Discharge and Recharge of Ocean Heat during ENSO Events

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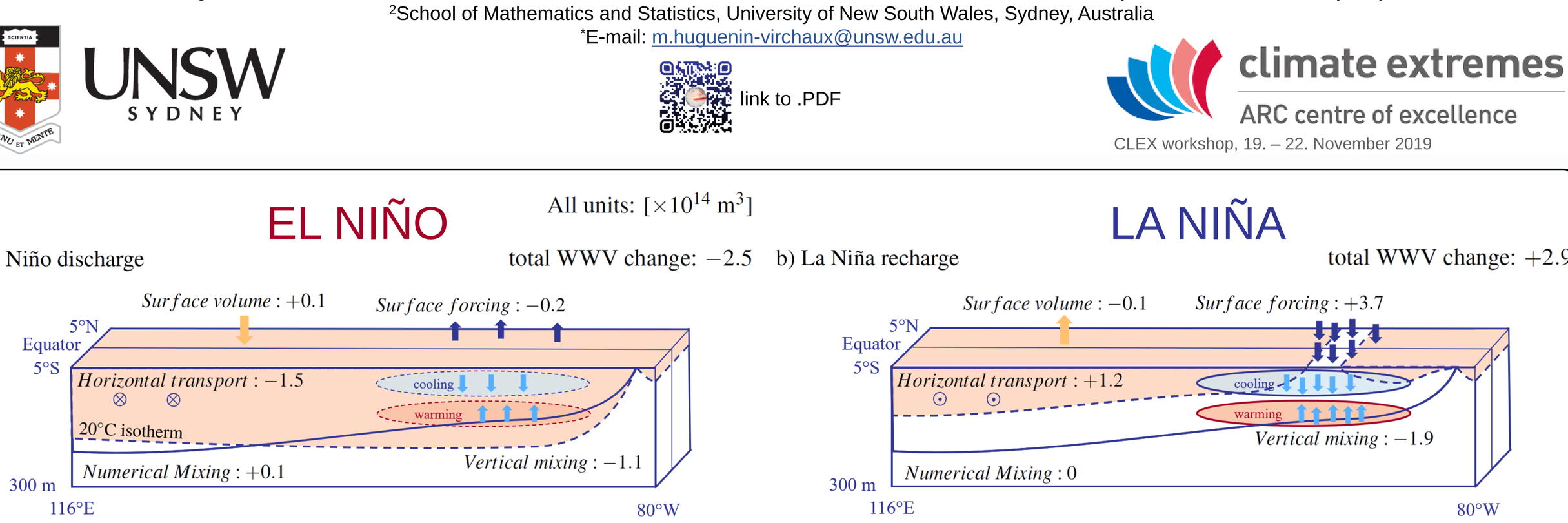

Fig. 1 Schematics representing the discharge and recharge phases of Warm Water Volume (WWV) during idealised symmetric (a) El Niño and (b) La Niña events in the MOM5 model. WWV is a proxy for the equatorial Pacific's upper ocean heat content and a key inclusion in ENSO forecasting. The overall contribution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

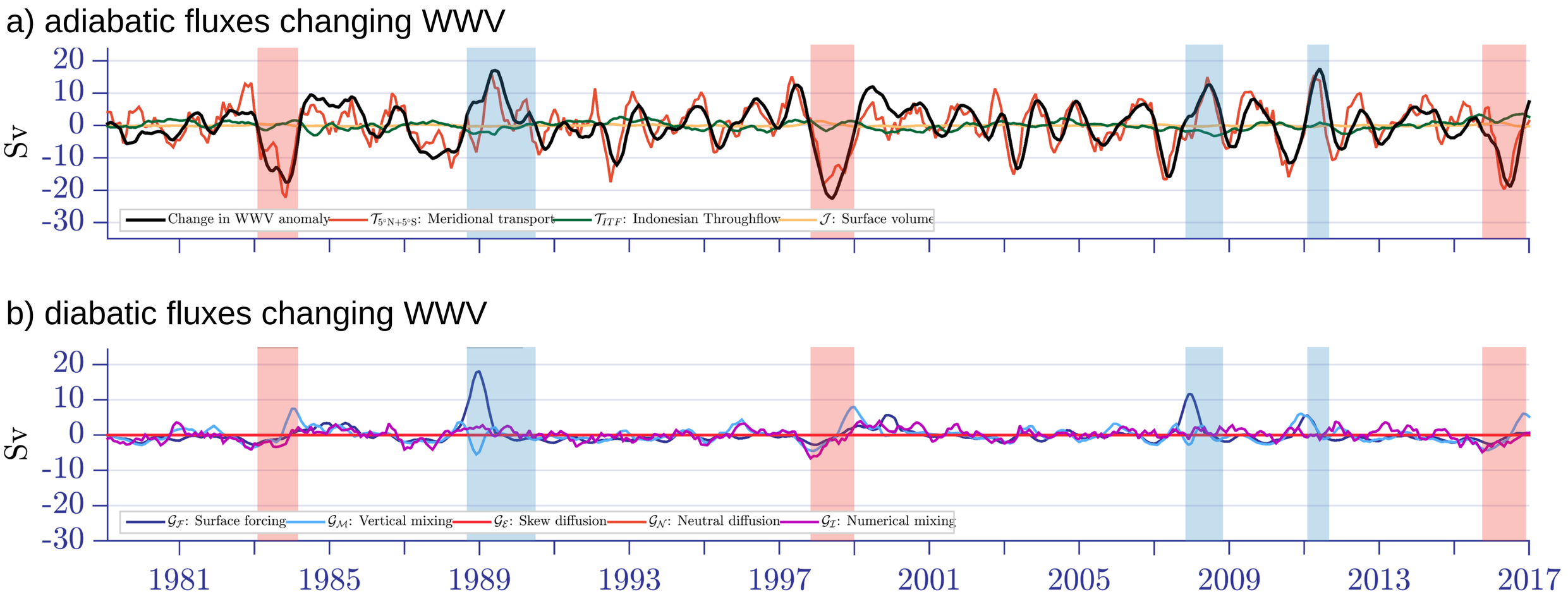

Fig. 2 Time series of the (a) adiabatic and (b) diabatic WWV budget terms during a simulation with the ¼° ACCESS-OM2 model.

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 during La Niña is linked to the shoaling of the 20°C isotherm in the eastern equatorial Pacific

Fig. 4 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