Contribution ID: **82** Type: **Interactive presentation**

Impact of a mixed ocean layer and the diurnal cycle on convective aggregation

Thursday 6 May 2021 16:00 (1h 45m)

We investigate ocean feedbacks and the diurnal cycle impact convective aggregation, introducing a new adaptive Q-flux method to control SST. Aggregation onset occurs after 25 days with thick ocean layers that suppress feedbacks. Thinner ocean layers slow the onset of clustering, with a 1m ocean layer needing around 43 days, but with clustering onset time also becoming more variable. The delay is due to enhanced solar radiation in clear sky regions, causing surface warming, increasing latent and sensible heat fluxes, acting to oppose low level convergence into convecting regions. Once clustering onset starts, the SST forms a 3 zone structure, with the convective region surrounded by moist, clear sky regions with the hottest SSTs, towards which convection constantly migrates, while a cold SST patch forms under the very dry subsiding regions due to the dominance of longwave emission. Next, the ocean is permitted to also undergo a diurnal cycle of 2.5^{o}C in response to solar forcing, with drift still eliminated. Convective rainfall shifts from a weak morning maximum to a sharper evening peak, reminiscent of undisturbed tropical observations. This shift reduces SW forcing of SST spatial variably in the pre-aggregated state, while the sharper diurnal variation leads to more even distribution of moisture sources. These feedbacks oppose each other and both reduce in magnitude over time, as convection reverts to a weak early morning maximum. The imposition of the mean diurnal cycle has no statistically significant impact on the mean timing of clustering onset.

Authors: TOMPKINS, Adrian (ICTP); Dr SEMIE, Addisu (LMD)

Presenter: TOMPKINS, Adrian (ICTP)

Session Classification: RCE and Processes in Deep Convective Organization

Track Classification: RCE and Processes in Deep Convective Organization