Estimated uncertainties in aerosol optical depth, size distribution, complex refractive index, and single scattering albedo

- From Eck et al. JGR, 1999.

		Master	Field
UV	$\Delta\tau_a$	0.009	0.02
VIS-NIR	$\Delta\tau_a$	0.005	0.01

From Dubovik et al. JGR, 2000.

Table 4. Errors in the Size Distribution, Complex Refractive Index, and Single-Scattering Albedo

	Water-Soluble	Dust	Biomass Burning
$dV/d\ln r(r_i)$, %			
0.1 μm < r < 7 μm	15	35	25
r < 0.1 μm and r > 7 μm	15–100	35–100	25–100
$n(\lambda)$			
$\tau_a(440) \le 0.2$	0.05		
$\tau_a(440) > 0.2$	0.025		
$\tau_a(440) \ge 0.5$		0.04	0.04
$k(\lambda)$			
$\tau_a(440) \le 0.2$	80–100%		
$\tau_a(440) > 0.2$	50%		
$\tau_a(440) \ge 0.5$		50%	30%
$\omega_0(\lambda)$			
$\tau_a(440) \le 0.2$	0.05–0.07		
$\tau_a(440) > 0.2$	0.03		
$\tau_a(440) \ge 0.5$		0.03	0.03

Errors should be expected in the retrievals from the combination of spectral optical depth (440, 670, 870, and 1020 nm) and angular distribution of sky radiance in the solar almucantar (440, 670, 870, and 1020 nm; solar zenith angle of 60°) in the presence of the following instrumental offsets: in optical thickness, $\Delta\tau(\lambda) = \pm 0.01$; in sky radiances $I(\Theta;\lambda)$, $[\Delta_I(\Theta;\lambda)/I(\Theta;\lambda)]\ 100\% = \pm 5\%$; in azimuth angle pointing, $\Delta\phi = 0.5°$; and in the a priori estimates of ground reflectance $A(\lambda)$, $[\Delta A(\lambda)/A(\lambda)]\ 100\% = \pm 50\%$.

AERONET Data Flows

Current and future additions

Flux measurements

Sun - λ=340, 380, 440, 500, 670, 870, 940, 1020 nm **+1640 nm (412, 532, 555 nm)**

Sky - λ=440, 670, 870, 1020 nm **+ 500, 1640 nm + ? 340, 380 nm**

Calibration and processing information H_2O, CO_2, CH_4

Aerosol optical depth and precipitable water computations (1020, 1640, 940 nm) + extra τ_a(1020 nm)

Cloud screening and quality control

Inversion products

Almucantar retrievals - spherical and spheroid models (4 wavelengths), level 2

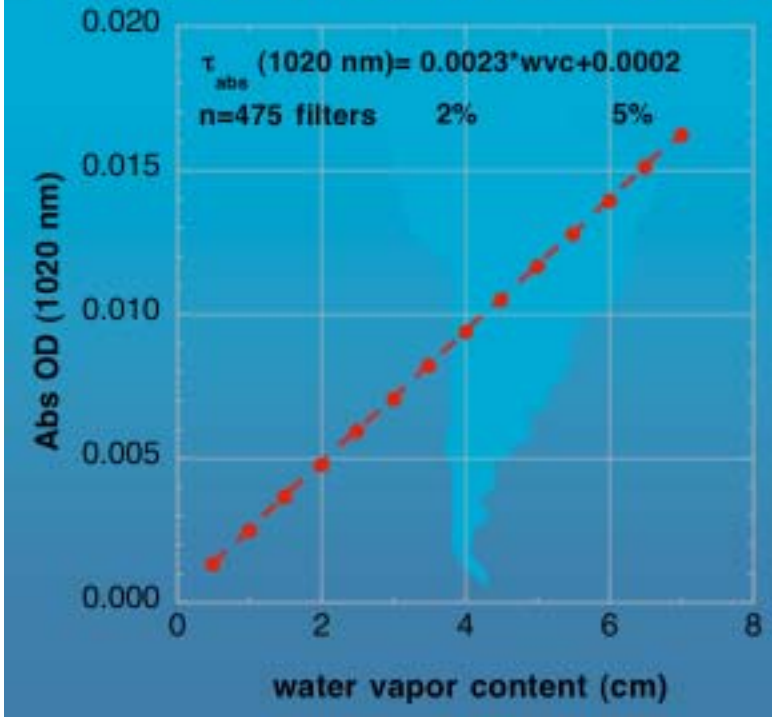
Almucantar retrievals - **6 wavelengths + ? 340, 380 nm**

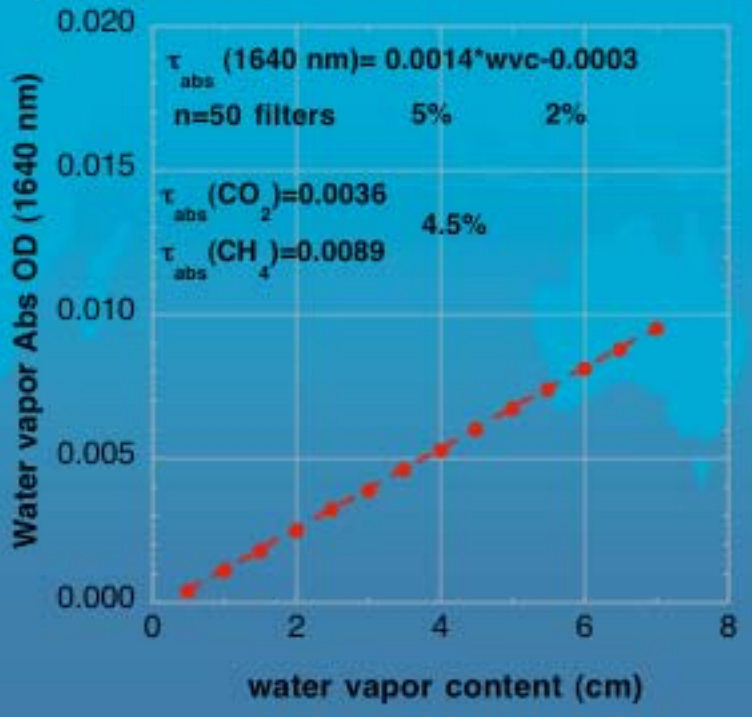
Principal plane retrievals - **4 wavelengths, level 2; ? 6 wavelengths**

? Combined retrievals (almucantar and principal plane)

Processing Algorithm Refinement

- Extraterrestrial Solar Flux - Woods et al. 1996
- Rayleigh optical depth - Bodhaine et al. 1999
- Ozone amount - LUT (1ºx 1º Lat Long) - TOMS data 1979-2002
- Water vapor content - Michalsky et al. 1995; Schmid et al. 1996
- Water vapor correction for AOD (1020 nm) - LBLRTM
- CO2, CH4, WV for AOD (1640 nm) - LBLRTM

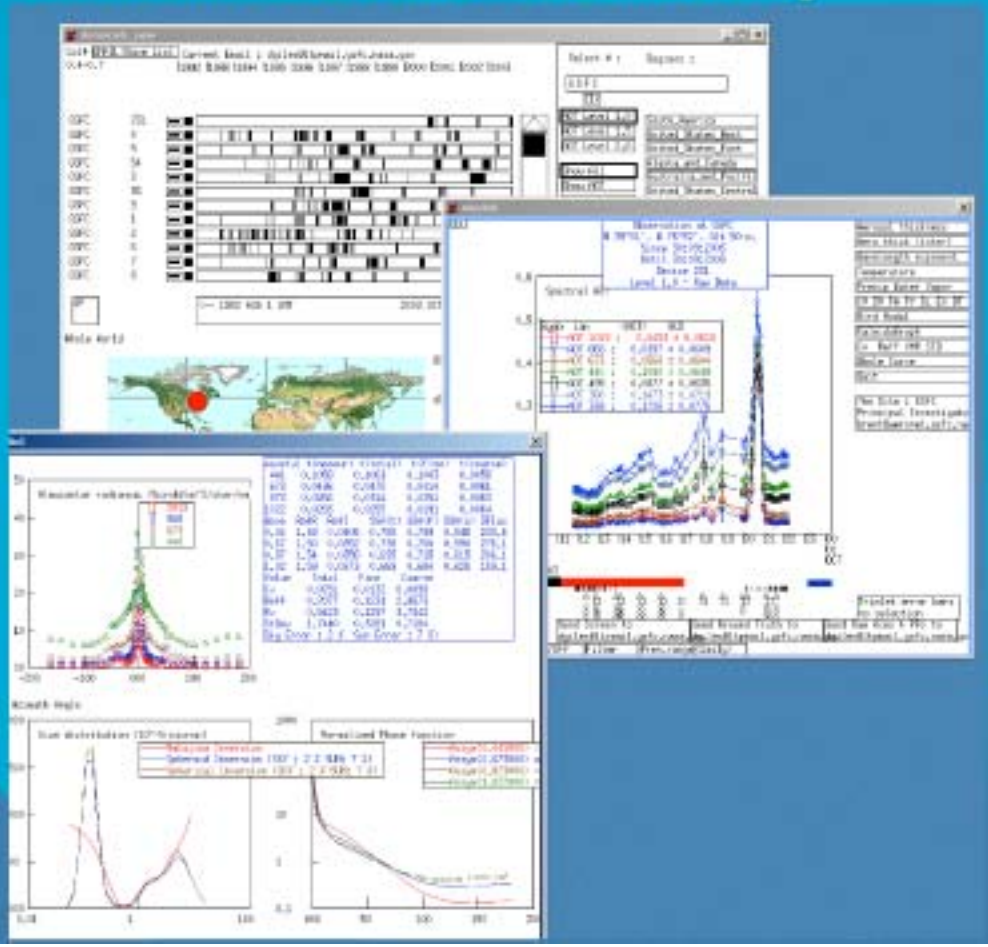




Internal Data Interface

"Demonstrat"

- Provides interactive data browsing and analysis
- Accesses all AERONET and experimental products
- Functions as a intercalibration utility



Web Server

Goddard Space Flight Center

Aerosol Robotic Network (AERONET)

+ HOME | + DATA | + OPERATIONS | + PAPERS | + CAMPAIGNS

QUICK LINKS

+ **AERONET Collaborators**
+ AerosolFlux Networks
+ Contacts
+ Installation/Shipping
+ Other NASA Projects
+ Site/Photos Information
+ Site Outline
+ System Description

DATA

Data Display
+ Level 1.0 AOT
+ Level 1.5 AOT
+ Level 2.0 AOT

Data Download Tool
+ All AERONET Data

Level 2.0 Climatology
+ AOT Tables

Climatology Map Animation
+ 500nm AOT
+ 870-440nm Angstrom Parameter

MISSION

The **AERONET** (**AE**rosol **RO**botic **NET**work) program is an inclusive federation of ground-based remote sensing aerosol networks established by AERONET and **PHOTONS** and greatly expanded by **AEROCAN** and other agency, institute, and university partners. The goal is to assess aerosol optical properties and validate satellite retrievals of aerosol optical properties. The network imposes standardization of **instruments**, **calibration**, and **processing**. Data from this collaboration provides globally distributed observations of spectral aerosol optical depths, **inversion products**, and precipitable water in geographically diverse aerosol regimes. Three levels of data are available from this website: Level 1.0 (unscreened), Level 1.5 (**cloud-screened**), and Level 2.0 (Cloud-screened and quality-assured). Descriptions may be found of program objectives, affiliations, the instrumentation, operational issues, data products, database browser "demonstrat", research activities, links to similar data sets, NASA EOS links and personnel involved in AERONET.

+ **Read More**

CAUTION: Data presented in the real time data version is unscreened and may not have final calibration reprocessing.

NOTICE TO NON-AERONET INVESTIGATORS: To maintain the integrity of the data base and fairness to the individuals who have contributed, use of these data for publication requires an offer of authorship to the AERONET PI (s).

Important Announcements

- **18 February 2004** - The AERONET/PHOTONS workshop will be held on the south coast of Spain from May 10 to May 14, 2004. The workshop will be located at the facilities of the experimentation range "**El Arenosillo**" which is operated by **INTA's Department of Earth Observation, Remote Sensing and Atmosphere (Spain)**.
- **12 January 2004** - Please read the January 2004 **AERONET quarterly** report for an update on the upcoming project workshop, activities, and new products.
- **Former Announcements**

NEWS

2004 AERONET/PHOTONS Workshop

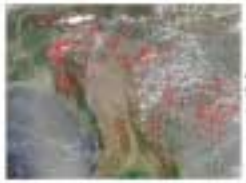
The workshop **overview**, **rationale**, **agenda**, **logistics** (PowerPoint), and **hotel shuttle service** information can be found on the main workshop web page.

+ **Read More**

2004 United Arab Emirates Campaign

+ **Read More**

Features

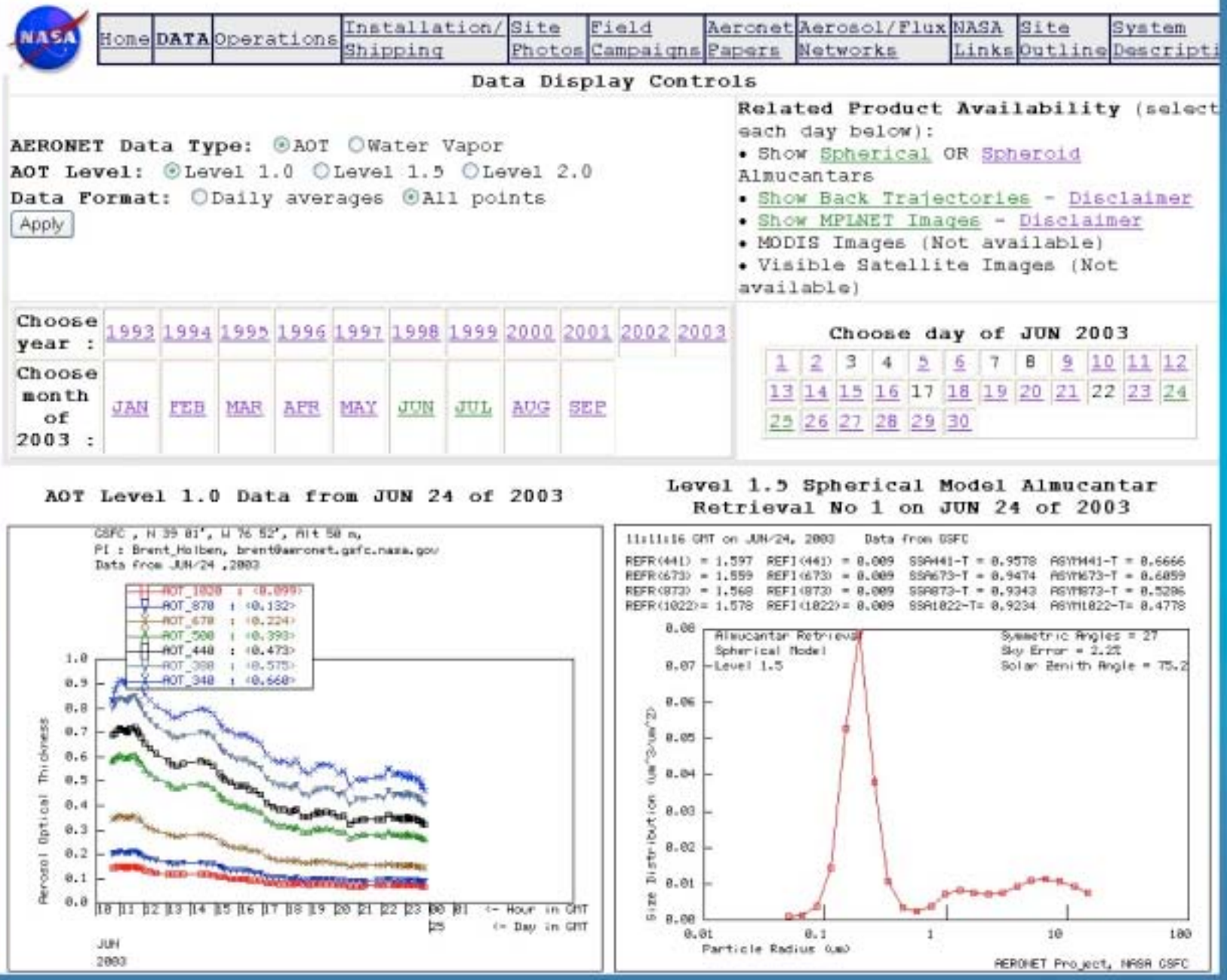


Aerosol Optical Properties in Southeast Asia
+ Read More (Power Point)

Send Us Your Comments

FIRSTGOV | + NASA Privacy, Security, Notices

Curator: David Giles
NASA Official: Brent Holben
Last Updated: **26 February 2004**


Home DATA Operations Installation/ Shipping Site Photos Field Campaigns Aeronet Papers Aerosol/Flux Networks NASA Links Site Outline System Descripti
Data Display Controls
AERONET Data Type: AOT Water Vapor
AOT Level: Level 1.0 Level 1.5 Level 2.0
Data Format: Daily averages All points
Apply
Related Product Availability (select each day below):
• Show Spherical OR Spheroid Almucantars
• Show Back Trajectories - Disclaimer
• Show MPLNET Images - Disclaimer
• MODIS Images (Not available)
• Visible Satellite Images (Not available)
Choose year : 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003
Choose month of 2003 : JAN FEB MAR APR MAY JUN JUL AUG SEP
Choose day of JUN 2003
1 2 3 4 5 6 7 8 9 10 11 12
13 14 15 16 17 18 19 20 21 22 23 24
25 26 27 28 29 30
AOT Level 1.0 Data from JUN 24 of 2003
GSFC , N 39 01', W 76 52', Alt 50 m,
PI : Brent_Holben, brent@aeronet.gsfc.nasa.gov
Data from JUN/24 ,2003
AOT_1020 : (0.099)
AOT_870 : (0.132)
AOT_670 : (0.224)
AOT_500 : (0.393)
AOT_440 : (0.473)
AOT_380 : (0.575)
AOT_340 : (0.668)
Aerosol Optical Thickness
<- Hour in GMT
<- Day in GMT
JUN
2003
Level 1.5 Spherical Model Almucantar Retrieval No 1 on JUN 24 of 2003
11:11:16 GMT on JUN/24, 2003 Data from GSFC
REFR(441) = 1.597 REFI(441) = 0.009 SSA441-T = 0.9578 ASYM441-T = 0.6666
REFR(673) = 1.559 REFI(673) = 0.009 SSA673-T = 0.9474 ASYM673-T = 0.6859
REFR(873) = 1.568 REFI(873) = 0.009 SSA873-T = 0.9343 ASYM873-T = 0.5286
REFR(1022)= 1.578 REFI(1022)= 0.009 SSA1022-T= 0.9234 ASYM1022-T= 0.4778
Almucantar Retrieval
Spherical Model
Level 1.5
Asymmetric Angles = 27
Sky Error = 2.2%
Solar Zenith Angle = 75.2
Size Distribution (um^3/um^2)
Particle Radius (um)
AERONET Project, NASA GSFC

Web download

Download Data for Capo_Verde

Select the start and end time of the data download period:

START:	1 JAN 1994	END:	1 JAN 2003

Data Descriptions Data Units Development Status Update Log

Note: Data are not available if the data type is *italicized*

Select the data type(s) with checkbox:

Aerosol Optical Thickness*:

1. ☐ Level 1.0 (Raw)
2. ☐ Level 1.5 (Cloud Screened)
3. ☐ Level 2.0 (Quality Assured)

*also WV and Angstrom Parameters

☐ Select All AOT

Raw Data (Calibration Applied):

4. ☐ Almucantars
5. ☐ Polar Principal Planes
6. *BRDF*
7. ☐ Principal Planes

☐ Select All Raw Data

Nakajima Almucantar Retrievals

8. ☐ SKYRAD.PAK

Almucantar Retrievals

Total Only

9. ☐ Size Distribution
10. ☐ Refractive Index
11. ☐ AOT Coincident

☐ Select All Retrievals

Total/Fine/Coarse Modes

12. ☐ Volume
13. ☐ AOT Absorption
14. ☐ AOT Extinction
15. ☐ SSA
16. ☐ Asymmetry Factor
17. ☐ Phase Functions
18. ☐ Combined Retrievals (9-16)

ALMUCANTAR RETRIEVAL MODELS			
Models	**SPHERICAL**	**SPHEROID**	**COMBINED SPHERICAL AND SPHEROID**
Levels	○ **1.5**	○ **1.5**	○ **2.0**
	◉ **2.0** (Spherical Particles)	○ **2.0**	
	○ **2.0** (Non-spherical Particles)		
Data Mode	◉ Recommended Default Parameters	○ User-defined Options	

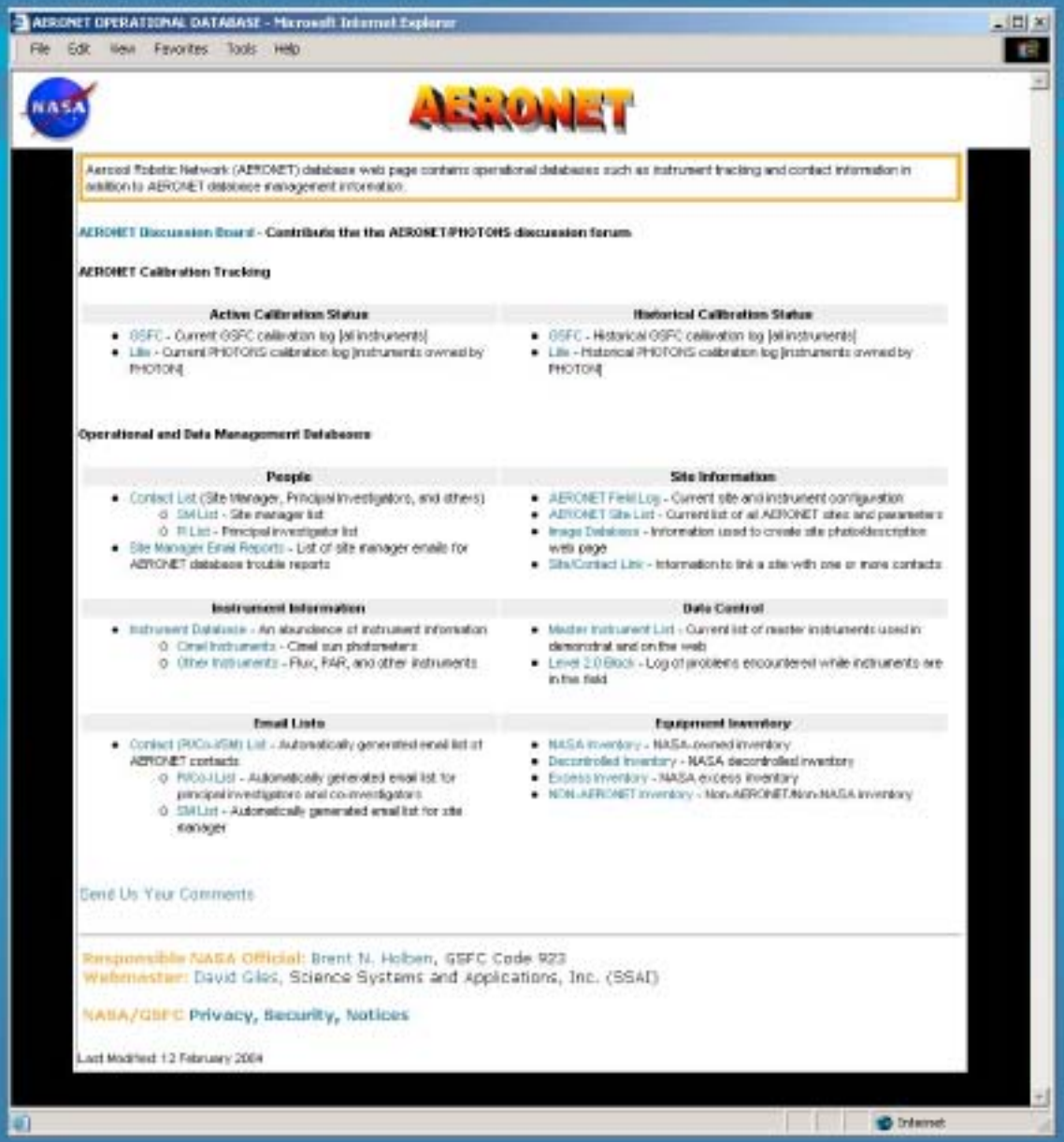
User-defined Almucantar Retrieval Options				
Angles (No.)	**Solar Zenith Angle Range**		**Spherical Sky Error Limit (%)**	**Spheroid Sky Error Limit (%)**
Min	**Min**	**Max**	**Max**	**Max**
21	25	77	5	10
Angstrom Parameter Limit (870-440)	**Solar Zenith Angle (Fine Mode Filter)**	**AOT at 440nm (Fine Mode Filter)**		
Max	**Min**	**Min**		
0.6	45	0.4		

Data Format		
○ All Points	◉ Daily Averages	○ Monthly Averages

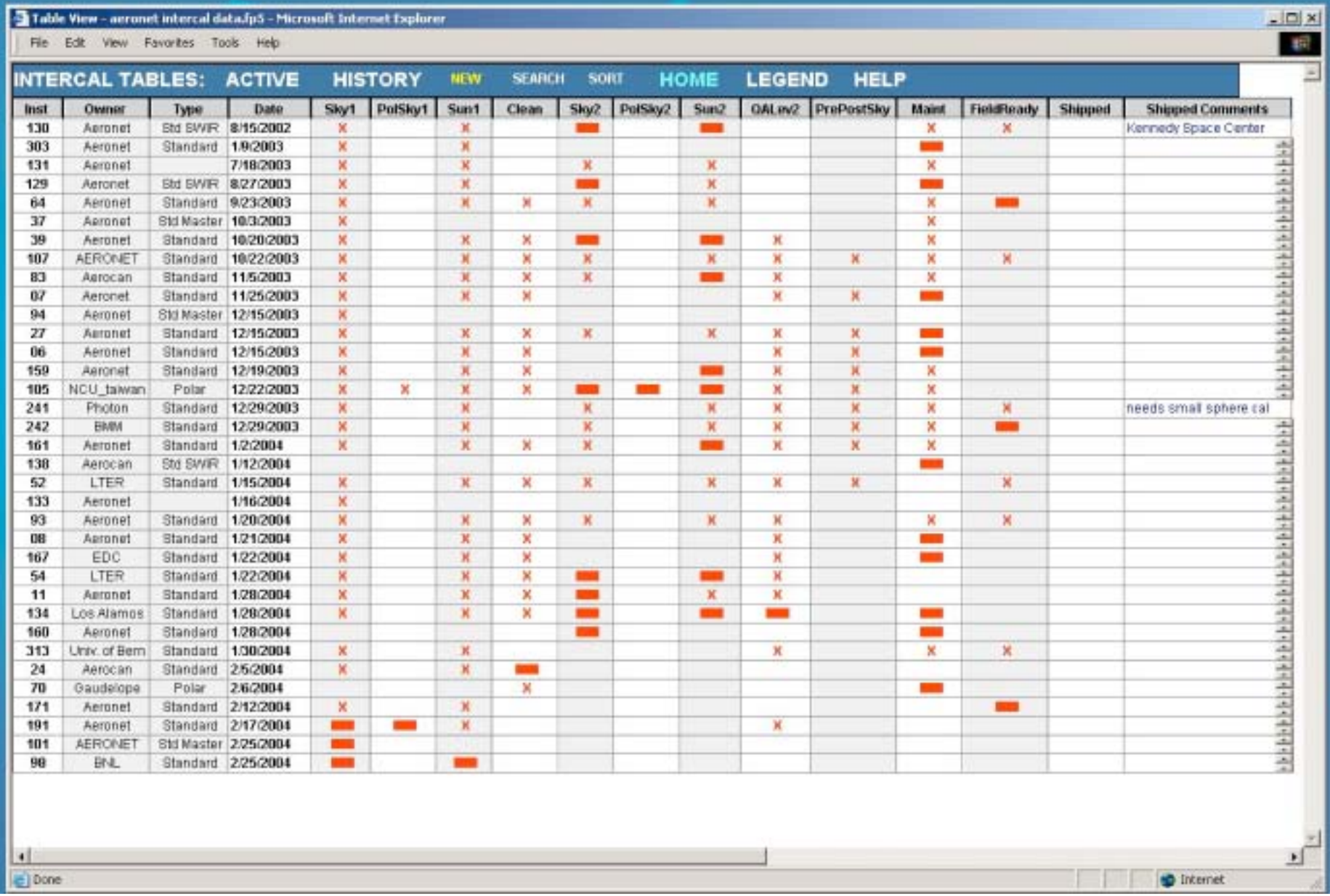
Download

Please wait for the new window
(larger intervals will require longer processing time)

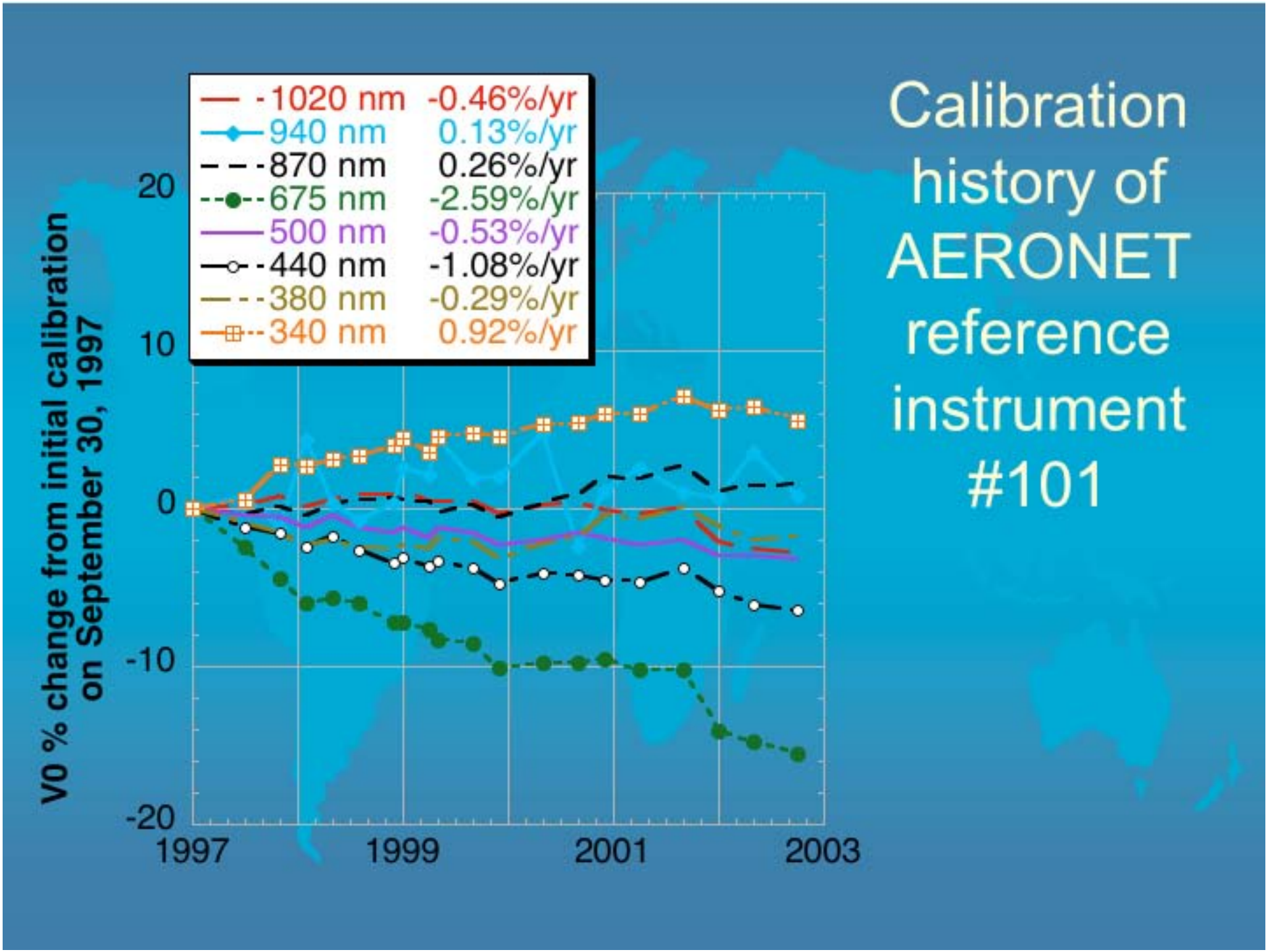
AERONET Relational Database



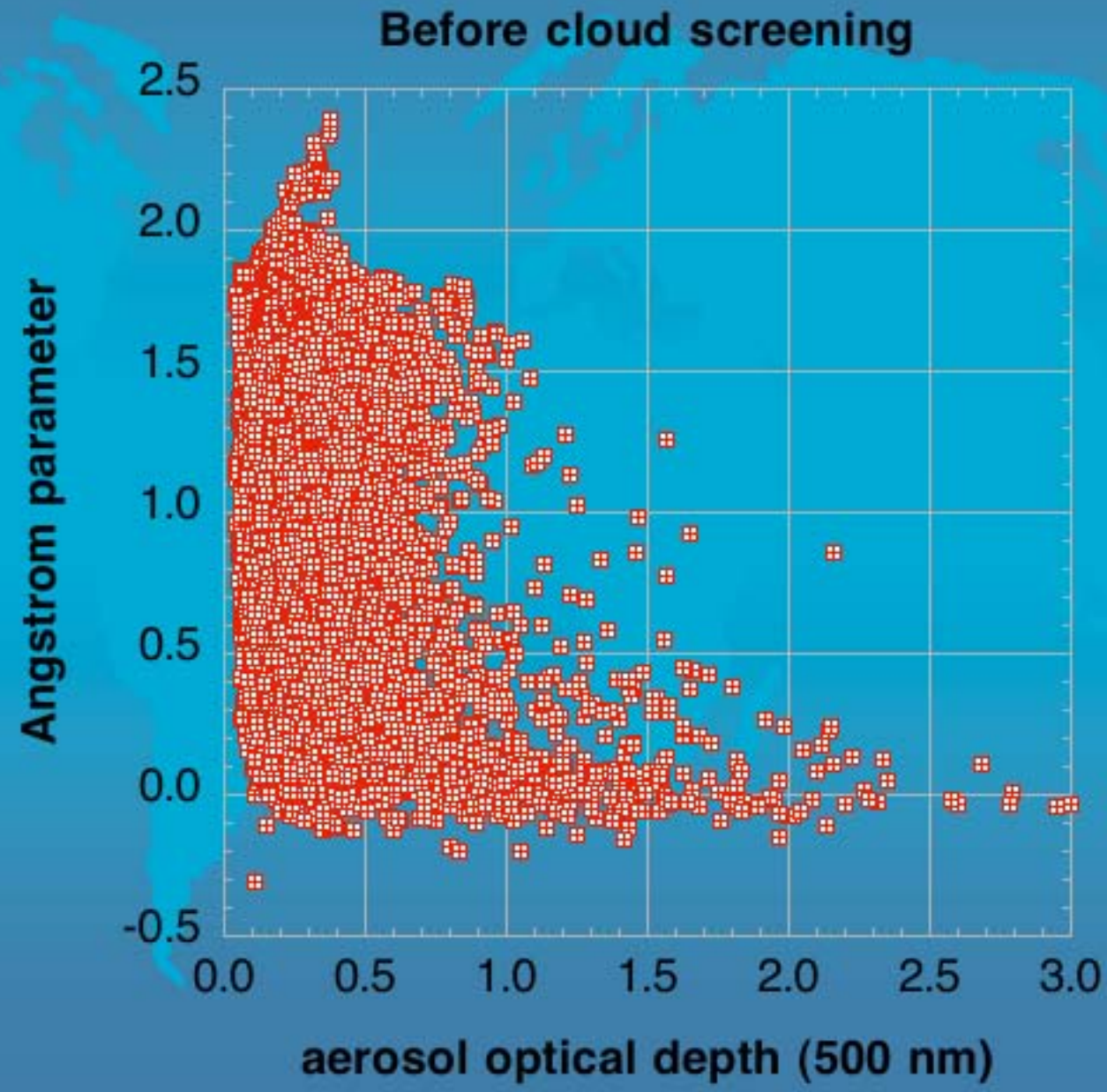
Active Intercalibration Table



Inst	Owner	Type	Date	Sky1	PolSky1	Sun1	Clean	Sky2	PolSky2	Sun2	OALev2	PrePostSky	Maint	FieldReady	Shipped	Shipped Comments
130	Aeronet	Std SWIR	8/15/2002	X		X		▬		▬			X	X		Kennedy Space Center
303	Aeronet	Standard	1/9/2003	X		X							▬			
131	Aeronet		7/18/2003	X		X		X		X			X			
129	Aeronet	Std SWIR	8/27/2003	X		X		▬		X			▬			
64	Aeronet	Standard	9/23/2003	X		X	X	X		X			X	▬		
37	Aeronet	Std Master	10/3/2003	X									X			
39	Aeronet	Standard	10/20/2003	X		X	X	▬		▬	X		X			
107	AERONET	Standard	10/22/2003	X		X	X	X		X	X	X	X	X		
83	Aerocan	Standard	11/5/2003	X		X	X	X		▬	X		X			
07	Aeronet	Standard	11/25/2003	X		X	X				X	X	▬			
94	Aeronet	Std Master	12/15/2003	X												
27	Aeronet	Standard	12/15/2003	X		X	X	X		X	X	X	▬			
06	Aeronet	Standard	12/15/2003	X		X	X				X	X	▬			
159	Aeronet	Standard	12/19/2003	X		X	X			▬	X	X	X			
105	NCU_taiwan	Polar	12/22/2003	X	X	X	X	▬	▬	▬	X	X	X			
241	Photon	Standard	12/29/2003	X		X		X		X	X	X	X	X		needs small sphere cal
242	BMM	Standard	12/29/2003	X		X		X		X	X	X	X	▬		
161	Aeronet	Standard	1/2/2004	X		X	X	X		▬	X	X	X			
138	Aerocan	Std SWIR	1/12/2004										▬			
52	LTER	Standard	1/15/2004	X		X	X	X		X	X	X		X		
133	Aeronet		1/16/2004	X												
93	Aeronet	Standard	1/20/2004	X		X	X	X		X	X		X	X		
08	Aeronet	Standard	1/21/2004	X		X	X				X		▬			
167	EDC	Standard	1/22/2004	X		X	X				X		▬			
54	LTER	Standard	1/22/2004	X		X	X	▬		▬	X					
11	Aeronet	Standard	1/28/2004	X		X	X	▬		X	X					
134	Los Alamos	Standard	1/28/2004	X		X	X	▬		▬	▬		▬			
160	Aeronet	Standard	1/28/2004					▬					▬			
313	Univ. of Bern	Standard	1/30/2004	X		X					X		X	X		
24	Aerocan	Standard	2/5/2004	X		X	▬									
70	Gaudelope	Polar	2/6/2004				X						▬			
171	Aeronet	Standard	2/12/2004	X		X								▬		
191	Aeronet	Standard	2/17/2004	▬	▬	X					X					
101	AERONET	Std Master	2/25/2004	▬												
98	BNL	Standard	2/25/2004	▬		▬										


-1020 nm -0.46%/yr
940 nm 0.13%/yr
870 nm 0.26%/yr
675 nm -2.59%/yr
500 nm -0.53%/yr
440 nm -1.08%/yr
380 nm -0.29%/yr
340 nm 0.92%/yr
V0 % change from initial calibration on September 30, 1997
20
10
0
-10
-20
1997
1999
2001
2003
Calibration history of AERONET reference instrument #101

Bordeaux, France, May 2001-Feb 2003



Bordeaux, France, May 2001-Feb 2003