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SAR analysis of the ocean surface

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Natural and man-made distributions of tensioactive substance concentrations in the sea surface features exhibit self-similarity at all radar reflectivity levels when illuminated by SAR. This allows the investigation of the traces produced by vortices and other features in the ocean surface. The man-made oil spills besides
often presenting some linear axis of the pollutant concentration produced by moving ships also show their artificial production in the sea surface by the reduced range of scales, which widens as time measured in terms of the local eddy diffusivity distorts the shape of the oil spills. Thanks to this, multifractal analysis [2]of the different backscattered intensity levels in SAR imagery can be used to distinguish between natural and man-made sea surface features due to their distinct self-similar properties. The use of routine satellite information by SAR or other sensor types may be of great interest to build a seasonal database of the dynamic conditions of the mesoscale turbulence in the ocean, after several years of observations the dominant patterns and the causes for different topological characterisations might be understood better [1,2].
In the simplified conditions described above the maximum size of stable vortices can be characterized directly by the Rossby [3,4]deformation radio RD depending on the square root on the depth on the local thermocline h. There is self-similar scaling at a very large range of scales and a linear dependence between the RD and the frequency of Brunt-Vaisala in the condition of a fixed h, this may be used to forecast and to check from satellite routine observations many of the dynamic characteristics of a certain area. The strong vertical stratification of the surface water aids the development of the largest vortices. As the frequency N strongly depends on the seasonal thermal balance, the wave mixing activity and other local batimetry induced processes that affect the water column, the range
and spatial distribution of detected vortices is very useful in the predictive behaviour of a marine zone[5].

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