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Hierarchy compensation of non-homogeneous intermittent atmospheric turbulence

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In this work a study both the internal turbulence energy cascade intermittency evaluated from wind speed series in the atmospheric boundary layer, as well as the role of external or forcing intermittency based on the flatness (Vindel et al 2008)is carried out. The degree of intermittency in the stratified ABL flow (Cuxart et al. 2000) can be studied as the deviation, from the linear form, of the absolute scaling exponents of the structure functions as well as generalizing for non-isotropic and non-homogeneous turbulence, even in non-inertial ranges (in the Kolmogorov-Kraichnan sense) where the scaling exponents are not constant. The degree of intermittency, evaluated in the non-local quasi-inertial range, is explained from the variation with scale of the energy transfer as well as the dissipation.
The scale to scale transfer and the structure function scaling exponents are calculated and from these the intermittency parametres. The turbulent diffusivity could also be estimated and compared with Richardson's law. Some two point correlations and time lag calculations are used to investigate the time and spatial integral length scales obtained from both Lagrangian and Eulerian correlations and functions, and we compare these results with both theoretical and laboratory data. We develop a theoretical description of how to measure the different levels of intermittency following (Mahjoub et al. 1998, 2000) and the role of locality in higher order exponents of structure function analysis.

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