DYNAMIC EFFECT OF QUASI-GEOSTROPHIC TURBULENCE ON OCEAN SURFACE AS DERIVED FROM SATELLITE IMAGERY

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In recent years, the application of new methodologies issued from the study of turbulent flows to the study of oceans has led to the design of novel tools for the description of the dynamics on ocean surface layer from satellite data [Turiel et al., 2005; Isern-Fontanet et al., 2007; Turiel et al., 2008a,2008b]. All the associated techniques are included within the so-called Microcanonical Multifractal Formalism (MMF) [Turiel et al., 2008a], which is a theoretical framework which group together diverse experimental facts (scale-invariance, intermittency) associated to the generation of chaotic, turbulent structures and allows to obtain a geometrical characterization of them. When MMF is exported to the context of satellite imagery of the ocean surface, we gain access to new dynamic information such as instantaneous streamlines [Turiel, 2008b], horizontal diffusivity and efficient flow characterization in terms of vortices [Nieves & Turiel, 2008]. Additionally, MMF can be applied to specific processing tasks such as pattern recognition, data compression, data fusion and data interpolation, with very good performance. In this paper, we will briefly review the applications of MMF to advanced image processing of ocean images, and discuss on future applications.

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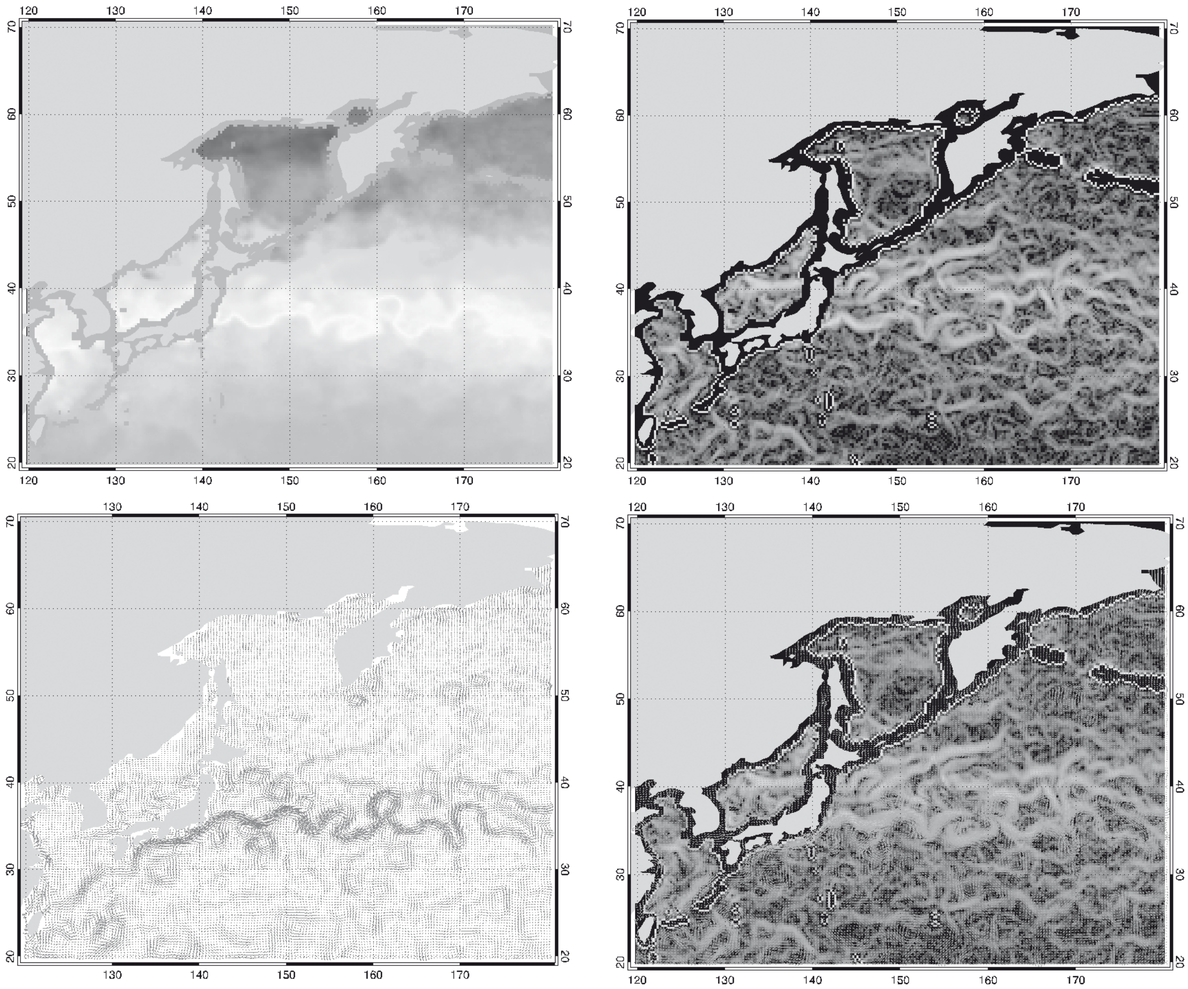

Fig.1: (from left to right and from top to bottom): Microwave SST map over the Kuroshio area in February 1st, 2003; associated singularity map; geostrophic velocities derived from the interpolation of four satellite altimeter traces; overimposition of the geostrophic velocities on the singularity maps. As it can be observed, singularities closely resemble the geostrophic streamlines; however, SST images are much less expensive to obtain and more synoptic.