Discharge and Recharge of Ocean Heat during ENSO Events

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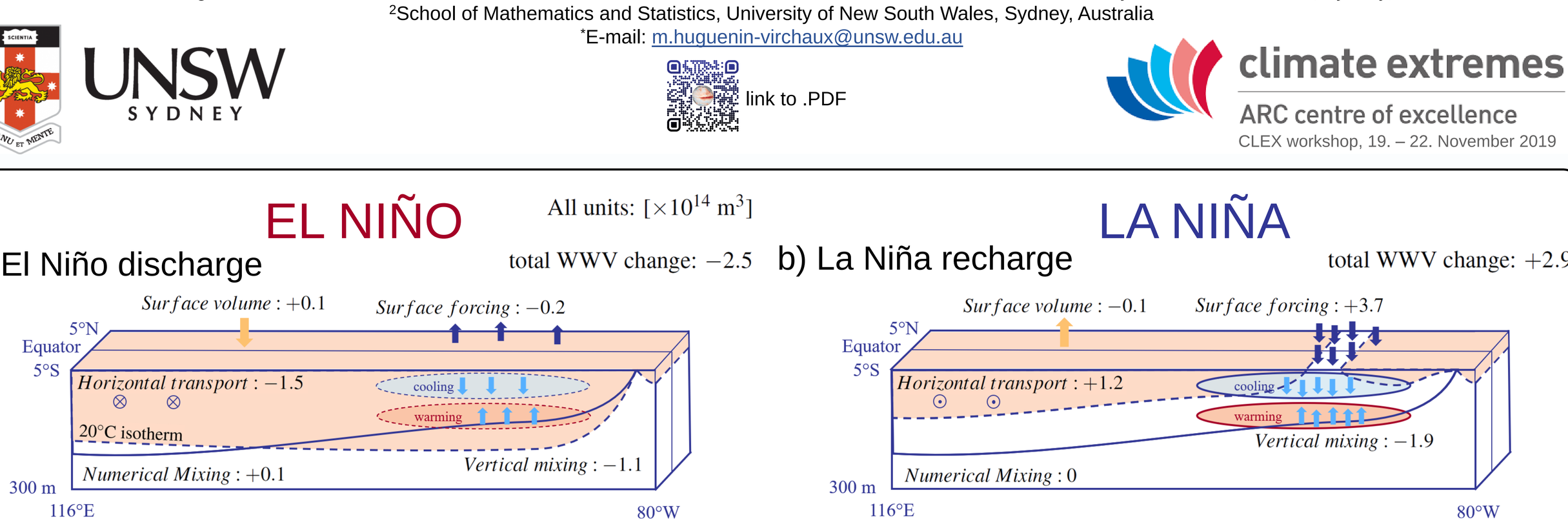

Fig. 1 Schematics representing the discharge and recharge phases of Warm Water Volume (WWV) during idealised symmetric (a) El Niño and (b) La Niña events in the MOM5 model. WWV as the volume of water above 20°C is a proxy for the equatorial Pacific's upper ocean heat content and a key inclusion in ENSO forecasting. The overall contribution of each flux is given as a unit of 10^{14} m^3.

a) adiabatic fluxes changing WWV

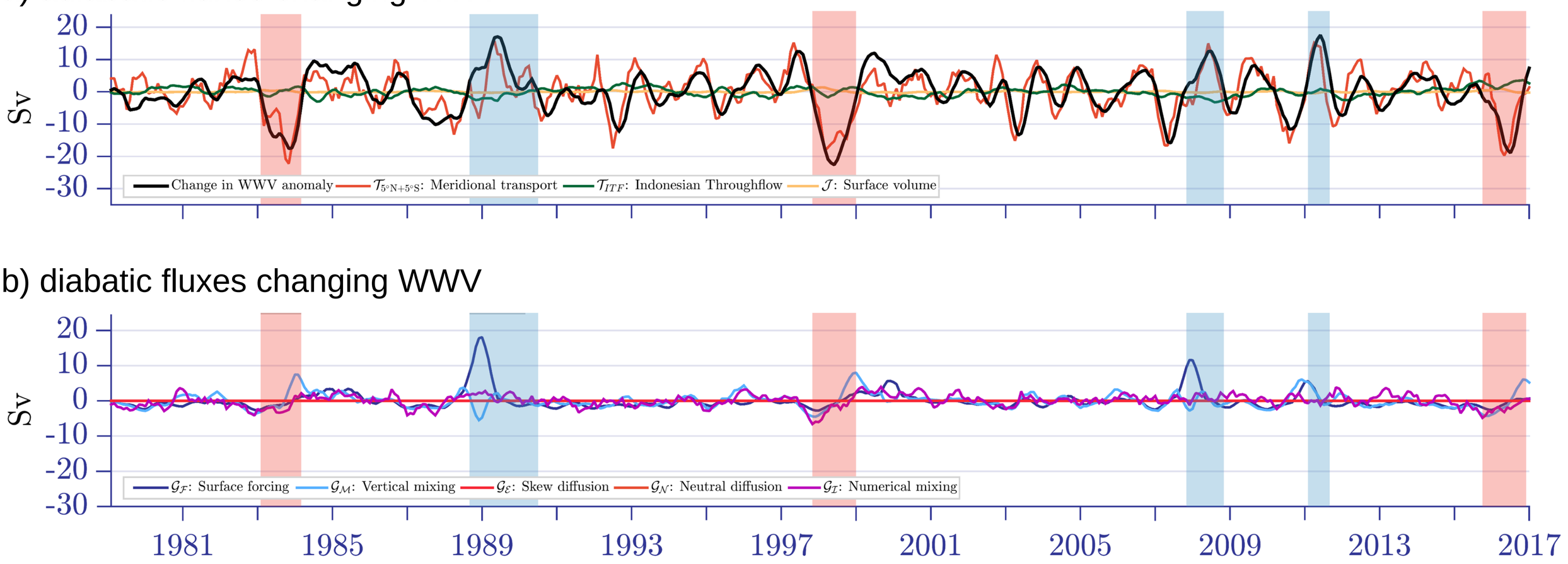

Fig. 2 Time series of the (a) adiabatic and (b) diabatic WWV budget terms during a simulation with the ACCESS-OM2 model.

Take Home Messages:

1. This study presents a comprehensive analysis of individually calculated upper ocean heat and volume fluxes during ENSO
2. Adiabatic volume fluxes are mostly symmetric for El Niño and La Niña, diabatic fluxes show a strong asymmetry and peak three to six months earlier
3. The large event-to-event variability of the surface forcing flux is linked to the shoaling of the 20°C isotherm in the eastern equatorial Pacific

Fig. 3 Lag regression of (a) adiabatic and (b) diabatic balance terms onto the change in WWV.

Method:

- simulating ENSO events in MOM5 / ACCESS-OM2, ¼° global ocean, sea ice models with 50 vertical depth levels and CORE-NYF + ERA-Interim / JRA55 forcing
- using the Water Mass Transformation framework to analyse the WWV balance terms