



Mechanisms of interannual-decadal variability in the subtropical-tropical circulation of the Pacific Ocean

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A set of experiments with a 0.5° - version of the global ORCA-LIM model is used to investigate the patterns and mechanisms of the interannual-decadal variability in the shallow subtropical-tropical circulation of the Pacific Ocean. The atmospheric forcing builds on the bulk formulation and data sets developed by Large and Yeager (2004), based on a combination of NCEP/NCAR reanalysis data and satellite products, following the suggestions for the "Co-ordinated Ocean-ice Reference Experiments (CORE) of the CLIVAR WGOMD. The model captures the salient features of the mean circulation in the tropical Pacific and reproduces the observed decline in the strength of the subtropical cells (STCs) and the corresponding warming in the central equatorial Pacific over the last decades. The trend in the net equatorward transport across, e.g., 8° S, is governed by a transport change in the interior and partly compensated by a rise in the strength of the New Guinea Coastal Undercurrent at the western boundary. The anticorrelation between interior and western boundary transport changes, found to hold both at interannual and decadal time scales, can be explained in terms of oscillations in the horizontal gyre circulation, namely in the southward extension of the southern tropical gyre. Additional experiments, using interannually-varying forcing only for the heat or momentum fluxes, confirm the role of the remote, wind-driven STC-variability in generating equatorial SST-anomalies.