Title: Dataset associated with "Ocean Surface Flux Algorithm Effects on Tropical Indo-Pacific Intraseasonal Precipitation"

Abstract: Surface latent heat fluxes help maintain tropical intraseasonal precipitation. We develop a latent heat flux diagnostic that depicts how latent heat fluxes vary with the near-surface specific humidity vertical gradient (dq) and surface wind speed (|V|). Compared to fluxes estimated from |V| and dq measured at tropical moorings and the COARE3.0 algorithm, tropical latent heat fluxes in the NCAR CESM2 and DOE E3SMv1 models are significantly overestimated at |V| and dq extrema. MJO sensitivity to surface flux algorithm is tested with offline and inline flux corrections. The offline correction adjusts model output fluxes toward mooring-estimated fluxes; the inline correction replaces the original bulk flux algorithm with the COARE3.0 algorithm in atmosphere-only simulations of each model. Both corrections reduce the latent heat flux feedback to intraseasonal precipitation, in better agreement with observations, suggesting that model-simulated fluxes are overly supportive for maintaining MJO convection.

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Format of data files – netCDF, zip

Location where data were collected – the ocean region between 20S-20N and 30E-180

Time period during which data were collected – 1998-2014

File Information – This is a preprocessed dataset generated from the E3SM (E3SM.zip) and CESM2 (CESM2.zip) model run. Each zip file contains three different simulations and 8 variables in each simulation.

E3SM.zip contains:

- E3SM_CLIMO_COARE.nc[S1] – This is a climatology forcing type simulation with surface forcing fixed at 2000 for 6 years with COARE flux algorithm applied.
- E3SM_CLIMO_ORIGINAL.nc – This is a climatology forcing type simulation with surface forcing fixed at 2000 for 6 years with original flux algorithm applied.
- E3SM_COUPLED.nc – This is an ocean-atmosphere coupled simulation from 1998-2014 with original flux algorithm applied.

CESM2.zip contains:

- CESM2_AMIP_COARE.nc – This is an atmosphere-only simulation with surface forcing based on 1998-2014 with COARE flux algorithm applied.
- CESM2_AMIP_ORIGINAL.nc – This is an atmosphere-only simulation with surface forcing based on 1998-2014 with original flux algorithm applied.
- CESM2_COUPLED.nc – This is an ocean-atmosphere coupled simulation from 1998-2014 with original flux algorithm applied.

Definitions of acronyms, site abbreviations, or other project-specific designations used in the data file names or documentation files
E3SM – Energy Exascale Earth System Model
CESM2 – Community Earth System Model Version 2

Variable information –
PS – surface pressure (Pa)
TS – surface temperature (K)
hfls – latent heat flux (W m-2)
pr – precipitation (kg m-2 s-1)
huss – surface specific humidity (kg/kg)
sfcWind – surface wind speed (m s-1)
qsurf – surface saturated specific humidity (kg/kg)
dq – specific humidity disequilibrium (kg/kg)

Method(s)
1. Crop the data to the desired time period (1998-2014) and region of interest (between 20S-20N and 90E-180)
2. Calculate surface saturated specific humidity based on surface temperature and surface pressure
3. Calculate specific humidity disequilibrium based on surface specific humidity and surface saturated specific humidity

Software – Python 3.8
Limitations to reuse – None