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An International Comprehensive Ocean-Atmosphere Data Set (ICOADS) Value-Added Database (VAD) to Support Climate Research

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Abstract: The International Comprehensive Ocean-Atmosphere Data Set (ICOADS) is the most complete and extensive archive available of historical in situ marine meteorological observations—presently covering 1662-2007, and augmented by “preliminary” near-realtime extensions lagging about one month behind real-time. Researchers have taken the ICOADS observed records and applied bias adjustments for various instruments and observing techniques, improved estimations of uncertainties, and advanced quality control (QC) to typically create globally gridded products of marine Global Climate Observing System (GCOS) Essential Climate Variables (ECVs). These products are essential for climate research. However, more scientific advancement and understanding could be gained if observed records and the expert recommended adjustments were paired together and openly offered to additional research teams worldwide. We propose to address this opportunity and scientifically demonstrate the impact through a new ICOADS “Value-Added Database” (IVAD).

In general terms, this project will confront the complex obstacles associated with our current inability to trace the value-added improvements back to individual ICOADS observations. Specifically, this project proposes to (a) establish a database management system (DBMS) to support the development of value-added records and access service for users; (b) implement modifications to an internationally recognized data archive format to expand the capabilities for records tracking, data provenance documentation, and inclusion of fields to hold new parameter adjustments and essential metadata; and (c) scientifically demonstrate the impact of value-added records on air-sea flux estimates and common climate indicator series. The IVAD will be centrally served, dynamic, and evolve as adjustments are submitted, evaluated, reviewed, and refined. IVAD will support a new broad set of statistical or analyzed summary products by presenting easy access to observations and recommended adjustments to the research community. The success of this approach will demonstrate the climate research benefits that have been previously discussed by the international marine science community and have recently also become relevant to the land surface climate community (Stott and Thorne 2010).