

32) POSTER

Modeling the fine-scale turbulence within and above an Amazon forest using Tsallis' generalized thermostatistics. II. Temperature

Fernando M. Ramos², Leonardo D. A. Sá¹, Maurício J. A. Bolzan^{1,3}, Camilo Rodrigues Neto², Reinaldo R. Rosaz

1. Laboratório Associado de Meteorologia e Oceanografia, Centro de Previsão de Tempo e

Estudos Climáticos, Instituto Nacional de Pesquisas Espaciais, São José dos Campos, Brazil

2. Laboratório Associado de Computação e Matemática Aplicada, Instituto Nacional de Pesquisas Espaciais, São José dos Campos, Brazil

3. Instituto de Pesquisa e Desenvolvimento, Universidade do Vale do Paraíba, São José dos

Campos, Brazil

Abstract: In this paper, we show that Tsallis generalized thermostatistics provides a simple and accurate framework for modeling the statistical behavior of turbulent temperature fluctuations. For this, we compared our theoretical framework to data measured during the Large Scale Biosphere Atmosphere Experiment in Amazonia (LBA) wet-season campaign, in the southwestern part of Amazonia region. Measurements were made simultaneously with Campbell sonic thermometers at different heights in a 60 meters micrometeorological tower located in the Biological Reserve of Jaru (10° 04' S, 61° 56' W), Brazil. The theoretical results were found to be in good agreement with experiment through spatial scales spanning at least three orders of magnitude and for a range of up to 10 standard deviations, including the rare fluctuations in the tails of the distribution. For scales larger than approximately 10 m, a gradual transition to Gaussianity becomes evident in the experimental histograms which is not captured by the present model. A generalization of this model is proposed to take this effect into account, assuring thus a smooth transition to Gaussianity as the scale increases.

* Corresponding author.

E-mail address: fernando@lac.inpe.br