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Iberian and California-Oregon Upwelling Systems: trends and status of two upwelling systems at the same latitude over the last four decades.

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The study of Eastern Boundary Upwelling Systems is of vital importance, given the interest in rational management of the fisheries resources. The high level of biogeochemical activity associated with the physical process of upwelling increases primary production and enriches the living resources of these areas. This presentation focuses on the variability of these physical processes on daily to interdecadal scales, in an investigation of the effects of climate change in the Iberian and California-Oregon Upwelling Systems. The Upwelling Index (UI) was analysed for the period 1967-2010 at 35.5-44.5ºN in both areas. The two systems differ in that the magnitudes of upwelling intensity off California-Oregon are 3.3 higher than off Iberia but they show a similar latitudinal behaviour. The annual/interannual scale variability of upwelling can be represented by the recently introduced Cumulative Upwelling Index (CUI) based on summing the mean daily UI. The seasonal cycle results show the length of upwelling season increases southwards from 180 to 300 days and a net upwelling occurs only for latitudes lower than 43ºN. On the interannual scales, the CUI showed a roughly linear change at high and low latitudes ($R>0.9$), with slopes between 250 and -130 $m^3\ s^{-1}\ km^{-1}\ day^{-1}$ in Iberian and 620 and -290 $m^3\ s^{-1}\ km^{-1}\ day^{-1}$ in California-Oregon. The central areas (40.5-42.5ºN) are less stable and shifted between net upwelling and downwelling over extended periods. This information helps us contextualize the present state of the study area and interpreted ongoing intensive process-oriented studies within the longer term variability.