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***Interactive comment on “Surface signature of  
Mediterranean water eddies in the North-East  
Atlantic: effect of the upper ocean stratification”  
by I. Bashmachnikov and X. Carton***

**B. Ruddick (Referee)**

barry.ruddick@dal.ca

Received and published: 11 September 2012

This paper presents a very nice model based on potential vorticity conservation that explains and quantifies the sea level perturbation to be expected above a Meddy, and is followed by an intelligent discussion of its limitations and comparison with observations. The final figure summarizes the take-home message nicely, showing readers the expected signature for a variety of Meddy parameters. Although I have a few minor comments related to presentation, I found the model compelling, the presentation clear, and the comparison with observations realistic.

My only scientific complaint concerns the estimation of vorticity from altimetry in figures

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1-3. I'm surprised that this can be done at all for such small scale features, and I think that error bars should be estimated for the vorticity. One way to do this would be with a bootstrap technique in which the SSH observations are perturbed randomly and the vorticity calculated many times. And I might have missed it, but I didn't see a description of just how you estimated the vorticity.

On p18 line 10 you discuss how a strong surface current can "shed the surface signature away", but this goes against your P-V model, which demands a relative motion between the Meddy and upper layer to form the anticyclonic surface velocity. Perhaps you might clarify.

One dynamical question occurred to me: is the anticyclone induced by a Meddy ever strong enough to induce closed circulation so that the upper layer water is trapped above the Meddy? I would guess not, but your model could estimate whether this is likely.

Minor presentation points:

I like your model, and think that the basics (conservation of PV of upper layer water that is compressed as the Meddy passes under, leading to anticyclonic vorticity and a high in SSH) should be explained in the abstract. You don't state exactly what the velocity and vorticity profile of a Rayleigh vortex is, nor give a reference. Why don't you show an example, along with the corresponding vorticity and SSH profiles, perhaps compared to one of the observations? It might be possible to include this in fig 5, and reference that figure at this point. fig 1 - State what the bathy contours in a and b are. Fig 8a and b do not reproduce or print well due to colour selection. And the lines on figure 7 are difficult to distinguish. I have marked a few comments on the manuscript, and I will attach as a supplement.

Please also note the supplement to this comment:

<http://www.ocean-sci-discuss.net/9/C929/2012/osd-9-C929-2012-supplement.pdf>

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