

Climatological fine structure in North American summer rains

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Daily climatological annual time series are separated into low frequencies (annual and semiannual periods, which have direct astronomical forcing) and higher frequencies, here denoted "fine structure," detected and depicted using a wavelet analysis. This method yields objective, significance-screened monsoon onset dates, among other information.

In North American summer, three main fine structures stand out:

1. a westward-propagating sudden onset of rainfall in the western Atlantic, Caribbean islands, and south Florida during May. This subtropical climatological front resembles the Mei-Yu/Baiu front of the east Asian summer monsoon in its spatial pattern and propagation.
2. the southwestern North American monsoon, with rain onset propagating up the west coast of Mexico into the US Southwest in July, where it apparently splits into two branches.
3. the midsummer minimum in rainfall in Mexico and central America in late July-early August, which coincides with a westward bulge of the Atlantic High and a surge of the trade winds. The timing of this feature coincides with the sudden eruption of the Northwest Pacific monsoon in the Philippine Sea, and may be related through the heating-induced wave dynamics governing the summer subtropical highs.

These climatological phenomena will be illustrated. Individual-year data will be used to show their repeatability, and to examine possible interannual correlations among these pieces of the overall continental-scale North American summer monsoon system.