Biogeosciences Discuss., 10, C1866–C1868, 2013
www.biogeosciences-discuss.net/10/C1866/2013/

Biogeosciences Discussions
Open Access

Interactive comment on "Autonomous, high-resolution observations of particle flux in the oligotrophic ocean" *by* M. L. Estapa et al.

Anonymous Referee #3

Received and published: 15 May 2013

BG-2013-21 by Estapa et al. REVIEW

Particle flux is an important vector for CO2 sequestration from the atmosphere by the marine ecosystem. In the context of CO2 increase and global change it is needless to say that the accurate estimation of this flux is of paramount importance. Moreover, an optimal method to obtain these estimates is still lacking. This work deals with the quantitative estimation of that flux. As it is stated in the abstract, Estapa et al specifically evaluate the results of an optical proxy-based method for high resolution observations of particle-flux. The method had been proposed and applied by Bishop before. In this work the authors make a very critical discussion of the results obtained from several long and short continuous records of particle flux, cross-checking the validity of the method as another tool to improve our understanding of particle flux dynamics. They

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

deliver extensively and thoroughly on the subject, an aspect I liked very much. The manuscript is recommended for publication. The points below need to be addressed.

1.- My main question is the influence of turbulence on the particles sitting on the lens. P 1243 l. 11 "The same low-energy turbulence that allows collection of particles by the transmissometer could also occasionally resuspend them." In addition to the occasional resuspension of particles and without a catching mechanism, wouldn't it be possible that small particles are washed off the lens continuously (unless they stick to the particles already deposited)? P 1248 l. 28 "Although the greatest need for high time-resolution particle flux data is conveniently in the upper thermocline, where ambient turbulent velocities are likely to be higher, we need to better-establish the degree to which low turbulence limits collection of quickly-settling particles, which may constitute a significant flux fraction." I'm not that sure that higher turbulence is convenient. I would say it will influence on the trade-off between catching larger, fast-sinking particles and loosing small-slow-sinking particles washed off the lens.

2.- A brief description or sketch of the transmissometer attached to the deployment line would help to explain the geometrical details that become important in the discussion about the effects of turbulence and catching efficiency. I have noticed the authors refer to Bishop 2004 and Bishop and Wood 2008 but, still, I think a brief description or sketch is needed here.

3.- Some data segments were discarded because they didn't satisfy the goodness-of-fit criteria. In Fig. 3 there is a short period (the 4 points after time=0) where the data collected didn't satisfy the criteria. How is the flux estimated in periods where there are non-significant segments? Are they included as zeros or discarded? I imagine that very low sedimentation rates wouldn't satisfy the goodness of fit criteria. If this interpretation is correct, flux rates might be overestimated if non-significant segments are not considered.

4.- Although it is clearly written, sometimes I was not sure I had understood the rea-

BGD
10, C1866–C1868, 2013

soning presented and I was missing an explicit statement on the mechanism. p. 1242 l. 20 "If the discontinuous flux component were caused by large, episodic flux events, we would expect the distribution shapes and CVs of time-averaged flux observations to match those from sediment traps." Please, state why. Page 1245 line 13 "We must first assume that settled particles and any fouling material on the transmissometer window do not interact optically (note that this is not the same as geometric overlap, since particles also diffract light around their edges). Justifying this assumption, we generally observed cp(650) to increase steadily for hours (Fig. 3) and sometimes for entire 1–2 15 d drift phases, rather than the rate slowing with increasing cp(650)." Why does the observation justify the interpretation? Please, explain.

5.- To validate a method, reproducibility or repeatability is usually required. Here, a comparison with "replicate" transmissometers would provide a very strong support to the consistency of these optical particle-flux measurements.

P 1243 l. 28 I think the authors refer to Fig 8d.

Fig. 9 caption: depth is shown on the right axis.

END OF REVIEW

Interactive comment on Biogeosciences Discuss., 10, 1229, 2013.