IVADS – Enhancing Marine Climate Data Records

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http://icoads.noaa.gov/ivad/

Abstract
A new initiative begun in 2011 to embed observational bias adjustments, improved uncertainty estimations, and advanced quality control (QC) into the International Comprehensive Ocean-Atmosphere Data Set (ICOADS). ICOADS, the most complete and extensive archive available of historical in situ marine meteorological observations, is used by the research community to develop long-term assessments of climate over the world’s oceans. However, the range of expert-derived data corrections, adjustments, and QC created for these and other applications are not readily available to other users. Developing the ICOADS value-added database (IVAD) will establish the infrastructure to capture adjustments and will provide the research community with easy access to observations and recommended adjustments. IVAD will (a) establish a database management system to support the development of value-added records and an access service for users; and (b) implement modifications to an internationally recognized data archive format to expand the capabilities for record tracking, data provenance, and inclusion of new parameter adjustments and essential metadata. In time, IVAD will support development of new marine climate data records and summary products.

IVADS Structure
The IVAD project design has six components. Development of the central data management structure was started in 2011 under NOAA Climate Program Office funding.

1.Adjustment definitions: International expert teams working with ICOADS will create and recommend adjustments to various parameters (SST, AT, waves, clouds, etc.).

2.Steering panel: Marine data experts will approve adjustment factors, corrections, and new critical metadata to be added to IVAD.

3.Central data management: Technical experts will define data formats, manage databases, integrate adjustment factors, and distribute and archive IVAD.

4.Platform and instrumental metadata augmentation: Accurate and complete metadata is critical to the development of adjustments and corrections to ICOADS.

5.Quality control: Developing and implementing new methods (e.g., track checking, multivariate checks) will improve ICOADS quality.

6.Product development: Research and operational groups will develop climate data records, data analyses, models, and indices for the community from IVAD.

Potential Adjustments
- Ship heating (Fig. 3, Berry et al. 2004)
- Beaufort winds (Lindau 1995)
- Instrument height (Thomas et al. 2008)
- Variations in instrument setup (Kent and Taylor 2006)
- Differing platform types (Kent and Taylor 2006)
- Enhanced metadata (Kent et al. 2007)
- Improved OA/QC procedures (Smith and Reynolds 2003)

What is IVAD?
- A database and archive solution to link individual marine reports from ICOADS with state-of-the-art adjustments, bias corrections, and/or additional information (e.g., advanced quality control) to support future marine climate research
- Adjustments based on documented research and recommendations of experts in the marine climate community

IVAD Progress
- Two key changes to ICOADS are necessary to moving IVAD forward.
  - Addition of unique identifiers (UID) to every marine report
  - Modification of the International Marine Meteorological Archive (IMMA, see below) format to include:
    - the UIDs
    - an IVAD attachment (see Fig. 4)
- In addition to modifications to IMMA and the development of the IVAD database, the National Oceanography Centre Southampton and FSU will test the proposed IMMA IVAD attachment.
- An IVAD website is under development at http://icoads.noaa.gov/ivad/.

What Is IMMA?
- IMMA is an ASCII format (http://icoads.noaa.gov/e-doc/ICMOD/IMMA.pdf)

IMMA: A Robust and Extensible Observational Data Format
- IMMA is an ASCII format (http://icoads.noaa.gov/e-doc/ICMOD/IMMA.pdf)
- IMMA includes a common Core + optional attachments.
- IMMA will form the archive foundation for IVAD.
- A new attachment has been designed (Fig. 4) to store IVAD values and associated metadata.

Key requirement:
- Attach original data forms. Experience demonstrates format variations frequently contain errors or omissions.

Advantage:
- An exact copy of the original data form translates with complete accuracy at any time.

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