Data, 2008 – Now
  - Based on NOAA NCEP GTS
- Metadata on each record
  - Source Identification
  - Platform / instrument type
  - VOS characteristics from WMO, 1966-2007

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R2.5 Basic Characteristics

Evolution platform mixture (1937-2007)

% Ocean Coverage by Variable

ICOADS website - hosted by NOAA/ESRL/PSD

- sea surface temp.
- sea level pressure
- air temperature
- wind speed
- total cloudiness
- relative humidity
- evap. parameter
Release 3.0, in development

- Completion target date: late 2014
- Collaborations w/ international partners
  - National Oceanography Centre, UK
  - Met Office, UK
  - CRU, University of East Anglia, UK
  - Deutscher Wetterdienst (DWD), Germany
  - Center for Earth Systems Research and Sustainability, U. Hamburg, Germany
  - Atmospheric Circulation Reconstructions over the Earth (ACRE), Global Participants
Release 3.0

**Important archive format expansions**

Permanent unique identifier (UID) on each record

- Provides absolute record tracking mechanism
- Enables inclusion of feedback from re-analyses
- Makes user interactions (consulting) easier
- Simplifies data contributions from partners
Release 3.0

**Important** archive format expansions

Near-surface ocean attachment (*Nocn*)

- Depth referenced data
  - Salinity, Temperature, Nutrients, pCO$_2$, DIC etc.
- World Ocean Database 2013
- Possible other TSG surface data:
  - SAMOS, GOSUD, R2R, etc.

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R3.0, Historical Additions

- Extended WWI Royal Navy Ship’s Logs: 1914-23
- Data digitized under ACRE/OldWeather: ~1700-1946
- German Maury Collection: 1845-67
- English East India Co.: 1789-1834

R3.0, Data Replacements / Improvements

- World Ocean Database 2013
- Merge two NOAA GTS feeds, NCEP + NCDC
  - Recover masked (deleted) ship IDs
- ISDM/Canada global drifting (moored) buoy archive
- Tropical moored buoy arrays: (PMEL, NDBC, JAMSTEC, etc.)
- NDBC near-coastal moored buoy/C-MAN
A system to manage ICOADS observations in parallel with expert developed adjusted data values.

Major sources of inhomogeneity in ICOADS

- Measurement differences between platforms
- Changes in observing systems over time
- Biases created by specific platforms
- Biases created by methods and coding practices
- Undetected systematic location errors

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Ship AT heating bias relative to research buoy

North East Subduction Buoy (33 N 22 W)

![Graph showing air temperature trends over years 1991 to 1993 for North East Subduction Buoy with uncorrected and corrected VOS.]

1. SST sample depth versus ship length, engine intake and hull for 1997 data
3. Coding resolution, whole degrees, July 1995 10 degree box.

IVAD; the technical pieces

- Design a data format attachment \((lvad)\), that is optional for every ICOADS record.
  - Allow for multiple \(lvad\) attm. per record
- Manage all records, \(~300M\), in relational DB
  - UID on each record is key
- Major candidates for \(lvad\)
  - Estimates of observational bias
  - Adjustments to standard measurement height/depth
  - Improved QC flag or measure method definition
IVAD; the technical pieces

- Features of the *Ivad* process
  - Prepared and submitted by expert community
  - **Contains the adjusted data value**
  - Several data uncertainty values (optional)
  - Author reference code – pointer to method documentation
ICOADS Release 3.0 with UID

Expert Working Group

Records of Interest, e.g. SST

IVAD DB
Expert Working Group

ICOADS Release 3.0 with UID

Records of Interest, e.g. SST

UID Parameter Adjustment & Uncertainty Estimate

Documentation
Expert Working Group

ICOADS Release 3.0 with UID

Records of Interest, e.g. SST

UID Parameter Adjustment & Uncertainty Estimate

Documentation

IVAD

value-added data

IVAD DB

ICOADS Value Added Database

NCAR
Users have access to expert developed bias adjustments. More homogenous data.
# ICOADS Products and Access

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- Very basic and reliable access for a diverse user community
- Desires for more standard and interoperable access
  - Re-design + make monthly statistics netCDF CF compliant
  - Publish monthly statistics in THREDDS catalog and service
  - Drive observation subsetting with IVAD DB and add netCDF output option.
Conclusions

- Working hard to prepare Release 3.0, 2014
  - Significant support from International partners
- IVAD is in testing phase
  - Adjusted data – more homogeneous, well documented
- Hope to achieve more standard and interoperable access
ICOADS

- [http://icoads.noaa.gov/](http://icoads.noaa.gov/)

IVAD


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Example of ship heterogeneity

Measurement height versus ship length (1980-2002)

Monitoring

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SST Sample buckets
R2.5 Basic Characteristics

1. Surface marine observations
2. Basic gridded monthly products
R2.5 Basic Characteristics

Evolution platform mixture (1937-2007)