Title: The Development of a 20-year Database of Ocean Surface and Near-Surface Properties Suitable for Climate Analyses

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In the proposed project, surface and near-surface parameters of wind speed, temperature, and humidity will be derived from a combination of satellite observations, with a focus on the use of these variables towards determination of the air-sea turbulent heat fluxes. This research falls directly in line with the Thematic CDR's FY 2009 Priority focus on the Earth's energy and water cycles. The goal is the production of a long-term (20 year) set of surface and near-surface parameters leading to fluxes with consistent, homogeneous errors that have been subjected to a rigorous error analysis.

We will develop, using information gained from the SeaFlux Intercomparison Project, a 20-year time series (1987 - 2007) of sea surface temperature and 10-m temperature, wind speed, and specific humidity at a 3-hourly, 0.25º resolution over the global oceans. These products will be developed for the specific focus of accurate determination of the surface turbulent fluxes. The unique aspects of this proposal include (1) a new approach for satellite-based (SSM/I) retrieval of near surface (10m height) air temperature and atmospheric humidity on a 3 hourly to 24 hourly scale; (2) an extension of a previously-developed validated algorithm using AVHRR data to determine skin surface temperatures resolving the diurnal cycle with additional microwave and ATSR data; (3) calculation of surface turbulent fluxes on these scales from data not derived from numerical weather prediction (NWP) models; and (4) an investigation of the strengths and weaknesses of gridding that will be optimized to minimize regional and global biases in the fluxes.

The TCDRs will be compared against the tens of thousands of measurements available from the SeaFlux Database, in addition to research vessel observations, which are quality controlled and archived at Florida State University (FSU) through the Shipboard Automated Meteorological and Oceanographic System (SAMOS) initiative. Additional research vessel, buoy, and volunteer observing ship observations will be targeted to widen and better examine the parameter space. Using research vessel observations takes advantage of these mobile platforms' ability to sample temperature and humidity in a wide range of ocean regimes (from the equator to the polar oceans) on short time scales, allowing for averaging of the data on a scale that matches the satellite footprint. The bulk surface turbulent fluxes, based on the satellite retrievals, will also be compared to available in situ flux observations that have been collected on these research vessels that are closely collocated in space and time to the satellite observations.