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Abstract

The semi-enclosed Solomon Sea in the southwestern tropical Pacific is on the pathway of a major oceanic circuit connecting the subtropics to the equator via energetic western boundary currents. Waters transiting through this area replenish the Pacific Warm Pool and ultimately feed the equatorial current system, in particular the equatorial undercurrent. In addition to dynamical transformations, water masses undergo nutrient and micronutrient enrichment when coming in contact with the coasts, impacting the productivity of the downstream equatorial region. Broad-scale observing systems are not well suited for describing the fine-scale currents and water masses properties in the Solomon Sea, leaving it relatively unexplored. Two multidisciplinary oceanographic cruises were conducted in the Solomon Sea region, the first in July–August 2012 and the second in March 2014, by investigators from France and the United States. The experimental approach combined physical, chemical, geochemical and biogeochemical analyses, providing access to a wide range of space and time scales of the circulation. This collection of data allows describing the fine-scale structure of the currents and the water properties, transformations and mixing from the surface to the sill depth in the Solomon Sea and in the straits connecting it to the equator. Ocean-margin exchanges were documented through a comprehensive sampling of trace elements and isotopes as efficient tracers of natural fertilization processes. As air chemistry is largely impacted by the regional volcanic plumes, rainwater pH was also sampled. Dinitrogen fixation rates were measured and found to be among the highest in the global ocean, highlighting this region as a hot spot of nitrogen fixation. This study provides an overview of the climatic context during both cruises and the physical circulation and water masses properties. It provides a comprehensive description of all measurements made onboard, and presents preliminary results, aiming to serve as a reference for further physical, geochemical and biogeochemical studies.

Knowledge Domain : Ocean Science

Keywords : Solomon Sea, Low latitude western boundary currents, Biogeochemistry

Voir en ligne : <https://www.elementascience.org/art...>