Biogeosciences Discuss., 10, C2970–C2973, 2013
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Biogeosciences Discussions
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Interactive comment on "On the consistency in variations of chlorophyll a concentration in the South China Sea as revealed by three remote sensing datasets" *by* S. L. Shang et al.

Anonymous Referee #2

Received and published: 24 June 2013

General Comments: The main focus of this paper is to compare MODIS chlorophyll products from three algorithms in use by the ocean color community. The authors examine a time-series of satellite data covering the South China Sea to describe spatial and temporal variability in the region, with emphasis on upwelling and river plume regions. They also assess consistency between the three chlorophyll products, in terms of concentrations and spatial patterns resolved. Furthermore, they compare the satellite Rrs values and derived chlorophyll concentrations to in situ measurements. The work is not novel, but does provide errors associated with different satellite chlorophyll algorithms in optically-complex coastal regions and extends our knowledge of the uncertainties associated with each product. The distributions observed are com-

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mon – higher chlorophyll values nearshore, in upwelling, and river-influenced areas, with lower values offshore. The paper is organized well and the material is presented clearly. However, the reader is still left confused as to why the various algorithms give such different results, not only in terms of magnitudes, but also in terms of spatial patterns and anomalies. The conclusion in the abstract suggests "more careful interpretation" and "the need for tuning of algorithm parameterization" but doesn't say how to do that. I think the paper would benefit from a more thorough description of the three chlorophyll algorithms. The bulk of the paper focuses on the differences in the results from the three algorithms, but only minimal text was devoted to the differences in the algorithms themselves. Describe the algorithms, rationales, and concepts more fully. Why would you expect different performance between them? Where should one algorithm work "better" than another? Also, more background on the problems in estimating chlorophyll in coastal areas (eg., interference from CDOM, etc.).

The paper requires revision before it is acceptable for publication.

Specific Comments: Page 7551, Line 5 – more on problems estimating chlorophyll in coastal areas (interference form CDOM, especially for blue/green ratio algorithms).change "data to" to "data with".

Page 7551, Line 18 – discuss differences between the algorithms in more detail, since the differences in their results is the focus of the paper. Why might one expect the algorithms give different chlorophyll values?

Page 7554, Line 16 – "Field observations showed high Chl during winter." Where?

Page 7555, Line 3 – "strong correlation between C_GSM, C_GIOP, . . ." Where is a plot and /or data to support this?

Page 7555, Line 4 – "compared to the limited in situ data. . ." Difficult to compare point data to a monthly mean satellite value, due to space/time differences between the measurements.

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Page 7555, Line 11 – “well known summer upwelling zones” In Fig. 7, there are also several peaks in winter – is that also upwelling?

Page 7555, Line 16 – “The upwelling induced bloom was found to be specifically strong in August 2007. . .” It is difficult to tell August 2007 is higher than the August climatology, just from Figure 6. Is there a better way to quantify this?

Page 7555, Line 22 – “(larger difference between annual maximum and annual minimum) than C_GIOP.” Why would this be the case? Any suggestions? Also, it is hard to verify this statement from Figure 7 – is there a better way to quantify the differences in seasonality between OC3M, GSM, and GIOP?

Page 7555, Line 24 – change “phenomenon was also found” to “patterns were observed”.

Page 7555, line 25 – “contradictory from the seasonal pattern observed from limited in situ measurements” Why would the satellite data be contradictory to the in situ data?

Page 7556, Line 6 – “data along shore are filtered during the process of producing the product” Explain, please. Why are the nearshore data filtered?

Page 7556, line 20 – because of the missing data of C_GIOP in some of the nearshore waters” Again, why is it missing? Missing for this algorithm but not the others?

Page 7556, Line 23 - “contradictory to the known seasonal patterns” Why is it contradictory? What is causing that?

Page 7556, Line 25 – “strong positive anomaly” Specify how you calculated the anomaly (eg., is it monthly mean – 11-year average? For each product separately?)

Page 7557, Lines 6-10 – Again, why the differences between the algorithms? These results are confusing – so what should be done? Do you recommend one algorithm over the others? Is one algorithm better for coastal patters or in upwelling regions, another for offshore? Not sure what the message is here, except that the 3 algorithms

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give different results.

Page 7557, Line 12 – “Figure 10 shows the spatial anomalies of the three Chl products.” Are the Chl anomalies calculated from the mean over the entire image area? If so, I’m not sure what Fig. 10 shows – just that the coastal areas are always high and offshore areas always low? That’s true pretty much everywhere globally. Perhaps it would be useful to calculate anomalies separately for coastal areas and offshore areas to better illustrate the patterns (using the 50m isobaths to delineate the two regions)?

Page 7558, Line 13 – “due in part to its poor performance in shallow waters” Why does GIOP perform poorly there?

Page 7558, Line 16 – “Rrs agreed well with ground truth data except at 412 nm and 667nm.” From Fig 12, it looks like it agreed well at 667nm except for one point.

Page 7559, Line 10 – “We speculate that the algorithm parameterization of GIOP requires a major tuning for the study region.” Which parameters specifically should be tuned? How?

Figure 3 – What area does this cover? The entire South China Sea? Perhaps put a box on Fig 1 or 2 to indicate the region where the data were extracted.

Interactive comment on Biogeosciences Discuss., 10, 7549, 2013.