

## ***Interactive comment on* “On the fast response of the Southern Ocean to changes in the zonal wind” by D. J. Webb and B. A. de Cuevas**

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Posted on behalf of a reviewer

Review of **On the fast response of the Southern Ocean to changes in the zonal wind** by DJ Webb and BA de Cuevas

The paper reports on some experiments with the OCCAM model forced by different wind stress patterns in the Southern Ocean. The emphasis is on the short time response behaviour, days to some weeks, after the model has been spun up to some quasi-steady state and the zonal wind is perturbed. The authors discuss their main findings: the Southern Ocean flow response occurs on a very fast time scales - a few days - to adjust the ACC transport, the Deacon Cell, the surface topography, the terms

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of the zonal momentum balance etc. They describe the resulting changes of circulation variables in great detail and claim that these fast adjustments are due to fast barotropic waves. They make their points in a concise and easy understandable paper which I read with interest but at the end I asked myself what is really new, what have I learned.

What should the ocean do on short time scales than to response with its fastest waves? The above mentioned concepts of Southern Ocean circulation, the Deacon Cell, the zonal balance, the ACC transport, are clearly and strongly affected by baroclinic processes but if you perturb their state their first response is of course barotropic, what else?. The Ekman part of the Deacon Cell - the northward Ekman transport and the associated up- and downwelling by Ekman pumping - adjusts immediately when the wind is changed; the surface topography adjusts with barotropic waves and changes the pressure field at depth instantaneously. The momentum balance takes its new state of balance by a changed surface pressure field. All these changes imply then on the long run baroclinic adjustments which have not yet occurred in the experiments. This is text book knowledge and of course, I am telling the authors nothing new.

Did I miss anything or overlook something important in the paper? I would not miss anything if the paper would not be published.

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