Trace Moment

Basic Summary

The TraceMoment function takes an input field which is a "conservative multifractal", i.e a flux with H=0, and degrades the resolution to the lower and lower scales by averaging over boxes (intervals here). It then estimates the statistical moments by averaging these disjoint boxes. The slopes of the resulting log-log graphs are K(q). One can then find C1 (codimension which measures mean inhomogeneity), and α (multifractality index) (for more information, see "The Weather and Climate" ch.4). The function uses a value that determines whether to use no differences ("Switch"=0 and the field has H=0), absolute first differences ("Switch"=1), or absolute second differences ("Switch" is anything else; this estimates to H=0 flux).

Inputs

It should be noted that the output will be the same no matter whether "field" is transposed or not. Changing "Switch" should only change the values slightly. Finally, "low" and "high" represent the fit parameters. These can be experimented with to obtain the best fit.

Outputs

The outputs are K(q), C1, α and two graphs. The first is a graph of Log(M) as a function of Log(λ), the second is a graph of K as a function of q.

Note: This function requires Flux, Flux2nd, and Fluxall

Example

Input: field= "globaltemp1"(1x1548 series of global temperature data)
      Switch=1
      low=5
      high=30
Output: C1 = 0.0243
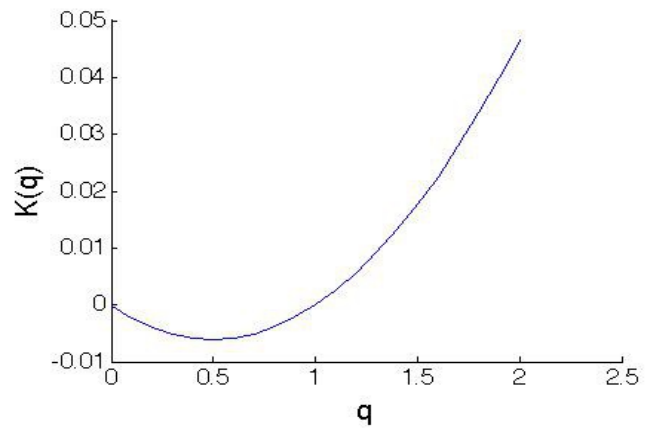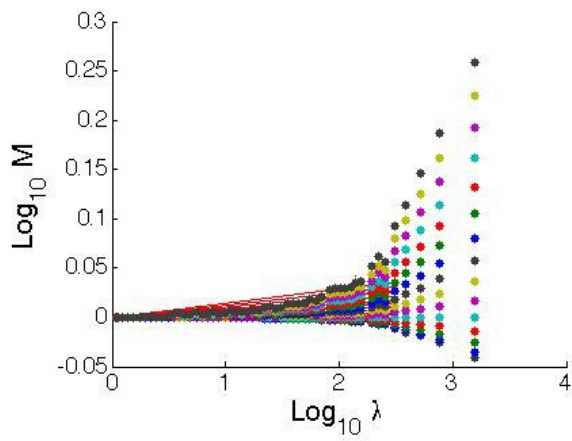   alpha = 1.9936
      K(q) =

Columns 1 through 8

0.0001	0.1001	0.2001	0.3001	0.4001	0.5001	0.6001	0.7001
-0.0000	-0.0022	-0.0039	-0.0051	-0.0058	-0.0061	-0.0058	-0.0051

Columns 9 through 16

0.8001	0.9001	1.0001	1.1001	1.2001	1.3001	1.4001	1.5001
-0.0039	-0.0022	-0.0000	0.0026	0.0057	0.0093	0.0133	0.0177

Columns 17 through 21

1.6001	1.7001	1.8001	1.9001	2.0001
0.0226	0.0279	0.0337	0.0399	0.0465

Errors
Index of element to remove exceeds matrix dimensions.
Error in TraceMoment (line 15)
ddelt(ind)=[];
  – This error occurs when the value of "dim" is too low.