
JOURNAL CLUB

Climb Aboard the Power Law Bandwagon

by

Ryan Woodard
UAF Physics Dept

ABSTRACT

You *will* come across claims of observed power laws in your research, whether by you or by others. The goal of this talk is to give you a basic understanding and vocabulary so that you will be able to begin to properly evaluate the importance and validity of those claims. This talk is appropriate for all science fields, not just physics.

Power law is the name given to any function of the form $f(x) = cx^\alpha$. These days, though, a much more important connotation is implied by the term. It seems that power laws are found in nearly every data set studied, as a glance at the titles of many recent journal articles and AGU posters and talks reveals. In those titles are terms associated with power laws, such as long-time correlations, $1/f$ noise, self-similarity, self-affinity and fractal, to name a few. In the multitude of these articles, posters and talks are countless *observations* of power laws yet very few *explanations* of their causes. The bright side is that there are many opportunities for discovery by eager young graduate students.

In this talk I will explain what is usually meant by a power law and describe three places where they are often found: probability distributions (histograms), power spectra and little-used statistical measures. I will give examples from current literature for fields of interest to the G.I. (space physics, seismology, climate) and describe some of the heated debate that can arise when the claim of a power law is disputed. Finally, I hope to explain the cause of at least one power law by using very complicated mathematical notation.

Friday, February 21
Elvey Bldg. Globe Room
3:45 pm