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Using data assimilation from operational weather prediction to improve the MJO in climate models

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The process of data assimilation has many more uses than for simply producing the initial conditions with which to start a forecast. In particular, it is a powerful means of 'confronting' models with observations. Diagnostics from operational data assimilation can be used to understand systematic model errors that would be hard to even identify in medium-range weather forecasts or climate simulations (when these errors have had time to affect and interact-with the entire general circulation). One clear problem common to many climate models is their inability to simulate adequately the Madden-Julian Oscillation (MJO). Such deficiencies lead to uncertainties in our predictions of regional climate throughout the globe. Here, diagnostics from data assimilation and the related 'initial tendencies' are used to understand model physics errors associated with the MJO.