

Holbrook NJ, 2010 South Pacific Ocean dynamics: potential for enhancing sea level and climate forecasts. Chapter 10 in: *Climate Alert: Climate Change Monitoring and Strategy*, eds. Y You and A Henderson-Sellers, Sydney University Press, 2010, pp 313-342, ISBN 978-1-920899-41-7.

Baroclinic ocean Rossby waves are critically important to changes in South Pacific Ocean climate, western boundary circulation and sea level. The southwest Pacific boundary converts impinging Rossby wave energy into Kelvin wave transfers to the equatorial zone, contributing to the timing of equatorial wave dynamics and ENSO climate variability. This complex boundary also hosts the poleward flowing East Australian Current (EAC) which transports heat to the mid-latitudes and moderates and modulates the regional climate of the southwest Pacific. This study uses wind stress forced upper ocean dynamics in the South Pacific to investigate interannual to decadal changes in sea level at the New South Wales (NSW) coast and the relationship with summer rainfall totals across NSW. It is found that there is a highly significant relationship between modelled first baroclinic-mode ocean dynamics, the baroclinic component of EAC intensity at 34oS, and observed sea level at Fort Denison. There is also a strong relationship with NSW summer rainfall, but only during the negative phase of the Interdecadal Pacific Oscillation. This chapter concludes with a discussion of the large scale ocean observing and monitoring of extra-tropical Rossby waves and the potential for enhancing future ENSO climate forecasts.