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Impact of Rossby Waves on the primary productivity off the coast of Peru.

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The upwelling ecosystem of the Humboldt Current off Peru is one of the most productive region in the world ocean in terms of fisheries and primary productivity. This system is submitted to strong intra-annual to interannual variability linked to the influence of equatorial dynamics. In particular, Kelvin waves generated in the equatorial Pacific can propagate southward along the Peruvian coast in the form of coastal Kelvin waves and may eventually force westward Rossby waves. The aim of the present study is to explore the role of seasonal to intraseasonal Rossby waves on primary productivity off Peru. The analysis of sea-color images from SEAWIFS shows a westward propagation of chlorophyll pulses off Peru during the weakest upwelling season. These pulses are associated with positive SSH anomalies (as seen from Topex/Poseidon) also propagating westward at the same speed. These SSH and Chlorophyll anomalies occur at different frequencies ranging form trimestrial to annual, depending on the observed latitude. This large-scale alongshore structure of the SSH signal is coherent with the structure of Rossby waves in this region. The underlying mechanisms responsible for this apparent enhanced productivity caused by the Rossby waves will be carefully analysed, especially the role of horizontal advection vs vertical transport. To help this analysis, we will use results from a coupled biogeochemical and physical model of this region (ROMS-PISCES). In the end, we will discuss the large-scale effects of Rossby waves on the productivity in the Peru upwelling region.