# Vision for a Delayed-mode High-resolution Marine Meteorology Data Center

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# Overview

- Brief history of research vessel (R/V) data center at FSU
- Vision for assembly, quality control, distribution, and archival of high-resolution (HR) meteorology
- Role of data assembly center (DAC)
- Contribution by U. S. sponsored HR vessels
- Benefits to HR vessels

# History: Who We Are

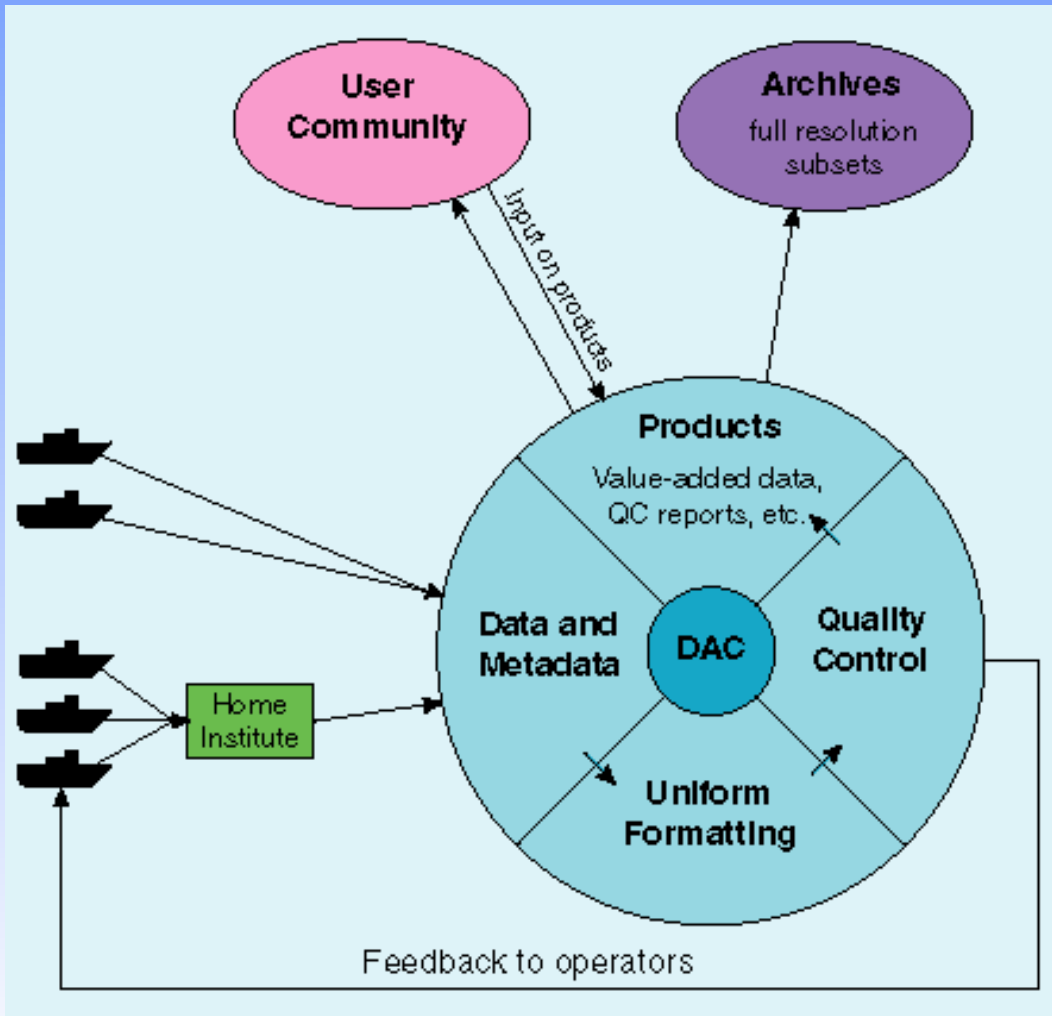
- Data center specializing in the quality review of meteorological data collected on research vessels (R/Vs)
  - Focus: high time resolution (1-15 min. intervals) data from automated instrument systems
- We employ quality control procedures developed in-house to create value added data products
- We freely distribute all products to science community and apply them to current scientific problems

# History : FSU Data Center

- David M. Legler and James J. O'Brien formed the Data Assembly Center (DAC) for WOCE in 1993
  - Final WOCE archive contains meteorology data from over 439 hydrographic cruises (82% of completed cruises)
- Expanded to include all surface meteorology data from TOGA/COARE
- Experience provided access to R/V data for scatterometer cal/val
- Late1990s, added data from select international, UNOLS, and NOAA R/Vs
  - Currently working with *Ronald Brown* and *Ka'imimoana*
  - VOS-IMET soon

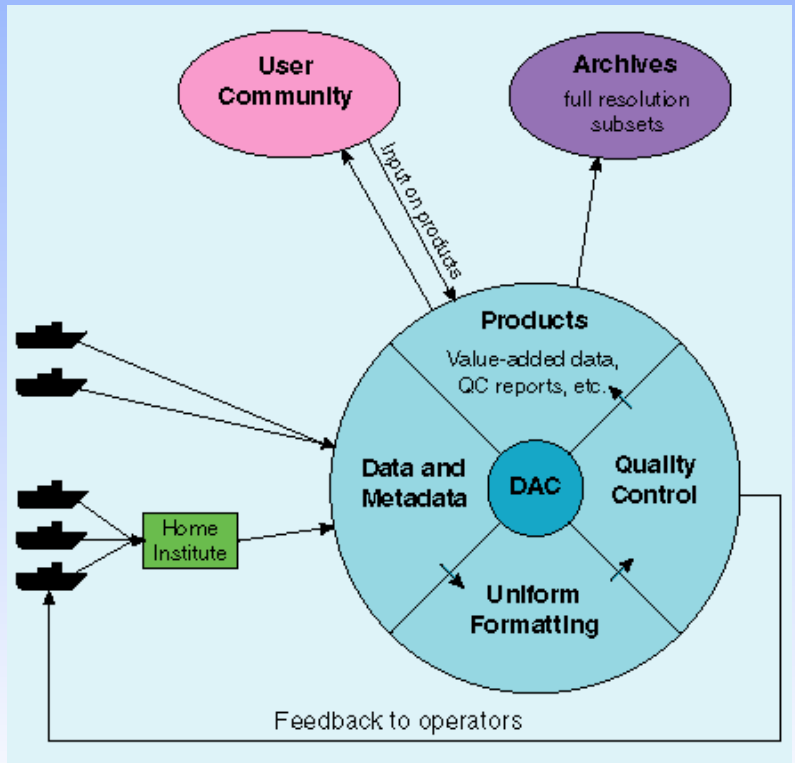
# Vision

- Establish data pathway from vessel to user
  - Data collection by ships/institutes
  - Centralized data assembly and product development
  - Distribution to archives and users
- Allow for user input on products



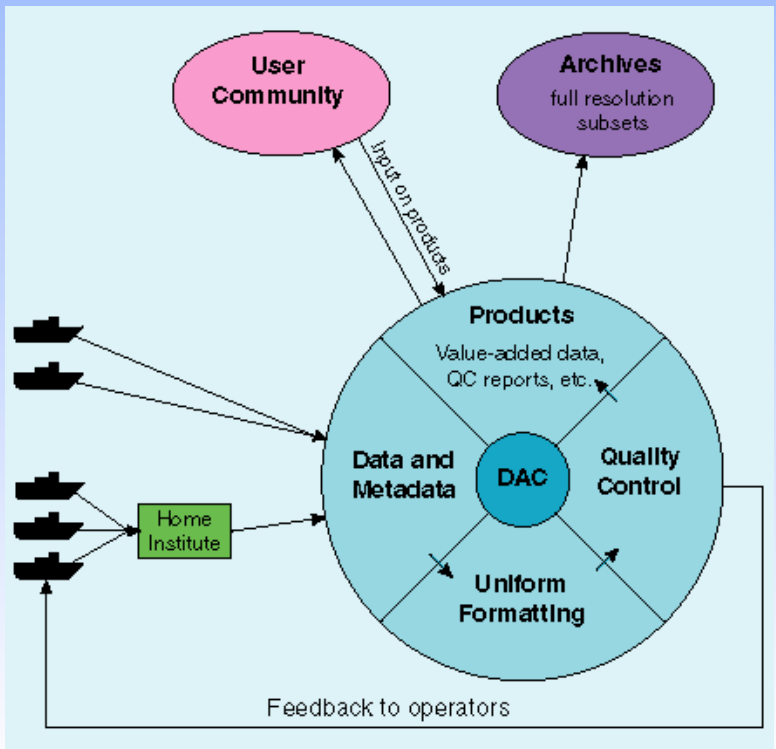
# Role of DAC

- The DAC will be the central collection location for delayed-mode HR observations
- A primary mission of the DAC will be service to the research community
- Duties of DAC
  - Maintain data pathways, communication
  - QC and reporting
  - Distribution of value-added products
  - Preparing data for long-term archival



# Role of DAC: Data pathways

- Coordinate data and metadata transfer from ship to DAC or institute to DAC (ftp or digital media)
- Establish standard navigation and meteorology data and metadata inputs to DAC (based on scientific needs)



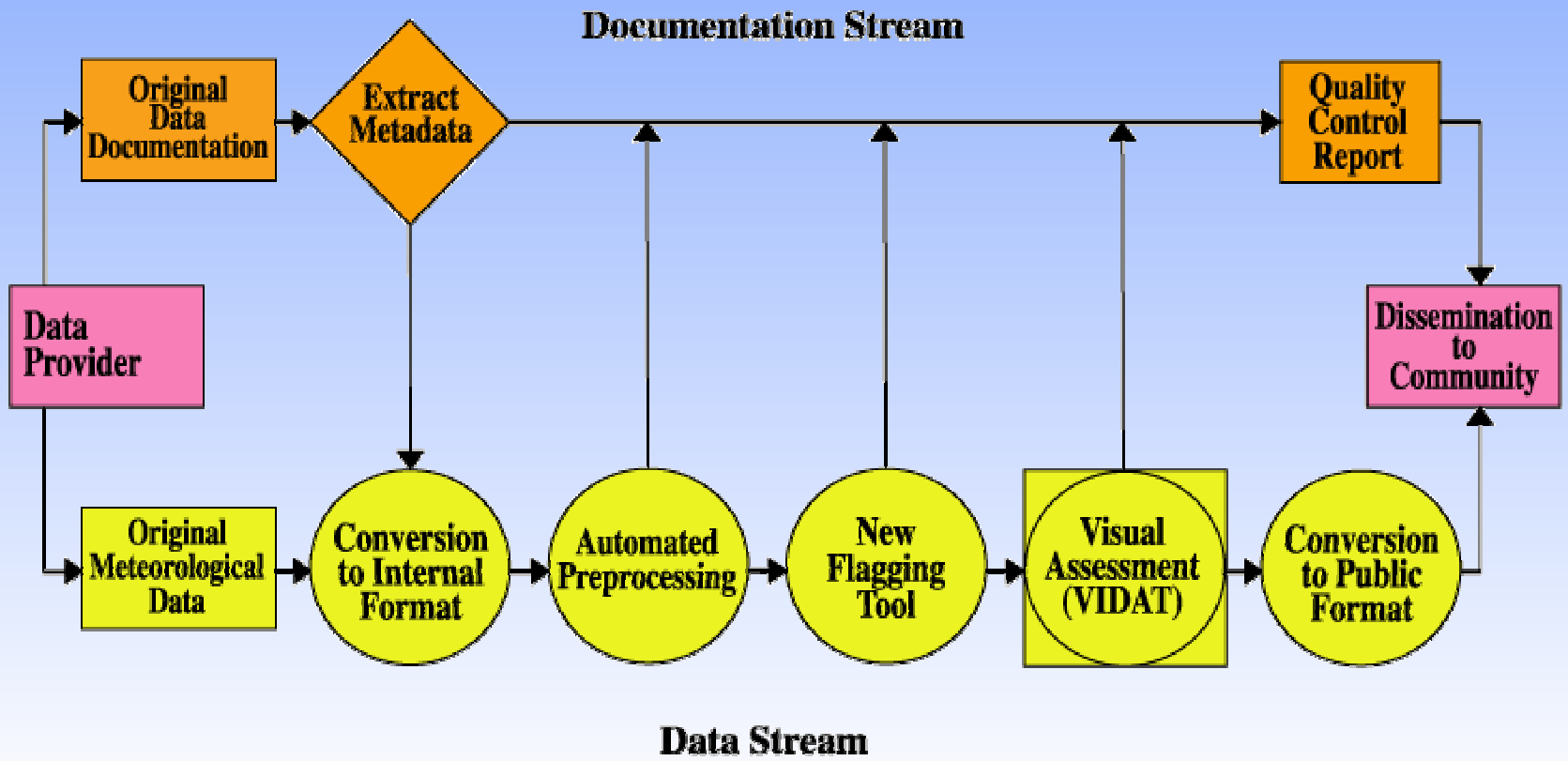

- Open communications for input from/feedback to vessel operators
- Accept data in multiple ship formats
- Maintain a database of U.S. sponsored HR meteorology data

# Role of DAC: Quality-Control

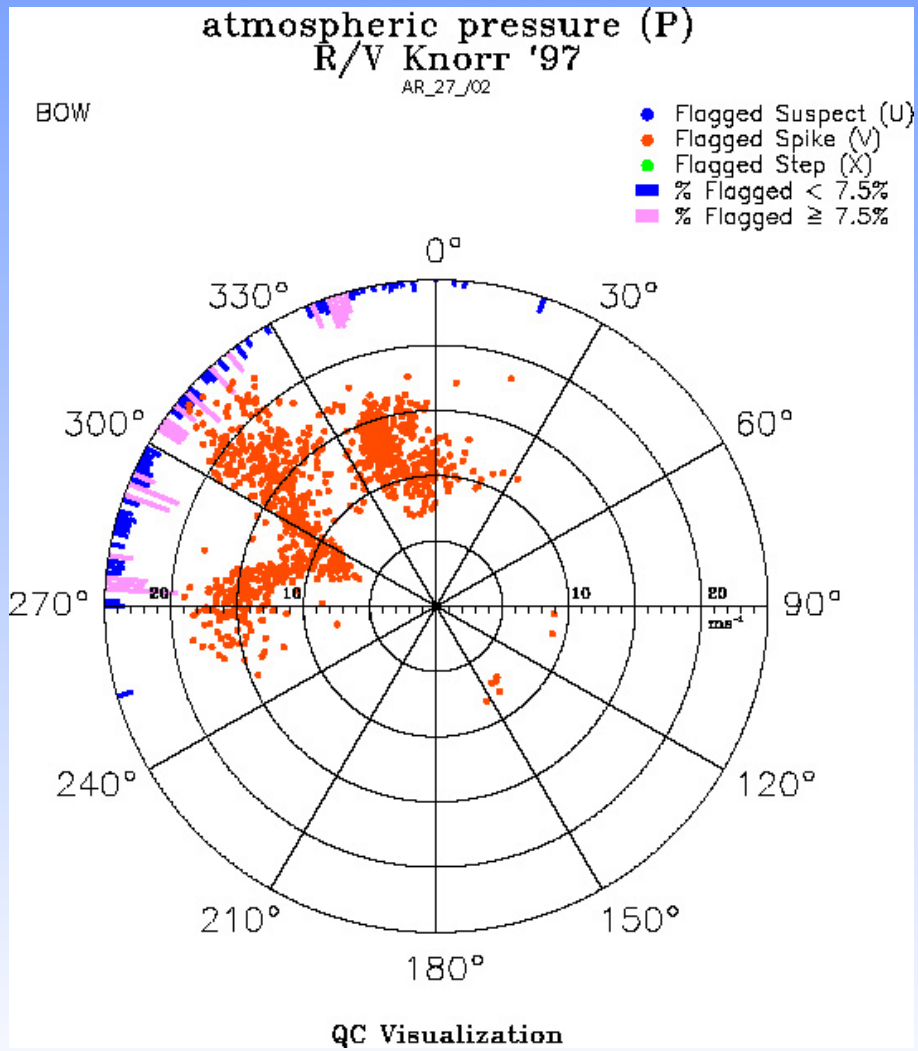
- Philosophy is to flag (not remove) suspect data at the parametric level
- A system using both automated and visual data inspection is essential
- Automated flagging
  - Pre-process for realistic ranges, time sequence, etc.
  - Statistical spike/step flagging tool
- VIDAT (VIsual Data Assessment Tool) software developed in-house
  - Visualize multiple data streams
  - Map positions/climatologies
  - Check automated flagging
  - Analyst adds additional flags

# Role of DAC: QC data flow

- Original data/documentation combined into single file (netCDF)
- Output from each QC process (flags) combined into data quality report
- Report and value-added data (with flags) released to public



# Role of DAC: Automated QC

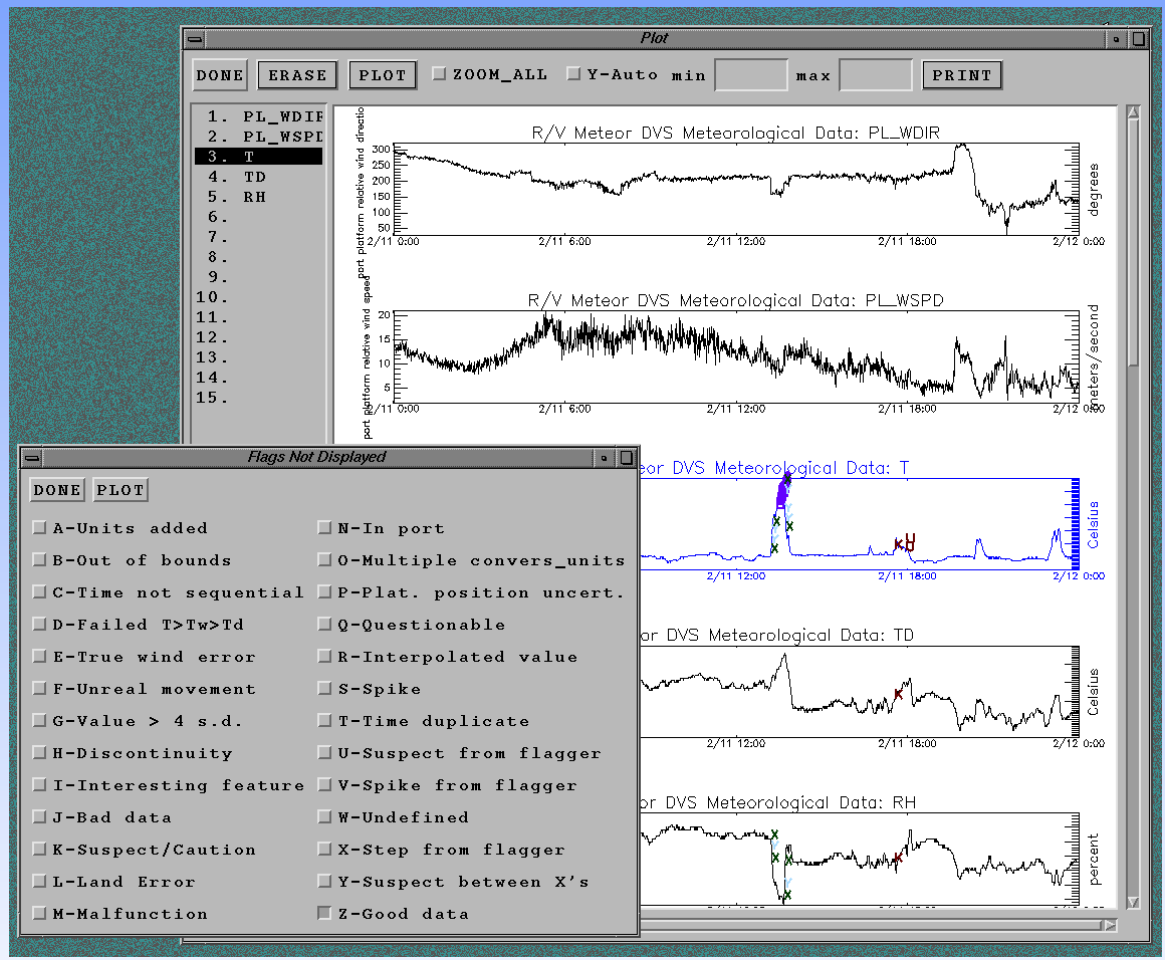


QC Visualization

- Spikes, steps, suspect values identified (flagged)
  - Examines difference in near-neighbor values
  - Flags based on threshold derived from observations
- Graphical Representation
  - Identifies flow conditions with severe problems
  - Flags plotted as function of ship-relative wind
  - % flagged in each wind bin on outer ring
- Analyst determines range of data to autoflag

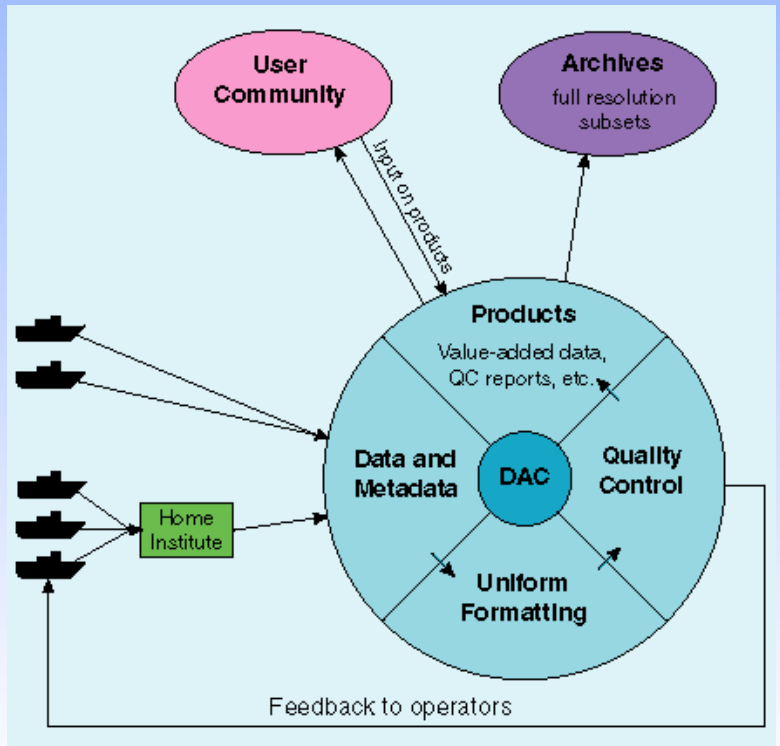
# Role of DAC: QC visual inspection

- Identifies systematic errors (e.g., severe flow distortion, sensor heating, and acceleration errors)
- Finds problems and features that are unique to new system deployments
- In time, common problems can be automated



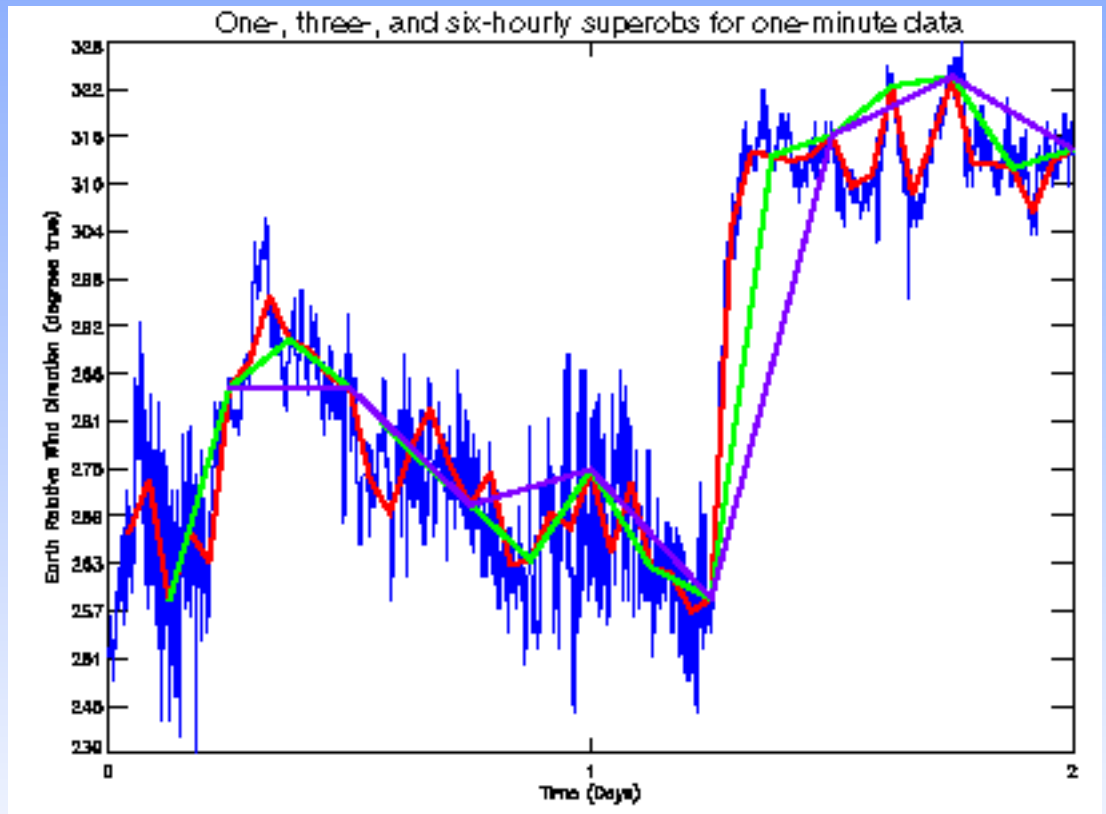
# Role of DAC: Distribution

- Primary product: value-added (flagged) meteorology data and QC reports
- DAC should accept input from users to define multiple output formats
- A variety of delivery services (ftp, http, DODS, digital media) should be supported



# Role of DAC: Archival

- Prepare subsets of HR marine data in formats used by global marine data archives (e.g., I-COADS)
  - One-minute data (blue) provide too much detail when compared to standard marine observations
  - Three (green) or six (purple) hourly subset lack desired content.
  - Hourly subset (red) provide a good compromise
- Establish regular submission to national archive center (e.g., NODC, NCDC)



# Input to DAC

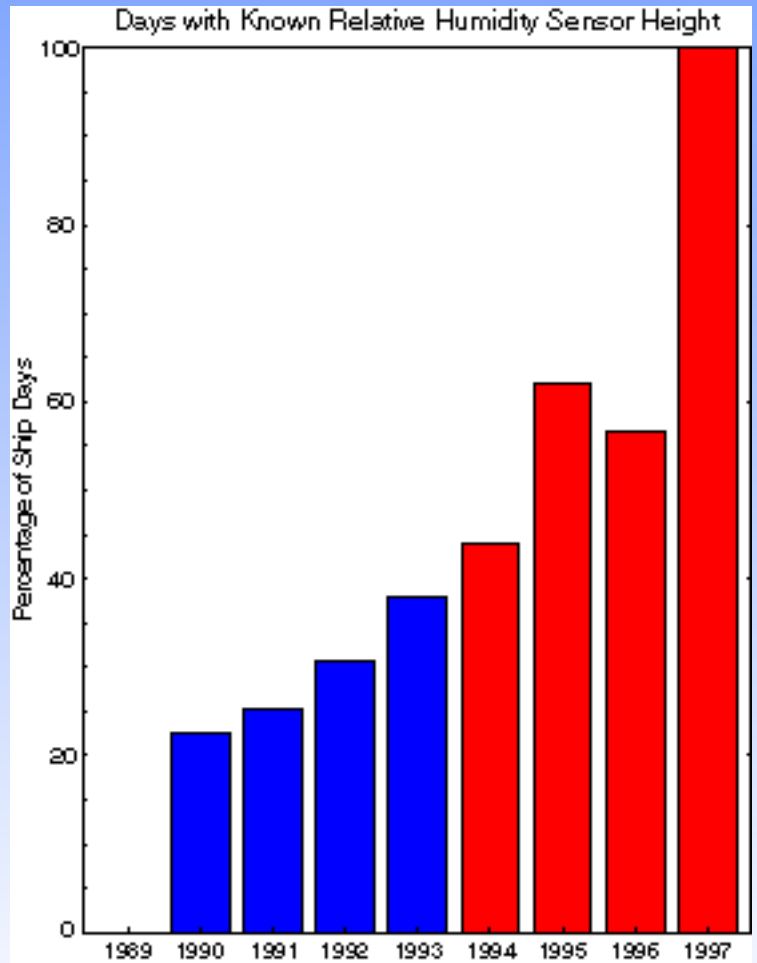
- A commitment is essential from:
  - Institutes/Agencies operating HR instrument systems
    - Regular data transfer
    - Detailed and up-to-date metadata
    - Maintain instruments and operate under all atmospheric conditions
  - Funding agencies
    - Vessels: Resources are needed to keep systems calibrated and operational
    - DAC: dedicated funding will allow continuous service to research community

# Input to DAC: Data

- Timely data transfer improves overall data quality
  - If QC is performed soon after cruise, sensor problems can be identified/reported before significant erroneous data are collected
  - Limited by data acquisition method (R/V vs. VOS)
- Clearly documented data format also essential
  - Need not be common across fleet
  - Cuts QC time, speeds distribution

# Input to DAC: Metadata

- Accurate metadata are essential for scientific application of marine observations
- Detailed metadata should include:
  - instrument height, location, and sensor type; units; direction conventions; time averaging period and method; ship ID; cruise ID (when available); and the facility providing data
- Agreed upon minimum metadata must be sent with data and updated as needed



# Benefits to HR vessels

- Broad dissemination of scientifically valuable data
  - One stop shopping for researchers
  - Inclusion of observations in widely used resources (e.g., I-COADS)
- Feedback on data quality, identifying instrument problems before they propagate into future data
- Historical record of data collection efforts (deep archival)

# Final Comments

- Much of the needed expertise and tools are available at FSU to establish a delayed-mode DAC
- Implementation:
  - Start with a subset of U.S. vessels from willing institutes
  - Add vessels at a rate determined by funding, etc.
- Other underway data (SST, SSS, bathymetry) should be considered