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Large and mesoscale circulation in the Peru upwelling region: influence of OGCM boundary conditions on the modelled regional circulation

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he aim of this work is to evaluate the impact of the large scale circulation in the south eastern pacific on the Peru current system. An eddy resolving (1/9˚) regional circulation model (ROMS) has been forced by various OGCM climatological solutions at its open boundaries: OCCAM (1/4˚), ORCA (1/2˚), POG (1/4˚) and SODA ($^1/_2$˚) and by a climatological surface forcing (COADS heat fluxes, Levitus SST and Quikscat wind stress). The model is run for 10 years and the last seven years are analysed to study the mean and seasonal circulation and mesoscale variability.

Nearshore model SST is compared to Pathfinder data which better resolves short coastal scales. Although well represented compared to the OGCMs, the SST pattern related to cold upwelled waters remains too continuous alongshore, likely due to relatively smooth bottom topography and weak near shore wind stress near 15˚S. The seasonal cycle of the poleward Peru undercurrent (PUC) transport is shown to be dominated by the Equatorial Undercurrent (EUC), whereas that of the equatorward Peru coastal current is dominated by the wind forcing.

Eddy kinetic energy (EKE) calculated from altimetry is compared to the model EKE. Observed structures show a correct level of energy but some spatial patterns are not reproduced by the model simulations. The EKE level is closely related to the position and intensity of the Peru undercurrent which generates vertical shear for baroclinic instability. Discrepancies between model and observations are discussed. Further diagnostics on the EKE seasonal cycle and on nearshore filament formation regions are presented and discussed.