14. Use of Wind Stress and Altimetric Data to Detect the Anomalous Loss of SVP Drifter's Drogue

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Abstract: The response of ocean currents to wind forcing as measured by SVP drifting buoys has been shown to present a linear trend from the late nineties to today (Rio et al, 2011), with an linear increase of the response amplitude, coupled with a linear decrease of the angle to the wind direction. Recently, a major problem of drogue loss detection has been identified on SVP drifting buoys by Grodsky et al, 2011. Consequently, a new Ekman model has been computed using only the first three months of each drifter trajectory, as suggested by Grodsky et al, 2011. The new model is steady all through the 1993-2010 period, showing that the unsteady behavior observed by (Rio et al, 2011) is fully explained by this drogue loss detection anomaly.

The new, steady Ekman model is used in an iterative process in order to detect for each drifter the time of the drogue's loss: It is first used to remove the Ekman component from the drifter's velocities. A three days low pass filter is subsequently applied to get rid of the tidal currents, the inertial oscillations and other ageostrophic currents. The obtained geostrophic velocity component is correlated both to the simultaneous wind stress and to the simultaneous geostrophic velocity estimated from altimetry for 3-months length moving segments along the drifter trajectory. A sudden increase of the vectorial correlation between the drifter geostrophic velocity and the wind stress, coupled with a sudden decrease of the vectorial correlation between the drifter geostrophic velocity and the altimeter geostrophic velocity, may be a good indicator of the drogue loss.