Supplement of Biogeosciences Discuss., 11, 8485–8529, 2014
http://www.biogeosciences-discuss.net/bgd-11-8485-2014/
doi:10.5194/bgd-11-8485-2014-supplement

Biogeosciences
Discussions
Open Access

Supplement of

Evaluating the ocean biogeochemical components of earth system models using atmospheric potential oxygen (APO) and ocean color data

C. D. Nevison et al.

Correspondence to: C. D. Nevison (cynthia.nevison@colorado.edu)

Evaluating the ocean biogeochemical components of earth system models using atmospheric potential oxygen (APO) and ocean color data

Supplemental Material

Evaluation of 9 ATMs participating in both the T3L2 and APO Transcom experiments, in which the seasonal cycle in atmospheric potential oxygen (APO) at a variety of northern and southern monitoring sites is estimated using the pulse-response code (PRC) described above and from APO Transcom forward simulations (FS). All simulations are forced by monthly mean air-sea O_2 and N_2 fluxes from the climatology of *Garcia and Keeling* [2001].

Table S1. Mean values of the correlation coefficient R and the ratio of standard deviations: σ_{prc}/σ_{fs},, representing the PRC vs. FS correlation in the shape and phase and the amplitude ratio, respectively, of the seasonal cycle in APO among 6 extratropical monitoring sites in the Southern Hemisphere (spo, syo, psa, mqa, cgo, ams) and 5 extratropical sites in the Northern Hemisphere (ljo, sbl, cba, brw, alt) – see also Figure S1. For σ_{prc}/σ_{fs},, the standard deviation among stations (in parentheses) is given.

ATM	Correlation Coefficient R		σ_{prc}/σ_{fs}	
	>25°N	>-25°S	>25°N	>-25°S
GCTM	0.98	0.99	0.89 (0.22)	0.91 (0.10)
GISS:UCB	0.99	1.00	0.87 (0.18)	0.91 (0.05)
JMA	0.98	1.00	1.00 (0.13)	1.00 (0.07)
MATCH:NCEP	0.97	0.98	1.01 (0.18)	1.11 (0.17)
MATCH:MACCM	0.99	1.00	0.80 (0.18)	0.86 (0.05)
NIES	0.99	1.00	0.81 (0.13)	0.86 (0.07)
NIRE	0.99	1.00	0.66 (0.08)	0.73 (0.09)
TM2	0.98	1.00	0.87 (0.11)	0.86 (0.08)
TM3	0.97	1.00	0.80 (0.18)	0.91 (0.06)
Model Mean	0.99	1.00	0.84 (0.14)	0.91 (0.08)

Table S2. Correlation coefficient R and ratio of standard deviations: σ_{prc}/σ_{fs},, representing the PRC vs. FS correlation in the shape and phase and the amplitude ratio, respectively, of the seasonal cycle in APO at 13 selected monitoring sites. The mean and standard deviation (for σ_{prc}/σ_{fs},, in parentheses) among the 9 ATMs participating in the APO Transcom experiment are given.

Station	Code	Lat.	Long.	Elev. (m)	R	σ_{prc}/σ_{fs}
Alert	ALT	82.5	-62.5	210	0.99	0.95 (0.12)
Barrow Alaska	BRW	71.3	-156.6	11	0.98	0.96 (0.10)
Cold Bay Alaska	CBA	55.2	-162.7	25	0.98	0.66 (0.11)
Sable Island Nova Scot.	SBL	43.9	-60.0	5	0.98	0.77 (0.11)
La Jolla CA	LJO	32.9	-117.3	16	0.98	0.93 (0.19)
Kumukahi HA	KUM	19.5	-154.8	3	0.97	1.20 (0.17)
Samoa	SMO	-14.3	-170.6	42	0.97	0.78 (0.07)
Amsterdam Island	AMS	-38.0	77.5	150	1.00	0.88 (0.10)
Cape Grim Tasmania	CGO	-40.7	144.7	94	1.00	0.82 (0.08)
Macquarie Island	MQA	-54.5	159.0	12	1.00	0.89 (0.09)
Palmer Antarctica	PSA	-64.9	-64.0	10	0.99	1.04 (0.14)
Syowa Antarctica	SYO	-69.0	39.6	11	0.99	0.93 (0.11)
South Pole	SPO	-90.0	-24.8	2830	1.00	0.88 (0.11)

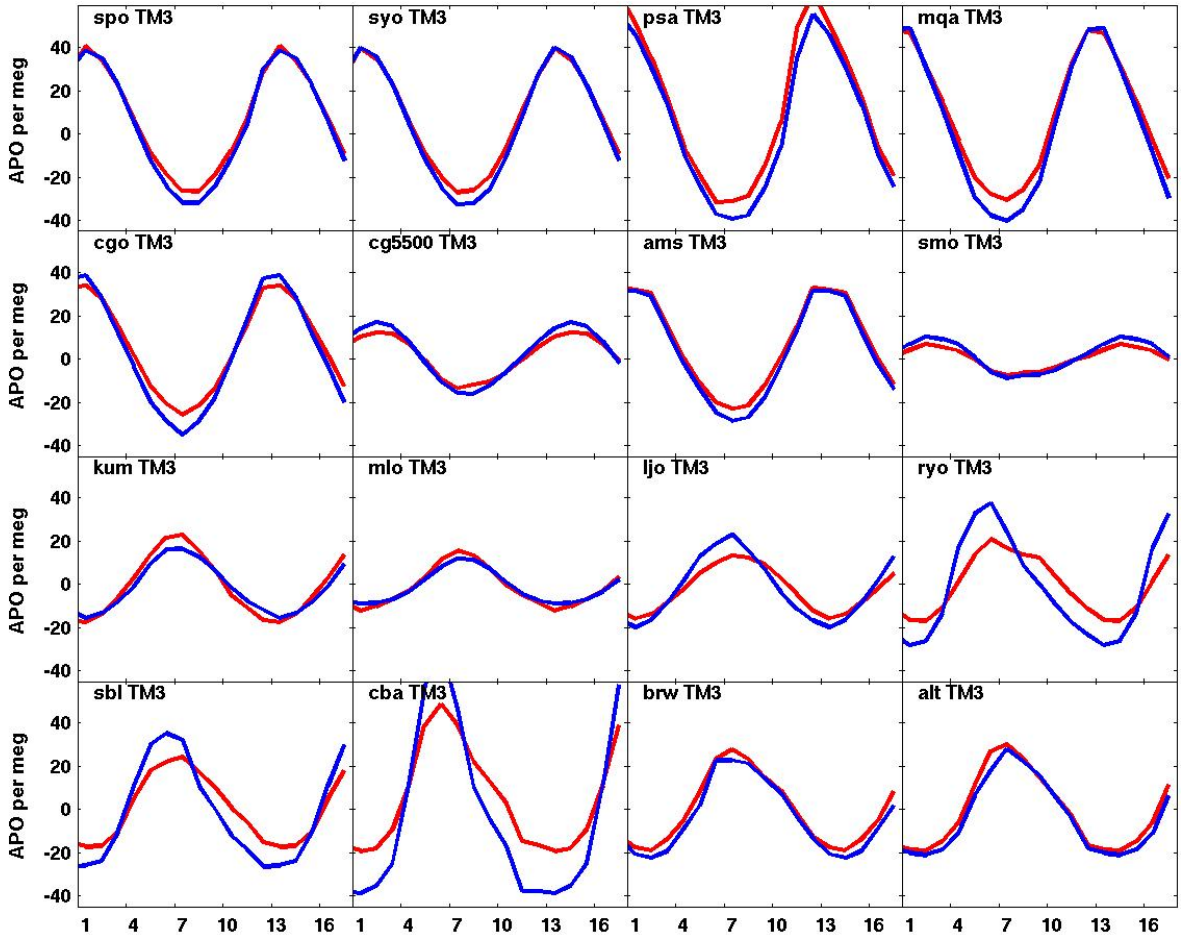

Figure S1. Mean seasonal cycle in atmospheric APO produced by forcing the TM3 atmospheric transport model with monthly mean O_2 and N_2 fluxes from the monthly flux climatology of *Garcia and Keeling* [2001]. Archived results from T3L2 GCTM forward simulations from the APO Transcom experiment (blue) are compared to estimates using the GCTM variant of the pulse-response code (red) at 16 stations: spo (South Pole), syo (Syowa), psa (Palmer Station), mqa (Macquarie), cgo (Cape Grim surface), cgo5500 (Cape Grim/Bass Strait 5500m), ams (Amsterdam Island), smo (Samoa), mlo (Mauna Loa), ljo (La Jolla, California), ryo (Ryori), sbl (Sable Island, Canada), cba (Cold Bay, Alaska), brw (Barrow, Alaska), alt (Alert, Greenland).

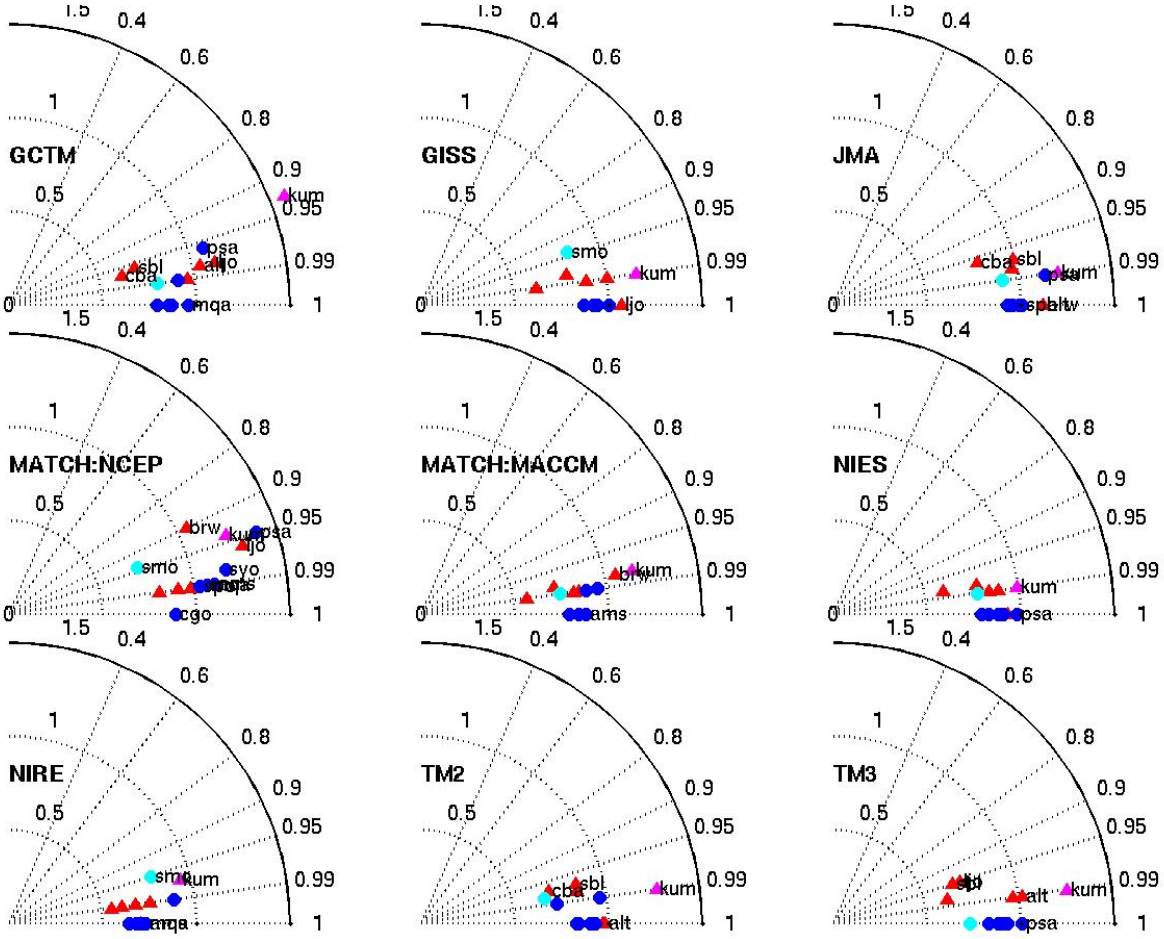

Figure S2. Taylor diagrams illustrating the agreement in phase and amplitude between the pulse-response code and the archived T3L2 forward simulations for the 9 ATMs participating in APO Transcom, forced by monthly mean O_2 and N_2 fluxes from the monthly flux climatology of *Garcia and Keeling* [2001]. The reference point at a radius of 1 and correlation coefficient of 1.0 represents perfect agreement with the forward simulation. Each symbol on the Taylor diagram represents one of 13 sampling sites, color coded by latitude (blue = <-25S, cyan=southern tropical, magenta = northern tropical, red = >25N), which are labeled by 3-letter station code where legibility permits.