A COMPARATIVE STUDY OF THE SCALING BEHAVIOR OF VARIOUS ATMOSPHERIC MEASURABLES

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Different atmospheric measurables play different roles in the turbulent atmospheric velocity field: some are tracers (such as rainfall), others are state variables (such as pressure or temperature). As a consequence of the multifractal scaling found in the velocity field itself, it is expected that other measurables will also show features of scaling. However, both the physical nature of the measurables and the devices used for their measurement play a role in their scale-invariance analysis, as well as the range of scales over which this analysis is pertinent. The present work considers the scaling analysis of simultaneously measured atmospheric velocities, pressures, temperatures, and specific humidity. We can relate the scaling of fields such as velocity to derive analogous variables so that the dynamics of scalar fluxes can be investigated employing unified, turbulent transport diffusivities. The data included in our analyses were obtained during a two-month field campaign at a deforested site in southern Brazil during the 1999 wet season. High frequency (10 Hz) measurements were obtained from sensors deployed on towers, tethered balloon, and free-flying balloon platforms.