Geophysical Research Abstracts,
Vol. 10, EGU2008-A-01034, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-01034
EGU General Assembly 2008

Characterization of horizontal transport in oceans by applying multifractal analysis on satellite images of different scalars

A. Turiel (1), V. Nieves (1), and E. Garcia-Ladona (1)
(1) Institut de Ciencies del Mar, CSIC. (turiel@icm.csic.es,+34 93 230 95 55)

The introduction of the Microcanonical Multifractal Formalism (MMF), and particularly the use of advanced techniques for singularity analysis, has allowed to represent multifractals in a geometrical basis. Hence, a given sample signal can be decomposed as the union of different fractal components, each one characterized by a value of singularity exponents. Singularity exponents are dimensionless measures of the degree of regularity of a function at a given point. An interesting property of singularity exponents is that they are advected by the flow which are creating them. Hence, for such variables as Sea Surface Temperature (SST) of chlorophyll concentration, as far as advection is the main singularity-inducing mechanism the streamlines of the flow can easily be traced on any single image.

We will show that both SST and chlorophyll concentration satellite maps can be used to trace the streamlines of the flow. We have validated our results with altimetry maps, and we have also checked our technique on numerical models. With the use of singularity patterns we can access a description of global circulation patterns with unprecedented accuracy, and also at a regional basis. Our results opens the way for many operational applications (obtaining of surface velocity fields from satellite images) and also for fundamental studies (as the behavior of Tropical Instability Waves, filamentation of currents, fronts on the Antarctic Circumpolar Currents, etc).