Ocean Sci. Discuss., 9, C356–C359, 2012
www.ocean-sci-discuss.net/9/C356/2012/

Ocean Science
Discussions

Interactive comment on "Validation of FOAM near-surface ocean current forecasts using Lagrangian drifting buoys" *by* E. W. Blockley et al.

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Received and published: 18 May 2012

Overall assessment:

This well-written manuscript demonstrates the value of global near-surface velocity measurements in evaluating two versions of the FOAM model, and also illustrates very clearly how improving the quality of the drifter data via drogue presence reevaluation will greatly increase their value for the user community. The authors evaluate their model results against a drifter-derived climatology, which serves well as a null hypothesis (can the model do better than climatology at predicting observed currents?). I would rate this manuscript as Excellent (1) for Presentation Clarity and Good (2) for Scientific Significance and Scientific Quality. As noted below, it is not clear why the authors did not use the quality-controlled GDP data (which includes velocity) rather than

data from the GTS; a clear explanation could warrant Excellent for Scientific Quality. The manuscript is sufficient in scope and novelty for publication on the Ocean Science Discussion web page.

Readers should note that a preliminary drogue reevaluation has now been performed for the post-1992 time period (Lumpkin et al, manuscript submitted to GRL; results available at ftp://ftp.aoml.noaa.gov/phod/pub/lumpkin/droguedetect/) and these results will be reflected in subsequent updates of the drifter data set from the GDP. The separate issues of drogue misdiagnosis and excess wind/wave slip in the Southern Ocean could not be assessed separately at the time of this Blockley et al. study ... hopefully their follow-up examination mentioned in the Conclusions will reevaluate this issue.

Minor/specific comments:

2.1: "[the drogue] exerts a drag on the SVP drifter approximately 40 times the drag exerted by the tether and the surface buoy. This 40:1 drag ratio means ..." Slight modification: the text should say that the drogue "has a cross-sectional area approximately 40 times that of the tether and surface buoy. This 40:1 drag area ration means ..."

"The SVP drifters are tracked by the Argos Data Collection and Location System on the NOAA polar-orbiting satellites and the reported locations are accurate to approximately 1km." Minor edit; "Most SVP drifters are tracked ...". A small but growing number relay data via Iridium and are tracked by GPS.

"Drifter data can be obtained through the Global Telecommunication System (GTS) or from the Global Drifter Program (GDP) via download from http://www.aoml.noaa.gov/phod/trinanes/xbt.html." The latter link is simply a GTS data server. The quality-controlled GDP data can be downloaded from http://www.aoml.noaa.gov/phod/dac/dacdata.php. These data have shipboard drifters (including those at speeds below 3.5 m/s) removed, have drogue presence reevaluated, and include velocities (calculated via 12h centered difference) and error bars for positions.

"The main purpose of the moored buoy array is to ..." Should include the goal of monitoring interannual climate fluctuations in the Atlantic and Indian ocean basins as well as ENSO, monsoons and hurricane formation. E.g., the PIRATA array was designed to observe the meridional and zonal climate modes of the tropical Atlantic.

3. Deriving near-surface currents from drifter positions: the GDP quality-controlled data (which includes velocity) is provided every 6h on a uniform time grid (0000, 0600, 1200, 1800 UTC), which includes inertial and tidal motions that are undesirable for this study. However, I wonder why the authors didn't lowpass and subsample the data to daily intervals, instead of their approach of subsampling the positions then calculating daily velocities. Their approach seems more likely to alias the undesirable high-frequency motion into additional noise. I don't anticipate that this will have a major effect on the results since position is intrinsically integrating, but wonder about the motivation for this strategy. Note that the lowpassing strategy would also address the authors' concern (stated later) that geostrophic velocities will tend to be slightly underestimated if the Rossby radius is small (although, as they note, this is a minor effect).

"Before deriving currents, drifters whose temperature observations failed the SST quality control process (Storkey et al., 2010; Ingleby and Lorenc, 1993) are removed as this failure could be indicative of poor/inaccurate location reporting." It's much more likely that the bad temperatures indicate problems with the thermistors, not the position (which is calculated completely separately from temperature). This strikes me as an overly-conservative choice. In addition, the GDP provides error estimates on each position; this information could be used to screen explicitly for bad positions.

In contrast, the choice to keep data that spans 8h in one day seems underconservative. For example, 12h of data could be roughly sufficient to complete half an inertial or M2 tidal circle. Given how relativley rare gaps are, and that positions are more uncertain anyway where there are gaps, isn't a more conservative choice warranted here?

"... drifter positions contribute towards the calculation of the MDT" True, but the drifter observations are independent for current variations about the mean in FOAM.

Pg. 1717: Re: model underrepresenting observed variability: "The most likely reason for this is that the 6-hourly wind fields used to force the model surface boundary and the spatial resolution of the model are too coarse to capture high-frequency features such as inertial currents." However, the authors have filtered much of this out, correct? It seems like the more significant culprit is submesoscale to relatively fine mesoscale variability not simulated well in the eddy-permitting model.

Interactive comment on Ocean Sci. Discuss., 9, 1705, 2012.