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Estimating the state of the tropical Pacific Ocean using an eddy-permitting variational data assimilation system

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We present the implementation and validation of an eddy-permitting variational data assimilation system that has been developed for the estimation of the tropical Pacific circulation. The system is based on the ECCO (Estimation of the Circulation and the Climate of the Ocean) global assimilation system and makes use of the MIT general circulation model and its adjoint to dynamically merge the Consortium for the Ocean's Role in Climate (CORC) observations. The model has realistic topography with parameterizations for the surface boundary layer (KPP) and open boundaries at the south and north, as well as in the Indonesian throughflow. The adjoint method is used to improve the model consistency with most of the available data sets in the tropical Pacific by adjusting initial temperature and salinity conditions, temperature, salinity and horizontal velocities at the open boundaries and the time-dependent surface fluxes of momentum, heat and freshwater. Assimilated data sets are multivariate and include climatologies (Levitus, Reynolds, Johnson), TAO, Drifters, ARGO, XBTs, floats, TMI, and altimeter data. This talk will first describe details of the data assimilation system and discuss the technical aspects of its different components, before showing early results for 1 year assimilation periods.