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Vorticity models of ocean surface diffusion in coastal jets and eddies

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We present and discuss the use of multi-fractal techniques used to investigete vorticity and jet dynamical state of these features detected in the sea surface as well as to identify possible local parametrizations of turbulent diffusion in complex non-homogeneous flows. We use a combined vorticity/energy equation to parametrize mixing at the Rossby Deformation Radius, which may be used even in non Kolmogorov types of flows. The vorticity cascade is seen to be different to the energy cascade and may have important cnsecuences in pollutant dispersion prediction, both in emergency accidental releases and on a day to day operational basis. We also identify different SAR signatures of river plumes near the coast, which are usefull to provide calibrations for the different local configurations that allow to predict the behaviour of different tracers and tensioactives in the coastal sea surface area by means of as a geometrical characterization of the vorticity and velocity maps which induce local mixing and dilution jet processes. The satellite-borne SAR seems to be a good system for the identification of dynamic. lt is also a convenient tool to investigate the eddy structures of a certain area where the effect of bathymetry and local currents are important in describing the ocean surface behavior. Maximum eddy size agrees remarkably well with the limit imposed by the local Rossby deformation radius using the usual thermocline induced stratification, Redondo and Platonov (2000). The Rossby deformation radius, defined as Rd = (N/f)h, where N is the Brunt-Vaisalla frequency, f is the local Coriolis parameter (f=2Osin(lat), where O is the rotation of the earth as function of the latitude), The role of buoyancy may be also detected by seasonal changes in h, the thermocline depth, with these considerations Rd is ranged between 6 and 30 Km.

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