

OCTS, MOS, and POLDER Vicarious Calibration Analyses

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SIMBIOS Science Team Meeting

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Sensor Spectral Characterizations

SeaWiFS Band Center (nm)	MOS Band Center (nm)	OCTS Band Center (nm)	POLDER Band Center (nm)	MODIS Band Center (nm)
412	408	412	—	412
443	443	443	443	443
490	485	490	490	490
510	520	520	—	530
555	570	565	565	550
670	685	670	670 [†]	670
765	750	765	765	750
865	868	865	865 [†]	865

[†] Polarized channel.

MS112 Vicarious Calibration

From sensor atmospheric correction

$$\begin{aligned}t^s &= t_{oz}^s t_{ra}^s && \text{surface to sensor transmittance} \\t_0^s &= t_{oz}^s t_{ra}^s && \text{TOA to surface transmittance} \\ \tau_e &= -\ln(t_0^s) \mu_0^s && \text{effective optical thickness}\end{aligned}$$

Normalize in situ L_w to sensor atmosphere

$$nL_w^t = L_w^t / \mu_0^t / \exp(-\tau_e / \mu_0^t) \quad \text{target (in situ) } nL_w$$

Propagate through atmosphere to compute expected TOA Radiance, L_t' .

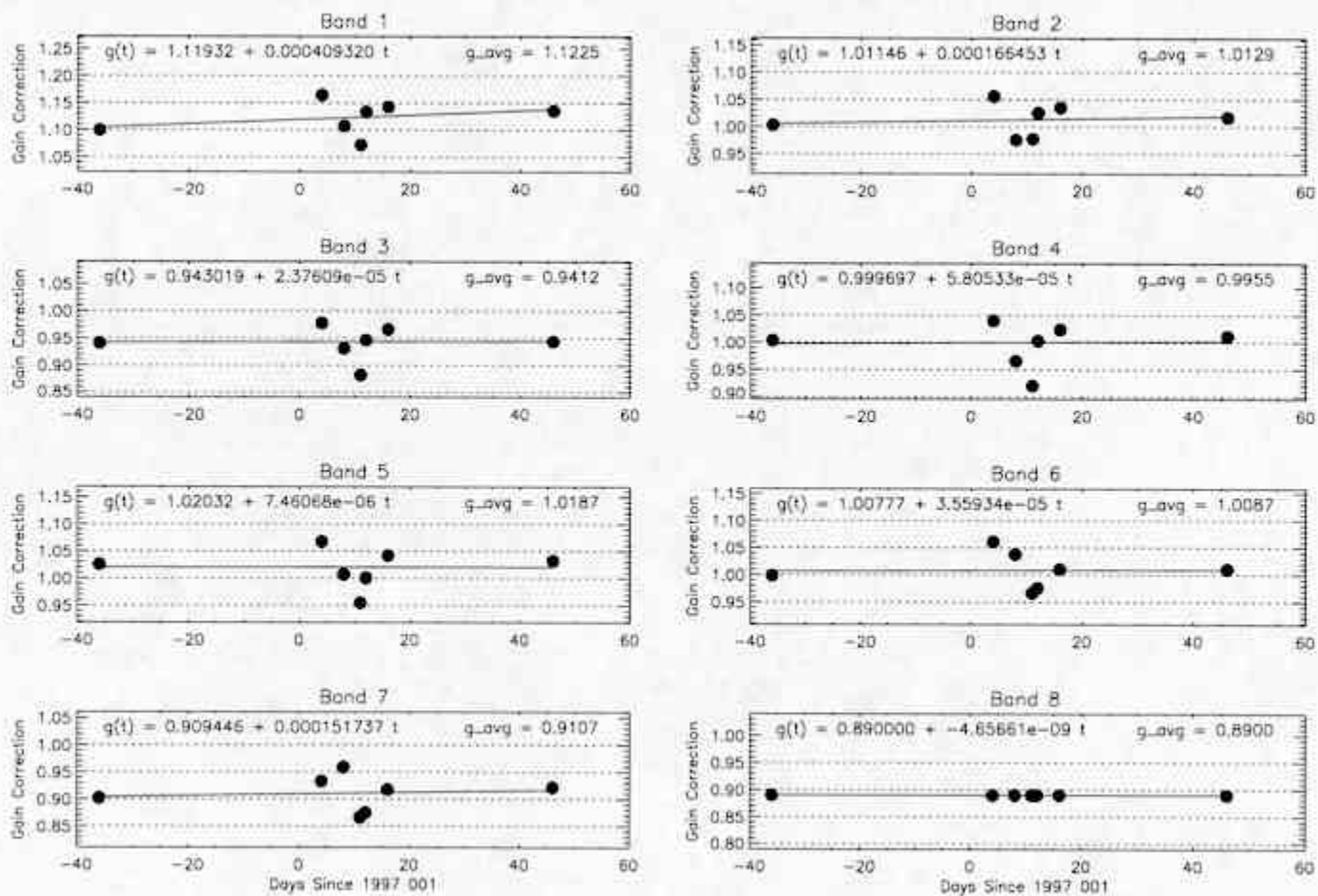
$$\begin{aligned}tL_w' &= (nL_w^t \mu_0^s t_0^s) t^s \\L_t' &= tL_w' + tL_f + (L_a + L_r) t_{oz}^s t_0^s\end{aligned}$$

$$\text{Vicarious Gain} = L_t' / L_t.$$

OCTS Vicarious calibration

- Calibration to MOBY
 - MOBY data provided by Dennis Clark, computed for OCTS band passes
 - OCTS Level-1B data provided by NASDA
- Assuming marine aerosols, 90% RH
- Seven usable match-ups

OCTS Vicarious Calibration to MOBY, M90 Aerosol



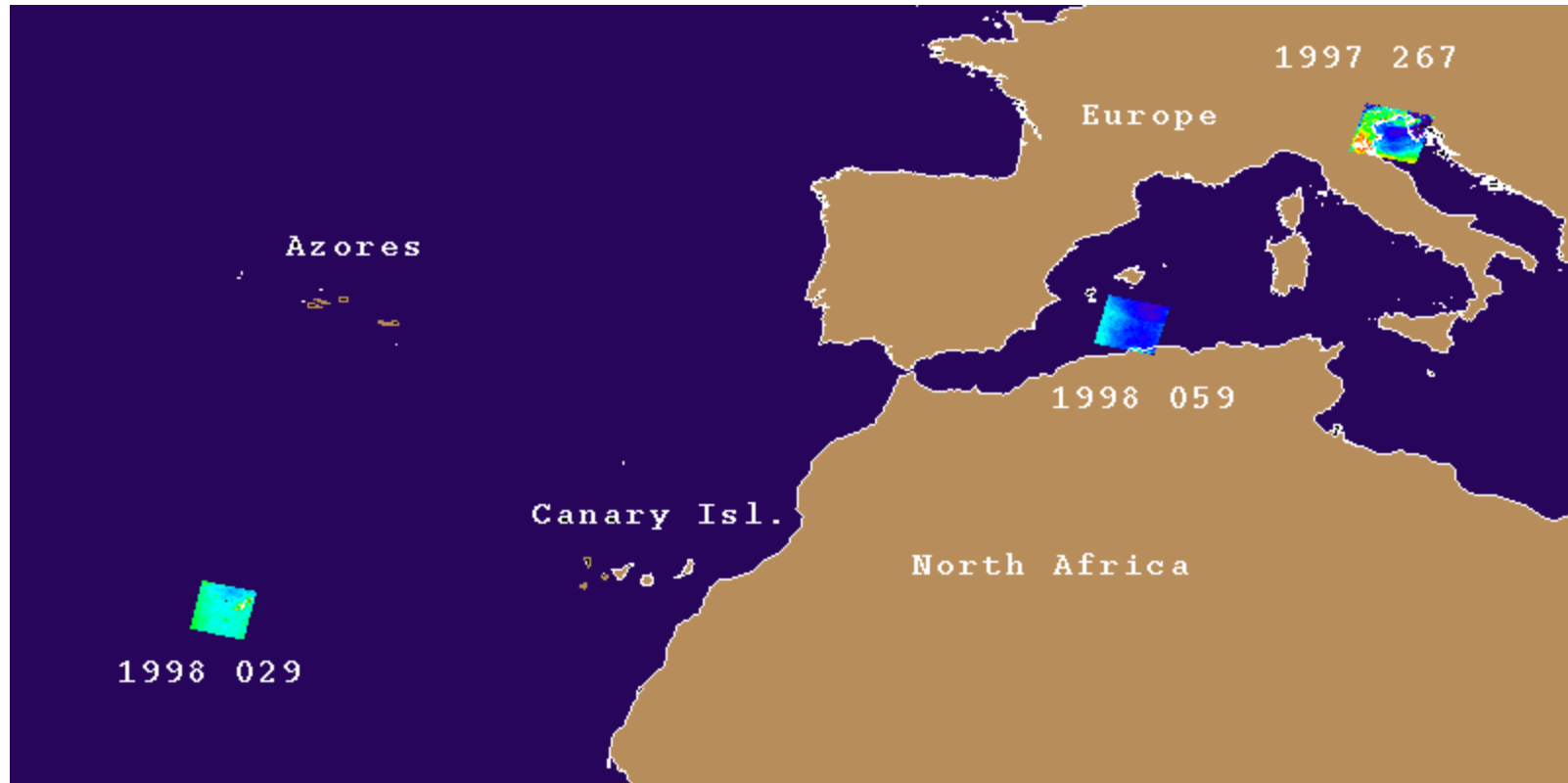
OCTS Vicarious Calibration

Band	NASDA V.4	SIMBIOS
1	1.14	1.13
2	1.03	1.02
3	0.9394	0.946
4	1.00	1.00
5	1.04	1.03
6	1.00	0.99
7	1.02	0.911
8	0.89	0.89

MOS Vicarious Calibration

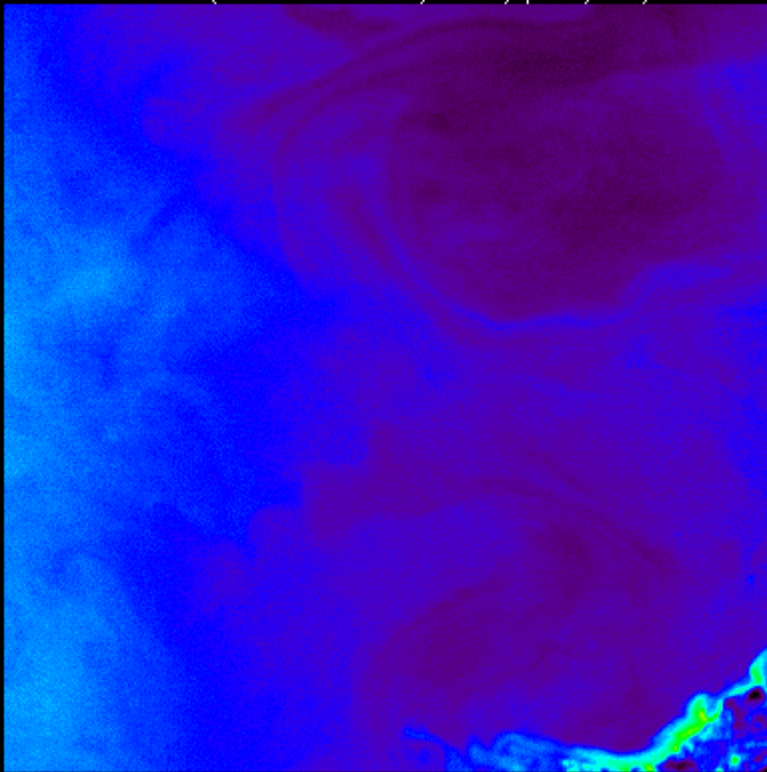
- Calibration to SeaWiFS retrieved nLw and aerosol model type.
- Independent calibration of 384 MOS detectors at each wavelength.
- To be published January 2000:

Wang, M. and Franz, B. A. (1999) Comparing the ocean color measurements between MOS and SeaWiFS: A vicarious intercalibration approach for MOS. *IEEE Trans. Geosci. Remote Sensing*, accepted February 1999.

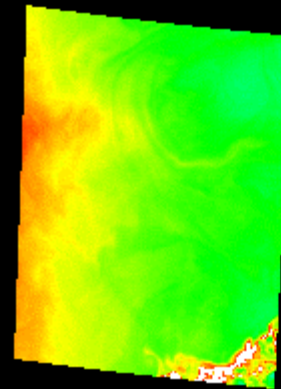


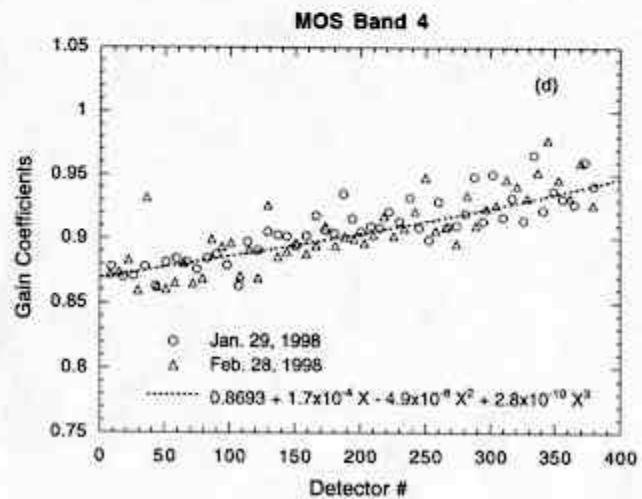
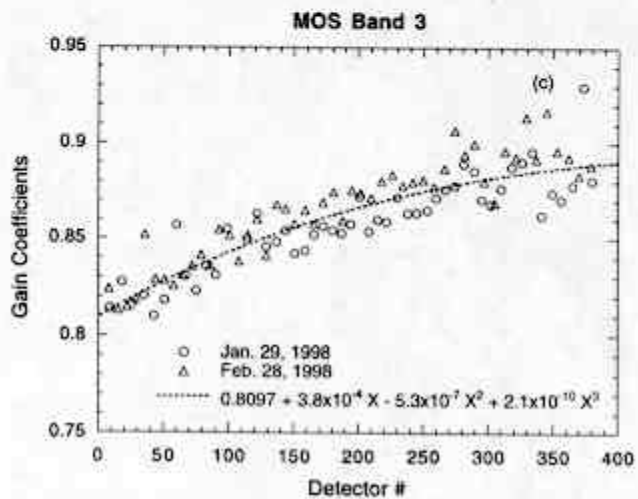
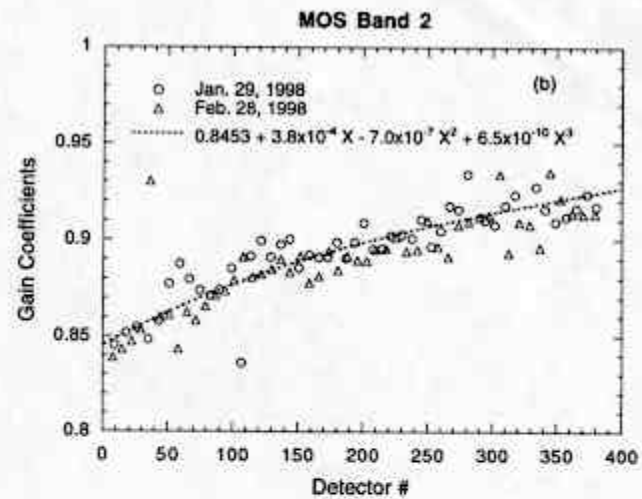
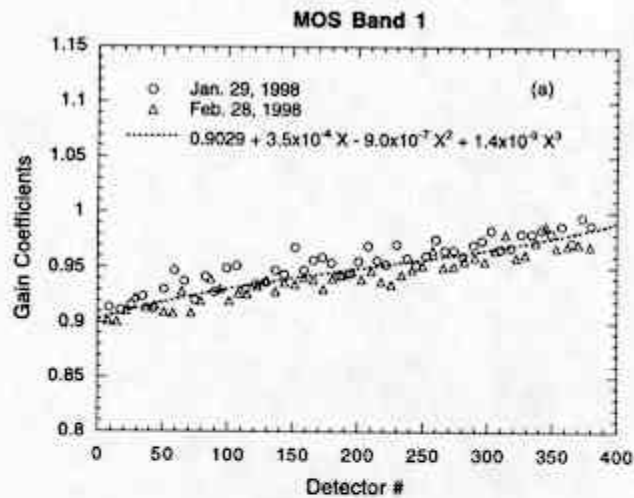
TOA Radiance at 443 nm, 1998 059 (Original Cal, Destriped)

MOS (5.2–7.2 mW/cm²/μm/sr)

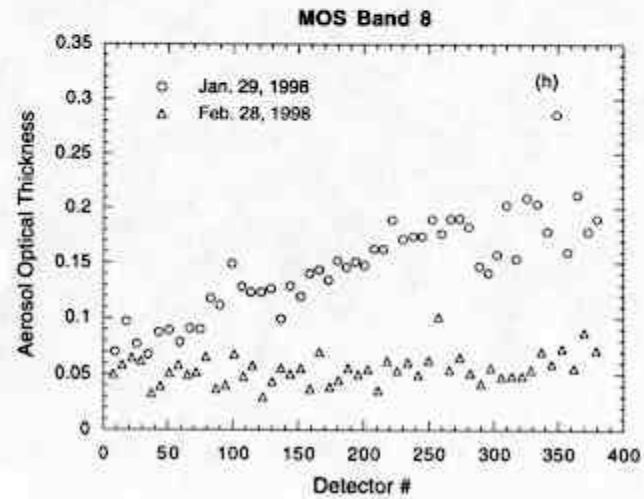
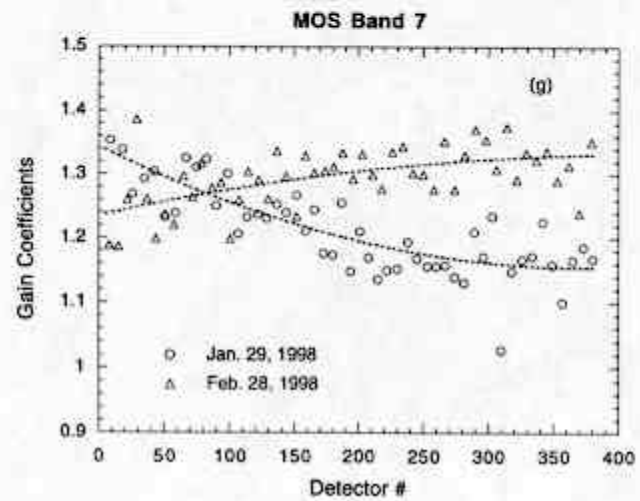
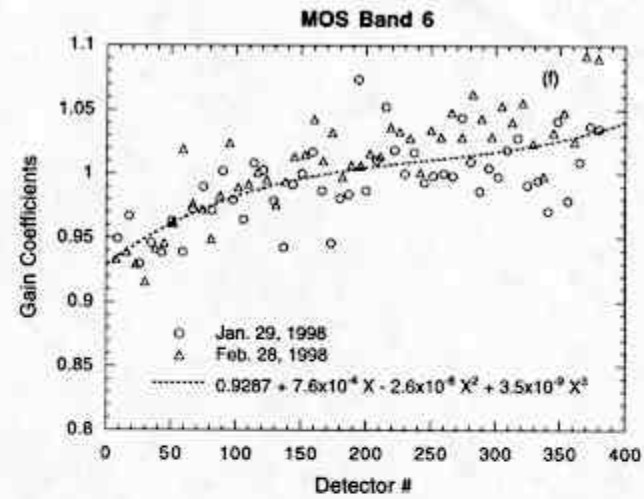
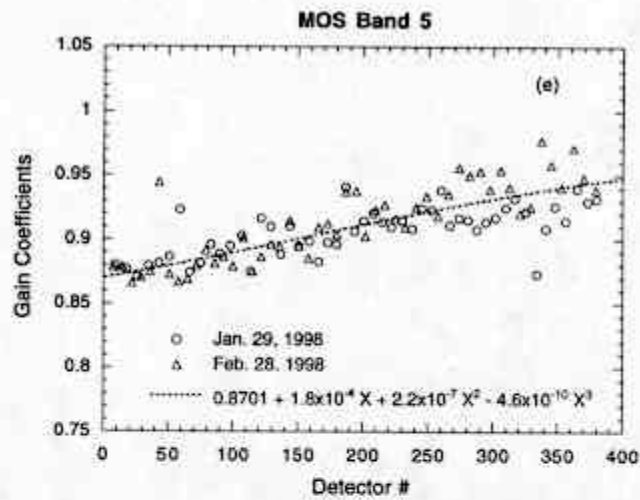


SeaWiFS (5.2–7.2 mW/cm²/μm/sr)

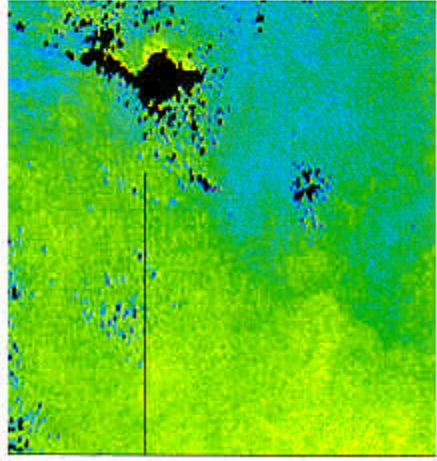




Figs. 4(a)-4(d)



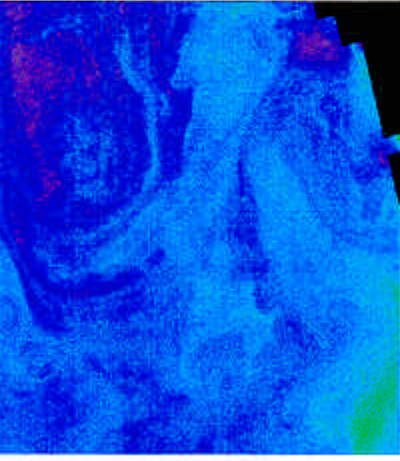
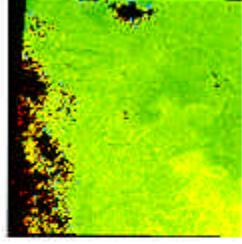
Figs. 4(e)-4(h)



(a)

Atlantic Ocean (Jan. 29, 1998)

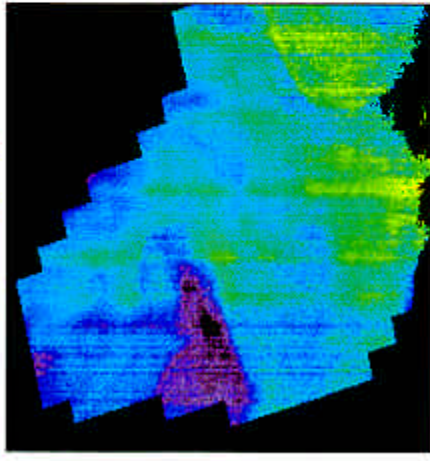
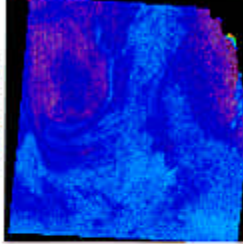
SeaWiFS



(b)

Mediterranean Sea (Feb. 28, 1998)

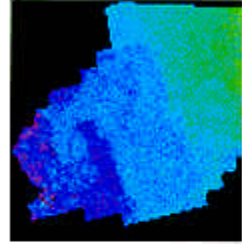
SeaWiFS



(c)

Adriatic Sea (Sep. 24, 1997)

SeaWiFS



[Pw(2)]N (%)

0

3

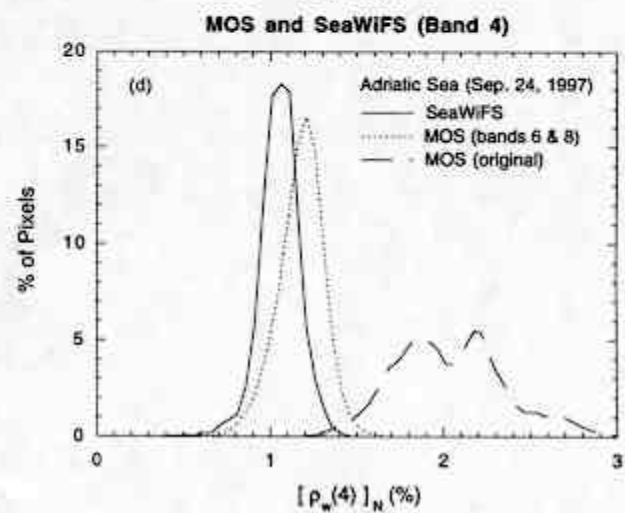
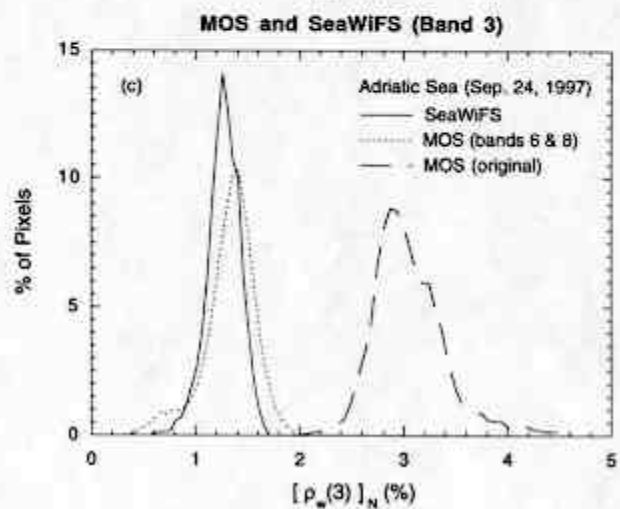
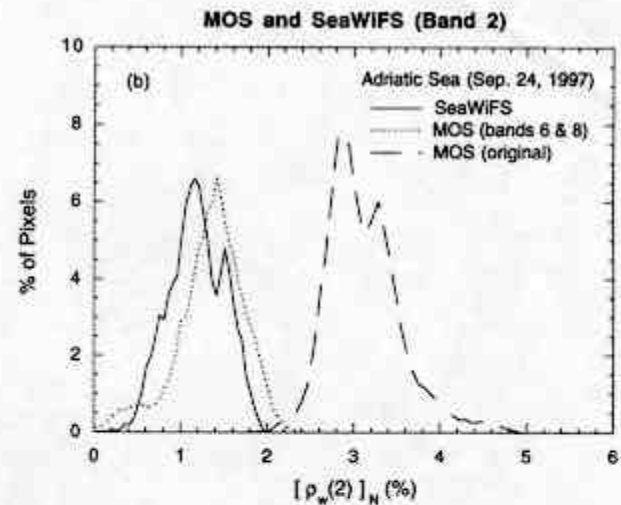
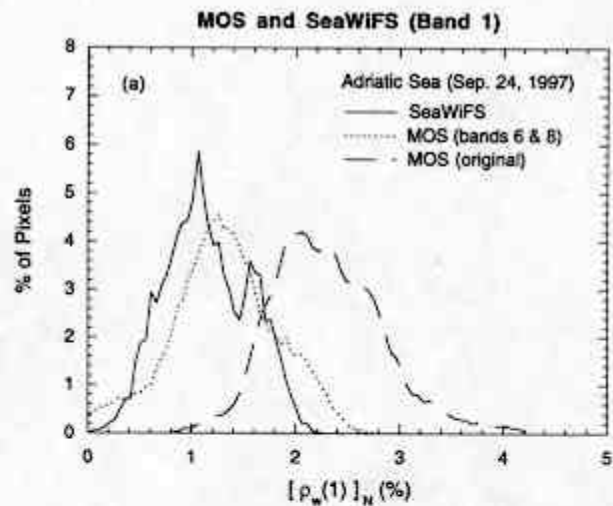


Figure 7.

POLDER Vicarious Calibration

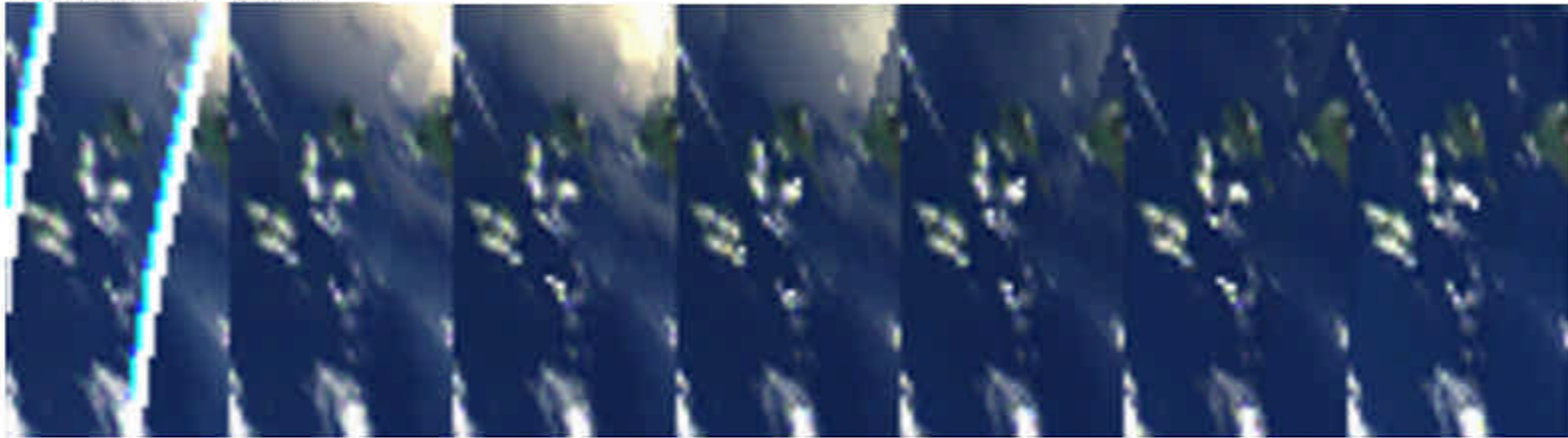
- Calibration to MOBY
 - MOBY data provided by Dennis Clark, computed for OCTS band passes
 - POLDER Level-1B data provided by CNES
- Assuming marine aerosols, 90% RH
- Multiple views treated as independent match-ups
- 11 MOBY scenes yielded 106 match-ups

Polder-MOBY Match-up Scenes

<i>Scene Time</i>			<i>Usable Directions</i>
1996	331	21:01	12
1997	005	21:28	7
1997	009	21:21	12
1997	010	20:54	12
1997	012	21:40	8
1997	013	21:13	12
1997	017	21:06	12
1997	046	21:28	6
1997	047	21:01	12
1997	050	21:21	8
1997	061	21:26	5

Polder Multi-Directional View of MOBY Site
1999 009

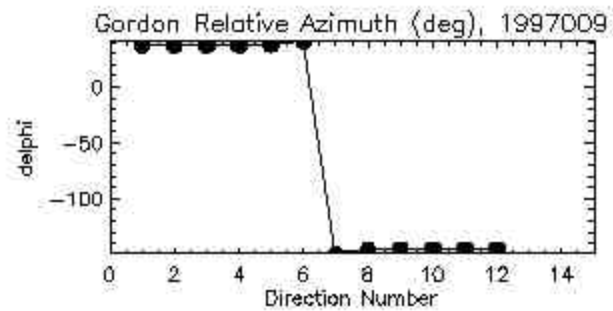
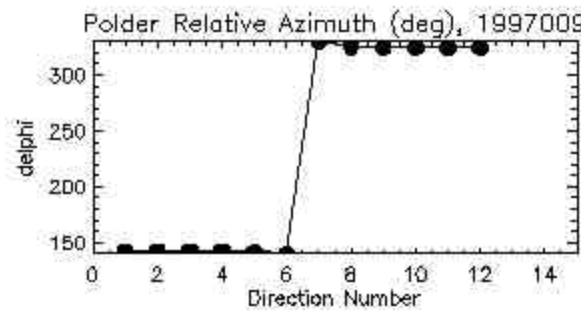
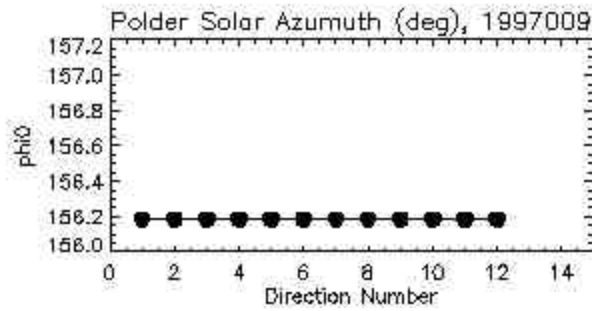
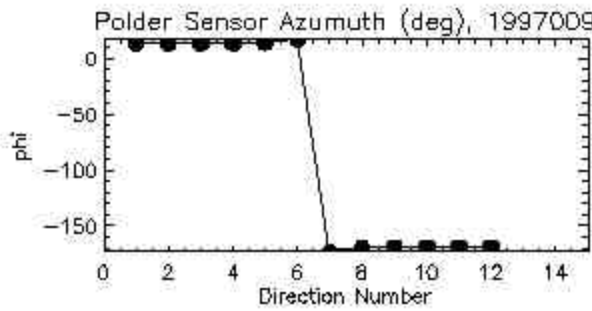
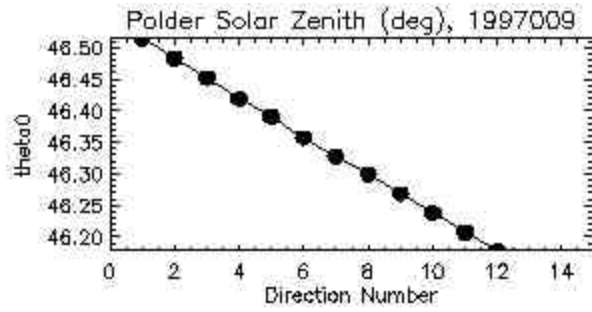
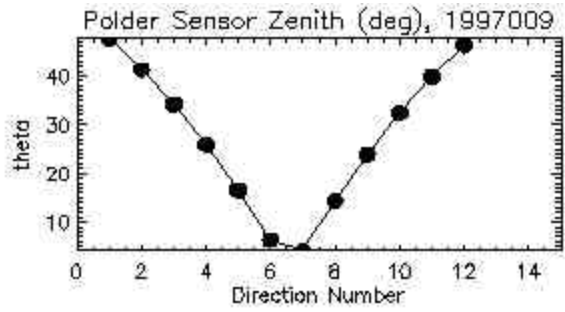
Toward Sun



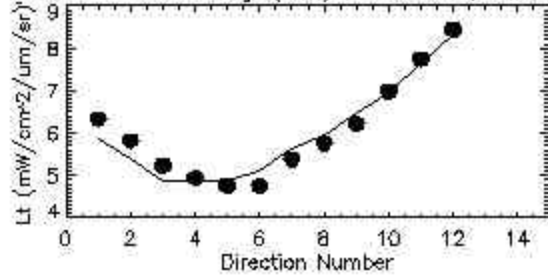
time →



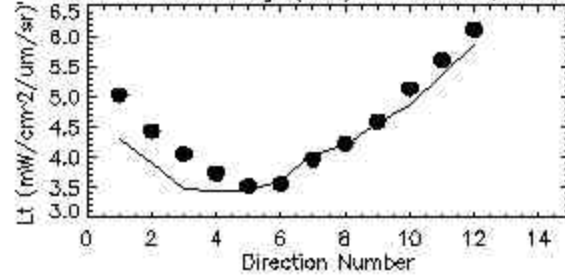
Away from Sun



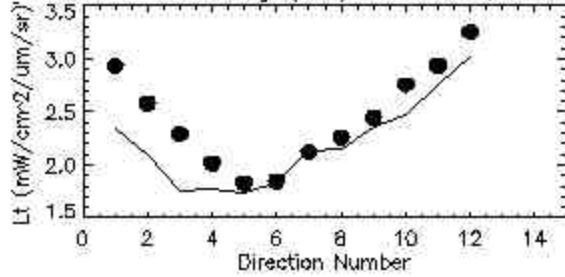
Polder Lt vs Theory (line) at 443nm, 1997009



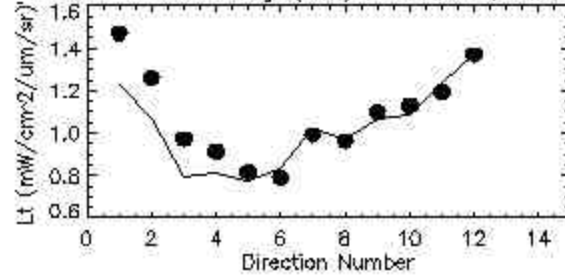
Polder Lt vs Theory (line) at 490nm, 199700



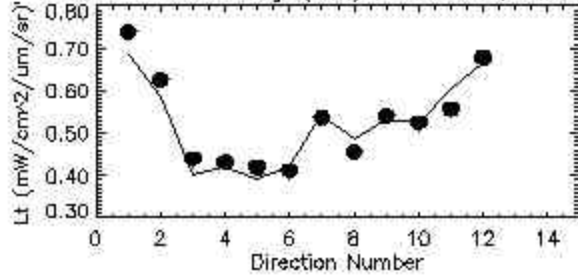
Polder Lt vs Theory (line) at 565nm, 1997009



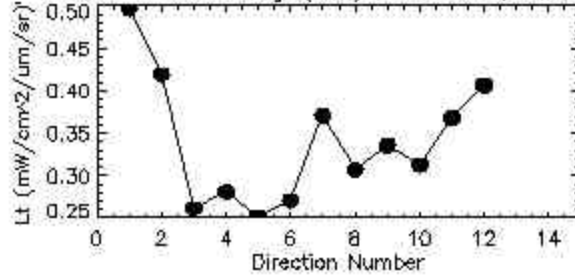
Polder Lt vs Theory (line) at 670nm, 199700

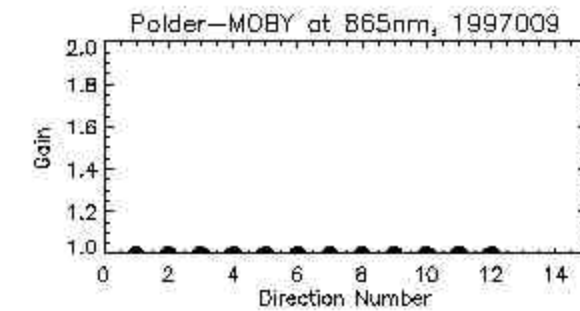
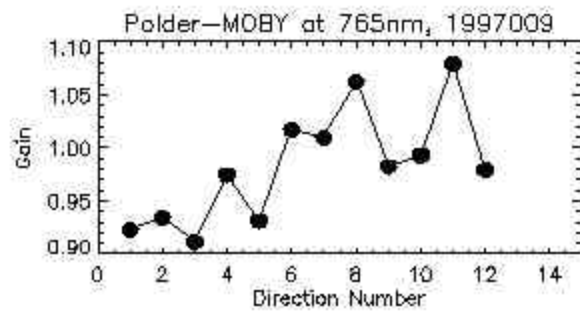
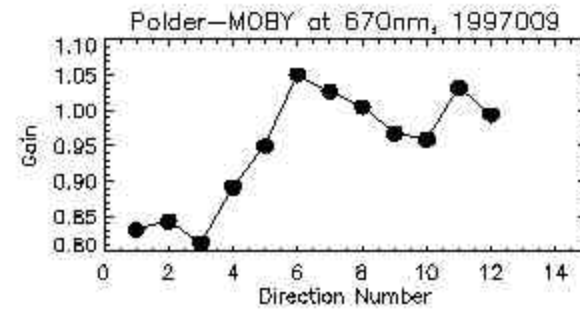
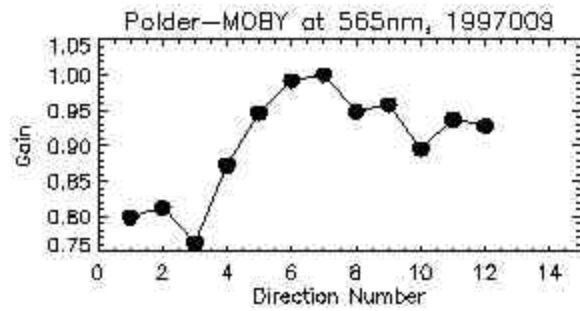
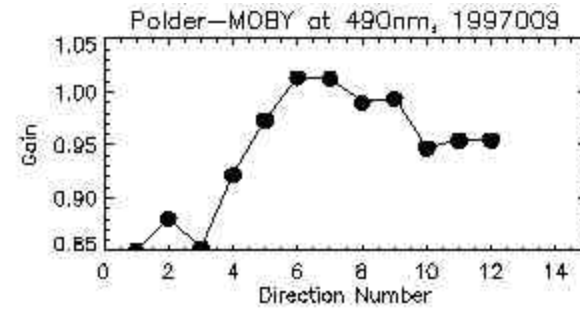
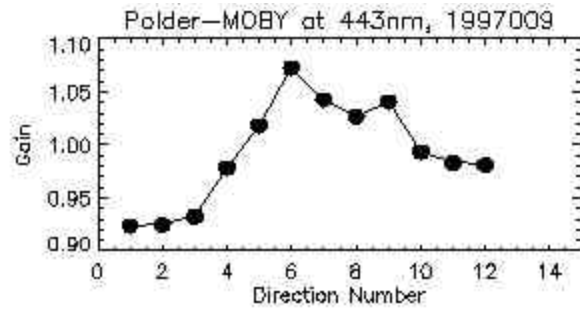


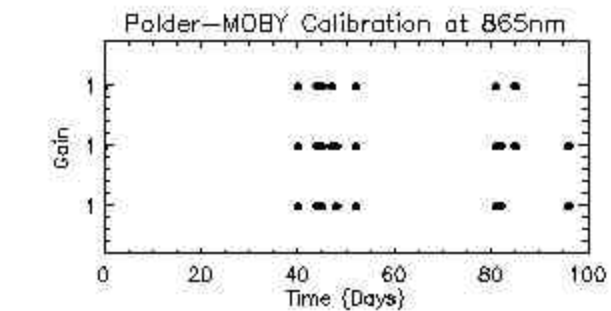
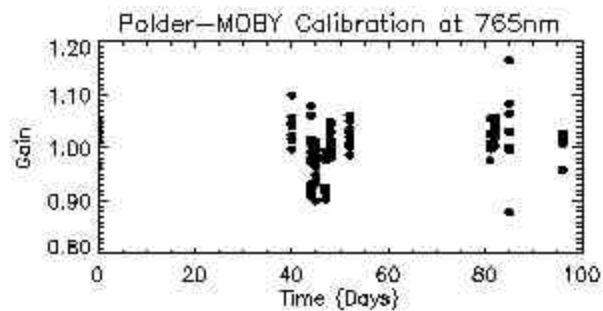
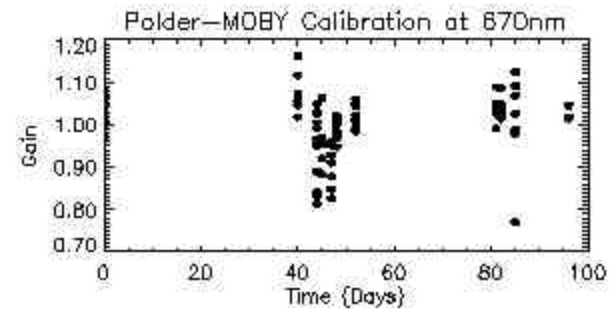
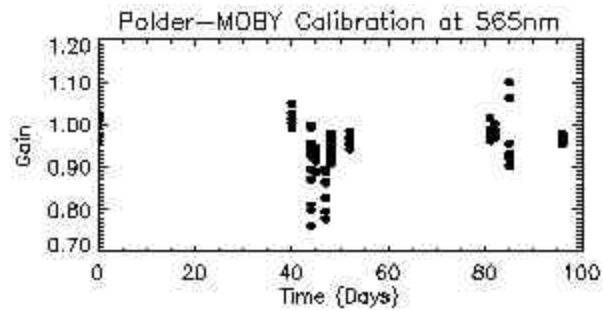
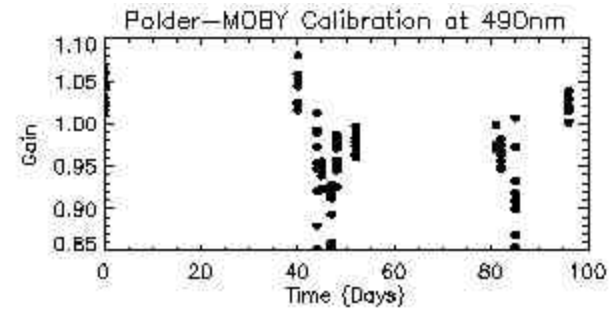
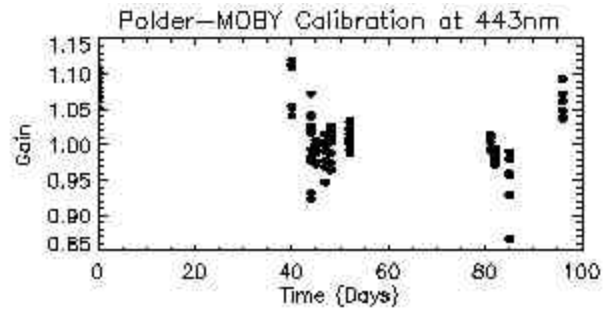
Polder Lt vs Theory (line) at 765nm, 1997009

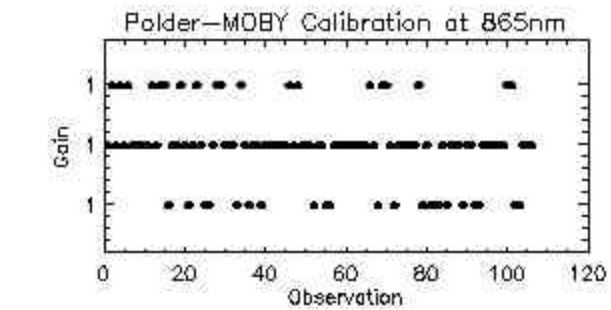
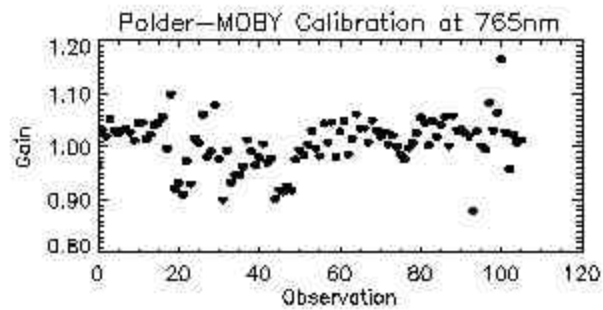
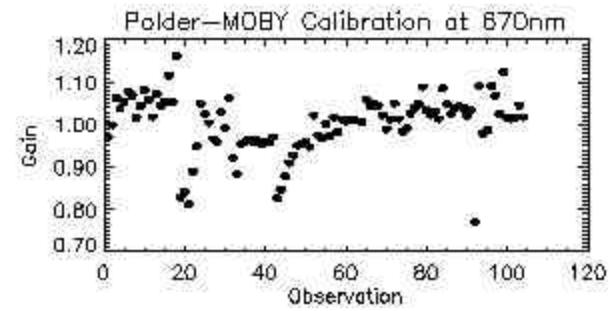
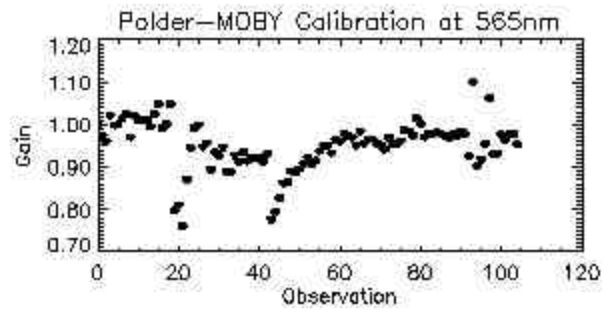
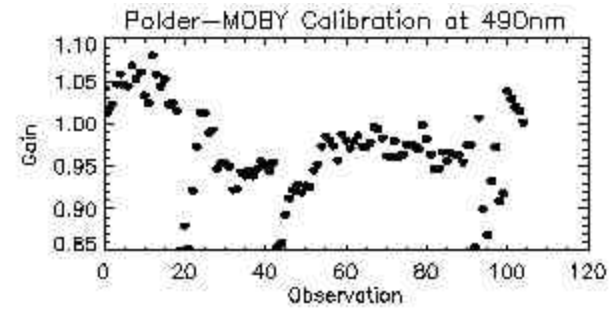
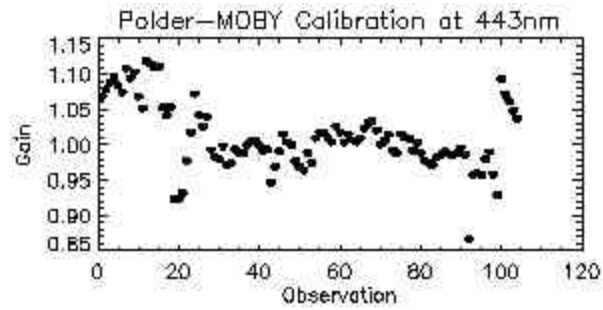


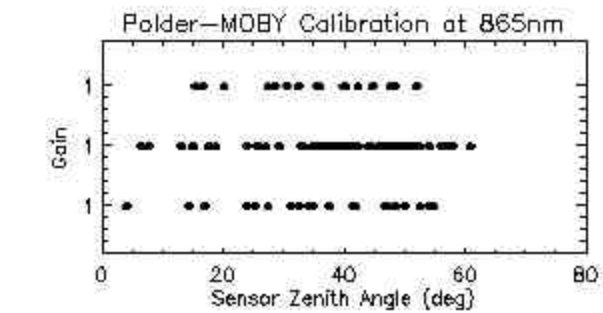
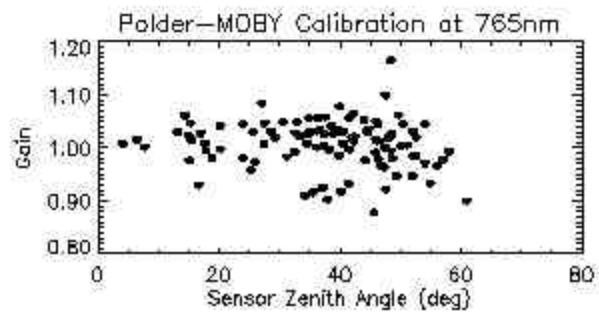
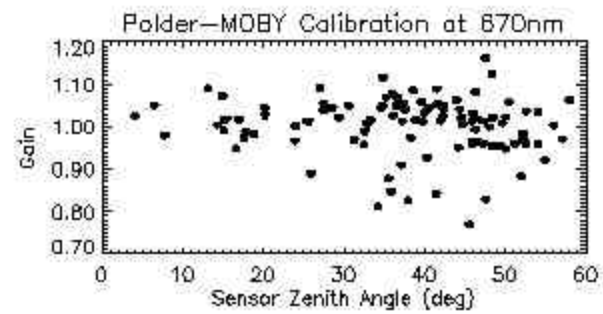
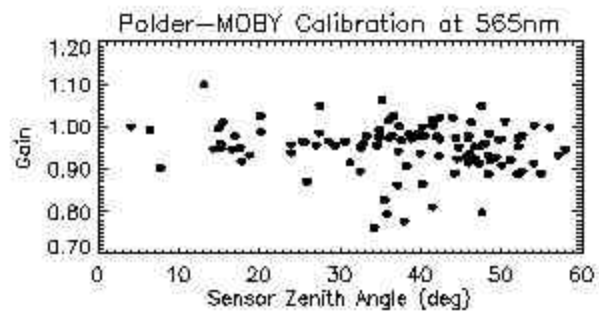
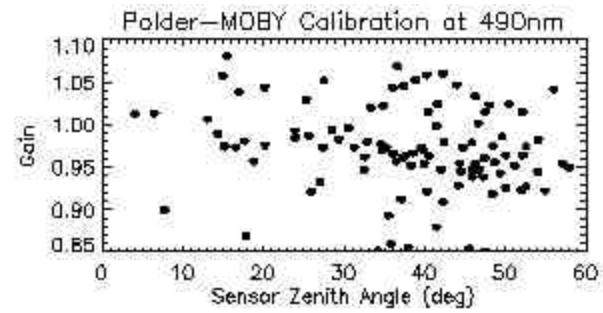
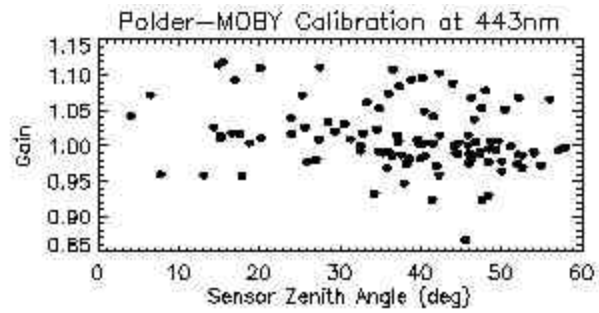
Polder Lt vs Theory (line) at 865nm, 199700











Polder Vicarious Calibration

Band	Polder OC2	SIMBIOS
443	1.072	1.013
490	1.042	0.971
555-565	1.000	0.953
670	1.000	1.004
765	1.000	1.008
865	1.000	1.000

SeaWiFS-MOS-OCTS-POLDER Intercalibration

