# Prediction of Tropical Waves, the MJO, and Tropical Cyclones in Global Coupled Atmosphere-Ocean Forecasts

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Convectively-coupled equatorial waves (CCEWs) and the Madden-Julian Oscillation (MJO) are major sources of predictability in the tropics. We evaluate the activity, behavior, structure, and skill in predicting these phenomena in three global coupled atmosphere-ocean models: ECMWF, NCEP CFSv2, and the Navy Earth System Model (NESM). The NESM consists of the Navy Global Environmental Model (NAVGEM) coupled to the Hybrid Coordinate Ocean Model (HYCOM).

Biases in the regional distribution of CCEW and MJO activity, and the behavior and structure of these phenomena are examined and related to their predictive skill in each model. In addition, the ability of the models to simulate CCEWs and the MJO are compared to biases in the mean state and the frequency of different cloud types. Process-based diagnostics relating to moisture-convection interactions such as the terms contributing to the moisture budget as a function of precipitation rate are also examined. Lastly, the modulation of environmental conditions relevant to tropical cyclone (TC) formation by CCEWs and the MJO such as humidity, shear, relative vorticity, and maximum potential intensity in each model are compared and the implications for long-range TC prediction are discussed.