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Response to “Plankton layer profiles as determined by shearing, sinking, and swimming” by D. A. Birch, W. R. Young, and P. J. S. Franks

In their comment on Stacey et al. (2007), Birch et al. (2008a) raise some interesting points related to the form of the concentration profile that results from the vertical processes we considered. Before discussing these points, we believe it is important to note that our scaling approach, on which our conclusions were based, was recognized by Birch et al. (2008a) to be appropriate and was confirmed by the same authors in Birch et al. (2008b).

The discussion contained in the Birch et al. (2008a) comment is limited to the section “Detailed analysis of cross-layer structure” of Stacey et al. (2007). Specifically, Birch et al. (2008) have identified two mathematical errors. For the case of *settling*, we incorrectly assumed that the vertical velocity was divergence-free. As such, eq. 40 in Stacey et al. (2007) should be Gaussian, as in eq. 5 in Birch et al. (2008). For the case of *straining*, our profile solution was based on two half-plane (one-sided) solutions. This approach does not account for feedbacks that occur between the two half-planes. Thus, the peaked layer structure in our fig. 3 (and associated eqs. 38 and 39) is in error.

On a separate note, the analysis for *motility* presented in the comment by Birch et al. (2008) is a useful extension of the results that we presented. Specifically, we considered swimming that was directed towards an infinitely thin “target layer.” By considering a hyperbolic tangent swim profile, Birch et al. (2008a) have extended the analysis.

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