

On the Leeuwin Current System and its linkage to zonal flows in the South Indian Ocean as inferred from a gridded hydrography

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[My poster is in English.] The Leeuwin Current System (LCS) along the coast of Western Australia consists of the poleward-flowing Leeuwin Current (LC), the equatorward-flowing Leeuwin Undercurrent (LUC), and neighboring flows in the South Indian Ocean (SIO). Using geostrophic currents obtained from a highly-resolved (1/8 deg) hydrographic climatology (CSIRO Atlas of Regional Seas, CARS), we describe the spatial structure and annual variability of the LC, LUC, and SIO zonal currents, estimate their transports, and identify linkages among them.

In CARS, the LC is supplied partly by water from the tropics (an annual mean of 0.3 Sv) but mostly by shallow ($z < -200\text{m}$) eastward flows in the SIO (4.7 Sv), and it loses water by downwelling across the bottom of this layer (3.4 Sv). The downwelling is so strong that, despite the large SIO inflow, the horizontal transport of the LC does not much increase to the south (from 0.3 Sv at 22S to 1.5 Sv at 34S). This LC transport is significantly smaller than previously reported.

The LUC is supplied by water from south of Australia (0.2 Sv), by eastward inflow from the SIO south of 28S (1.6 Sv), and by the downwelling from the LC (1.6 Sv), and in response strengthens northward, reaching a maximum near 28S (3.4 Sv). North of 28S it loses water by outflow into subsurface westward flow (−3.6 Sv between 28S and 22S) and despite an additional downwelling from the LC (1.9 Sv), it decreases to the north (1.7 Sv at 22S). The seasonality of the LUC is described for the first time.

Keywords: zonal overturning, downwelling, comparison with OGCM

