ON THE NAVIDAD EVENTS IN THE BAY OF BISCAY IN 2003-2004: WHAT DO WE LEARN FROM SATELLITE ALTIMETRY?

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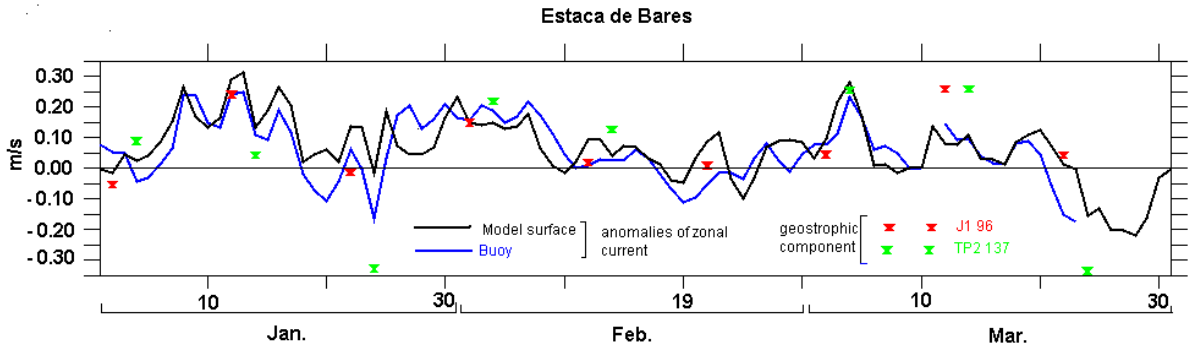
Under favorable atmospheric conditions, the Iberian Poleward Current (IPC) develops northward off the Portuguese coasts and eastward along the northern Spanish shelf slope in late autumn and winter. It advects warm and salty waters in the Bay of Biscay: such warm events, that mostly occur in December-January, have been referred to as 'Navidad events' (Pingree and Le Cann, 1992). They have been mainly depicted and studied from their thermal signature in satellite IR observations. However, the scarcity of cloud free images in winter in the North East Atlantic makes difficult a reliable and continuous monitoring of the Navidad events from sea surface temperature (SST) satellite observations only.

In this study, we use TOPEX/POSEIDON (T/P) and Jason-1 (J1) altimetric data over two wintertime periods: Dec 2002 - Mar 2003 and Dec 2003 - Mar 2004. With such datasets, observing coastal narrow currents, such as the IPC, is a great challenge. However, a specific altimetric data processing tool (X-Track) dedicated to coastal regions has been recently developed at LEGOS (http://ctoh.legos.obs-mip.fr/). We use TP and J1 datasets processed with X-Track and analyze the signature of the eastward IPC extension along the Spanish slope in SLA along-track data. It is then compared to information on SST and surface currents provided by satellite IR observations and buoys respectively. During winter 2003/2004, the Navidad occurrences appear as pulses of warm and eastward current anomalies over a few days, in agreement with the large wind variability at short time scales. Altimetry detects the main pulses and suggests a large spatial variability in terms of current intensity, location with respect to the shelf and width of the main vein. There is a global good agreement with the buoys current data (see figure below for example). Some discrepancies between neighboring tracks are also observed; they might be due to physical signals that we do not yet understand or to some geophysical corrections. We also use a numerical simulation from the Symphonie coastal model (Marsaleix et al., 2008) to infer further information on the eastward current subsurface properties. Finally, we explore the influence of wind forcing on the observed and simulated eastward current. While the IPC is generated by large scale atmospheric forcing in the Eastern North Atlantic (as reported in the literature), we suggest that local wind forcing impacts significantly its strength and eastward extension into the Bay of Biscay.



Anomalies of surface zonal current from the buoy Estaca de Bares (44°3.6'N, 7°37.2'W, *blue curve), and from the model (black curve), anomalies of geostrophic velocities perpendicular to the tracks 96 of Jason1 (red circles) and 137 of Topex/Poseidon (green circles), over the period Dec 2003 - Mar 2004. The anomalies are computed with respect to the mean over the year 2004.*

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