

## ***Interactive comment on “Antarctic Circumpolar Transport and the Southern Mode: a model investigation of interannual to decadal time scales” by C. W. Hughes et al.***

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In this paper that authors investigate the relationship between the Southern Mode and the transport through the Southern Ocean on a variety of time scales. In particular, they study the depth distribution of the boundary pressure on the Antarctic continental slope in relation to Southern Ocean transport, and find significant surface intensification at longer time scales.

This is an excellent paper on all accounts: an interesting, relevant topic; well written, with clear introductory sections on Southern Mode dynamics; clearly described and appropriate analytical procedures; and the conclusions drawn seem valid. I would not

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have any hesitation to recommend accept as is, if not for one question that I am left with after reading the manuscript: how is the /horizontal/ structure of transport variability modified on longer time scales? For short time scales the variability seems trapped on the continental slope; but at some point this variability has to project onto the jet structure of the ACC, not only in the vertical (as recognized in the manuscript) but also in the horizontal plane. If this is indeed a valid question, would correlations between DP transport filtered for certain frequency bands on SSH fields provide such a spatial picture?

p.2088, l.6: Not clear (yet) what is meant by boundary pressure.

p.2089, l.25: Maybe state that those anomalies are indicated by a prime.

p.2092, l.17: Maybe worth emphasizing that these are bottom pressures.

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Interactive comment on Ocean Sci. Discuss., 10, 2085, 2013.