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Trends of coastal and oceanic ST along the Western Iberian Peninsula over the period 1975- 2006.

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Temperature is observed to have different trends at coastal and oceanic locations along the western Iberian Peninsula (from 43.25^{o}N to 37.25^{o}N and from 9.75ºW to 14.75ºW) from 1975 to 2006. This period corresponds with the last warming period in the area under study. The analysis was carried out by means of the Simple Ocean Data Assimilation (SODA) package. Reanalysis of ocean climate variability are available at monthly scale with a horizontal resolution of $0.5^o \times 0.5^o$ and a vertical resolution of 40 levels which allows us to obtain information beneath the sea surface levels (http://www.atmos.umd.edu/∼ocean/). Only the first 21 vertical levels (from 5.0 m to 729.35 m) were considered since the most important changes in the heat content observed in the world ocean during the last decades, correspond to the upper 700m (Levitus et al., 2009). Warming was observed to be considerably higher at ocean locations than at coastal ones at the same latitude. This behavior is observed throughout the water column. Ocean warming ranged from values on the order of 0.3 ºC dec^{-1} near surface to 0.1 ºC dec^{-1} at 500 m depth. On the contrary, the coastal warming is much smaller, reaching values close to 0.2 ºC dec^{-1} near surface and decreasing rapidly at values below 0.1 ºC dec^{-1} for depths on the order of 50 m. Actually, coastal warming is practically negligible under 50 m. The different warming rates near coast and at ocean locations have been previously described for SST by the authors (Santos et al, 2011, 2012). The weaker coastal warming compared with the ocean warming at the same latitude was related to the presence of coastal upwelling. Coastal upwelling is the most importing forcing mechanism in the western coast of the Iberian Peninsula pumping cold water from below to near surface layers. In this sense, the heat diffusion from the atmosphere is constrained to near surface area by advection, which mixes deeper colder water with warmer surface water.

The heat content anomaly was also calculated from 1975 to 2006 in terms of temperature anomaly The heat content for the upper 700m, showed a sharp increase from coastal (0.46 Wm^{-2} at 9.75ºW) to ocean locations (1.59 Wm^{-2} at 12.25ºW). The heat content anomaly shows a sharp trend increase $\sim$1.1 $\times 10^{18}$J dec^{-1}at ocean locations and a smoother increase $\sim 0.6 \times 10^{18}$J dec^{-1} at coastal locations.

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