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Persistence analysis in convective turbulence SUBHARTHI CHOWDHURI, Indian Institute of Tropical Meteorology, TAMAS KALMAR-NAGY, Budapest University of Technology and Economics, TIRTHA BANERJEE, University of California, Irvine — We carry out a detailed analysis of the statistical characteristics of the persistence probability distribution functions (PDFs) of velocity and temperature fluctuations in the surface layer of a convective boundary layer, using a field-experimental dataset. Our results demonstrate that for the time scales smaller than the integral scales, the persistence PDFs of turbulent velocity and temperature fluctuations display a clear power-law behaviour, associated with self-similar eddy cascading mechanism. Moreover, we also show that the effects of non-Gaussian temperature fluctuations act only on those scales which are larger than the integral scales of temperature, where the persistence PDFs deviate from the power-law and drop exponentially. Furthermore, the mean time scales of the negative temperature fluctuation events persisting longer than the integral scales are found to be approximately equal to twice the integral scale in highly convective conditions. However, with stability this mean time scale gradually decreases to almost being equal to the integral scale in the near neutral conditions. Contrarily, for the long positive temperature fluctuation events, the mean time scales remain roughly equal to the integral scales, irrespective of stability.

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