Revisiting the CMIP5 Thermocline in the Equatorial Pacific and Atlantic Oceans

Antonio - Castaño[1,2], Elsa - Mohino[1], *Belen Rodriguez-Fonseca[1,2], Teresa - Losada[1]

1. Department of Physics of the Earth and Astrophysics, Universidad Complutense de Madrid, 28040, Madrid, Spain., 2. Institute of Geosciences, IGEO, UCM-CSIC 28040, Madrid, Spain.

The thermocline is defined as the ocean layer for which the vertical thermal gradient is maximum. In the equatorial ocean, observations led to the use of the 20˚C isotherm depth (z20) as an estimate of the thermocline. This work compares z20 against the physical thermocline in the Equatorial Atlantic and Pacific Oceans, using SODA reanalysis and CMIP5 Pre-Industrial Control simulations. Our results show that in models z20 is systematically deeper and flatter than the thermocline and does not respond correctly to surface wind stress variations. It is also shown that the annual cycle of z20 is much weaker than that of the physical thermocline. This happens in both equatorial basins and indicates that z20 does not react to the same mechanisms as the thermocline. Possible consequences in the assessment of air-sea coupling in current GCMs and bias reduction strategies are also suggested, as well as possible effects in the representation of upwelling systems in the tropical region.

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