

Interactive comment on “A comparison between vertical motions measured by ADCP and inferred from temperature data” by H. van Haren

Anonymous Referee #2

Received and published: 19 May 2008

I think I like this paper, though I come away not sure I have learned anything particularly useful. The key point is that for high-frequency wave packets, a linear advection model for estimating w from a temperature record is poor (I think). I am not sure, because aside from mention in the abstract of order-of-magnitude discrepancies between ADCP and temperature derived w , I found no such case clearly presented in the paper. I also found no presentation of discrepancy in w for sub-inertial frequencies, as reported in the abstract and discussion. I would recommend a serious round of revision, with an attempt made to clarify the presentation in the paper.

Two issues stand out. First, the methodology described for the calculation of temperature record w is quite crude, typical of that used for coarsely instrumented thermistor chains. More often, an isotherm displacement record is calculated from a record with

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



Interactive
Comment

good vertical resolution (say a temperature measurement every 2 meters), and then w is calculated from the time derivative of the displacement. I would seem that the data presented here are of the latter class, with adequate depth-resolution to allow for estimating the displacement field. I believe that the displacement method would give better results than the linear 1-D advection method.

Second, there is the pesky issue that ADCP data is often just bad, particularly for the vertical velocity. Typically, ADCP estimates of w are simply not used or published. Many reasons contribute to the failure of Doppler to actually resolve physical signal of vertical velocity, most often because the signal is simply too small or the signal to noise ratio of acoustic return data is too poor. This is particularly true at depths greater than 100 m or so, where there are very few plankton for scattering acoustic energy. The author here feels the ADCP w estimates being presented are worthy. It would be helpful to have a benchmark for the quality of ADCP data for each of the data sets used in the study.

I also found the paper difficult to read. There are many confusing pieces of text. I lead with an example right from the Abstract: "There however, the internal wave continuum is not well-described: near the buoyancy frequency it is dominated by non-linear waves and near [sub]inertial frequencies by eddies and gyroscopic waves." The internal wave continuum is very well described, with a vast literature. Here, I believe the author intends to say that the internal wave continuum model (i.e. Garrett and Munk) is not applicable in the FSC region, which experiences high-frequency non-linear waves. This is quite different from the previous sentence. Also, page 108, line 20: "The above general lack of Eq. (1) describing directly observed w is confirmed in the spectral domain (Fig. 5). Where is there a lack of Eq. (1)? I believe the author is trying to say that the previous examples were not adequately described by Eq. (1). There are many other tortured bits of text. I recommend a party unfamiliar with this author's work provide editorial clarifications to the writing.

The figures are quite difficult to follow:

[Full Screen / Esc](#)[Printer-friendly Version](#)[Interactive Discussion](#)[Discussion Paper](#)

Interactive
Comment

Figure 1: Panel B is useless. Much more useful would be a histogram showing the distribution of w for the whole record. Figure 3: It appears the color here shows ADCP data, although I am not sure this is specifically stated. The Author should clarify which component is shown.

Figure 4: Perhaps a legend describing the 3 lines could be added to panel a. I am not sure I understand what actual comparison was done here. I believe that w was calculated from the ADCP data, and used on the RHS of Eq. (1). This is a painful way to compare the two estimation methods; wouldn't it be more straight forward to just compare the estimates of w ?

Figure 6: The temperature record is very nice, but the ADCP data looks awful- I don't even see a signal. I am again unsure of which component of velocity is shown. At these depths most ADCP data would be useless, as the ping return rate must be very poor for such short ensembles. The actual comparison between ADCP and temperature derived w in panel c looks better than a comparison of panels a and b warrants

Interactive comment on Ocean Sci. Discuss., 5, 103, 2008.

[Full Screen / Esc](#)[Printer-friendly Version](#)[Interactive Discussion](#)[Discussion Paper](#)