Singularity Analysis Service

BEC team offers a **Singularity Analysis GUI**. 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.

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).

Microwave OI SST map (AMSRE-E+TMI, derived by Remote Sensing Systems) corresponding to January 1st, 2005

Map of associated singularity exponents

Detail of singularity exponents on the Gulf Stream. Overimposed we see the geostrophic currents derived by AVISO, SURCOUF product (generated by combining 4 different altimeter satellites)

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

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