



A quest for the mesoscale spectral gap

S. Baidya Roy

Dept. of Atmospheric Sciences, University of Illinois at Urbana-Champaign, 105 S. Gregory St., Urbana IL 61801 USA,
(sbroy@atmos.uiuc.edu)

The famous van der Hoven (1957) spectrum of wind speed, showing a clear "spectral gap" in the atmospheric mesoscale range, has formed the basis of categorizing atmospheric processes into micro, meso, synoptic and global scales. It has also been used as evidence against atmospheric scale invariance. Lack of high-resolution long-term observations has prevented a thorough critical evaluation of the spectral gap. In this work, we revisit this concept. A survey of recently available observations that can resolve mesoscale processes and data from the Rain in Shallow Cumulus (RICO) field campaign show that the spectral gap is not universal. Apart from vertical velocity spectra, mesoscale spectral gaps are rare in other atmospheric variables. In view of these findings, we urge caution in accepting the mesoscale spectral gap as an universal physically-based phenomenon.