



Nonlinear statistics of daily temperature fluctuations: Empirical studies and laboratory experiments

I.M. Jánosi, B. Gyüre and I. Bartos

Von Kármán Laboratory for Environmental Flows
Loránd Eötvös University, Budapest, Hungary (janosi@lecso.elte.hu)

Near global statistics of daily mean temperature changes reveal a robust asymmetry. Warming steps have significantly higher frequency and lower average magnitude than those of cooling steps for most weather stations [1]. This is a markedly nonlinear feature, Fourier surrogate time series exhibit completely symmetric increment statistics. The obtained geographic distribution of asymmetry parameters suggested an experimental test in a classical rotating tank setup. Temperature measurements in the dynamical regime of geostrophic turbulence reproduce quantitatively the strong asymmetry and spatial dependence of field observations [2]. The statistics might be relevant in other systems of nonequilibrium steady states.

[1] I. Bartos and I.M. János*i*: Atmospheric response function over land: Strong asymmetries in daily temperature fluctuations.

Geophys. Res. Lett., **32**, L23820 (2005). doi: 10.1029/2005GL024559

[2] B. Gyüre, I. Bartos and I.M. János*i*: Nonlinear statistics of daily temperature fluctuations reproduced in a laboratory experiment.

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