



Extraction of dynamical information from high resolution satellite measurements

J. Isern-Fontanet (1), B. Chapron (2), P. Klein (3), F. Collard (4), G. Lapeyre (5), and E. Danioux (3)

(1) Institut Català de Ciències del Clima, Barcelona, Spain (jiser@pcb.ub.cat, +34 93 403 72 88), (2) Laboratoire d'Océanographie Spatiale (Ifremer), Plouzané, France, (3) Laboratoire de Physique des Océans (Ifremer,CNRS,UBO), Plouzané, France, (4) Collecte Localisation Satellites, PLouzané, France, (5) Laboratoire de Météorologies Dynamique (ENS), Paris, France

Satellite altimetry has significantly advanced the study of ocean variability. However, noise level and track separation has limited the investigation of scales smaller than 100 km. In contrast to altimeters, other sensors such as visible and infrared radiometers and imaging radars such as SAR have demonstrated their capability to provide measurements at high spatial resolutions. Nevertheless, their main limitation for dynamical studies have been the difficulty to extract quantitative information. To further explore this question we have compared sea surface roughness images obtained by SAR with nearly simultaneous Brightness Temperature (BT) images. Results clearly revealed that the most intense patterns observed in the SAR image, when environmental conditions makes roughness unveil the flow topology, were located in the same position as strong thermal gradients. Assuming that hydrodynamic modulation is the main imaging mechanism in our case, our observations implies that strong thermal gradients have associated strong divergences and convergences. To further investigate this hypothesis we have directly estimated the vorticity field from BT images. To this end we have used a new theoretical framework based on an effective version of the Surface Quasi-Geostrophic (eSQG) equations. The comparisons of these fields with the SAR image reveals a very good coincidence between the patterns in the SAR image and vorticity gradients. A dynamical interpretation of this result will be discussed.