



What drives the offshore extension of coastal productivity in the eastern South Pacific ?

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The offshore extension of coastal productivity is not uniform in the eastern South Pacific, being restricted to a narrow coastal band off northern Chile while high productivity is still observed hundreds of kilometers from the coast in the coastal transition zone (CTZ) off Peru and central-southern Chile. Given the role of mesoscale eddies in the offshore transport of coastal upwelling productivity, some authors have attributed this feature to the lower mesoscale activity observed off northern Chile. Using a hindcast physical-biogeochemical simulation (ROMS-PISCES) of the Peru-Chile upwelling system, we find that the iron limitation of phytoplankton growth may also play a key role in structuring primary productivity at this regional scale. Minimum coastal productivity off northern Chile is attributed in the model to strong iron limitation due to a narrow continental shelf, which limits iron inputs from the sediments. The plankton biomass in the adjacent coastal transition zone mostly depends on the cross-shore transport of living biomass from the coast. The meridional variability of the latter is found mostly related to that of coastal productivity. The mean spatial pattern of primary productivity is then modified when iron limitation is ignored in the model.