Dear Professor Barry Ruddick,

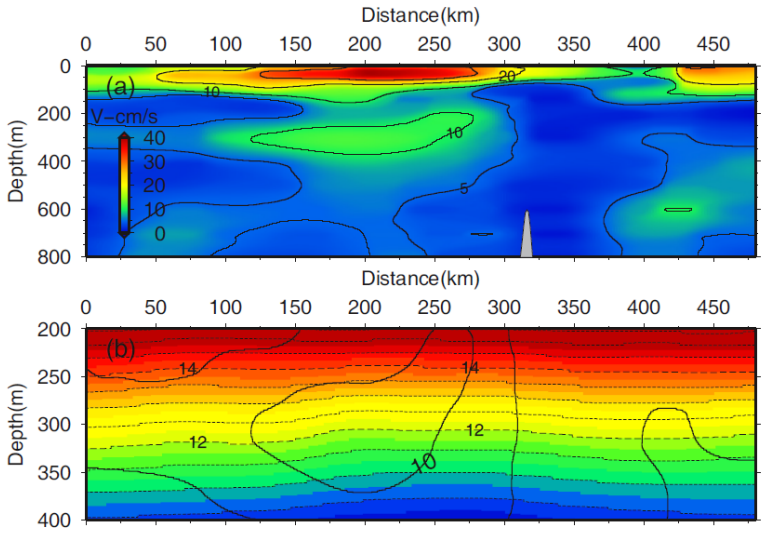
Thanks very much for your approval of this work. Your comments will help us to improve the manuscript greatly. Here, we would like to reply your comments as listed below.

1：We truly agree with your suggestion to remove this paragraph about internal waves, which are not closely related to the subject of the work. Meanwhile, it is a great idea to study the internal waves quantitatively with comparison to the previous works as cited, and show them in a different paper. It would be an interesting work.

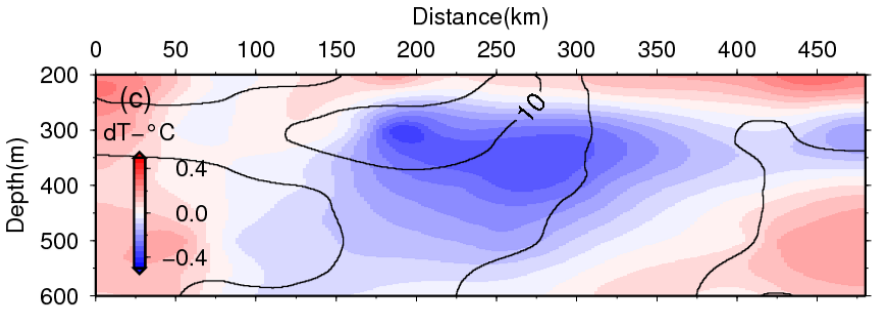
2: Thanks for kind reminder. It is helpful for our manuscript.

3: Sorry for my misunderstanding. It will be corrected in the coming manuscript. Recent work by Quentel et al. (2011, Int. J. Geosci., 2: 185-194) also shows that the lens-like undercurrent and Meddies are similar.

4: Thanks for your suggestion. (1) Considering that the seismic image of the water just carries the scalar information from the impedance contrasts, we only use the current speeds/strengths of the HYCOM for comparison. The contours are added. The along track velocity components (along or normal to the line heading) are not shown. (2) Because of the weak lateral thermal variance, we exaggerated the vertical scale of the temperature section. The velocity contours are superimposed. Please see below.



5: Sorry, I do not quite clear about the “lateral temperature gradient”. If it means the lateral variations along the section of the vertical temperature gradient, I think the vertical nodes of the HYCOM are too sparse (100m interval at depth larger than 300m). The temperature gradients would be difficult to compare with the seismic reflections. Here, we show the temperature anomaly (relative to the temperature “profile” at 80km) with velocity contours superimposed. It seems that the lowest temperature anomaly correlates spatially with the seismic lens-like structure.



Other minor comments on the pdf file:
http://www.ocean-sci-discuss.net/9/C1674/2013/osd-9-C1674-2013-supplement.pdf.

P4, L2: During the migration, the velocity model is used to calculate the travel time table of the seismic waves. The travel time table is then used to convert from the seismic time section to the migrated depth section. A strong positive/negative velocity jump will stretch/contract the seismic image along the discontinuity. In practice, a velocity model with smoothed discontinuities is required and thus a very subtle trail (hard to notice) will be resulted. No additional reflections will be created so long as the velocity model is close to the true ocean reasonably.

P4, L5: It is fixed.

P4, L11: The assimilated data includes: SST (GAC/LAC, MCSST, GOES, Ship, Buoy); Profile (XBT, CTD, PALACE, Float, Fixed Buoy, Drifting Buoy); Altimeter SSHA; SSM/I Sea Ice. From http://hycom.org/attachments/084_Smedstad.pdf.

P4, L22-25: We would rewrite the sentences as follows: The noises dominate the profile below 800 m and reflections are nearly blanking (not shown below 900 m), a strong indicative of the nearly homogeneous deep water. Such a three-layer division by seismic reflection is very similar to the hydrographic distribution of the upper water, intermediate water, and deep water of the SCS.

P4, L29-31 to P5, L1-3: We will remove the paragraph of internal waves according to your suggestion. Also see the reply to comment 1.

P5, L6: Yes, it is a relatively strong reflection zone down to 600 m. Reflections are typically deeper and more continuous than the adjacent region, although its exact outline is not clear. Probably the stratification of the water is less disturbed at this region. It seems that the “lens-like” feature is farfetched.

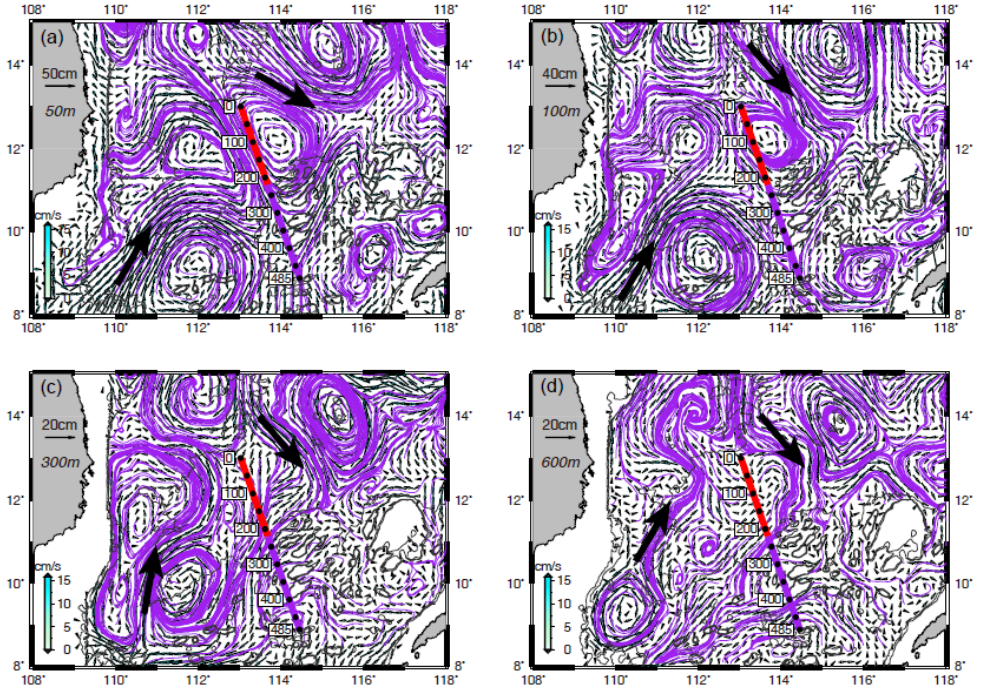
P5, L18: Yes. It is an apparent distance along the section. Thanks.

P5, L26: Please also see the reply to comment 2.

P6, L3: Please also see the reply to comment 3.

P6, L12: It is fixed. Thanks.

P6, L20: Thanks. We added two black arrows of each sub-map at the key points. Please see below.



P6, L24: Yes. Here we try to “exclude” the possible causes of the subsurface structure. We have interpreted this feature of the subsurface current in the next paragraph. Its formation mechanism – a dipole induced current is proposed in the end. Thanks.

P7, L13: Please also see the reply to comment 4.