New service available: Singularity Analysis

Maybe you have seen the singularity exponents maps we are offering in this CP34-BEC data server. Singularity analysis is a technique for estimating, at any point, the singularity exponent of a signal. Singularity exponents, usually denoted by *h*, are dimensionless variables providing information about the local regularity (if positive) or irregularity (if negative) of the signal at any given point. When *h* is integer it means that the function has *h* continuous derivatives, while non-integer values indicate a more complex topological situation.

Why should we be interested in such a mathematical, abstract concept? Because if a flow exhibits horizontal turbulence – and the ocean is a quasi-2D turbulent flow at scales greater that a few kilometers – singularity exponents derived from any ocean scalar are the same and, in fact, they represent the streamlines of the flow! (Turiel et al., *Physical Review Letters*, 2005; Isern-Fontanet et al, *Journal of Geophysical Research*, 2007; Nieves et al, *Geophysical Research Letters*, 2007; Turiel et al., Remote Sensing of Environment, 2008; Turiel et al., *Ocean Science*, 2009).

Among other uses, singularity exponents provide a very useful tool to assess the geophysical consistency of remote sensing variables. Besides, the correspondence of singularity exponents of different ocean scalars provides the theoretical

basis to define the blending algorithm we are presently using in the production of our SSS L4 maps (Umbert et al., Remote Sensing of Environment, 2014).

Since January 2013, daily maps of singularity exponents derived from OSTIA SST are available at our server. In response to some researchers' need to compute the singularity exponents from their own datasets, we have created an experimental web service that allows users to compute the singularity exponents field from any input image saved in a NetCDF file, to visualize it (individually or fused with the original image) and to download the output image in NetCDF for its later use.

Aspect of the GUI for singularity analysis in our server

The Singularity Analysis GUI can be accessed at http://cp34-bec.cmima.csic.es/CP34GUIWeb/. Processing is restricted to registered users (registration is free and completing it is a matter of seconds). Presently, there is no limitation in the amount of NetCDF files you can process, but a maximum number can be imposed in the future if we experience server overload.

Feel free to use our Singularity Analysis tool in your research and product development and please provide us with some feedback.

Enjoy!

The BEC Team