Structure function analysis and intermittency of the atmospheric boundary layer

Vindel, J.M. (1), Yagüe, C. (2) and Redondo, J.M. (3)

(1) Instituto Nacional de Meteorología, Spain (jmvindel@inm.es). (2) Dpto. de Geofísica y Meteorología. Universidad Complutense de Madrid, Spain. (3) Dpto. de Física Aplicada. Universidad Politécnica de Cataluña, Barcelona, Spain.

Data from SABLES98 experimental campaign (Cuxart et al., 2000) have been used in order to study the structure functions of the turbulence. Using the hypothesis of local similarity, so the third order structure function scaling exponent is one, we identify the inertial range in the Kolmogorov sense and obtain the structure function scaling exponents for several orders. Using a least-squares fit it has been obtained for the different turbulence models (log-normal model, p model, etc), the value of the parameters able to characterize the intermittency according to the model. From these parameters it has been distinguished the effect of stratification on the intermittency of the turbulence using, for example, the local Richardson number, Ri. Finally, the role of non homogeneity in the turbulence structure is analysed relaxing the hypothesis of local similarity. Using Extended Self Similarity (ESS) (Benzi el al., 1993) we describe a criterion to identify the inertial range and find a physical interpretation of the scale independence of the relative exponents.