Biogeosciences Discuss., 7, C2840–C2843, 2010
www.biogeosciences-discuss.net/7/C2840/2010/

Biogeosciences Discussions

Interactive comment on "The most oligotrophic subtropical zones of the global ocean: similarities and differences in terms of chlorophyll and yellow substance" *by* A. Morel et al.

Anonymous Referee #1

Received and published: 8 September 2010

GENERAL COMMENTS:

The paper is a comparative bio-optical study (based on the SeaWiFS mission record) of subtropical gyres of the world ocean with respect to dissolved substance absorption and chlorophyll content. The work is a valuable contribution to remote-sensing calibration/validation efforts particularly as seasonal and interannual variability in the gyre optical properties are presented. The authors pose a well-supported hypothesis for the role of convective mixing in establishing the concomitant annual cycling of Chl and CDOM in the surface ocean in the subtropical regions where mixed layer deepening is strong enough to effect a seasonal cycle. However, the discussion would be made

more interesting with the insertion of additional hypotheses (physical, biological) for why the pelagic N. Pacific differs so strikingly from the rest of the subtropical zones investigated (see specific comments). The paper requires only minor revision, including a number of needed citations (where noted under technical comments).

SPECIFIC COMMENTS:

The authors claim lateral advection is negligible in the gyre cores (with the exception of the H zone). In their assessment of inter-annual and inter-gyre variability, the authors may want to consider mechanisms relating to lateral mode water circulation in the N. Atlantic as described in Palter et al. (2005), and potentially extrapolate such mechanisms to nutrient delivery by lateral influences in the N. Pacific (including the N. Pac. equatorial current). Also, Fig. 5 suggests that the Mariana I. (M) region exhibits MLD seasonality on par with that of the N. Atlantic, but much less seasonality in optical properties is observed in M than S. What is the explanation for this? I.e., lack of active convection may explain the minimal seasonality in H, but does it adequately explain it for the case of M (as implied on pg. 5061, Line 1 – 3)?

pg. 5053, Line 20 (and Fig. 1): the reader can not reproduce or follow the statistical method for gyre delimitation directly in the main text or appendices, and is only directed to Fougnie et al., 2002, which is not easily accessed online. Perhaps the authors could append the method, cite an alternate reference, or make the Fougnie 2002 paper available via their ftp site.

pg. 5060, Line 25 – 28: The hypothesized effect of grazing activity with respect to the phi cycles, if mentioned, should be expounded and referenced.

TECHNICAL CORRECTIONS

Figs. 2 and 3 suggested edit: include the letter notation (E, B, S, etc.) also on the panels.

Fig. 4 suggested edit: define within caption what the dotted and solid lines correspond

to in each panel. (It is written on the panel but the font is quite small)

Fig. 6 suggested edit: include location on panels (E and Portugal)

pg. 5049: Line 7 correction: “Waters extremely transparent to visible and near ultraviolet solar radiation were found...” (removed commas) Line 18 suggested edit: replace “direct” with “spectroscopic”

pg. 5050, Line 23 suggested edit: “...the initial question: from an optical viewpoint, do waters identical to, or approaching those encountered near Easter Island exist elsewhere in the world ocean?”

pg. 5050, Lines 1 – 6: citation(s) needed.

pg. 5051, Line 13 correction: “The CDOM index is the factor defined and studied in Morel and Gentili (2009a) and denoted...”

pg. 5053, Line 8 – 11: citation needed for the CDM to CDOM approximation (e.g., Bricaud et al., 2010)

pg. 5054: Line 9 correction: “...has been known for a long time...” Lines 17 – 19: citation needed.

pg. 5055, Line 23 correction: “...everywhere (Table 2), which is low when compared to...”

pg. 5056, Line 11: the term “organized” (used in a few places within the paper) is not well-defined. If apparent covariance between CDOM, Chl and phi is what is meant, it may be better stated that way.

pg. 5057: Line 16 correction: “...exhibits...” Line 24 suggested edit: change “limited” to “small”

pg. 5058, suggested edit: in section 4.4 heading replace “similarity” with “similarities” (consistent with title)

pg. 5059: Line 7 correction: “climatologies tend” Lines 20 – 24: citation needed.

pg. 5060, Line 5 – 7: sentence needs clarification. Suggested edit: “The E zone represents the typical scenario among the zones within group 1, which regularly exhibit a winter Chl maximum, thus a pelagic seasonality consistent with Longhurst’s (1995) Model 3 (winter-spring production with nutrient limitation). The development of the bloom begins in fall...”

pg. 5061: Line 1 – 3: citation needed regarding the physical properties of these regimes if discussed. Line 6 suggested edit: replace “prominent” with “erratic” or “inconsistent”, as the peaks in H are not more prominent than most of the other regions’. Line 13 correction: “discernible” Line 27 correction: “regimes”

pg. 5064: Lines 7 – 10, citation needed. Lines 18 – 22, citation needed.

References: Palter, J.B., Lozier, M.S., Barber, R.T., 2005. The effect of advection on the nutrient reservoir in the North Atlantic subtropical gyre. Nature 437, 687–692.

Interactive comment on Biogeosciences Discuss., 7, 5047, 2010.