Net effects of mesoscale organization in cloud fields

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Convective cloud fields are invariably observed to be organized into mesoscale systems whose dynamics we don't fully understand. So what? Of course descriptions and mechanisms are of intrinsic scientific interest, but sometimes we just want to know the gross functional role of these mesoscales on larger scale variability. Fortunately, mesoscales emerge naturally in cloud models too, if they are permitted by domain size and resolution. Thus one can probe the sensitivities of (simulated) organized cloud ensembles, as we vary the organization via fairly light-touch interventions like domain size and shape sculpting and introduction of simple vertical wind shears. Recent simulations by 2 groups suggest that aerosol- microphysical effects in radiative-convective equilibrium depend on large-scale organization. On the dynamical side, 2-dimensional convection appears to be more sensitive and responsive to large-scale waves (as probed through clever indirect means) than is 3D statistically isotropic convection. We are attempting to understand this result better through exploration of the continuous space in between: with shear-encouraged elongations of convection, or in long and narrow rather than isotropic periodic domains. Can the results of such work be related to the types of disturbances that we see in pioneering new global simulations with explicit convection (meshes in the 5km range)?