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Transition to organized deep convection

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Deep convective-type cloud can cause extreme precipitation. The strongest deep convective extremes often occur in the late afternoon. This intensification might be explained by a self organization comparable to shallow cloud organization.
Shallow open cell clouds are strongly organized due to shallow cold pool dynamics acting at a constant length scale (Rayleigh-Bénard-scale). In contrast, the first deep convective cloud cells develop at several locations, which are destabilized due to surface heating. Thus, the first deep convective events are thermodynamically driven. These initial deep convective cells seem to be in an unorganized state as the resulting cold pools often dissipate or weaken before a collision can trigger further deep convective events. Later the day, when the mean precipitation amount already retreats and no additional heating favours thermodynamically driven deep convection, the scale of single precipitation events continues to increase. This final state is again organized by the dynamics of cold pool collisions. However, this type of organization differs from the initial shallow convection organization: 1. cold pools of different developing stages and strength interact with each other. 2. The scale of precipitation events keeps growing, while the number of precipitation events decreases.
The scale increase is proposed to come along with intensification in precipitation. We will identify cold pools and their boundaries in an idealized LES to determine when deep cold pool collisions start to trigger new deep convection events and thus making transition from an unorganized to an organized state. We propose a sufficient cold pool density to enable deep convective cold pool organization. We will further address the question on how many cold pools need to be involved to result in intensified precipitation.