

Interactive comment on “Evidence for surface organic matter modulation of air-sea CO₂ gas exchange” by M. LI. Calleja et al.

Anonymous Referee #3

Received and published: 5 November 2008

A major question with this paper will be the use of domes. Although some researchers have championed the use of domes in the field, many other researchers doubt their appropriateness. As Figure 3 shows, the k values obtained using the dome provide values much higher than parameterizations from the literature, some of which are obtained using less intrusive methods. In fact in figure 3, the authors fit their points using a power curve, which completely misses their last point at wind speeds of 15 (the data points actually look exponential). The measured values, being much larger than published relationships are a red flag to me. An intercept of 13cm hr⁻¹ is very difficult to believe. Also remember that the Kremer paper referenced here cautions against using the dome in areas with a large fetch yet this is not mentioned. These high k values make it very difficult for a non dome believer like myself to move forward with this pa-

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

per, but the relationship in figure 4b is still intriguing. I do have a little trouble of using the residuals of a power curve when the relationship in figure 3 looks more exponential or cubic. It also looks like the highest wind speed data point isn't included as there are no residuals of +70 in figure 4, yet this isn't stated. That aside, on one hand this could be evidence that organic matter in the top layer can dampen DOC flux as the author contends and others have shown. On the other hand I worry a little that this is correlative but might not be evidence of a true mechanism but is a correlative relationship that is in-direct not direct. Possible indirect causes (methodological and real) aren't discussed, but should be. Is there any inherent physical difference in the high DOC sites that could be causing an in-direct effect? Figure 4 shows that DOC can cause a 40cm hr⁻¹ difference in k over a rather modest range in DOC. This is rather large and therefore troubling. If we used any of the other curves available, a -20cm hr⁻¹ correction to the gas transfer velocity would cause negative or extremely small k's over a wide range of wind speed. The paper cited by Frew et al. 2002 demonstrate that surfactant concentration can only change k by ~10cm hr⁻¹, over a DOC range 2-3x greater. This paper should discuss why the range found here (40 cm hr⁻¹) is so much larger with smaller DOC ranges than ranges found previously. In summary, I do find figure 4b intriguing, yet some of the numbers and ranges obtained by k seem high and are troubling to me as a reviewer.

Interactive comment on Biogeosciences Discuss., 5, 4209, 2008.

[Full Screen / Esc](#)[Printer-friendly Version](#)[Interactive Discussion](#)[Discussion Paper](#)