

## ***Interactive comment on “Eddy length scales and the Rossby radius in the Arctic Ocean” by A. J. G. Nurser and S. Bacon***

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Received and published: 2 April 2014

Authors' initial replies to reviews.

Our manuscript is intended to be short and relatively straightforward. It aims to fill a gap: there is at present no published analysis of the Arctic Ocean Rossby radius. Our study is motivated by the very well-cited paper by Chelton et al. (J. Phys. Oceanogr., vol. 28, pp. 433-459, 1998), entitled “Geographical variability of the first baroclinic Rossby radius of deformation”. They examine the Rossby radius in most of the World Ocean, but not in the Arctic. Our manuscript is structurally similar to theirs, but it is much shorter mainly because we refer to, but do need to repeat, their technical material. Our approach comprises (i) derivation of Rossby radii from coupled ice-ocean general circulation model output, and (ii) comparison of the model results with co-

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located values obtained from measurements.

There are three reviews, and they contain a varying degree of recognition of the utility of our project, i.e. the proposed publication of an analysis of the Arctic Ocean summer and winter Rossby radius (first and second modes). Reviewer 1 says that “the idea of providing an estimate of Rossby radii for the Arctic Ocean is excellent”. Reviewer 2 notes that “the internal deformation radius is a very useful metric”. Reviewer 3 states that we attempt to address “an important topic for the dynamics of the Arctic Ocean”. However, it is also clear that the reviewers are unhappy with our approach. In order to respond constructively to their criticisms, we propose the following.

We will centre the manuscript around the analysis of a climatology, rather than model output and distributed measurements. We will use the Polar Science Centre Hydrographic Climatology (PHC; Steele et al., J. Climate, vol. 14, pp. 2079-2087, 2001). It comprises annual and seasonal means of hydrographic properties (temperature and salinity) at set depths. From these fields, we will derive the relevant Rossby radii. The analyses presently contained in the ms. will thus form a supplement to this new analysis. In addition, we propose to examine time series of selected repeated hydrographic stations in order to assess the likely impact of interannual-to-decadal variability on the Rossby radii.

If this revised approach is acceptable to the journal, we will provide a detailed (point-by-point) response to the reviewers' comments along with our revised ms.

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Interactive comment on Ocean Sci. Discuss., 10, 1807, 2013.