

SPICE: Southwest Pacific Ocean and Climate Experiment

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SPICE is a regionally coordinated experiment to measure, study and monitor the ocean circulation and the SPCZ, to validate and improve numerical models, and to integrate with assimilating systems. It is designed to improve climate simulation and prediction on seasonal to decadal timescales as part of the Climate Variability and Predictability (CLIVAR) objectives. South Pacific oceanic waters are carried from the subtropical gyre centre in the westward flowing South Equatorial Current (SEC), towards the southwest Pacific—a major circulation pathway that redistributes water from the subtropics to the equator and Southern Ocean. The transit in the Coral Sea is potentially of great importance to tropical climate prediction because changes in either the temperature or the amount of water arriving at the equator have the capability to modulate ENSO and produce basin-scale climate feedbacks. The south branch is associated with comparable impacts in the Tasman Sea area. The Southwest Pacific is a region of complex circulation, with the SEC splitting in strong zonal jets upon encountering island archipelagos. Those jets partition on the Australian eastern boundary to feed the East Australian Current for the southern branch and the North Queensland Current and eventually the Equatorial Undercurrent for the northern branch. On average, the oceanic circulation is driven by the Trade Winds, and subject to substantial variability, related with the South Pacific Convergence Zone (SPCZ) position and intensity. The circulation, and its influence on remote and regional climate, is poorly understood due to the lack of appropriate measurements. Ocean and atmosphere scientists from Australia, France, New Zealand, the United States and Pacific Island countries initiated an international research project under the auspices of CLIVAR to comprehend the southwest Pacific Ocean circulation and its direct and indirect influence on the climate and environment. We review here the ongoing progresses that have been made through collaboration among South Pacific national research groups, coordinated with broader South Pacific projects. Early results are presented.