

The Marine Surface Reference Dataset ICOADS: Status, Future, and IVAD

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The International Comprehensive Ocean-Atmosphere Data Set (ICOADS) is a unique and widely used international archive of historical global *in situ* marine surface observations, with a long development history—and incorporating many critical continuing contributions from a wide range of national and international partners—presently extending back more than three centuries. ICOADS underpins many avenues of weather and climate science, among these serving as the primary marine data input for atmospheric and ocean reanalyses. The basic ICOADS individual observations—from voluntary observing ships and research vessels, as well as for recent decades from moored and drifting buoys, near surface ocean profile measurements, and other automated platform types—are accompanied by simple gridded products summarizing a wide range of observed and derived meteorological variables, via a rich matrix of quality controlled monthly statistical measures.

The current status of ICOADS will be reviewed, together with highlights about the archive composition and characteristics. Release 2.5 (R2.5), completed in 2009 and extending from 1662 through 2007, incorporated many newly digitized historical data collections, together with substantial enhancements in delayed-mode sources of contemporary ship and buoy data—yielding 261M output records in the flexible and extensible International Maritime Meteorological Archive (IMMA) observational format. Additionally, R2.5 was accompanied by the issuance of monthly “preliminary” updates based on marine Global Telecommunication System (GTS) data from the NOAA National Centers for Environmental Prediction.

Our plans for future dataset management, content development, and improved data and product access, will also be discussed. Current plans include a full delayed-mode update, Release 2.6.0, to include many new sources of data and correct identified errors in R2.5. This major update was originally planned for completion by the end of 2012, but likely will be delayed indefinitely due to still unresolved resource uncertainties. Plans are also under continuing development to transition more of the processing to NCDC, initially focusing on enhanced preliminary processing, utilizing a blend of both the currently utilized NCEP GTS ship and buoy receipts, plus a new source of GTS data from NCDC. These two GTS streams will be merged and duplicates removed to produce one comprehensive monthly file, allowing one point of access to unique observations contained within both individual sources, and partially resolving some important problems such as the masking of ship call signs (for commercial and security reasons) in many GTS data since late 2007.

In addition, we will describe our plans for an ICOADS Value-Added Database (IVAD), to create a bias-adjusted 300-year record for 70% of the earth’s surface, which was recently funded for three years by the NOAA Climate Observations and Monitoring Program. New initiatives like the IVAD—to link observed data with quality-indicators and bias adjustments—are essential to ensure that the entire climate research community benefits from state-of-art research outputs, by

making them easily accessible alongside the ICOADS observations and easily traceable back to individual IMMA reports. Moreover the close links of ICOADS with reanalysis centers means that IVAD has the potential for even wider impacts as data improvements will directly feed into improved reanalysis products. Further benefits to the climate research community come through information on observational quality from data assimilation processes, which ICOADS plans to make available.

ICOADS has established a model for effective sustained data stewardship that is internationally recognized. This open access model is the standard to which other climate data providers aspire. For example, a recent high-profile International Surface Temperature Initiative (ISTI, <http://www.surface temperatures.org/>) from the beginning took ICOADS as a model to follow. While major resource uncertainties currently exist within NOAA, it should be emphasized that the stature of ICOADS has thus been achieved partly through long-term stable program continuity made possible by NOAA and NCAR, and partly through the cooperative research-operations model of the joint program in the U.S. and internationally.

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