



Convective organization characterized by the wavelet-based organization index (WOI)

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Wavelet spectra of rain rates are used to characterize convective organization in observations (radar data or satellite-derived rain rates) and in high-resolution simulations with ICON over Germany and the tropical Atlantic. The degree of organization is measured by the wavelet-based organization index (WOI), which is able to distinguish between non-organized and organized patterns based on rain rates alone. The WOI consists of three components describing the horizontal scale of precipitation (WOI_1), intensity (WOI_2) and anisotropy (WOI_3).

We apply WOI to a handful of convective cases over Germany and investigate the dynamical properties that relate to convection organization like wind shear or helicity. It turns out that WOI differentiate better between non-organized and organized convection measured by the dynamical quantities than other convective organization indexes.

An important advantage of our wavelet-based methodology over competing approaches is its natural ability to characterize spectral properties at each location individually. Exploiting this convenient property, we calculate WOI for all grid points in order to localize convective organization over the tropical Atlantic. We find that convection is more organized north of the ITCZ and over northern parts of South America and of West Africa. Topographically forced convection is small-scaled and intense while maritime convection acts on larger scales and is zonally orientated.