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1 Impact of different convective cloud schemes on the simulation of the tropical seasonal cycle in a coupled ocean-atmosphere model

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The simulation of the mean seasonal cycle of sea surface temperature (SST) remains a challenge for coupled ocean-atmosphere general circulation models (OAGCMs). Here we investigate how the numerical representation of clouds and convection affects the simulation of the seasonal variations of SST. For this purpose, we analyze the simulations of two versions of the same OAGCM differing only by their convective cloud schemes. Most of the differences between the two simulations in the mean atmospheric temperature and precipitation fields reflect differences found in atmosphere-only simulations. They affect the ocean interior down to 1000 m.

Substantial differences are found between the two coupled simulations in the seasonal march of the Intertropical Convergence Zone in the eastern part of the Pacific and Atlantic basins, where the equatorial upwelling develops. The results confirm that the distribution of atmospheric convection between ocean and land during the American and African boreal summer monsoons plays a key role in maintaining a cross equatorial flow and a strong windstress along the equator, and thereby the equatorial upwelling. Feedbacks between convection, large scale circulation, SST and clouds are highlighted from the differences between the two simulations. In one case, these feedbacks maintain the ITCZ in a quite realisitic position, wherease in the other case the

ITCZ is located too far south close to the equator.