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THESIS/DISSERTATION INFORMATION

Author (last name, first name): Kelly, Frank

Title: Understanding Interannual Variability and Trends in 15 Years (1993-2007) of Satellite-Derived Oceanic Evaporation

Keywords (please provide at least three keywords that identify the topic of your work): Satellites, Ocean, Evaporation, Trends, Bulk Algorithm, Interannual Variability, ENSO, Clausius-Clapeyron

Abstract: Warming trends in sea surface temperature during the latter portion of the 20th century have raised inquiries about associated trends in oceanic evaporation. Theory dictates that evaporation increases according to the Clausius-Clapeyron relation. In this study, a 15-yr (1993-2007) dataset based on satellite observations by the French Research Institute for Exploitation of the Sea (IFREMER) is used to estimate interannual variability and trends in latent heat flux (LHF) and associated bulk variables. Comparisons with three satellite datasets, two reanalyses, and a hybrid of the two present both similarities and differences. Interannual variability of evaporation shows spatial structure that is mainly related to El Niño-Southern Oscillation (ENSO) and cold air outbreaks over boundary currents. LHF variability is largely controlled by variability in air-sea humidity difference. Globally-averaged trends in LHF are positive for all seven products, but satellite datasets show an increase in evaporation that is larger and more global in scope. The observed trends in LHF, in which IFREMER is second largest, are mostly attributable to trends in air-sea humidity difference.

Because none of the datasets can be regarded as a "truth," this study helps give an uncertainty range in trend estimates. Discrepancies among datasets arise because of source and derivation of the meteorological variables used in the evaporation algorithm. In particular, IFREMER uses the two-satellite product from *Reynolds et al.* (2007) for sea surface temperature, which creates a ~2 W/m^2 bias high in LHF starting June 2002. Biases in the Special Sensor Microwave Imager (SSM/I) contribute a larger than expected jump in IFREMER's merged wind speed, and thus LHF, around 2002. In addition, IFREMER's humidity algorithm produces a large negative trend in air specific humidity, which enhances the positive evaporation trend.

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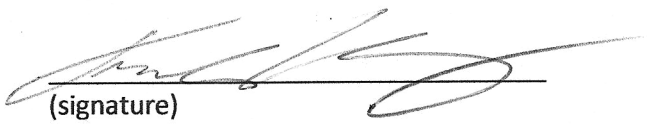
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