

## ***Interactive comment on “Short-term variations of thermohaline structure in the Gulf of Finland” by T. Liblik and U. Lips***

**M. J. Howarth (Referee)**

MJH@POL.AC.UK

Received and published: 2 May 2012

The paper presents a two month set of temperature and salinity profiles obtained by a moored profiler in the Gulf of Finland during summer and a concurrent one month ADCP record. The temperature and salinity profiles were recorded at 3 hour intervals, between 2 and 50 m below the surface at a site having 85 m water depth. The measurements focus on the upper mixed layer and the cold intermediate layer, with information on horizontal gradients, needed to complete the picture, lacking. During the two months five different characteristic periods are identified.

The data set is valuable, giving a detailed and comprehensive description of temporal and vertical variations of the density field. Of interest, unless reported elsewhere, would be comments on the performance of the profiling system, since this is a relatively

C251

new technique, on its reliability and accuracy over the deployment and on whether the measurement strategy could be improved for future deployments. Was the profiler affected by the strongest currents? Gaps in the data are mentioned – how serious were these for the data interpretation since the data return was 65% of possible?

The measurement period was modelled with a mixing model described in section 2.3 with terms for surface heat flux, wind mixing, advection of density gradients, and fresh water input at the coast. What are the relative magnitudes of these terms? Mixing by currents was not included since tides are small in the Gulf of Finland but what are the errors by neglecting mixing by other currents – the maximum recorded current speed was 0.48 m s<sup>-1</sup>. The advection of density gradient term was calculated indirectly, using the formula of Oey, when for the second month it could have been estimated more directly, from the ADCP record. The wind mixing term presumably includes the contribution due to wave mixing and has a mixing efficiency. Is the standard value of the efficiency used here (10<sup>-3</sup>) the optimum? To be consistent the value for  $Se$  should be in units of J m<sup>-3</sup> s<sup>-1</sup>.

Minor points

Are the averages quoted in the second paragraph of the Introduction for the months of July and August; over what area? Similarly in the first paragraph of section 3.1.1 over what area are the averages calculated?

Are the axes x east and y north?

At several points in the manuscript gradients are quantified as differences, which is dimensionally inconsistent.

In the scale for the currents in Figure 2 the blocks of colour need to be larger to be legible. Why is only the east component of current presented in this figure?

Figure 6 presents the potential energy anomaly which should always be positive. The arbitrary choice of a zero origin makes it more difficult to interpret.

C252

The paper is in general well written, but there were no page or line numbers, making specific comments difficult to target.

p2, line 5, Introduction: 'Gulf of Finland, much larger' is better than 'Gulf of Finland, well larger'.

p2, penultimate line of Introduction: 'sea surface to the 40-50' is better than 'sea surface until to the 40-50'.

p11, line 10, section 4. 'This is another confirmation' is better than 'This is another approval'.

---

Interactive comment on Ocean Sci. Discuss., 9, 877, 2012.