Dear Dr. Whitehead,

we would like to thank you for your positive feedback and constructive comments. We also thank for the reference to your study of the flux and mixing rates of Antarctic Bottom Water within the North Atlantic. This is a promising advice for a future extension of this study.

Please find answers to your questions below where needed. All minor issues were corrected as you suggested.

Section 3

After giving a fine review in section 1 and and outlining the data in section 2, section 3 establishes the turbulent heat flux equations for a Boussinesq fluid. Here, I begin to question the wording. Although the entrainment of a density current was emphasized in section 1, entrainment itself, which I assume represents a mean flow into the current from the side and therefore is represented by the term $\overline{\bar{u}\frac{\partial \bar{T}}{\partial x}}$ *is not measured. Instead, correlations between temperature and velocity fluctuations are said to be a proxy for entrainment. Also, should (1) be called a heat flux equation when heat is not really expressed? (found in many places in the text). I suggest another word such as temperature flux. Many people know that density times specific heat times an equation (1) is a heat equation, but still it is better to be accurate with word usage. For heat flux, the usual approach would be to multiply equation (1) by density and specific heat and then integrate over a control volume, then again integrate by parts to make surface flux integrals. Heat flow through such a surface would be equal to density multiplied by specific heat times an elevation or width (for lateral and vertical heat fluxes respectively) times length of a tube section times correlation of velocity and temperature. I think it preferable to either just use the words temperature flux or have such an integral clearly defined in the text. This would eliminate some questions that arose when I read the text.*

It is important to point out that a value termed heat transport has to be a temperature flux multiplied by density and the specific heat constant. The text was changed to express that the heat transport equation (1) is a temperature transport equation (2) if not multiplied by these factors. To keep text and calculations simple, the multiplication by density and specific heat is only carried out where needed, elsewhere the wording was now changed to temperature flux.

Also in section 3 equation (5) the magnitude of vertical and horizontal advective terms are compared. For the vertical flux they use a rough estimate of Ekman flux. On the basis of the estimate that vertical flux is five times smaller than downstream advection flux, the vertical flux is rejected. The numbers do not seem convincing for outright rejection to me, although the point that vertical flux might not be sufficient is a good one. It is important to state that the estimates do have considerable uncertainly. After all, the constant c_D *is only approximately* 10^{-3} *and is known to vary with bottom roughness. Second, the result depends on how a velocity is determined. Third, the estimate of vertical temperature gradient must have a wide range due to local variations and microstructure presence.*

The text was changed to express the uncertainty in the estimates of the vertical temperature gradient and the Ekman velocity.

Section 4

In section 4, the structure of the overflow plume is given. I would really love to see the time series of u and T and that correlation $\overline{u'T'}$ *in this section for at least some of the current meters. The information would help me picture in my mind the information that establishes the results in the next section.*

A figure showing an example of a time series of u, v and T was added in Section 2. Another example showing a combination of bottom temperatures and current vectors in a Hovmoeller diagram was added in Section 5.

Section 5

It would be good to have more details about $\overline{u'T'}$*. How does the magnitude of* $\overline{u'T'}$ *compare with the product of the standard deviations of u times T? What is the time over which the integral was taken, and how does that time compare with a typical autocorrelation timescale? As said earlier in this review, figures showing time series would be very useful.*

Figure 6 was added to give a visual impression of the correlation between current and temperature fluctuations. The magnitude *of* $\overline{u'T'}$ and its relation to the product of the standard deviations of u and T is now discussed in the text.
The time for the integral corresponds to the length of the time series which is one year for array B and C and three months for array A. With the time scale of the eddies between one and ten days, this means that even the short time series were integrated over more than ten eddies.

Figures

Figure 4 shows plume temperatures (not plume warming). The numbers over the lines are temperature gradients with units mK per 100 km. They correspond, as I understand it, to a mean temperature difference between stations divided by distance between the stations. How exactly are the temperature gradients above the sloping lines calculated?

The wording was changed from plume warming to plume temperatures. The temperature gradients were calculated as the slope of linear fits to the mean plume temperatures as is now explained in the caption.