Supplement of Atmos. Meas. Tech., 9, 3939–3967, 2016
http://www.atmos-meas-tech.net/9/3939/2016/
doi:10.5194/amt-9-3939-2016-supplement

Atmospheric Measurement Techniques
Open Access
EGU

Supplement of

New methods for the retrieval of chlorophyll red fluorescence from hyperspectral satellite instruments: simulations and application to GOME-2 and SCIAMACHY

Joanna Joiner et al.

Correspondence to: Joanna Joiner (joanna.joiner@nasa.gov)

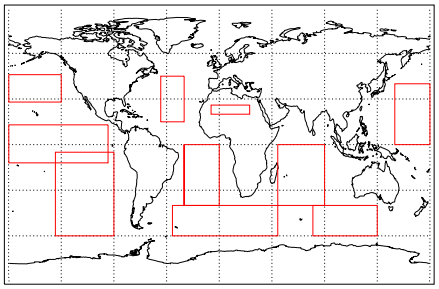
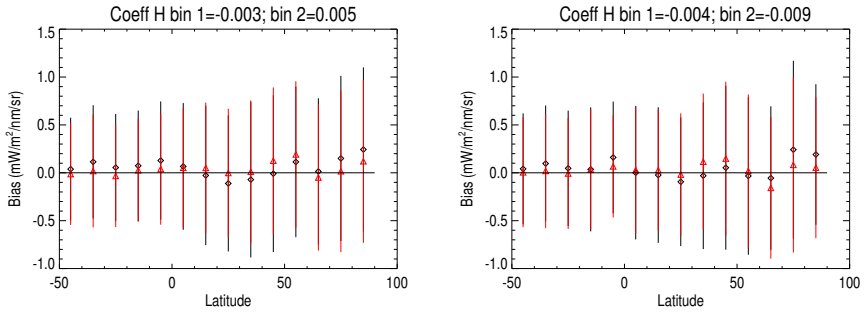
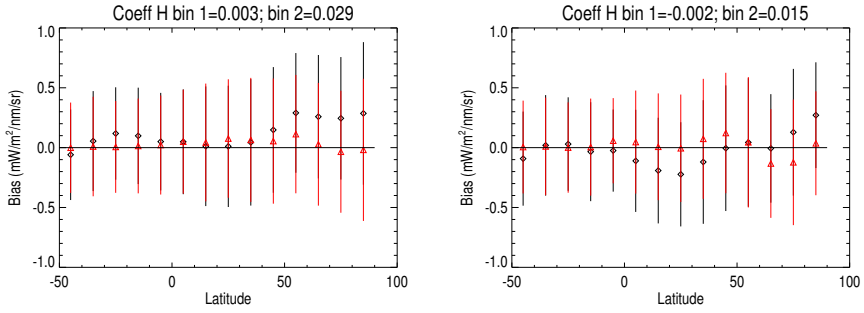


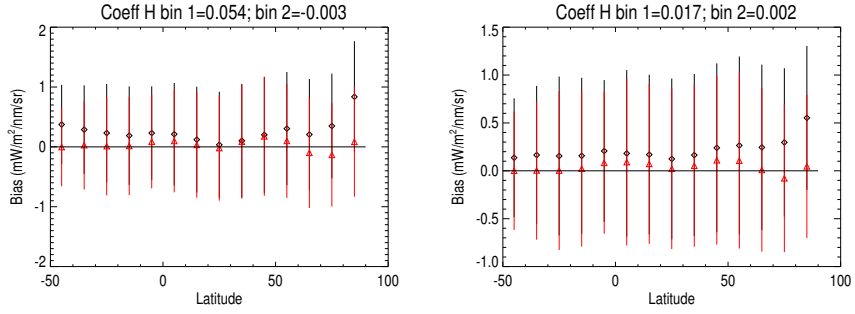
Figure S1. Regional boxes used for principal component analyses (PCA).



(a) SCIAMACHY biases over ocean (black with diamonds: before bias adjustment; red with triangles: after adjustment) for solar line retrievals for July 15 (left) and July 31 (right) 2007. Symbols denote mean bias and error bars are the standard devations. Bins 1 and 2 refer to latitude bins between 0-90N and 0-90S, respectively.

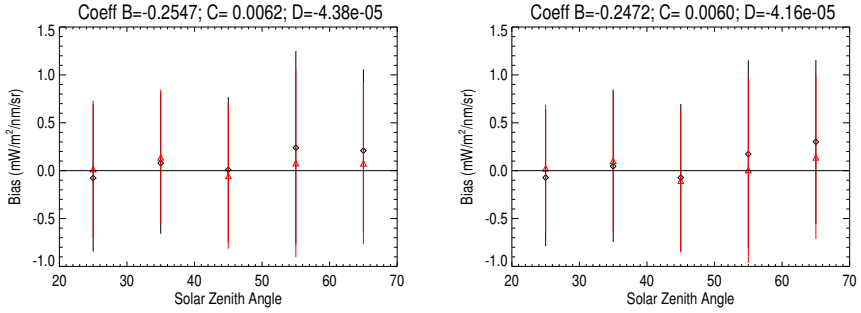


(b) Similar to (a) but for SCIAMACHY O_2 band retrievals.

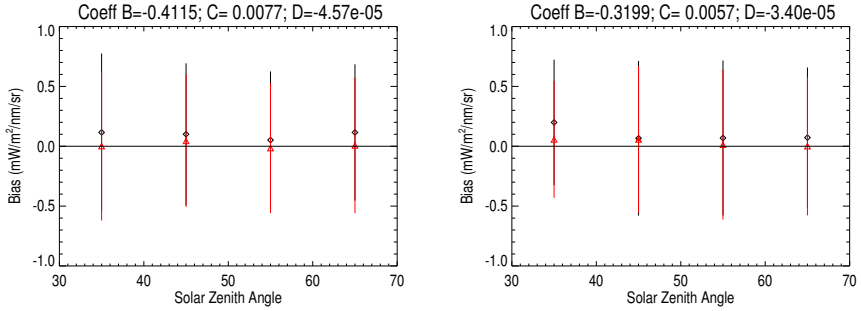


(c) Similar to (b) but for GOME-2. Bins 1-3 refer to latitude bins between 40-90N (bin 1), 40S-40N (bin 2), and 40S-90S (bin 3).

Figure S2. SCIAMACHY (upper two panels) and GOME-2 (lower panel) biases over ocean as a function of latitude before (black) and after (red) zero-level adjustment for July 15 (left) and July 31 (right) 2007.

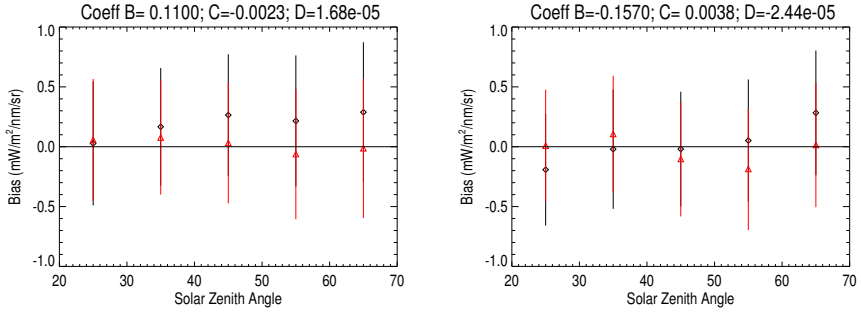


(a) SCIAMACHY solar line retrieval biases over ocean (black with diamonds: before bias adjustment; red with triangles: after adjustment) for latitude bin 1 (0–90N) for July 15 (left) and July 31 (right) 2007. Symbols denote mean biases and error bars are the standard deviations.

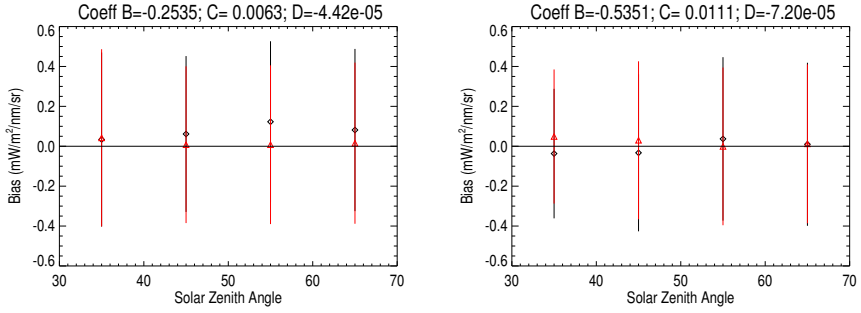


(b) Similar to (a) but for latitude bin 2 (0–90S).

Figure S3. SCIAMACHY solar line retrieval biases over ocean as a function of solar zenith angle before (black) and after (red) zero-level adjustment for July 15 (left) and July 31 (right) 2007 and two latitude bins (top and bottom).

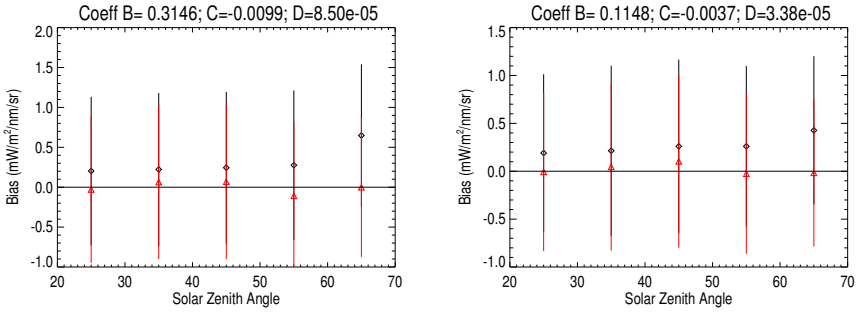


(a) SCIAMACHY O_2 band retrieval biases over ocean (black with diamonds: before bias adjustment; red with triangles: after adjustment) for latitude bin 1 (0–90N) for July 15 (left) and July 31 (right) 2007. Symbols denote mean biases and error bars are the standard deviations.

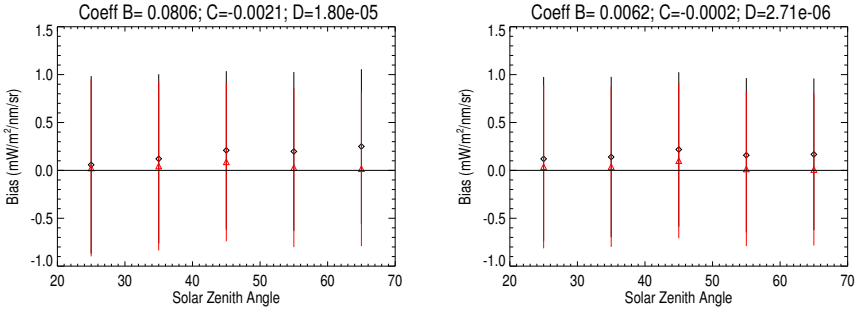


(b) Similar to (a) but for latitude bin 2 (0–90S).

Figure S4. SCIAMACHY O_2 band retrieval biases over ocean as a function of solar zenith angle before (black) and after (red) zero-level adjustment for July 15 (left) and July 31 (right) 2007 and two latitude bins (top and bottom).

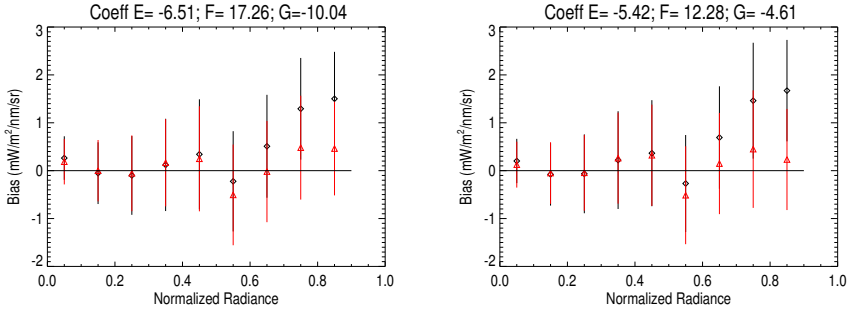


(a) GOME-2 O_2 band retrieval biases over ocean (black with diamonds: before bias adjustment; red with triangles: after adjustment) for latitude bin 1 (40N-90N) for July 15 (left) and July 31 (right) 2007. Symbols denote mean biases and error bars are the standard deviations.

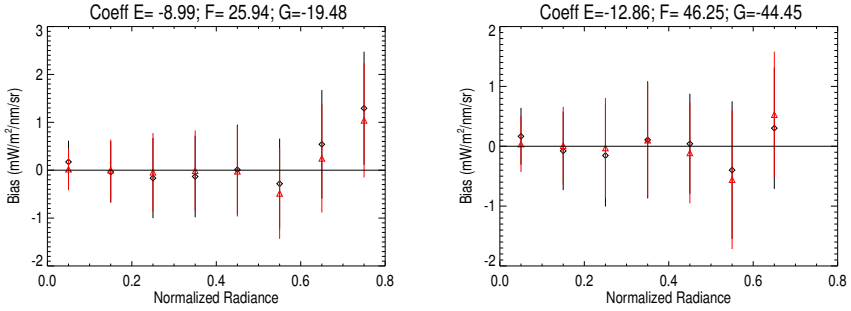


(b) Similar to (a) but for latitude bin 2 (40S-40N).

Figure S5. GOME-2 biases over ocean as a function of solar zenith angle (SZA) before (black) and after (red) zero-level adjustment for July 15 (left) and July 31 (right) 2007 and two latitude bins (top and bottom). The third latitude bin for GOME-2 is not shown because it contains only high SZAs.

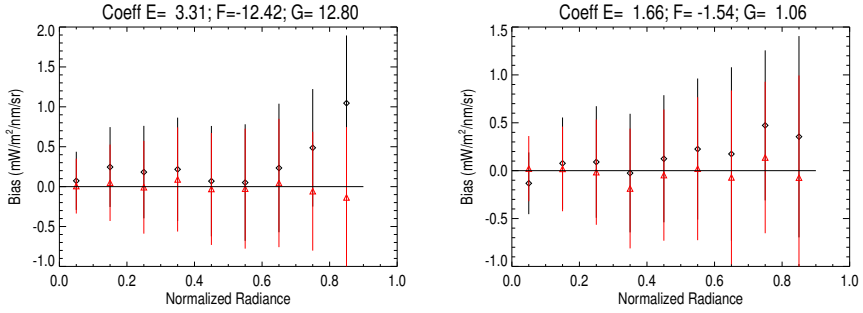


(a) SCIAMACHY solar line retrieval biases over ocean (black with diamonds: before bias adjustment; red with triangles: after adjustment) for latitude bin 1 (40N-90N) for July 15 (left) and July 31 (right) 2007. Symbols denote mean biases and error bars are the standard deviations.

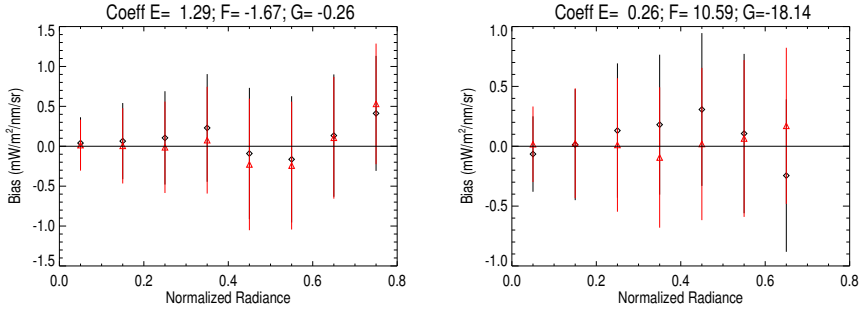


(b) Similar to (a) but for latitude bin 2 (40S-40N).

Figure S6. SCIAMACHY solar line retrieval biases over ocean as a function of radiance (normalized, arbitrary units) before (black) and after (red) zero-level adjustment for July 15 (left) and July 31 (right) 2007 and two latitude bins (top and bottom).

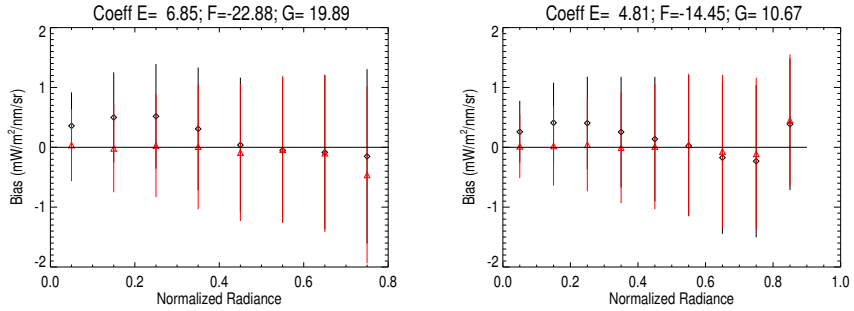


(a) SCIAMACHY O_2 band retrieval biases over ocean (black with diamonds: before bias adjustment; red with triangles: after adjustment) for latitude bin 1 (40N-90N) for July 15 (left) and July 31 (right) 2007. Symbols denote mean biases and error bars are the standard deviations.

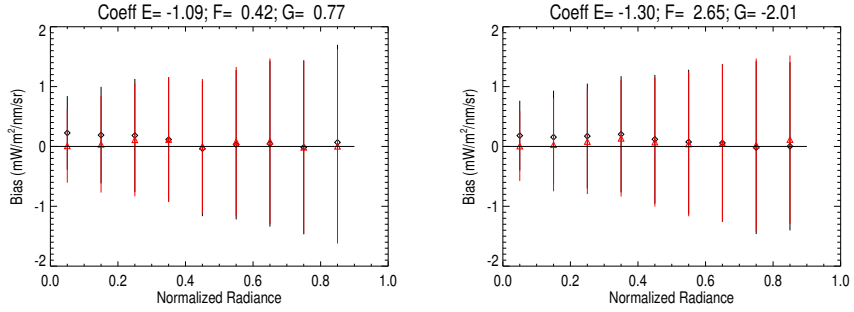


(b) Similar to (a) but for latitude bin 2 (40S-40N).

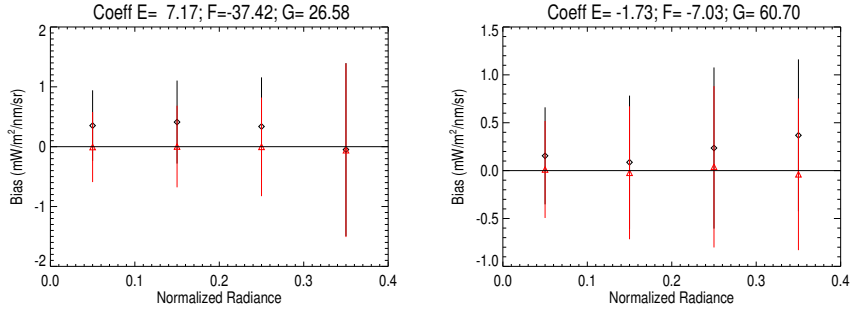
Figure S7. SCIAMACHY O_2 band retrieval biases over ocean as a function of radiance (normalized, arbitrary units) before (black) and after (red) zero-level adjustment for July 15 (left) and July 31 (right) 2007 and two latitude bins (top and bottom).



(a) GOME-2 O_2 band retrieval biases over ocean (black with diamonds: before bias adjustment; red with triangles: after adjustment) for latitude bin 1 (40N-90N) for July 15 (left) and July 31 (right) 2007. Symbols denote mean biases and error bars are the standard deviations.

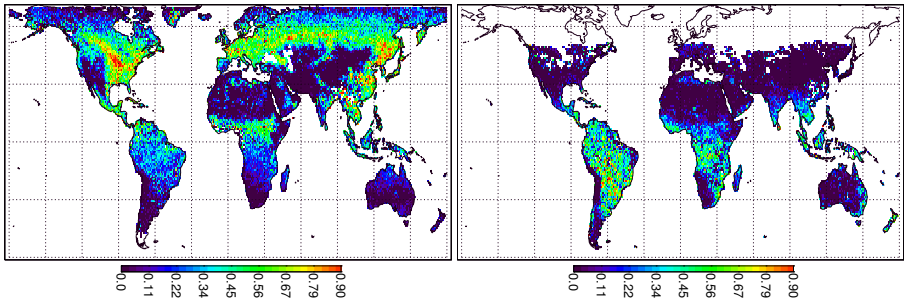


(b) Similar to (a) but for latitude bin 2 (40S-40N).

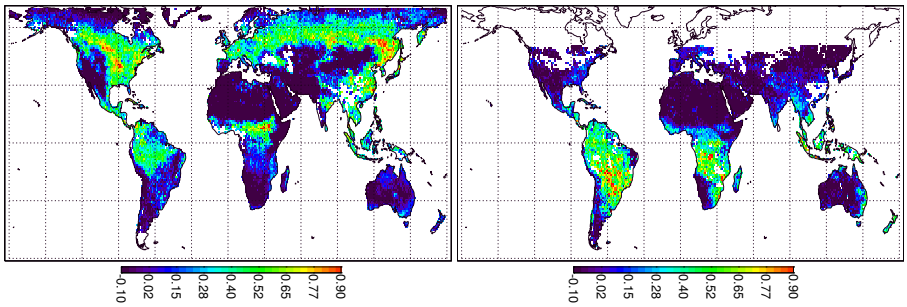


(c) Similar to (b) but for latitude bin 3 (40S-90S).

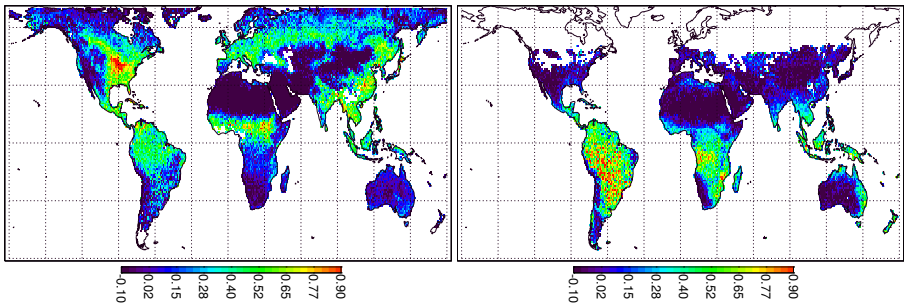
Figure S8. GOME-2 O_2 band retrieval biases over ocean as a function of radiance (normalized, arbitrary units) before (black) and after (red) zero-level adjustment for July 15 (left) and July 31 (right) 2007 and three latitude bins (top, middle, and bottom).



(a) SCIAMACHY retrievals using fitting window 682-686.6 nm

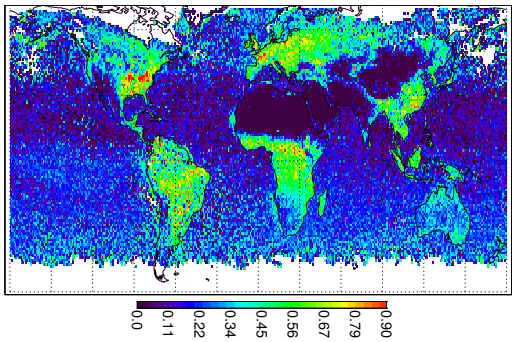


(b) Similar to (a) but using fitting windows in O_2 γ- and B-bands.

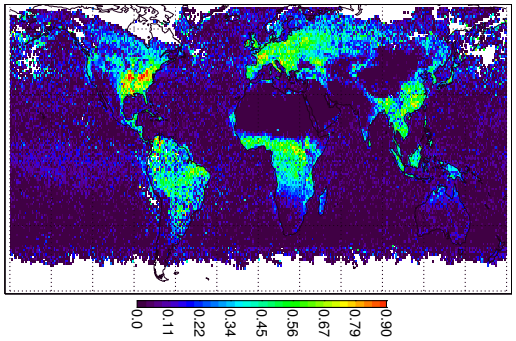


(c) Similar to (b) but using GOME-2.

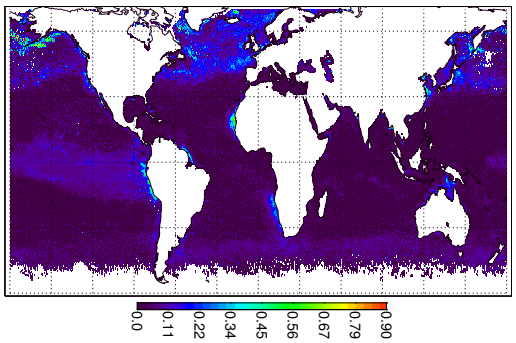
Figure S9. Global composites of red SIF from SCIAMACHY and GOME-2 binned in 1° cell boxes with zero-level adjustment for July (left) and December (right) 2007.



(a) GOME-2 uncorrected O_2 band red SIF retrievals.



(b) GOME-2 corrected O_2 band red SIF retrievals.



(c) GOME-2 full band ocean FLH retrieval (no correction).

Figure S10. Monthly mean fluorescence from different retrievals with and without corrections as noted in mW/m^2/sr/nm for May 2007 gridded to spatial resolutions of 0.5° in (c) and 1° resolution in (a) and (b).