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How is the Solomon Sea impacted by ENSO?

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The western boundary of the tropical South Pacific is rather unusual with a 5o-longitude barrier formed by the Solomon Islands in front of Papua New Guinea. The blocked region defines the Solomon Sea where Low Latitude Western Boundary Currents (LLWBCs) connect the subtropical and equatorial circulations through narrow straits. Since the LLWBCs are the main sources of the Equatorial Undercurrent, they could play a major role in the low frequency modulation of ENSO. Therefore, the Solomon Sea is of particular interest in a climatic context and is a focal point in the South PacifIc Circulation and Climate Experiment (SPICE) (http://www.clivar.org/organization/pacific/pacific SPICE.php). In recent work, the mean circulation and the seasonal cycle have become better known from modelling studies whose the results are confirmed by increasing observational evidence from in situ and satellite data. But, as shown by altimetry, the highest variability is at interannual time scales and represents a response of the LLWBCs in phase with ENSO that counterbalances equatorial-driven changes in western Pacific warm water volume. At this stage, little is known about the sensitivity of the Solomon Sea circulation to ENSO. In this work we investigate how the pathways of the LLWBCS and their water masses are affected by ENSO. We analyse a high resolution ($1/12^{o}$) model of the Solomon Sea interactively embedded in a regional model of the southwest Pacific, itself embedded in a global model. The northward transports increase in the Solomon Sea during El Niño, and decrease during La Niña. Compared with normal conditions, ENSO modifies the partition of transports between Vitiaz and Solomon Straits, with a net increase of the transport through Solomon Strait during El Niño with possible effects on the feeding of the Equatorial Undercurrent.