Biogeosciences Discuss., 6, C2687–C2689, 2009
www.biogeosciences-discuss.net/6/C2687/2009/

Biogeosciences Discussions

Interactive comment on "Yellow substance and the shades of blue in the Mediterranean Sea" *by* A. Morel and B. Gentili

Anonymous Referee #2

Received and published: 27 October 2009

The manuscript describes an application study (in the Mediterranean Sea) for a recently developed technique (Morel and Gentili, RSE, 2009) using water-leaving reflectance ratios between bands 412 and 443 nm and bands 490 and 555 nm for simultaneously deriving chlorophyll-a and chromophoric dissolved organic material (CDOM). The technique is based on the fact that CDOM has a significantly larger absorption at the shorter blue wavelength (e.g., 412 nm), compared to the phytoplankton absorption peaked at the wavelength 443 nm. Authors have provided evidences and detailed discussions showing that the overestimations of the chlorophyll-a concentration from the satellite standard chlorophyll algorithm (e.g., NASA SeaWiFS algorithm) in the Mediterranean Sea are primarily due to significantly high CDOM concentration in the region. Thus, the standard bio-optical algorithm has misinterpreted the higher than normal yellow-substance amount as from the phytoplankton. The manuscript is well written

and can be understood quite well. I do have couple comments for authors to consider when they revise the manuscript.

1. Page 8513, first and second paragraphs. It is not clear to me a_y(443) data in Fig. 3 (third row) were derived using the corrected chlorophyll-a values (fourth row in Fig. 3) (similarly for Fig. 4(b) results). It appears to me that authors used SeaWiFS-derived chlorophyll-a values using OC4V4 algorithm, for which Chl-a values are overestimated. I think it would be useful to change the order of rows in Fig. 3, i.e., exchange the third and fourth row (thus the logical is clear to readers). Some detailed descriptions are needed to explain how the data are derived. Along this line, authors need to explicitly indicate what is [Chl] parameter in Eqs. (3) and (4), i.e., [Chl] in Eq. (4) should be the corrected one. Otherwise, these two equations are not consistent.

2. The manuscript explains well with all the details about cases for $\Phi > 1$. However, some more discussions about cases with $\Phi < 1$ are still needed. Specifically, for the SeaWiFS-derived chlorophyll-a data, does $\Phi < 1$ represent underestimation of chlorophyll-a, e.g., cases around the 38N line of Atlantic (Fig. 2)? Are there field data for verification? I think this is also important. Potentially, using the proposed technique the satellite-derived chlorophyll-a data over very clear ocean waters can also be improved.

Other comments and corrections:

Page 8504, line 12, "SeaWiFS" needs to be defined.

Page 8505, line 12, correct "Coastal Zone Color Sensor" to "Coastal Zone Color Scanner".

Page 8509, lines 27-29, authors need to provide the details as how the normalized water-leaving radiances were converted to the irradiance reflectances, e.g., what is value for Q factor (I understand it may be cancelled in the ratio), etc.

Page 8510, line 2, it'd be useful to provide the threshold value and a brief (a sentence

or two) description in here.

Page 8513, first line, Eq. (3b) has no Φ factor in it. It should be changed to "Eq. (4)" and indicate that [Chl] is the corrected one.

Page 8515, line 22, add a space between "of" and "yellow". Similarly, in page 8516, line 9, between "in" and "yellow".

Figure presentations:

For clear presentation and discussion, I would suggest to add (a), (b), (c), etc., in each plot for Figs. 2 and 3. In addition, there are many geographical names used in the manuscript in the Mediterranean Sea region, which are not necessary familiar to many readers. It would be better to indicate those geographical locations in Fig. 2.

Interactive comment on Biogeosciences Discuss., 6, 8503, 2009.