Using ECCO Ocean State Estimates, Atmospheric Reanalysis Products, and Satellite Data in Support of DYNAMO: Selected Highlights

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Abstract

Intraseasonal variability in the tropical Indian Ocean associated with the Madden-Julian Oscillation (MJO) is an important component of regional climate variability. Understanding it will help close the gap in predictive capabilities between traditional weather and seasonal climate forecasts. Yet, MJO activity is difficult to predict and poorly represented in most climate models. Understanding the MJO requires knowledge of ocean mixed layer (ML) heat budgets and cross-equatorial heat transport. We present highlights from a joint effort underway by researchers at the Jet Propulsion Laboratory to support the Dynamics of the MJO (DYNAMO) project. These will include a comparison of intraseasonal timescale ocean ML heat budget estimates from three different ocean state estimation products from the Estimating the Circulation and Climate of the Ocean (ECCO) project. The models used to produce these products differ in terms of horizontal resolution, numbers of vertical layers, atmospheric forcing fields, and data assimilation methods. Results indicate that ML heat budget calculations on the MJO timescale are sensitive to details of methodology, and that this may explain some of the controversy in the literature regarding the relative importance of surface heat fluxes and ocean dynamics. Some differences in model studies may be explained by notable discrepancies on the MJO-timescale in surface winds or heat fluxes from available atmospheric reanalysis products that are often used to force ocean models. We also present a study of the MJO contribution to cross equatorial heat transport in the Indian Ocean, and additional selected analyses.