The Denmark Strait overflow is a significant contributor to deep waters in the oceans. The quantification of the dynamics of heat and salinity as the water descends to form North Atlantic Deep Water is important, and in this study Voet and Quadfasel make an important contribution to a measurements of flux of heat. They use data from the Denmark Strait overflow to indicate that eddy flux by lateral eddies is important in a region beyond 200 km downstream of the overflow sill. The contribution is important.

Although it was possible to follow the logic in this manuscript, clarification of wording can help make this study easier to understand. 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.

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.

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.

I feel that the results given in section 5.1 are important and they deserve clearer wording and perhaps more discussion. The authors say "a net heat flux" $\overline{u'T'}$ can take place by the transport of warm and cold water in opposite directions. Except for misuse of the definition of heat flux (as discussed above), this is true, and, as I said, I recommend that they say "temperature flux". They then show that this term is large enough to be consistent with warming of the current in a downstream direction (or more accurately with the observed mean temperature change in the downstream direction).

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.

At this point, let us return to the topic of entrainment of the current. As said previously, one might infer that the results are not consistent with entrainment of water as the current flows downstream, since $\overline{u'T'}$ expresses no net inflow into the current. I disagree with such an inference and suggest that the warming from temperature flux $\overline{u'T'}$ only redistributes heat between the current and the ambient fluid, resulting in the core of the current being warmed and the ambient fluid being cooled. Perhaps the cooled ambient water thus becomes part of the outer current and is hence entrained. An entrainment flux in reality it would be due to a finite value of $\overline{u}$ and/or $\overline{w}$. Unfortunately, measurement of $\overline{u} \neq 0$ is eliminated outright by the definition of $\overline{v}$ as the mean downstream current. One would need to de-convolve the downstream velocity component across isotherms from that along isotherms, which has not been attempted here.

This analysis also allows the possibility of comparison with the method developed by Worthington (Whitehead and Worthington, JGR 87, 7903-7924, 1982, and Hogg et al. J. Mar. Res, 40, 231-263, 1982). In that method, surfaces of isotherms for water flowing into a region with known inflow are used to constrain eddy fluxes. The method applies best to isotherms with temperature values that terminate in the basin. The water colder than the coldest isotherm flows into the volume below the coldest isotherm at the upstream end and since the isotherm terminates, the same volume flux of water must exit the volume enclosed by the isotherm and the ocean bottom by rising through the isotherm. In order to leave, the water must be warmed by cross-isotherm eddy heat flux (and geothermal heating, which is often smaller). Entrainment of water into the plume along the way constitutes part of the cross-isotherm eddy flux since the entrained water enters and leaves through the same isotherm by such a process. Other isotherms above the first one have a similar flux balance, with the addition of fluid arriving from below. The present data set and analysis really does follow Worthington's approach to some extent, and it can perhaps be used explicitely for such an analysis in the future.

In summary, the measurement of a significant correlation between *T* and *u* is a useful new contribution. Figure 7 compares the actual change in core temperature downstream with an estimate determined from measurements with eddy flux. (At least, that is my guess although the actual calculations are hard to understand with the present description in the text.) As such this is a very nice result. This provides an important addition to the story of how the cold water is diluted with warmer water and how the cold water in turn warms surrounding ambient water and brings it to greater depths in the North Atlantic.

More specific details:

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?

Figure 5 shows temperature fluxes, not heat fluxes. Numbers give mean eddy temperature flux.

In figure 6 the units J/ms appear, so that apparently a procedure for heat flux (perhaps somewhat like the one I outlined above) was followed. Nowhere was it made clear in the text that the procedure in Figures 5 and 6 differed, so clarification is needed.

In closing, I think this is an excellent contribution and hope that the above suggestions can help to make the analysis clearer to students, scientists and others who might use the results subsequently. Very good job.