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Interactive comment on "Flow separation of intermediate water in the lees of sills off Taiwan from seismic observations" *by* Q. S. Tang et al.

Anonymous Referee #2

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This paper presents two seismic images tuned to highlight oceanic features, in the vicinity of Taiwan. There are "reflectors" in these images that appear to emanate from topography and a considerable distance offshore. These reflectors are identified (as in previous studies) with water mass boundaries. The authors then argue that flow is largely off-topography, and that these boundaries also represent flow separation from the topography. They further note that there is no downslope dip in the reflectors, and therefore hypothesize that a lee wave they might expect is being suppressed by a "dense pool" downstream of the ridge crest.

This paper suffers a number of weaknesses, and I feel is unpublishable.

The thrust of the argument seems to be that a) no non-linear lee waves are seen in these sections, and b) no solitary waves are seen in these sections, and therefore the

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conclusion is that lee waves have been suppressed by a baroclinic density gradient across the sill.

The first observation would be interesting if the authors could show that they were passing the sill crest at a time non-linear lee waves would have been expected. There is substantial observational (Alford et al 2007) and modelling evidence (Buijsman et al 2013) that there are substantial lee waves in Luzon Strait generated during off-ridge flow. However, the authors do not test the tidal flow for the presence of lee waves, and indeed erroneously exclude the possibility of the tide forming the structures they find because they are too long to have been formed during a tide. (This last supposition is particularly unlikely, as the reflector is likely a water mass boundary, and there is no reason to believe that it is caused by instantaneous flow character. Or if it were, it would be associated with an internal tide phase speed (>1 m/s) not the advective flow speed). So without more clearly showing that the ship passed the crest of these sills when lee waves are expected to be present, I don't see that they have much evidence that there are no lee waves.

The evidence for the subtidal flows moving in one direction or another is very flimsy, and not very convincing. The mean flows alternate direction all the time in this region due to the eddy-rich influence of the Kuroshio.

The second supposition is that because we do not see solitary waves then a "lee wave" was not produced. This is not consistent with our understanding of solitary waves in the South China Sea, which is that the solitary waves are a steepening of the internal tide (see Farmer and Li, Helfrich et al). I don't think anyone has taken the "lee wave hypothesis" seriously for quite a while (certainly not the papers cited). A lack of solitary waves so close to the ridge is not surprising.

I think the null hypothesis - that there is a water mass boundary near the sill depth because there is little exchange below the sill - is the easiest explanation of a strong reflector at these depths. That there is a flow separation should the shallow water flow

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out over the deep would not be a very surprising observation, even if there was more compelling evidence from these images.

In summary, this paper is a loose collection of conjectures to explain the seismic images, none of which are well-founded by our current understanding of the phenomenology in the region, nor are they strongly supported from the from the data presented.

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