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Tropical Atlantic climate and variability in a coupled ocean-atmosphere model

R.J. Haarsma, W. Hazeleger
KNMI, De Bilt, The Netherlands.

Tropical Atlantic climate and variability is investigated in a coupled ocean-atmosphere model. Using the heat balance in the mixed layer it is shown that a too strong development of the equatorial cold tongue can be attributed to a too large entrainment at the base of the mixed layer. Enhanced entrainment efficiency acts to deepen the mixed layer and causes strong reduction of the upper ocean divergence in the central equatorial Atlantic. As a result the simulated sea surface temperature, thermocline structure, and upwelling velocities are close to the observed estimates. Also the interannual variability improves. The dominant modes of cloupled variability in the tropical Atlantic, i.e. the Atlantic El-Nino analogue and the inter-hemispheric gradient mode, resemble the observed ones. The mechanism of these modes and the connection with north Atlantic extra-tropical variabilty will be discussed.