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## Modelling the stratification and circulation in a shallow embayment off Peru: the case of Paracas bay

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Understanding the circulation in the narrow (5-10 km) and shallow (15 m depth) Paracas bay in the Peruvian Upwelling System and the mechanisms that set up stratification are key steps for the forecast of extreme events affecting the highly exploited coastal ecosystem of the bay. Using a CROCO offline dynamical downscaling from 10 km to 500 m resolution in the bay, sensitivity experiments were carried out to investigate the impact of local forcing (diurnal wind variability, solar heat flux, river discharge, tides) and of parameterizations of the solar radiation absorption. According to observations, the bay stratification is strongest in summer, with a temperature vertical difference of  $\approx$  4-5 °C. Results show that stratification increases slightly ( $<0.5$  °C) when diurnal wind variability was introduced. Parameterization of shortwave absorption using chlorophyll-dependent water type affects mainly the bottom temperature in the bay. Furthermore, the freshwater flow associated with the Pisco River discharge only affects the salinity (and stratification) in the bay during periods of weak winds, when low salinity water is transported southward and then mixed in the bay. It is also shown that the shape of the wind forcing, which is difficult to obtain in small bay surrounded by orographical obstacles, has a major impact on the stratification.