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Poster
This study aims at documenting the mesoscale activity in the Solomon Sea for the first time. The Solomon Sea represents a transit area for the LLWBCs connecting the subtropics to the equatorial Pacific and playing a major role in ENSO dynamics. It has been shown that the Solomon Sea circulation is complex with well-marked seasonal and interannual cycles, and a high level of eddy kinetic energy. At this stage, we examined the relation between the eddy kinetic energy and mesoscale eddy activity, and how they are related to the main currents and their variability.
Our analysis is mainly based on altimetric data to take advantage of the 19 years of observations. This synoptic time series at the surface is complemented by occasional in situ glider observations providing at-depth information. The good consistency between both measurements gives confidence in the analysis. Moreover, the analysis of in situ observations is completed by an analysis of model outputs since both model and observation provide similar diagnostics of the mesoscale activity in the Solomon Sea.
The highest eddy kinetic energy (EKE) is observed in the northern part of the basin and extends southward to the central basin. Both the EKE level and the eddy activity in the Solomon Sea are related to variations in the strength of the different currents entering the Solomon Sea, namely the GPC and the NVJ feeding the LLWBC through the southern boundary and the SEC through Solomon Strait. The type of instability that leads to the eddy growth in the Solomon Sea has not been determined so far. Both barotropic instability associated with horizontal shears between the northward LLWBC and southard SEC inflow and baroclinic instability associated with vertical shear between the highly variable surface current overlying the LLWBCs are possible méchanisms.
Most of the cyclonic eddies are generated in the southern Solomon Sea along the LLWBC and are advected northward. As for anticyclonic eddies, they are generated in the eastern part of the Solomon Sea and propagate westward until reaching the LLWBCs and being dissipated. Observations from gliders show that the signature of eddies on the temperature and salinity fields is visible down to about 300 m depth. Cyclones are responsible for an upwelling of the thermocline water up to the surface, whereas anticyclones lead to a downwelling of the warm surface water and to a depression of the thermocline. If eddies are predominantly cyclones, the eddy variability at seasonal and interannual time scales is dominated by the anticyclonic eddies. The SEC inflow variability through Solomon Strait appears as a main trigger of the mesoscale variability in the Solomon Sea, and the interannual variability of the anticyclonic activity is in phase with ENSO. Since anticyclonic eddies are generated in a region where the T, S water characteristics are different from that of the LLWBCs and dissipate in the LLWBCs, they could participate in the modification of water masses characteristics of the LLWBCs.
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