Differential Kinematic Properties of Oceanic Flow by satellite tracked Lagrangian Surface Drifters.

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The differential kinematic properties (DKP) of fluid flow such as, divergence, vorticity, shearing and stretching deformation rates, are important elements for the kinematic and dynamic description of ocean flow. Satellite tracked Lagrangian drifters are perhaps the most suitable devices that can be used to obtain the DKP of oceanic flow. In most of published results, such as Stevenson *et al.* (1974), Okubo and Ebbesmeyer (1975), Molinari and Kirwan (1975) and Okubo *et al.* (1976)), these parameters are derived through the analysis of the motion of a cluster of drifters in relation to their center of mass. Due to the dispersion and the decorrelation of the drifters, the application of these methods is limited both, spatially and temporally. More recently Halide (1992) and Kirwan (1992) derived a different method that uses single trajectories. Both methods, although making use of single trajectories, only can be applied in regions dominated by only one singularity. Additionally they demand the calculation of high order derivatives, resulting in appreciable uncertainties in the obtained values. In order to overcome such difficulties we present in this work a methodology that does not suffer from such limitation and that allows the assessment of the DKP of the flow from the Reynolds stress tensor components parameterization. The methodology which will be detailed, allows the assessment of the DKPs from single particle analysis. This is of great utility since the application of this method is not temporally restricted as is the case for the particle pair analysis. An example of such methods of pair of particles is given by Molinari and Kirwan (1975). Two different analyses using particle pair are presented in that paper. Both analyses resulted in the same results but both were limited to approximately three days of data. On the average, after this time interval the relative movements of the drifters become uncorrelated. Another drawback of such types of analysis is that the DKPs are only obtained in the general region where the cluster of drifters was deployed. By our methods, the DKPs can be obtained in all regions covered by drifter trajectories and for which there is a statistically robust set of drifter data.