QC
807.5
.U6
A7
no.114

A Technical Memorandum ERL ARL-114

RESULTS OF A SUNPHOTOMETER INTERCOMPARISON HELD AT BOULDER, 19 OCTOBER TO 16 DECEMBER 1981

Ellsworth Dutton
John DeLuisi

Air Resources Laboratories
Rockville, Maryland
June 1982

noaa NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION / Environmental Research Laboratories

H
QC
807.5
.U6A7
no. 114
c. 1

NOAA Technical Memorandum ERL ARL-114

RESULTS OF A SUNPHOTOMETER INTERCOMPARISON HELD AT BOULDER, 19 OCTOBER TO 16 DECEMBER 1981

Ellsworth Dutton
John DeLuisi

Geophysical Monitoring for Climatic Change
Boulder, Colorado

Air Resources Laboratories
Rockville, Maryland
June 1982

CENTRAL
LIBRARY

DEC 1 5 1982

N.O.A.A.
U. S. Dept. of Commerce

UNITED STATES
DEPARTMENT OF COMMERCE

Malcolm Baldrige,
Secretary

NATIONAL OCEANIC AND
ATMOSPHERIC ADMINISTRATION

John V. Byrne,
Administrator

Environmental Research
Laboratories

George H. Ludwig
Director

82 03109

NOTICE

Mention of a commercial company or product does not constitute an endorsement by NOAA Environmental Research Laboratories. Use for publicity or advertising purposes of information from this publication concerning proprietary products or the tests of such products is not authorized.

CONTENTS

	Page
Abstract	iv
Introduction	1
Instrumentation	2
Intercomparison Procedures	5
Observations	5
Data Reduction and Analysis Procedures	7
Independent Calibration	8
Dependent Calibration	9
Intercomparison Results	10
Summary and Conclusions	14
Acknowledgements	15
References	16
Tables	18
Plotting Symbols	22
Figures	23
Appendix	31

Abstract

Total atmospheric optical depths as derived from quasi-simultaneous observations by 12 modern sunphotometers of 5 different designs are intercompared. The relative agreement between instruments depends on the calibration of the instruments and is given for two different calibration procedures. When the self-calibration procedure by the Langley-plot technique was used, the instrument agreed only to within ± 10%; however, when the instruments were all calibrated relative to a reference standard (the consensus of the Langley-plot calibration values) the agreement was on the order of ± 1.5%. The measurements were made at 380 and 500 nm, typical turbidity measurement wavelengths. The impact of the relative instrument agreement on possible errors in aerosol optical depth calculations is discussed.

RESULTS OF A SUNPHOTOMETER INTERCOMPARISON HELD AT BOULDER, 19 OCTOBER TO 16 DECEMBER 1981

ELLSWORTH DUTTON and JOHN DELUISI
NOAA-ERL-ARL-GMCC
Boulder, CO 80303

Introduction

Sunphotometers are used extensively to measure spectral extinction of direct solar radiation as received at the bottom of the atmosphere. Total extinction can then be separated into contributions from molecular scattering, trace gas absorption, and aerosol attenuation. Extinction measurements made at wavelengths where the aerosol attenuation is the only unknown contribution, permit quantitative determinations of atmospheric turbidity. Turbidity measurements at two or more wavelengths are useful for specifying the aerosol attenuation at intervening wavelengths.

Concern about the role of aerosol optical properties in the atmosphere and about their effect on local and global climate has led to widespread use of sunphotometers (Volz, 1959; Flowers et al., 1969; Flowers et al., 1974; Peterson et al., 1981; Shaw, 1979; Prospero et al., 1979). The detectors and electronics of the earlier instruments, although sufficient for the tasks for which they were employed, were subject to precision and drift problems. Recent advances in detectors and miniature electronics have been used to develop a new generation of sunphotometers that are expected to perform, overall, much better than the older models. The possibility of errors in the calibrations and the observed discrepancy of results among instruments (Laulainen and Taylor, 1974; Russell and

Shaw, 1975; Volz, 1975) have led us to perform an intercomparison of several new sunphotometers of differing designs, but having the standard 380 and 500-nm turbidity channels.

The objective of the intercomparison was to evaluate the performance of the instruments in terms of the relative agreement among the set, using two distinct calibration procedures. On the average, all the new instruments measured total atmospheric extinction to within ± 10% of each other at 380 and 500 nm when the instruments were independently calibrated, and ± 1.5% for both channels when calibrated to a reference standard. The percent differences would be larger if the total extinction were reduced to aerosol extinction by subtracting the known contributions for ozone absorption and Rayleigh scattering.

This intercomparison was not intended to be a comprehensive comparison of all types of existing instruments. In fact, we are aware of several modern sunphotometers that were not included in this intercomparison. Our results indicate that such a comprehensive intercomparison would not only be beneficial, but would be desirable to successfully combine measurements of different instrument networks, especially when turbidity values are small.

Instrumentation

The typical sunphotometer has a narrow-band interference filter of ≃10 nm, a field-of-view limiting foresection to eliminate diffuse sky radiation, and a photodetector whose electrical output is proportional

to the incident light intensity. A description of the instruments that were used in the present intercomparison is given in Table 1. Of the 12 instruments 6 were of the same design, whereas the remaining 6 were of 4 different designs; only 3 of the designs included a 380-nm channel. All instruments, with the exception of two, were handheld for discrete-point manual observation. A source of error from handheld observations has been reduced in this latest generation of sunphotometers because they typically use peak-reading digital displays with as much as four-digit accuracy, whereas the old models required reading a dial meter. All instruments use high-quality silicon detectors and have a field of view varying from 1.5° to 2.5° between instruments. A brief discussion of the five different sunphotometer designs and their intended field use follows.

(1) The NOAA instruments, from GMCC (Geophysical Monitoring for Climatic Change) and SRCF (Solar Radiation Calibration Facility), are updated versions of the Volz-type sunphotometers currently being used in the U.S. turbidity network. The major modifications to the original instrument included new electronics with digital readout and silicon detectors. The optics were modified to conform with standards recommended by the World Meteorological Organization (E. C. Flowers; NOAA Environmental Research Laboratories, Boulder, Colo.; personal communication, 1982). Instruments of this design are intended to replace the existing instruments in the U.S. turbidity network.

(2) The instruments provided by G. M. Shah of the Canadian Atmospheric Environment Service were commercially built, and have four wavelength channels, a temperature-monitoring circuit, and provisions for

continuous, one-channel analog output. The instruments also include several handy features such as tripod mounting, automatic shutoff, peak-hold readings, battery check, electronic zero calibration test, and an optional ability for tenfold electronic amplification. When fully evaluated and calibrated, these instruments will be used in the Canadian turbidity network, which is part of the global WMO network.

(3) The Solar Energy Research Institute (SERI) provided a state-of-the-art, fully automated, four-channel sunphotometer. Two such instruments were used, but they were not operated concurrently, and neither was available for the entire intercomparison. Instrument features include active solar tracking, continuous automatic data recording (sample interval 1 to 5 min), temperature control and monitoring, and atmospheric pressure monitoring. Because of the limited number of days each instrument was available, we did not assign an independent calibration to these instruments, but instead we used the value provided by the participant, R. Bird.

(4) The sunphotometer from the University of Miami was provided by J. M. Prospero. A number of these instruments were used by him in short-term studies of turbidity in various networks. The instrument has four wavelength channels, a single silicon detector, temperature monitoring, an attached time piece, and digital peak-hold readout.

(5) The sunphotomer provided by G. E. Shaw of the University of Alaska is a relatively new instrument that has six wavelength channels using a single detector. Instruments of this design are intended for use in an Arctic turbidity network. The features of this sunphotometer include dual-range amplification, temperature monitoring, automatic

shutoff, an attached clock, and continuous output capability for one channel at a time. Unfortunately, delays in receiving the instrument prevented it from being involved in the bulk of the comparisons, so very few data were available to assign an independent calibration to this instrument.

Intercomparison Procedures

First, an independent calibration of each instrument was obtained by the Langley-plot method. Second, all instruments were calibrated relative to a standard reference, which we classified as a dependent calibration. In this case, the standard reference was taken to be the average of all independently calibrated instruments. Of course this choice of a standard is somewhat arbitrary, but it will be shown later on that a meaningful evaluation could be performed by this approach.

The parameter used to compare the instruments was the ratio of the total atmospheric optical depth (base e), as derived from each instrument, to that of the consensus of all instruments participating in a measurement episode. Unfortunately, not all instruments were available for the entire intercomparison, which weakens the statistics of the final results.

Observations

Direct sun measurements were made on 12 days when the relative airmass (using the formulation of Kasten [1966]) changed from about 12 to 2. The measurements were used to derive the independent calibrations,

as well as to provide simultaneous observations for intercomparison. At larger airmasses, insufficient offband blocking by the filters (especially the 380-nm channel) and errors in solar position determination can become problematic. At the smaller airmasses, the atmosphere is becoming more destabilized because of local solar heating, and the time interval between unit airmass changes is long; thus, the probability of temporal variations of the optical depth, which is assumed constant during a Langley calibration, is increased. On a few occasions measurements were made near midday for intercomparison purposes only.

The observational sessions were held between 19 October and 16 December 1981 on the roof of the seven-story Research Building #3, which is a part of the University of Colorado campus. Local atmospheric conditions during several of the sessions were less than ideal for precise Langley calibrations because of temporal changes in the observed vertical optical depth. Sporadic changes in optical depth will appear as deviations from the straight-line fit of the Langley plot, whereas gradual changes during calibration could yield an apparently smooth Langley plot, but an erroneous calibration. The short-term steadiness of the atmosphere during a calibration was determined, after the fact, by plotting deduced optical depths as a function of time.

Handheld sunphotometer measurements were not taken when any visible obstruction to the direct solar beam was noted. Hourly meteorological observations are routinely made at our location, which is also a station in the NOAA Solar Radiation Network. In addition, the nonspectral normal incident and global solar flux are recorded continuously on

strip charts; these records were occasionally referred to during observation sessions to verify stability of atmospheric conditions. At times, low-lying smoke was present in the Boulder valley. Because of the height of the observing site and the solar elevation, it is believed that the line of sight of the instruments avoided most of this local pollution.

During the first few observational sessions, various sampling schemes were used by the observers; however, timing of all observations was accurately kept so that each observation time was known to within 30 s. Later, and for the bulk of the intercomparison, a uniform sampling scheme was established in which each observation consisted of a pair of readings from each instrument, centered about a coordinated time common to all instruments. This sampling method assures the integrity of the timing and comparability of the data. The primary intercomparison clock was maintained to within 1 s of WWV.

Data Reduction and Analysis Procedures

For each session and for each instrument, Langley plots were made and inspected for outlying data or abnormal curvature. Obvious errors were handled by editing the raw data. The outlying 5% of the data were routinely discarded. Also, because of filter light-leakage problems at the larger airmasses, it was discerned from the behavior of the Langley plots that data obtained at airmasses greater than 7.5 were not to be used for the Langley calibrations. This limit is more critical at 380 nm than at 500 nm. Data obtained between 19 October and 4 November were

best suited to determine the independent calibration. For the dependent calibration and direct intercomparisons, essentially all data were used.

Independent Calibration

Two approaches were used to obtain independent calibrations by means of the Langley-plot technique. The first was to identify only the "best" data sets by applying to the Langley plot rigid criteria concerning the goodness of fit, and by subjectively selecting from the data itself only the days when the optical depth was very steady. This approach yielded so few suitable calibration sessions that, to increase the number, a second approach was used in which only the "worst" data sets were eliminated and the remaining results for each instrument were then averaged. Table 2 gives the day-by-day calibrations (natural-log Langley-plot intercepts from unweighted linear regression fit) for each instrument. The standard deviation of the daily-determined intercepts was $\simeq$ 0.01 and ranged from 0.003 to 0.015 over the entire set.

The Langley-plot slopes, which represent an estimate of the average vertical optical depth during the calibration session, are given in Table 3. The standard deviation of the individual slopes is $\simeq$1.0%, ranging from 0.2% to 2.0%. The linear regression correlation coefficient in all cases was greater than 0.990. Certain instruments produced slopes with a consistent bias from those of other instruments, indicating that the instruments are probably measuring extinction at different effective wavelengths. For example, at 380 nm, instrument UM32 nearly always had the highest observed slope among the entire group, indicating

a shorter effective wavelength for that instrument. A discrepancy such as this will manifest itself in two ways in the subsequent intercomparison analysis. First, if we assume that the proper independent calibration constant has been determined for the wavelength-shifted instrument, it will consistently give optical depths that are relatively too large or too small, depending on the direction of the wavelength shift. Second, when the wavelength-shifted instrument is assigned a dependent calibration in which the reference standard has a different effective wavelength, an airmass-dependent relative error will occur. Examples of these error manifestations are given later as they are encountered in the process of analysis.

Dependent Calibration

The second calibration procedure, in which the original plan was to calibrate all instruments relative to a reference instrument, is described next. Since no well-qualified reference instrument was identifiable, the reference standard was taken as the consensus optical depth of all independently calibrated instruments. (It is acknowledged that this approach could produce bias in the reference standard.) A dependent calibration for each instrument was derived by calculating a calibration factor that forces the optical depth from that instrument to agree with the reference standard, observation by observation. These individual calibration factors were then averaged over the entire intercomparison to produce a final dependent calibration. The final dependent and independent calibration factors for the intercomparison instruments are given in Table 2.

Intercomparison Results

To intercompare the total extinction as determined by the individual calibrated sunphotometers, the ratio of total optical depth to the consensus optical depth was calculated, where the consensus was the average of all instruments with simultaneous readings. As it turned out, different sunphotometers constituted the consensus at different times, a condition which prevents rigorous statistical analysis of the results. Nonetheless, a large number of comparisons were possible, and the results are believed to be indicative of the individual character of each of the sunphotometers.

The comparison ratios for each instrument were averaged by grouping the entire 12 days of data into airmass intervals of 0.25 units. Plots of the results for the independent calibrations are given in Figures 1 and 2. It should be noted that the instruments that displayed deviant slopes on the Langley plots (see Table 3) also displayed comparably different comparison ratios. The upper two curves and lower one curve in Figure 2 are for three instruments that were unavailable for independent calibration simultaneously with the others, and the assigned calibrations were considered tentative. Considering that the range of the remaining instruments does not exceed ≃5%, the comparison is reasonably good.

Figures 3 and 4 show the results of using the dependently determined 380 and 500-nm calibration constants to calculate the comparison ratio as a function of airmass, as before. In this comparison it is seen that there is a strong airmass dependency for some of the plots corresponding to the outlying plots in Figure 1. This strongly suggests

that these instruments are measuring at different wavelengths, and the calibration cannot be forced to agree with the reference standard to better than the precision indicated, ±1.5%. Table 4 gives the average of all comparison ratios for each participating instrument and for both types of calibrations.

Examples of observation-by-observation total optical depth is shown in Figures 5, 6, 7 and 8. Figures 5 and 6 show optical depths derived from the dependent calibrations at 380 and 500 nm on a day with noticeable temporal variation in optical depth. The majority of the instruments agree to within 0.010 and 0.007 optical depth units (base e) for 380 and 500 nm, respectively; outlying instruments are suspect because of wavelength-shift problems discussed previously. Additionally, it is seen that observation-to-observation changes in optical depth as small as 0.003 are often detected by the bulk of the instruments. Figures 7 and 8 show optical depths for a very steady period, until the last few observations, and illustrate the difference between the dependent and independent calibrations of a number of instruments at 500 nm. Out of the 10 instruments, 9 agree to within 0.005 optical depth units when the dependent calibration is used (Fig. 7) as opposed to 0.015 for the independent calibration (Fig. 8).

An estimate of the precision of aerosol optical depth measurement was taken as two standard deviations about the average total optical depth measured by all instruments at a given time. This precision is for the entire group of instruments, not individual instruments, and is distinguished from accuracy because the average of all the instruments may

contain an unknown bias. The calculated precision, averaged over the entire intercomparison, was 0.005 and 0.014 optical depth units at 500 nm and 0.012 and 0.025 at 380 nm for the dependent and independent calibrations, respectively. The precision of individual instruments, measurement repeatability, was not specifically determined but appears to be close to the limit imposed by the number of digits displayed by the instrument.

The Appendix lists aerosol optical depth at 380 and 500 nm determined for several intercomparison days, using both the dependent and independent calibration procedures. The Rayleigh optical depths used were 0.4468 and 0.1456, before pressure correction, at 380 and 500 nm, respectively (Pendorf [1957] adjusted according to Young [1981]). The ozone optical depth at 500 nm was fixed at 0.0104. Examination of the results gives some insight into their consistency with generally accepted spectral characteristics of aged atmospheric aerosols. The optical depth of aerosols is generally expected to decrease with increasing wavelength, the amount of the decrease being approximately proportional to the inverse of wavelength. The results for days 1029 and 1103 (29 October and 3 November) show roughly the inverse wavelength relationship. However, on days 1102 and 1104 there is no such apparent relationship. The reason for this difference may be found in comparing the relative magnitudes of the indicated aerosol optical depths on these days. On days 1029 and 1103 the optical depth was much higher than on days 1102 and 1104. For the cleaner days, the measurements were at the limit of the precision and accuracy of the instruments. In fact, on the cleanest day, viz. 1104, several of the 380-nm measurements became negative, a

physical impossibility indicating that the consensus calibration level (dependent calibration) may be too low. It follows that one or more of the independent calibrations is also too low, which is not surprising after examining the results in Figure 1.

The discrepant results discussed above could also be caused by using an incorrect value for Rayleigh scattering. Aerosol optical depth determination at low values, ≈0.01, is extremely sensitive to the Rayleigh correction; i.e., a 1% error in the Rayleigh term will result in ≈50%, or 0.0045 optical depth units, error in aerosol optical depth at 380 nm. Several recent publications (see Young [1981] for summary) have raised the possibility of uncertanties of several percent in Rayleigh optical depths. It must be accepted that accurate measurements of low aerosol optical depths are severely limited by both instrumentation precision and accuracy of the Rayleigh determination. Note that accurate determination of atmospheric pressure to within a few millibars is also required for accurate Rayleigh optical depth determination.

The sensitivity of the entire sunphotometer calibration process can be demonstrated by raising the 380-nm calibration level by only 0.5%. This would sufficiently increase the 380-nm optical depth to eliminate the negative values and bring most of the values in line with the inverse wavelength model on the cleaner days, yet without substantially changing the results on the other days. We therefore conclude that (1) the 380 nm consensus of this intercomparison is at least 0.5% low, (2) the Rayleigh values are too large, or (3) some combination of (1) and (2).

Summary and Conclusions

We have seen that the varied instruments used in this intercomparison are capable of measuring total spectral optical depth with a precision approaching ±1.0% if all instruments are calibrated relative to a consensus standard. Failure of the instruments to achieve this level of precision when independently calibrated may well be explained by the known shortcomings of varying atmospheric conditions during calibration or by improperly specified filters. The adverse atmospheric conditions, however, are typical of conditions often encountered when attempting a Langley-type calibration of sunphotometers. Indeed, locations and times suitable for precise Langley calibrations are rare.

Use of a high-quality standard reference sunphotometer, having thermal stability and high-quality filters, amplifiers and detectors, would greatly aid and improve routine calibration and performance of evaluations of sunphotometers. As demonstrated in the present intercomparison, instruments displaying characteristics incompatible with (wavelength shifted or unstable) the reference can be identified from the results of the dependent calibration procedure. Performance evaluation and maintenance of accurate calibration-standard instruments requires repeated access to adequate facilities at a location where ideal atmospheric conditions allow independent Langley calibrations to be made regularly. A program of routine recalibration of the standard instrument is necessary to reveal possible long-term drifts in the calibration. Drifts in calibration are mostly due to changes in filter, detector, and

amplifier characteristics. We recommend that at least one thoroughly tested and accurately calibrated standard reference sunphotometer be made available in future intercomparisons of sunphotometers.

Acknowledgements

We would like to thank the following people who provided instruments: Ed Flowers, G. M. Shah, Joe Prospero, Glen Shaw, and Dick Bird. A special thanks to those who participated in the observations, particularly John Osborn and Dan Endres who were involved during the entire intercomparison. In addition, the following participated in some portion of the observations: Thayne Thompson, Ed Flowers, G. M. Shah, Sandra Willmert, Forrest Cook, and Caroline Carden.

REFERENCES

Flowers, E. C., R. A. McCormick, and K. R. Kurtis, 1969: Atmospheric turbidity of the U. S., 1961-1965. J. Appl. Meteor., 8, 955-962.

Flowers, E. C., R. A. McCormick, K. R. Kurtis, and T. H. Bilton, 1974: Atmospheric turbidity measurements with the dual-wavelength sunphotometer. Observation and measurement of atmospheric pollution, Special Environ. Rep. No. 3, Rep. No. 368, World Meteorological Organization, Geneva, Switzerland, 463-480.

Kasten, F., 1966: A new table and approxiamte formula for the relative air mass. Arch. Meteor. Geophys. Biok., Ser. B, 14(2), 206-269.

Laulainen, N. S., and B. J. Taylor, 1974: The precision and accuracy of Volz sunphotometer. J. Appl. Meteor., 13, 298-302.

Pendorf, R., 1957: Tables of the refractive index for standard air and the Rayleigh scattering coefficient for the spectral region between 0.2 and 20μ and their application to atmospheric optics. J. Opt. Soc. America, 47, 176-182.

Peterson, J. T., E. C. Flowers, G. J. Berri, C. L. Reynolds, and J. H. Rudisill, 1981: Atmospheric turbidity of central North Carolina. J. Appl. Meteor., 20, 229-241.

Prospero, J. M., D. L. Savoie, T. N. Carlson, and R. T. Nees, 1979: Monitoring Sahara aerosol transport by means of atmospheric turbidity measurements. In Saharan Dust: Mobilization, Transport, Deposition, SCOPE Rep. 14, C. Morabs (ed.), Wiley, Chichester, England, 171-186.

Russell, P. B., and G. E. Shaw, 1975: Comments on the precision and accuracy of Volz sunphotometry. J. Appl. Meteor., 14, 1206-1209.

Shaw, G. E., 1979: Aerosols at Mauna Loa: Optical properties. J. Atmos. Science, 36, 862-868.

Volz, F., 1959: Photometer snit selenphotoelement zur bestimmung der wellenlaugenabhangegkeit der dunsthulung. Arch. Meteor. Geophys. Bioklin., B10, 100-131.

Volz, F., 1975: Precision and accuracy of sunphotometry--A response. J. Appl. Meteor., 14, 1209-1213.

Young, A. T., 1981: On the Rayleigh-scattering optical depth of the atmosphere. J. Appl. Meteor., 20, 328-330.

TABLE 1

Intercomparison Instruments

OWNER	TYPE	INTERCOMPARISON CHANNELS (nm)	MANUFACTURER	NUMBER OF INSTRUMENTS	DATES PARTICIPATING
NOAA/GMCC	2 channel handheld 3 1/2 digit display	380, 500	In house	4	19 Oct.-16 Dec.
NOAA/SRCF	2 channel handheld 3 1/2 digit display	380, 500	In house	2	19-20 Oct. and 2 Nov.-16 Dec.*
Canadian Environment Service	4 channel handheld 3 digit display	380, 500	SONOTEK	2	a) 19 Oct.-16 Dec. b) 19-20 Oct.+
Solar Energy Research Inst.	4 channel auto tracking** 4 digit accuracy auto recording	500	Systems and Applied Sciences	2	a) 19 Oct.-20 Oct. b) 26 Oct.-9 Nov.+
University of Miami	4 channel handheld ++ 4 digit display	380, 500	In house	1	19 Oct.-16 Dec.
University of Alaska	4 channel handheld 3 digit display	500	In house	1	11 Nov.-16 Dec.

* Both instruments used on both dates

\+ One instrument used on date (a), the other on date (b)

** One unit (a) temperature controlled

++ Data temperature corrected according to information provided by owner

TABLE 2

Langley Intercepts (Natural Log)

and

Final Independent and Dependent Calibrations

	19 Oct. a.m.	19 Oct. p.m.	20 Oct. a.m.	20 Oct. p.m.	29 Oct. p.m.	2 Nov. p.m.	3 Nov. a.m.	4 Nov. a.m.	Indepnt. Cal.	Depndt. Cal.
					380 nm					
UM32	3.533	3.622	3.625	3.638	3.551	3.579	3.548	3.552	3.581	3.494
J207	7.889	7.899	7.877	7.968	7.828	7.908	7.826	7.833	7.881	7.875
SH98	6.521	6.554	6.540	6.423*	5.800*	5.910	5.857	5.838	5.860**	5.796
SH97	5.797	5.862	5.881	5.887	--	--	--	--	5.830	5.773
J208	7.787	7.841	7.832	7.910	7.764	7.824	7.772	7.800	7.816	7.813
J201	7.793	7.852	7.840	7.845	--	7.819	--	--	7.830	7.862
J204	7.603	7.673	7.658	7.690	--	7.659	--	7.784	7.657	7.736
J206	7.838	7.875	7.852	7.900	7.768	7.848	--	7.827	7.844	7.841
J203	7.840	7.862	7.826	7.883	7.752	7.846	--	7.816	7.832	7.870
					500 nm					
UM32	5.197	5.284	5.233	5.300	5.250	5.285	5.257	5.262	5.259	5.217
J207	7.463	7.479	7.476	7.516	7.438	7.482	7.454	7.454	7.470	7.482
SH98	6.206	6.236	6.232	6.257	6.122	6.183	6.160	6.167	6.195	6.179
SH97	6.245	6.310	6.306	6.330	--	--	--	--	6.283	6.287
J208	7.393	7.410	7.413	7.459	7.362	7.401	7.376	7.395	7.401	7.412
J201	7.568	7.592	7.600	7.600	--	7.588	--	7.674	7.590	7.595
J204	7.286	7.310	7.321	7.319	--	7.306	--	7.404	7.308	7.303
J206	7.517	7.532	7.534	7.554	7.483	7.532	--	7.496	7.521	7.529
J203	7.397	7.410	7.428	7.431	7.356	7.408	--	7.408	7.405	7.403
SN07***	--	--	--	--	--	--	--	--	-0.2431	-0.2037
SER1***	--	--	--	--	--	--	--	--	0.346	0.288
SER2***	--	--	--	--	--	--	--	--	0.346	0.249

*Filter change

**After 20 October only

***Independent calibration determined outside intercomparison

Table 3

Langley Slope (Total Optical Depth)

	19 Oct. a.m.	19 Oct. p.m.	20 Oct. a.m.	20 Oct. p.m.	29 Oct. a.m.	2 Nov. p.m.	3 Nov. a.m.	4 Nov. a.m.
				380 nm				
UM 32	0.393	0.407	0.422	0.417	0.469	0.431	0.410	0.390
J207	0.381	0.394	0.389	0.408	0.443	--	0.389	0.373
SH98	0.361	0.376	0.374	0.411	0.455	0.449	0.393	0.372
SH97	0.394	0.408	0.417	0.422	--	--	--	--
J208	0.376	0.403	0.394	0.415	0.438	0.420	0.381	0.362
J201	0.363	0.380	0.380	0.380	--	0.414	--	--
J204	0.350	0.373	0.371	0.378	--	0.403	--	--
J206	0.377	0.395	0.394	0.404	0.436	0.424	--	0.361
J203	0.367	0.378	0.379	0.386	0.422	0.410	--	0.348
				500 nm				
UM32	0.138	0.152	0.155	0.158	0.182	0.168	0.150	0.138
J207	0.136	0.150	0.147	0.159	0.177	0.168	0.143	0.131
SH98	0.146	0.157	0.159	0.163	0.177	0.174	0.146	0.137
SH97	0.144	0.154	0.155	0.161	--	--	--	--
J208	0.136	0.151	0.148	0.161	0.175	0.165	--	0.132
J201	0.134	0.149	0.151	0.152	--	0.167	--	--
J204	0.136	0.150	0.152	0.154	--	0.169	--	--
J206	0.137	0.147	0.149	0.155	0.174	0.167	--	0.131
J203	0.140	0.150	0.152	0.156	0.177	0.168	--	0.136

Table 4

Photometer Intercomparison:

Instrument Response Ratioed to Consensus and

Averaged For Entire Intercomparison

	Independent Calibrations				Dependent Calibrations		
				380 nm			
	Ratio	S.D.	n		Ratio	S.D.	n
UM32	1.050	0.015	269		0.985	0.031	269
J207	1.003	0.008	238		1.003	0.006	238
SH98	1.013	0.022	127		1.016	0.019	127
SH97	1.060	0.011	121		0.998	0.025	121
J208	1.000	0.008	258		1.005	0.007	258
J201	0.980	0.014	173		1.005	0.017	173
J204	0.954	0.010	173		1.014	0.029	173
J206	0.962	0.009	264		1.002	0.006	264
J203	0.998	0.007	261		0.994	0.013	261
				500 nm			
UM32	1.051	0.019	312		1.002	0.014	312
J207	0.965	0.015	285		1.000	0.015	285
SH98	1.004	0.038	298		0.988	0.043	298
SH97	0.979	0.018	119		1.010	0.017	119
J208	0.968	0.016	305		1.000	0.017	305
J201	0.989	0.013	174		1.004	0.012	174
J204	1.003	0.013	174		1.004	0.012	265
J206	0.975	0.017	265		1.002	0.015	265
J203	0.989	0.015	260		1.003	0.016	260
SN07	0.943	0.015	56		1.003	0.008	56
SER1	1.088	0.063	119		0.979	0.067	119
SER2	1.098	0.038	66		0.992	0.050	66

Plotting Symbols for Intercomparison Instruments

on the Following Plots

□	--	J203
⬡	--	J208
△	--	UM32
+	--	SH97
×	--	SH98
◇	--	J201
▽	--	J204
⊠	--	J206
✳	--	J207
⊕	--	SN07
⊕	--	SER1
⧖	--	SER2

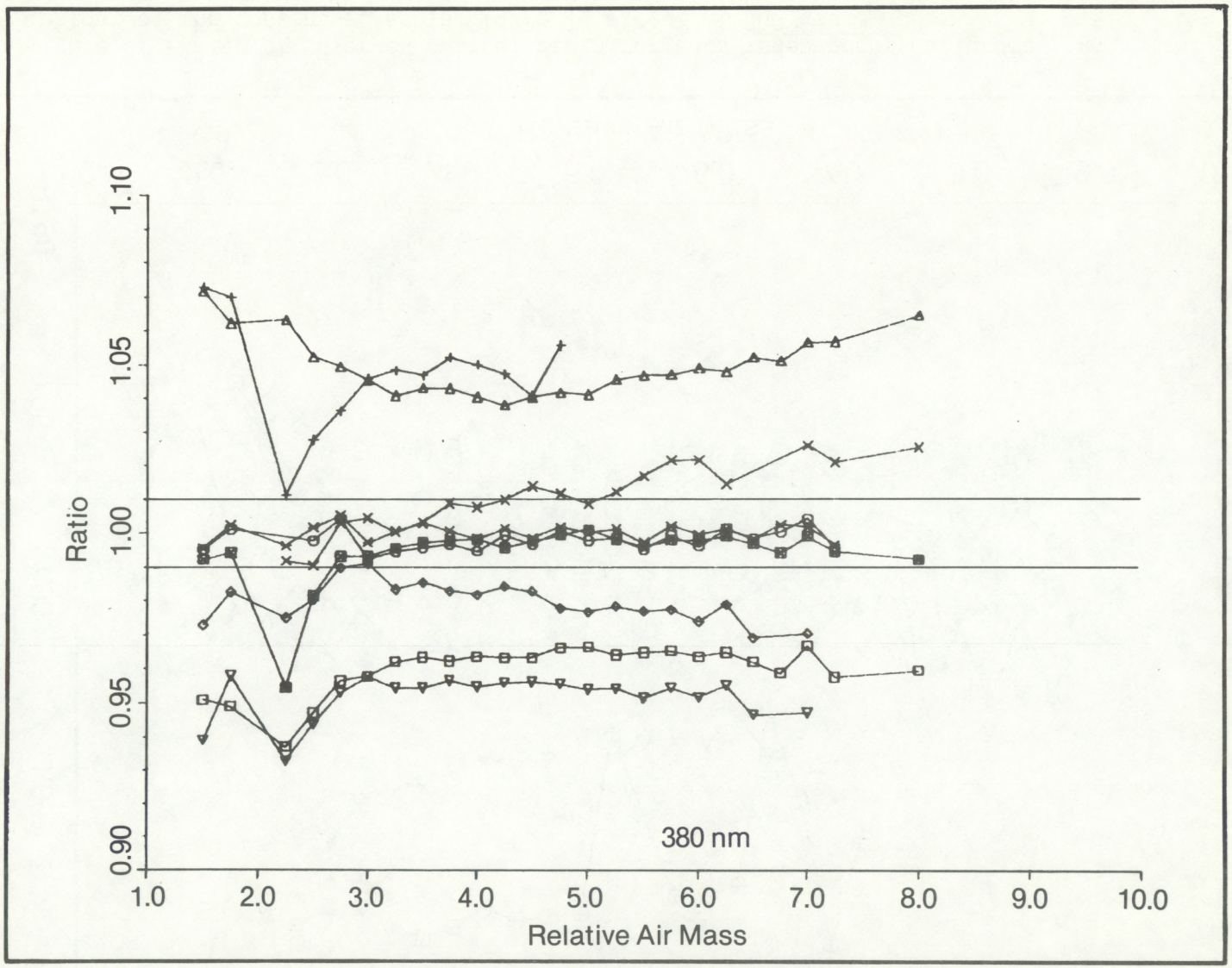

Figure 1.--Ratio of observed optical depth for each independently calibrated instrument to that of the consensus of all participating instruments at 380 nm. Each point is an average for the entire intercomparison within the indicated airmass interval.

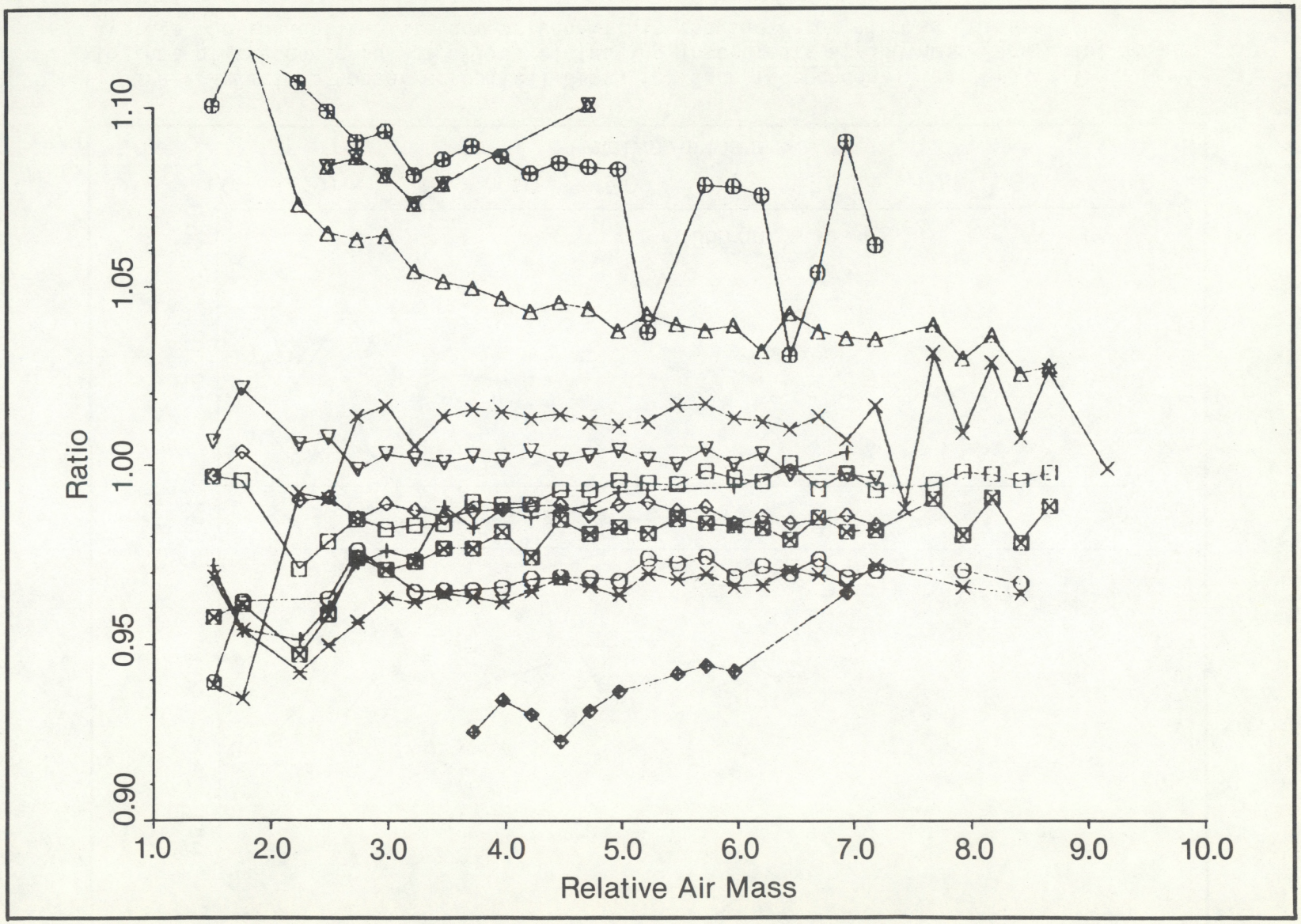

Figure 2.--Ratio of observed optical depth for each independent calibrated instrument to that of the consensus, as in Figure 1, except at 500 nm.

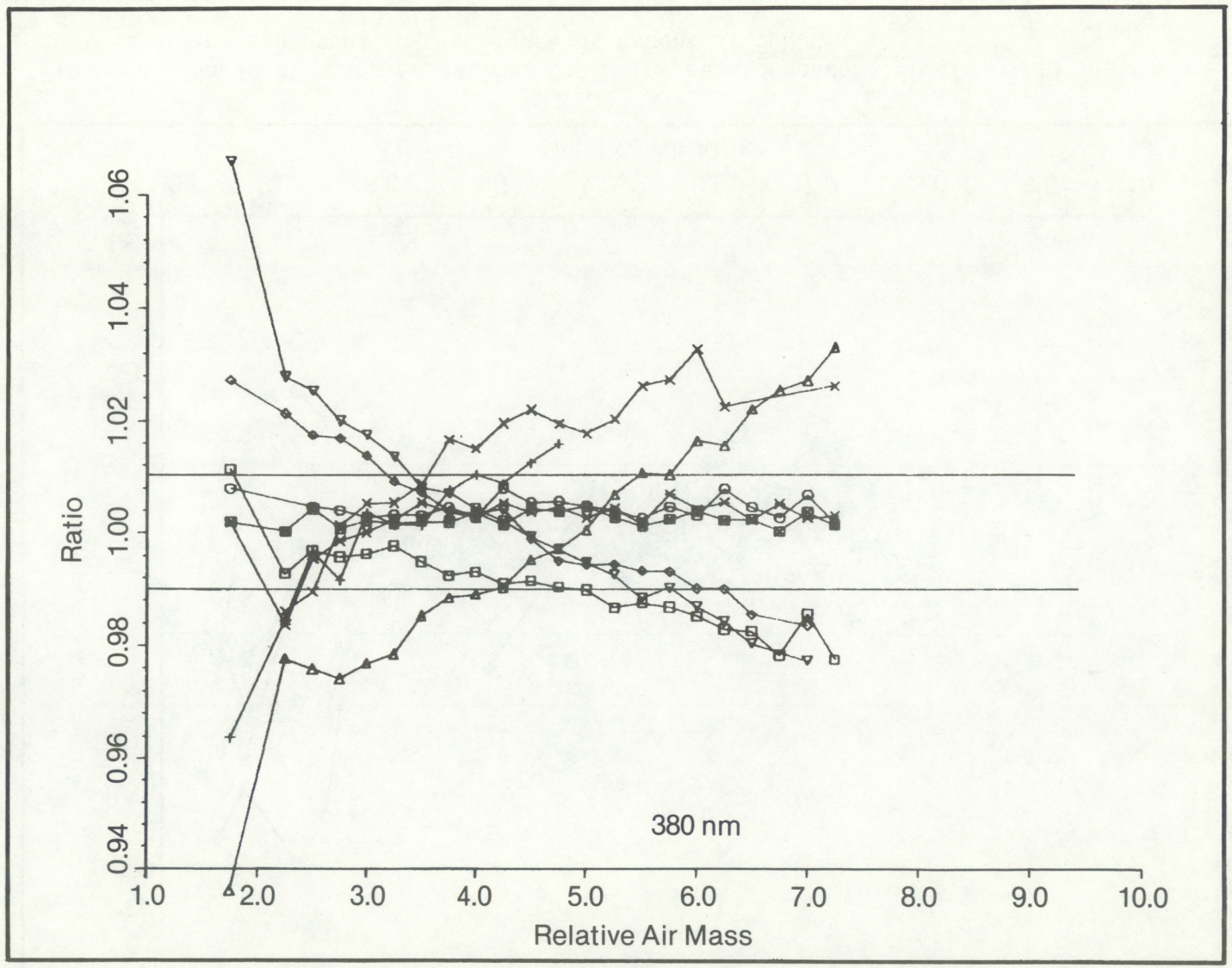

Figure 3.--Ratio of observed optical depth for each dependently calibrated instrument to that of the consensus, at 380 nm. Each point is an average for the entire intercomparison within the indicated airmass interval.

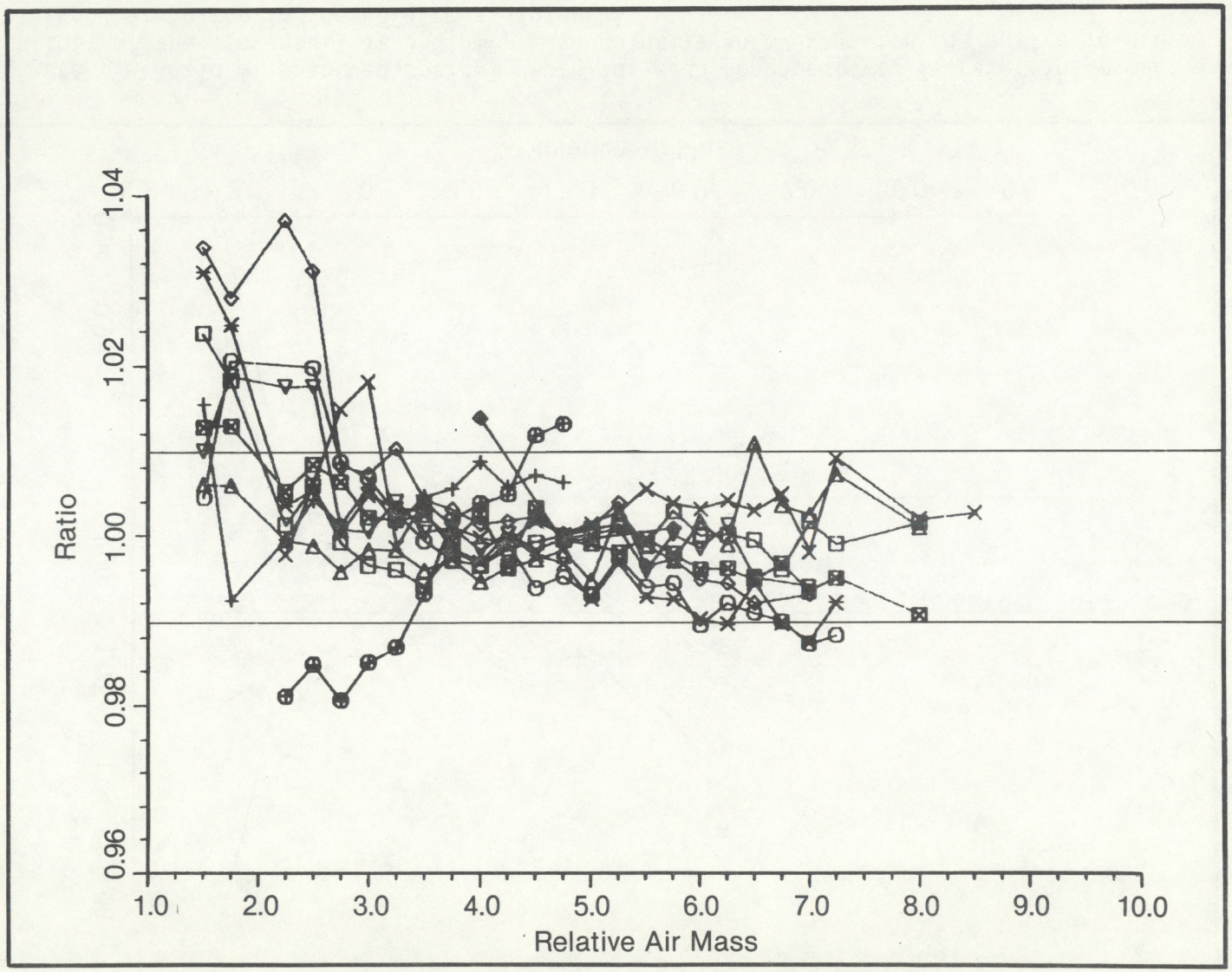

Figure 4.--Ratio of observed optical depth for each dependently calibrated instrument to that of the consensus, as in Figure 3, except at 500 nm.

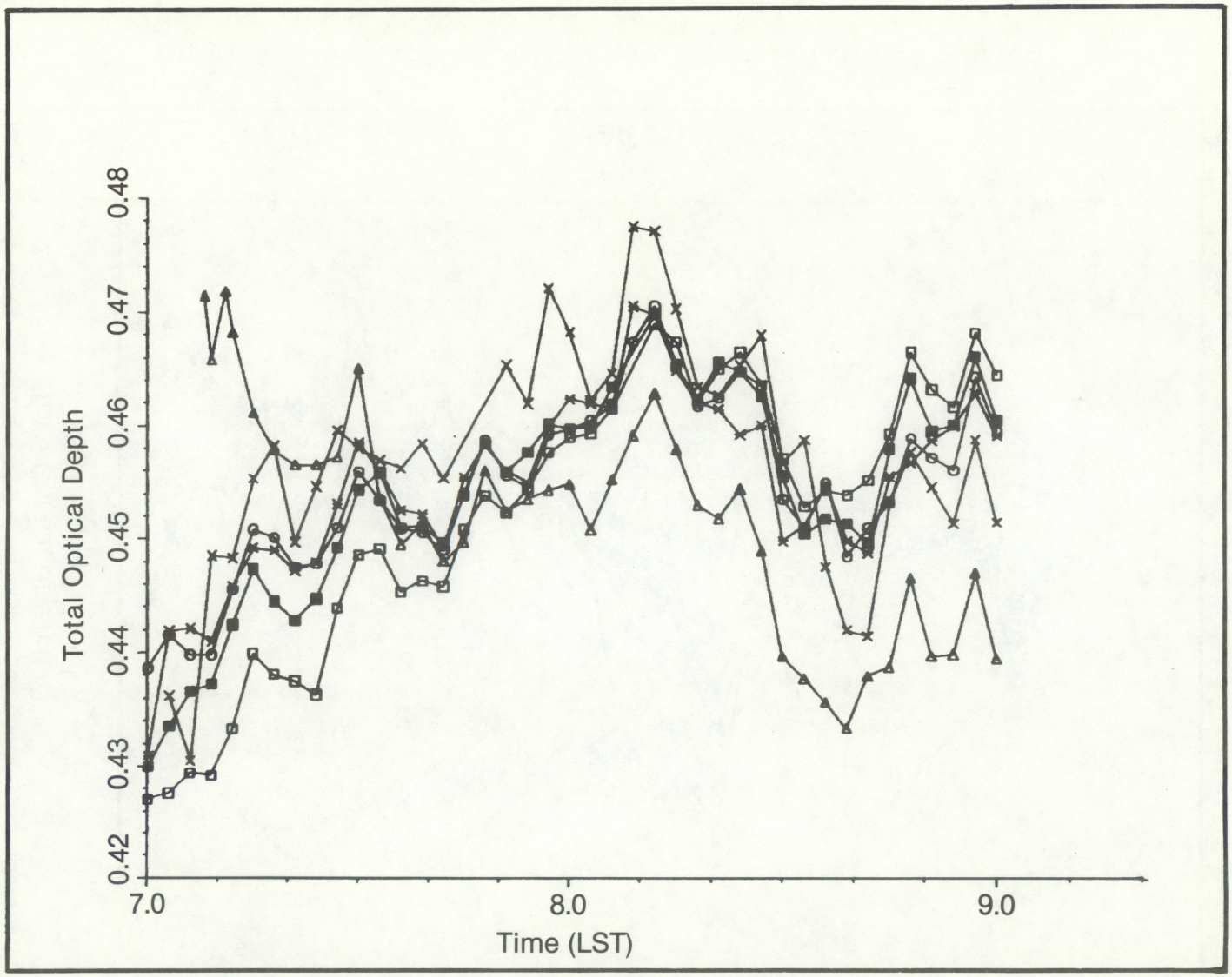

Figure 5.--Total optical depth at 380 nm on the morning of 29 October 1982 for 6 intercomparison instruments using the dependent calibration of each.

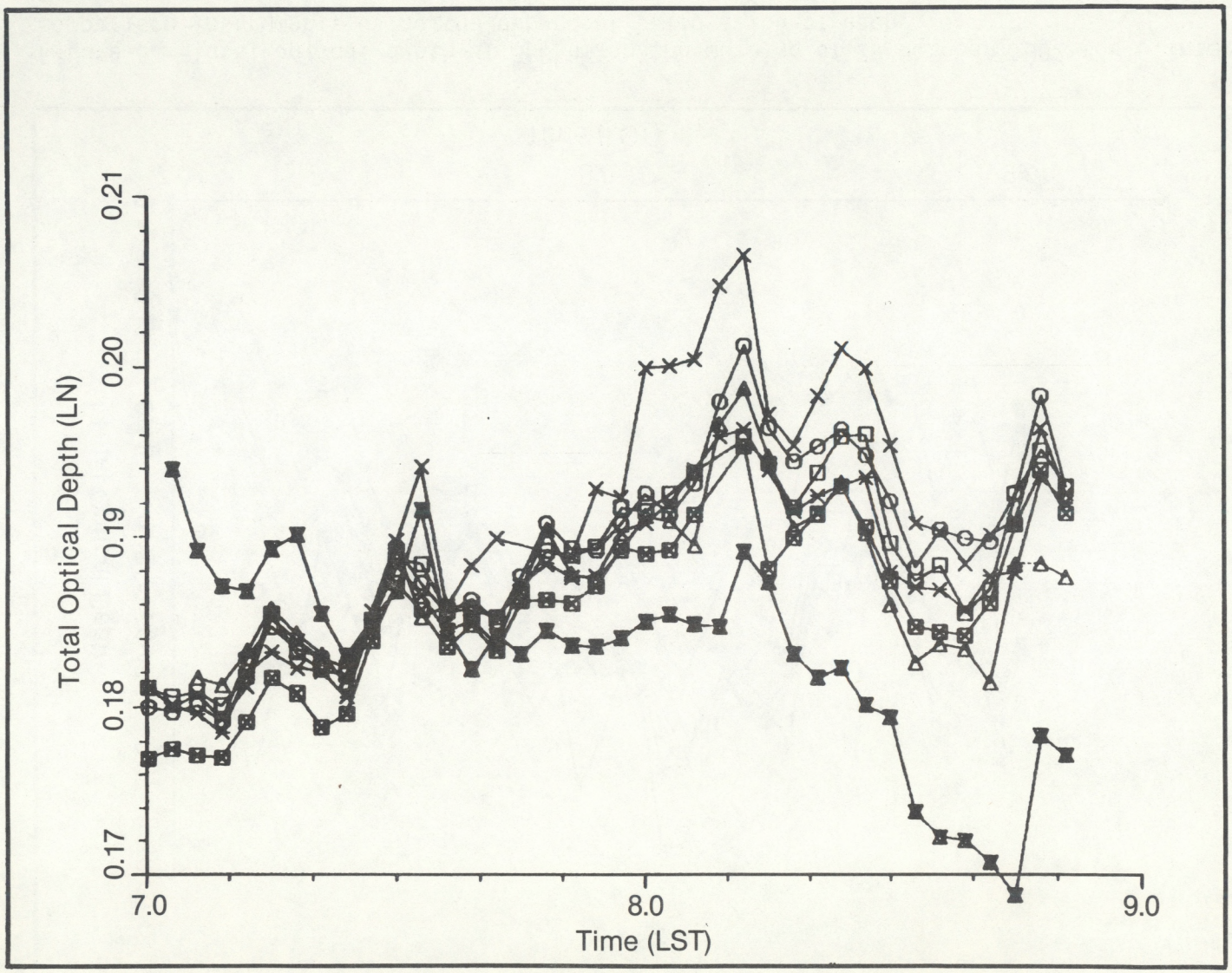

Figure 6.--Total optical depth as in Figure 5, but at 500 nm.

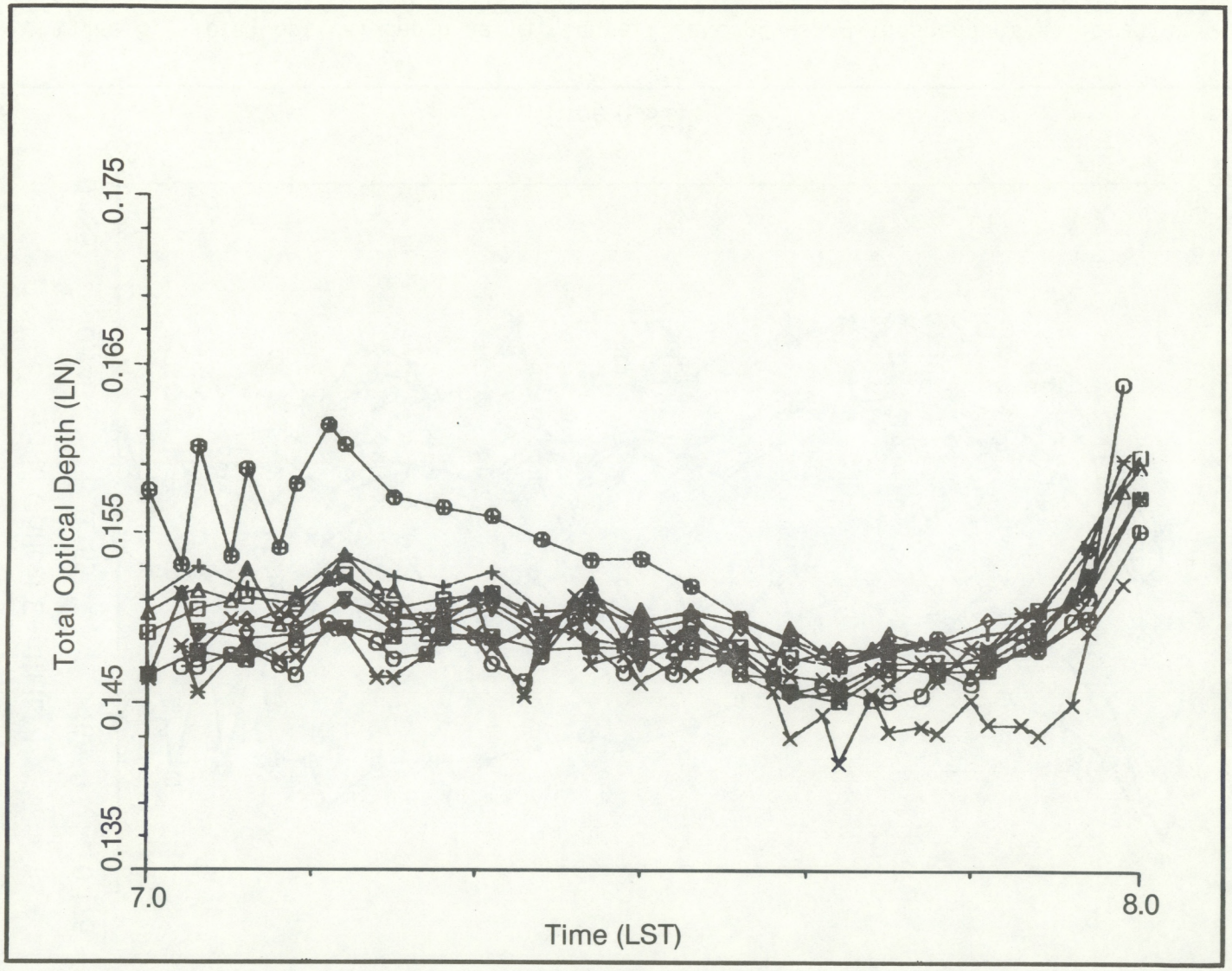

Figure 7.--Total optical depth on the morning of 20 October 1981 using the dependent calibration at 500 nm.

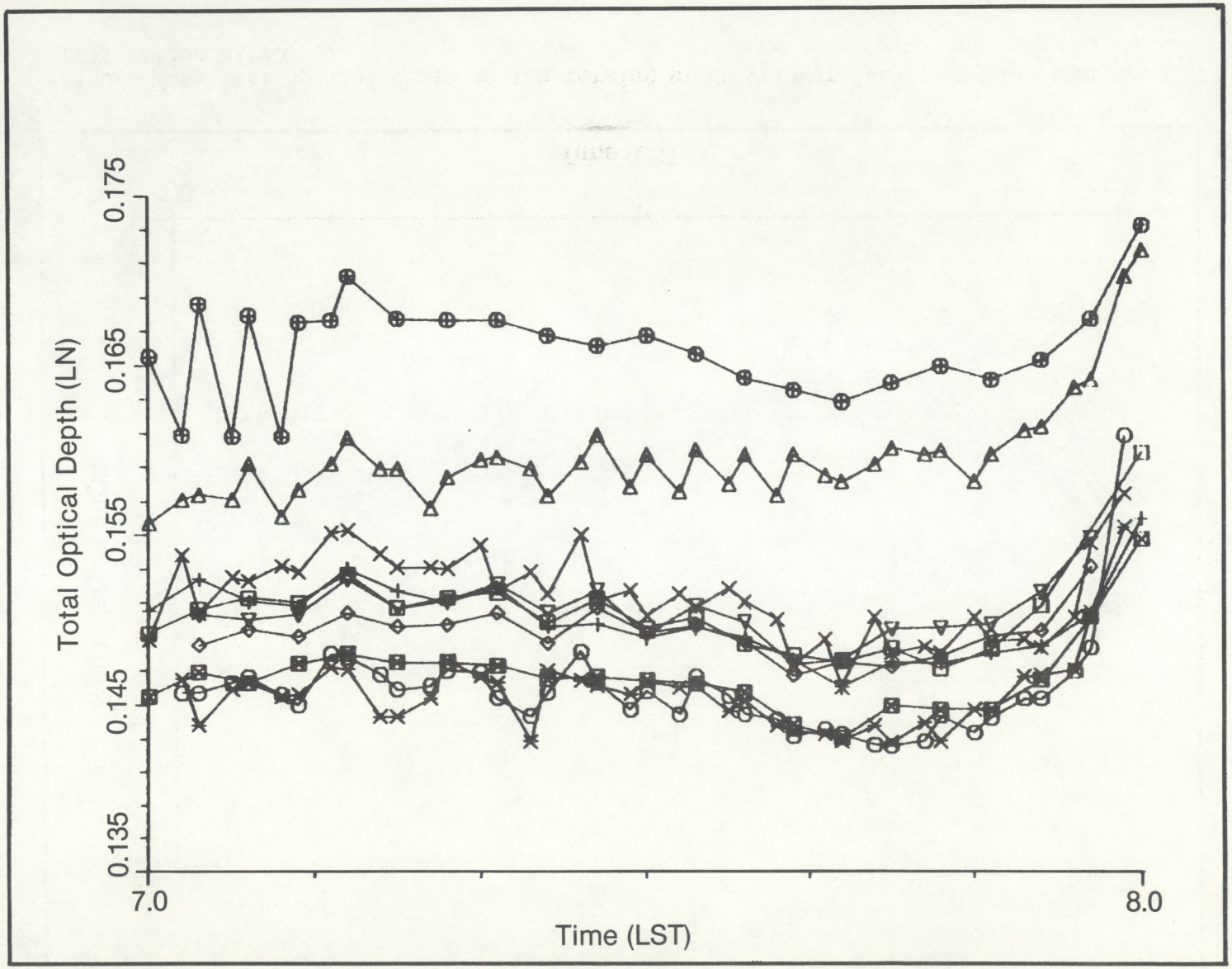

Figure 8.--Total optical depth as in Figure 7, except using independent calibration factors.

APPENDIX

AEROSOL OPTICAL DEPTH (DEP. CAL.) FOR DAY 1029-- 380. NM.

JD	TIME(LT)		J203	J208	UM32	SH97	SH98	J201	J204	J206	J207	SN07	SER1	SER2
302	7	3	.0631	.0772	88.8888	88.8888	.0680	88.8888	88.8888	.0689	.0776	88.8888	88.8888	88.8888
302	7	6	.0649	.0755	.1238	88.8888	.0621	88.8888	88.8888	.0720	.0777	88.8888	88.8888	88.8888
302	7	9	.0647	.0755	.1013	88.8888	.0797	88.8888	88.8888	.0727	.0767	88.8888	88.8888	88.8888
302	7	12	.0687	.0812	.1036	88.8888	.0792	88.8888	88.8888	.0779	.0815	88.8888	88.8888	88.8888
302	7	15	.0754	.0865	.0966	88.8888	.0860	88.8888	88.8888	.0827	.0849	88.8888	88.8888	88.8888
302	7	18	.0736	.0857	.0932	88.8888	.0885	88.8888	88.8888	.0799	.0847	88.8888	88.8888	88.8888
302	7	21	.0729	.0832	.0920	88.8888	.0798	88.8888	88.8888	.0782	.0829	88.8888	88.8888	88.8888
302	7	24	.0718	.0835	.0919	88.8888	.0844	88.8888	88.8888	.0802	.0836	88.8888	88.8888	88.8888
302	7	27	.0794	.0867	.0926	88.8888	.0890	88.8888	88.8888	.0847	.0888	88.8888	88.8888	88.8888
302	7	30	.0840	.0916	.1005	88.8888	.0872	88.8888	88.8888	.0898	.0942	88.8888	88.8888	88.8888
302	7	33	.0846	.0891	.0889	88.8888	.0858	88.8888	88.8888	.0912	.0916	88.8888	88.8888	88.8888
302	7	36	.0808	.0866	.0850	88.8888	.0848	88.8888	88.8888	.0865	.0882	88.8888	88.8888	88.8888
302	7	39	.0818	.0863	.0868	88.8888	.0867	88.8888	88.8888	.0865	.0879	88.8888	88.8888	88.8888
302	7	42	.0813	.0847	.0834	88.8888	.0833	88.8888	88.8888	.0851	.0850	88.8888	88.8888	88.8888
302	7	45	.0863	.0897	.0851	88.8888	88.8888	88.8888	88.8888	.0892	.0911	88.8888	88.8888	88.8888
302	7	48	.0893	.0944	.0915	88.8888	88.8888	88.8888	88.8888	.0939	.0939	88.8888	88.8888	88.8888
302	7	51	.0878	.0913	.0879	88.8888	.0925	88.8888	88.8888	.0914	.0917	88.8888	88.8888	88.8888
302	7	54	.0899	.0901	.0889	88.8888	.0888	88.8888	88.8888	.0930	.0906	88.8888	88.8888	88.8888
302	7	57	.0931	.0948	.0897	88.8888	.0987	88.8888	88.8888	.0956	.0956	88.8888	88.8888	88.8888
302	8	0	.0944	.0953	.0903	88.8888	.0945	88.8888	88.8888	.0951	.0980	88.8888	88.8888	88.8888
302	8	3	.0947	.0961	.0863	88.8888	.0883	88.8888	88.8888	.0953	.0976	88.8888	88.8888	88.8888
302	8	6	.0969	.0975	.0906	88.8888	.0904	88.8888	88.8888	.0989	.0972	88.8888	88.8888	88.8888
302	8	12	.1043	.1060	.0983	88.8888	.1023	88.8888	88.8888	.1051	.1054	88.8888	88.8888	88.8888
302	8	15	.1028	.1009	.0934	88.8888	.0952	88.8888	88.8888	.1005	.1005	88.8888	88.8888	88.8888
302	8	18	.0975	.0974	.0884	88.8888	.0882	88.8888	88.8888	.0978	.0976	88.8888	88.8888	88.8888
302	8	21	.1004	.0981	.0873	88.8888	.0871	88.8888	88.8888	.1010	.0971	88.8888	88.8888	88.8888
302	8	24	.1018	.1003	.0898	88.8888	.0896	88.8888	88.8888	.1002	.0949	88.8888	88.8888	88.8888
302	8	27	.0990	.0991	.0843	88.8888	.0919	88.8888	88.8888	.0980	.0956	88.8888	88.8888	88.8888
302	8	30	.0925	.0891	.0751	88.8888	.0805	88.8888	88.8888	.0909	.0855	88.8888	88.8888	88.8888
302	8	33	.0882	.0866	.0732	88.8888	.0822	88.8888	88.8888	.0858	.0868	88.8888	88.8888	88.8888
302	8	36	.0897	.0906	.0710	88.8888	.0708	88.8888	88.8888	.0872	.0904	88.8888	88.8888	88.8888
302	8	39	.0893	.0841	.0687	88.8888	.0649	88.8888	88.8888	.0867	.0855	88.8888	88.8888	88.8888
302	8	42	.0906	.0866	.0733	88.8888	.0642	88.8888	88.8888	.0850	.0844	88.8888	88.8888	88.8888
302	8	45	.0946	.0889	.0741	88.8888	.0757	88.8888	88.8888	.0933	.0910	88.8888	88.8888	88.8888
302	8	48	.1019	.0945	.0820	88.8888	.0799	88.8888	88.8888	.0995	.0923	88.8888	88.8888	88.8888
302	8	51	.0986	.0928	.0751	88.8888	.0767	88.8888	88.8888	.0950	.0943	88.8888	88.8888	88.8888
302	8	54	.0970	.0917	.0752	88.8888	.0732	88.8888	88.8888	.0955	.0955	88.8888	88.8888	88.8888
302	8	57	.1036	.0999	.0824	88.8888	.0803	88.8888	88.8888	.1015	.0985	88.8888	88.8888	88.8888
302	9	0	.0999	.0950	.0749	88.8888	.0729	88.8888	88.8888	.0958	.0946	88.8888	88.8888	88.8888

9999

AEROSOL OPTICAL DEPTH (INDEP. CAL.) FOR DAY 1029-- 380. NM.

JD	TIME(LT)		J203	J208	UM32	SH97	SH98	J201	J204	J206	J207	SN07	SER1	SER2
302	7	3	.0589	.0774	88.8888	88.8888	.0717	88.8888	88.8888	.0691	.0783	88.8888	88.8888	88.8888
302	7	6	.0604	.0758	.1352	88.8888	.0660	88.8888	88.8888	.0722	.0785	88.8888	88.8888	88.8888
302	7	9	.0598	.0757	.1135	88.8888	.0840	88.8888	88.8888	.0729	.0775	88.8888	88.8888	88.8888
302	7	12	.0635	.0815	.1167	88.8888	.0838	88.8888	88.8888	.0781	.0824	88.8888	88.8888	88.8888
302	7	15	.0699	.0868	.1105	88.8888	.0908	88.8888	88.8888	.0830	.0859	88.8888	88.8888	88.8888
302	7	18	.0677	.0860	.1080	88.8888	.0936	88.8888	88.8888	.0802	.0858	88.8888	88.8888	88.8888
302	7	21	.0667	.0835	.1076	88.8888	.0852	88.8888	88.8888	.0786	.0840	88.8888	88.8888	88.8888
302	7	24	.0652	.0838	.1084	88.8888	.0901	88.8888	88.8888	.0805	.0848	88.8888	88.8888	88.8888
302	7	27	.0725	.0870	.1099	88.8888	.0950	88.8888	88.8888	.0851	.0900	88.8888	88.8888	88.8888
302	7	30	.0768	.0920	.1186	88.8888	.0934	88.8888	88.8888	.0901	.0955	88.8888	88.8888	88.8888
302	7	33	.0770	.0894	.1079	88.8888	.0924	88.8888	88.8888	.0916	.0930	88.8888	88.8888	88.8888
302	7	36	.0729	.0870	.1047	88.8888	.0917	88.8888	88.8888	.0869	.0896	88.8888	88.8888	88.8888
302	7	39	.0736	.0867	.1074	88.8888	.0939	88.8888	88.8888	.0870	.0893	88.8888	88.8888	88.8888
302	7	42	.0728	.0851	.1048	88.8888	.0907	88.8888	88.8888	.0855	.0865	88.8888	88.8888	88.8888
302	7	45	.0774	.0901	.1074	88.8888	88.8888	88.8888	88.8888	.0897	.0926	88.8888	88.8888	88.8888
302	7	48	.0801	.0948	.1145	88.8888	88.8888	88.8888	88.8888	.0944	.0956	88.8888	88.8888	88.8888
302	7	51	.0783	.0918	.1117	88.8888	.1008	88.8888	88.8888	.0919	.0934	88.8888	88.8888	88.8888
302	7	54	.0801	.0906	.1136	88.8888	.0973	88.8888	88.8888	.0935	.0924	88.8888	88.8888	88.8888
302	7	57	.0830	.0954	.1151	88.8888	.1075	88.8888	88.8888	.0961	.0974	88.8888	88.8888	88.8888
302	8	0	.0839	.0958	.1165	88.8888	.1036	88.8888	88.8888	.0957	.0999	88.8888	88.8888	88.8888
302	8	3	.0840	.0967	.1133	88.8888	.0976	88.8888	88.8888	.0958	.0995	88.8888	88.8888	88.8888
302	8	6	.0859	.0981	.1184	88.8888	.1001	88.8888	88.8888	.0994	.0992	88.8888	88.8888	88.8888
302	8	12	.0927	.1066	.1275	88.8888	.1125	88.8888	88.8888	.1057	.1075	88.8888	88.8888	88.8888
302	8	15	.0909	.1016	.1234	88.8888	.1057	88.8888	88.8888	.1011	.1027	88.8888	88.8888	88.8888
302	8	18	.0852	.0981	.1192	88.8888	.0989	88.8888	88.8888	.0984	.0998	88.8888	88.8888	88.8888
302	8	21	.0879	.0987	.1188	88.8888	.0980	88.8888	88.8888	.1016	.0994	88.8888	88.8888	88.8888
302	8	24	.0890	.1010	.1220	88.8888	.1008	88.8888	88.8888	.1009	.0972	88.8888	88.8888	88.8888
302	8	27	.0858	.0998	.1173	88.8888	.1033	88.8888	88.8888	.0987	.0980	88.8888	88.8888	88.8888
302	8	30	.0791	.0898	.1088	88.8888	.0921	88.8888	88.8888	.0916	.0879	88.8888	88.8888	88.8888
302	8	33	.0745	.0873	.1075	88.8888	.0941	88.8888	88.8888	.0865	.0892	88.8888	88.8888	88.8888
302	8	36	.0757	.0913	.1061	88.8888	.0830	88.8888	88.8888	.0879	.0929	88.8888	88.8888	88.8888
302	8	39	.0750	.0848	.1045	88.8888	.0773	88.8888	88.8888	.0874	.0880	88.8888	88.8888	88.8888
302	8	42	.0761	.0874	.1098	88.8888	.0769	88.8888	88.8888	.0858	.0870	88.8888	88.8888	88.8888
302	8	45	.0799	.0897	.1113	88.8888	.0886	88.8888	88.8888	.0941	.0937	88.8888	88.8888	88.8888
302	8	48	.0868	.0953	.1198	88.8888	.0930	88.8888	88.8888	.1003	.0950	88.8888	88.8888	88.8888
302	8	51	.0833	.0936	.1135	88.8888	.0900	88.8888	88.8888	.0958	.0970	88.8888	88.8888	88.8888
302	8	54	.0815	.0925	.1143	88.8888	.0868	88.8888	88.8888	.0963	.0983	88.8888	88.8888	88.8888
302	8	57	.0878	.1007	.1221	88.8888	.0941	88.8888	88.8888	.1023	.1013	88.8888	88.8888	88.8888
302	9	0	.0838	.0959	.1152	88.8888	.0869	88.8888	88.8888	.0967	.0975	88.8888	88.8888	88.8888

9999

AEROSOL OPTICAL DEPTH (DEP. CAL.) FOR DAY 1029-- 500. NM.

JD	TIME(LT)		J203	J208	UM32	SH97	SH98	J201	J204	J206	J207	SN07	SER1	SER2
302	7	3	.0514	.0506	88.8888	88.8888	.0508	88.8888	88.8888	.0483	.0509	88.8888	88.8888	.0643
302	7	6	.0517	.0510	.0525	88.8888	.0515	88.8888	88.8888	.0479	.0505	88.8888	88.8888	.0595
302	7	9	.0509	.0501	.0521	88.8888	.0501	88.8888	88.8888	.0478	.0494	88.8888	88.8888	.0574
302	7	12	.0526	.0537	.0541	88.8888	.0520	88.8888	88.8888	.0499	.0529	88.8888	88.8888	.0571
302	7	15	.0563	.0556	.0567	88.8888	.0560	88.8888	88.8888	.0525	.0541	88.8888	88.8888	.0596
302	7	18	.0540	.0543	.0551	88.8888	.0548	88.8888	88.8888	.0517	.0532	88.8888	88.8888	.0604
302	7	21	.0530	.0538	.0539	88.8888	.0536	88.8888	88.8888	.0496	.0530	88.8888	88.8888	.0558
302	7	24	.0527	.0531	.0523	88.8888	.0524	88.8888	88.8888	.0504	.0515	88.8888	88.8888	.0533
302	7	27	.0556	.0558	.0560	88.8888	.0564	88.8888	88.8888	.0547	.0559	88.8888	88.8888	.0554
302	7	30	.0595	.0603	.0602	88.8888	.0606	88.8888	88.8888	.0581	.0592	88.8888	88.8888	.0571
302	7	33	.0592	.0582	.0561	88.8888	.0649	88.8888	88.8888	.0565	.0574	88.8888	88.8888	.0619
302	7	36	.0565	.0564	.0567	88.8888	.0567	88.8888	88.8888	.0543	.0553	88.8888	88.8888	.0548
302	7	39	.0565	.0571	.0567	88.8888	.0591	88.8888	88.8888	.0556	.0559	88.8888	88.8888	.0525
302	7	42	.0561	.0559	.0561	88.8888	.0607	88.8888	88.8888	.0541	.0546	88.8888	88.8888	.0544
302	7	45	.0576	.0585	.0578	88.8888	88.8888	88.8888	88.8888	.0570	.0581	88.8888	88.8888	.0533
302	7	48	.0600	.0617	.0612	88.8888	88.8888	88.8888	88.8888	.0571	.0593	88.8888	88.8888	.0548
302	7	51	.0597	.0602	.0586	88.8888	.0596	88.8888	88.8888	.0569	.0584	88.8888	88.8888	.0539
302	7	54	.0602	.0601	.0583	88.8888	.0636	88.8888	88.8888	.0579	.0586	88.8888	88.8888	.0538
302	7	57	.0625	.0616	.0600	88.8888	.0631	88.8888	88.8888	.0602	.0612	88.8888	88.8888	.0543
302	8	0	.0623	.0634	.0620	88.8888	.0707	88.8888	88.8888	.0598	.0617	88.8888	88.8888	.0553
302	8	3	.0633	.0622	.0617	88.8888	.0708	88.8888	88.8888	.0600	.0629	88.8888	88.8888	.0557
302	8	6	.0646	.0639	.0603	88.8888	.0712	88.8888	88.8888	.0621	.0648	88.8888	88.8888	.0551
302	8	9	88.8888	.0687	.0674	88.8888	.0755	88.8888	88.8888	88.8888	.0668	88.8888	88.8888	.0550
302	8	12	.0665	.0721	.0695	88.8888	.0773	88.8888	88.8888	.0661	.0672	88.8888	88.8888	.0594
302	8	15	.0651	.0672	.0655	88.8888	.0680	88.8888	88.8888	.0589	.0647	88.8888	88.8888	.0576
302	8	18	.0625	.0653	.0613	88.8888	.0662	88.8888	88.8888	.0607	.0624	88.8888	88.8888	.0534
302	8	21	.0646	.0662	.0621	88.8888	.0691	88.8888	88.8888	.0622	.0633	88.8888	88.8888	.0520
302	8	24	.0667	.0672	.0640	88.8888	.0718	88.8888	88.8888	.0638	.0639	88.8888	88.8888	.0526
302	8	27	.0668	.0656	.0610	88.8888	.0707	88.8888	88.8888	.0614	.0644	88.8888	88.8888	.0504
302	8	30	.0604	.0630	.0568	88.8888	.0662	88.8888	88.8888	.0582	.0588	88.8888	88.8888	.0498
302	8	33	.0582	.0591	.0534	88.8888	.0616	88.8888	88.8888	.0555	.0579	88.8888	88.8888	.0440
302	8	36	.0591	.0613	.0545	88.8888	.0611	88.8888	88.8888	.0552	.0578	88.8888	88.8888	.0426
302	8	39	.0563	.0608	.0542	88.8888	.0592	88.8888	88.8888	.0550	.0566	88.8888	88.8888	.0423
302	8	42	.0577	.0605	.0522	88.8888	.0609	88.8888	88.8888	.0569	.0586	88.8888	88.8888	.0411
302	8	45	.0633	.0635	.0592	88.8888	.0618	88.8888	88.8888	.0615	.0587	88.8888	88.8888	.0392
302	8	48	.0659	.0692	.0592	88.8888	.0672	88.8888	88.8888	.0647	.0644	88.8888	88.8888	.0487
302	8	51	.0638	.0638	.0584	88.8888	.0633	88.8888	88.8888	.0622	.0629	88.8888	88.8888	.0475
302	8	54	.0639	.0668	.0602	88.8888	.0626	88.8888	88.8888	.0639	.0631	88.8888	88.8888	.0452
302	8	57	.0690	.0704	.0643	88.8888	.0657	88.8888	88.8888	.0663	.0671	88.8888	88.8888	.0470
302	9	0	.0658	.0649	.0579	88.8888	.0621	88.8888	88.8888	.0606	.0636	88.8888	88.8888	.0474
9999														

AEROSOL OPTICAL DEPTH (INDEP. CAL.) FOR DAY 1029-- 500. NM.

JD	TIME(LT)		J203	J208	UM32	SH97	SH98	J201	J204	J206	J207	SN07	SER1	SER2
302	7	3	.0515	.0496	88.8888	88.8888	.0528	88.8888	88.8888	.0474	.0495	88.8888	88.8888	.0751
302	7	6	.0518	.0498	.0529	88.8888	.0536	88.8888	88.8888	.0470	.0490	88.8888	88.8888	.0711
302	7	9	.0510	.0489	.0525	88.8888	.0523	88.8888	88.8888	.0468	.0478	88.8888	88.8888	.0699
302	7	12	.0527	.0524	.0545	88.8888	.0544	88.8888	88.8888	.0489	.0511	88.8888	88.8888	.0704
302	7	15	.0565	.0542	.0571	88.8888	.0586	88.8888	88.8888	.0513	.0522	88.8888	88.8888	.0738
302	7	18	.0541	.0528	.0555	88.8888	.0575	88.8888	88.8888	.0504	.0513	88.8888	88.8888	.0753
302	7	21	.0532	.0522	.0544	88.8888	.0564	88.8888	88.8888	.0483	.0509	88.8888	88.8888	.0717
302	7	24	.0528	.0515	.0528	88.8888	.0554	88.8888	88.8888	.0491	.0493	88.8888	88.8888	.0700
302	7	27	.0558	.0541	.0565	88.8888	.0596	88.8888	88.8888	.0533	.0536	88.8888	88.8888	.0729
302	7	30	.0597	.0584	.0608	88.8888	.0639	88.8888	88.8888	.0566	.0568	88.8888	88.8888	.0754
302	7	33	.0594	.0563	.0567	88.8888	.0684	88.8888	88.8888	.0550	.0549	88.8888	88.8888	.0810
302	7	36	.0567	.0543	.0573	88.8888	.0603	88.8888	88.8888	.0527	.0527	88.8888	88.8888	.0748
302	7	39	.0567	.0550	.0574	88.8888	.0629	88.8888	88.8888	.0540	.0532	88.8888	88.8888	.0733
302	7	42	.0563	.0537	.0567	88.8888	.0646	88.8888	88.8888	.0524	.0517	88.8888	88.8888	.0760
302	7	45	.0578	.0563	.0585	88.8888	88.8888	88.8888	88.8888	.0552	.0551	88.8888	88.8888	.0757
302	7	48	.0602	.0594	.0619	88.8888	88.8888	88.8888	88.8888	.0552	.0562	88.8888	88.8888	.0780
302	7	51	.0600	.0578	.0594	88.8888	.0639	88.8888	88.8888	.0550	.0553	88.8888	88.8888	.0779
302	7	54	.0605	.0576	.0591	88.8888	.0682	88.8888	88.8888	.0559	.0553	88.8888	88.8888	.0787
302	7	57	.0627	.0590	.0608	88.8888	.0678	88.8888	88.8888	.0582	.0578	88.8888	88.8888	.0799
302	8	0	.0626	.0607	.0628	88.8888	.0756	88.8888	88.8888	.0577	.0582	88.8888	88.8888	.0818
302	8	3	.0636	.0594	.0626	88.8888	.0758	88.8888	88.8888	.0578	.0593	88.8888	88.8888	.0829
302	8	6	.0649	.0611	.0612	88.8888	.0763	88.8888	88.8888	.0598	.0611	88.8888	88.8888	.0830
302	8	9	88.8888	.0658	.0683	88.8888	.0808	88.8888	88.8888	88.8888	.0630	88.8888	88.8888	.0837
302	8	12	.0668	.0691	.0704	88.8888	.0827	88.8888	88.8888	.0637	.0633	88.8888	88.8888	.0889
302	8	15	.0654	.0642	.0664	88.8888	.0735	88.8888	88.8888	.0564	.0608	88.8888	88.8888	.0878
302	8	18	.0629	.0621	.0622	88.8888	.0719	88.8888	88.8888	.0582	.0583	88.8888	88.8888	.0844
302	8	21	.0649	.0630	.0631	88.8888	.0749	88.8888	88.8888	.0597	.0591	88.8888	88.8888	.0837
302	8	24	.0671	.0639	.0650	88.8888	.0777	88.8888	88.8888	.0612	.0596	88.8888	88.8888	.0850
302	8	27	.0671	.0623	.0620	88.8888	.0767	88.8888	88.8888	.0587	.0600	88.8888	88.8888	.0835
302	8	30	.0607	.0596	.0578	88.8888	.0724	88.8888	88.8888	.0555	.0543	88.8888	88.8888	.0836
302	8	33	.0585	.0556	.0544	88.8888	.0679	88.8888	88.8888	.0527	.0533	88.8888	88.8888	.0786
302	8	36	.0594	.0577	.0556	88.8888	.0675	88.8888	88.8888	.0524	.0531	88.8888	88.8888	.0778
302	8	39	.0566	.0571	.0553	88.8888	.0658	88.8888	88.8888	.0521	.0518	88.8888	88.8888	.0782
302	8	42	.0581	.0568	.0533	88.8888	.0676	88.8888	88.8888	.0539	.0537	88.8888	88.8888	.0777
302	8	45	.0637	.0597	.0603	88.8888	.0686	88.8888	88.8888	.0585	.0538	88.8888	88.8888	.0765
302	8	48	.0662	.0654	.0603	88.8888	.0741	88.8888	88.8888	.0616	.0594	88.8888	88.8888	.0867
302	8	51	.0642	.0599	.0596	88.8888	.0704	88.8888	88.8888	.0590	.0578	88.8888	88.8888	.0861
302	8	54	.0643	.0628	.0614	88.8888	.0698	88.8888	88.8888	.0607	.0579	88.8888	88.8888	.0844
302	8	57	.0694	.0664	.0655	88.8888	.0730	88.8888	88.8888	.0630	.0619	88.8888	88.8888	.0870
302	9	0	.0662	.0607	.0591	88.8888	.0695	88.8888	88.8888	.0573	.0583	88.8888	88.8888	.0879

9999

AEROSOL OPTICAL DEPTH (DEP. CAL.) FOR DAY 1102-- 380. NP.

JD	TIME(LT)		J203	J208	UM32	SH97	SH98	J201	J204	J206	J207	SN07	SER1	SER2
306	14	45	.0309	.0375	.0251	88.8888	.0217	.0443	.0408	.0361	.0383	88.8888	88.8888	88.8888
306	14	48	.0386	.0397	.0272	88.8888	.0254	.0426	.0443	.0391	.0343	88.8888	88.8888	88.8888
306	14	51	.0378	.0423	.0324	88.8888	.0305	.0550	.0497	.0415	.0409	88.8888	88.8888	88.8888
306	14	54	.0403	.0404	.0307	88.8888	.0339	.0566	.0506	.0392	.0441	88.8888	88.8888	88.8888
306	14	57	.0412	.0422	.0355	88.8888	.0353	.0449	.0495	.0442	.0435	88.8888	88.8888	88.8888
306	15	0	.0411	.0442	.0334	88.8888	.0400	.0495	.0517	.0463	.0422	88.8888	88.8888	88.8888
306	15	3	.0363	.0443	.0310	88.8888	.0342	.0436	.0462	.0383	.0392	88.8888	88.8888	88.8888
306	15	6	.0367	.0425	.0317	88.8888	.0366	.0450	.0490	.0385	.0426	88.8888	88.8888	88.8888
306	15	9	88.8888	.0405	.0287	88.8888	.0337	.0384	.0452	.0417	.0381	88.8888	88.8888	88.8888
306	15	12	.0340	.0360	.0289	88.8888	.0339	.0479	.0449	.0387	.0368	88.8888	88.8888	88.8888
306	15	15	.0345	.0393	.0288	88.8888	.0286	.0440	.0426	.0368	.0386	88.8888	88.8888	88.8888
306	15	18	.0327	.0364	.0284	88.8888	.0282	.0420	.0406	.0334	.0374	88.8888	88.8888	88.8888
306	15	21	.0326	.0399	.0313	88.8888	.0276	.0431	.0415	.0403	.0357	88.8888	88.8888	88.8888
306	15	24	.0304	.0366	.0268	88.8888	.0302	.0370	.0381	.0362	.0344	88.8888	88.8888	88.8888
306	15	27	.0288	.0330	.0292	88.8888	.0290	.0406	.0382	.0358	.0338	88.8888	88.8888	88.8888
306	15	30	.0318	.0384	.0314	88.8888	.0275	.0370	.0385	.0372	.0364	88.8888	88.8888	88.8888
306	15	33	.0286	.0318	.0296	88.8888	.0314	.0397	.0350	.0349	.0339	88.8888	88.8888	88.8888
306	15	36	.0288	.0336	.0314	88.8888	.0333	.0372	.0336	.0326	.0354	88.8888	88.8888	88.8888
306	15	39	.0287	.0420	.0331	88.8888	.0413	.0428	.0352	.0360	.0394	88.8888	88.8888	88.8888
306	15	42	.0308	.0399	.0347	88.8888	.0410	.0445	.0367	.0400	.0399	88.8888	88.8888	88.8888
306	15	45	.0315	.0378	.0319	88.8888	.0362	.0387	.0368	.0366	.0388	88.8888	88.8888	88.8888
306	15	48	.0335	.0403	.0425	88.8888	.0424	.0371	.0352	.0416	.0420	88.8888	88.8888	88.8888
306	15	54	.0329	.0420	.0414	88.8888	.0439	.0411	.0358	.0406	.0422	88.8888	88.8888	88.8888
306	15	57	.0354	.0439	.0494	88.8888	.0493	.0423	.0366	.0418	.0467	88.8888	88.8888	88.8888
306	16	0	.0338	.0420	.0529	88.8888	.0528	.0375	.0358	.0451	.0449	88.8888	88.8888	88.8888
306	16	3	.0282	.0395	.0440	88.8888	.0472	.0373	.0325	.0393	.0418	88.8888	88.8888	88.8888
306	16	6	.0325	.0424	.0489	88.8888	.0489	.0356	.0309	.0409	.0446	88.8888	88.8888	88.8888
306	16	15	.0281	.0387	.0631	88.8888	.0512	.0283	.0251	.0388	.0417	88.8888	88.8888	88.8888
306	16	18	.0305	.0431	.0745	88.8888	.0590	.0296	.0246	.0423	.0454	88.8888	88.8888	88.8888

9999

AEROSOL OPTICAL DEPTH (INDEP. CAL.) FOR DAY 1102-- 380. NM.

JD	TIME(LT)		J203	J208	UM32	SH97	SH98	J201	J204	J206	J207	SN07	SER1	SER2
306	14	45	.0169	.0382	.0603	88.8888	.0339	.0343	.0138	.0369	.0409	88.8888	88.8888	88.8888
306	14	48	.0248	.0404	.0617	88.8888	.0373	.0327	.0179	.0398	.0367	88.8888	88.8888	88.8888
306	14	51	.0244	.0430	.0662	88.8888	.0423	.0453	.0237	.0422	.0433	88.8888	88.8888	88.8888
306	14	54	.0271	.0411	.0639	88.8888	.0454	.0471	.0252	.0398	.0465	88.8888	88.8888	88.8888
306	14	57	.0283	.0428	.0680	88.8888	.0466	.0356	.0246	.0448	.0459	88.8888	88.8888	88.8888
306	15	0	.0284	.0448	.0651	88.8888	.0510	.0404	.0274	.0470	.0445	88.8888	88.8888	88.8888
306	15	3	.0239	.0449	.0620	88.8888	.0449	.0347	.0225	.0389	.0414	88.8888	88.8888	88.8888
306	15	6	.0246	.0431	.0620	88.8888	.0472	.0364	.0257	.0392	.0448	88.8888	88.8888	88.8888
306	15	9	88.8888	.0411	.0583	88.8888	.0439	.0299	.0226	.0423	.0402	88.8888	88.8888	88.8888
306	15	12	.0225	.0366	.0577	88.8888	.0439	.0396	.0228	.0393	.0389	88.8888	88.8888	88.8888
306	15	15	.0233	.0399	.0569	88.8888	.0384	.0359	.0211	.0374	.0406	88.8888	88.8888	88.8888
306	15	18	.0218	.0369	.0558	88.8888	.0377	.0342	.0197	.0340	.0394	88.8888	88.8888	88.8888
306	15	21	.0220	.0405	.0579	88.8888	.0368	.0355	.0212	.0408	.0376	88.8888	88.8888	88.8888
306	15	24	.0201	.0372	.0527	88.8888	.0392	.0297	.0183	.0368	.0363	88.8888	88.8888	88.8888
306	15	27	.0188	.0335	.0543	88.8888	.0377	.0335	.0190	.0363	.0355	88.8888	88.8888	88.8888
306	15	30	.0221	.0389	.0557	88.8888	.0360	.0301	.0199	.0377	.0381	88.8888	88.8888	88.8888
306	15	33	.0193	.0322	.0532	88.8888	.0396	.0330	.0170	.0354	.0356	88.8888	88.8888	88.8888
306	15	36	.0198	.0341	.0542	88.8888	.0412	.0307	.0162	.0330	.0370	88.8888	88.8888	88.8888
306	15	39	.0200	.0425	.0551	88.8888	.0489	.0365	.0184	.0364	.0409	88.8888	88.8888	88.8888
306	15	42	.0224	.0403	.0559	88.8888	.0484	.0385	.0205	.0404	.0414	88.8888	88.8888	88.8888
306	15	45	.0234	.0382	.0523	88.8888	.0432	.0329	.0212	.0370	.0403	88.8888	88.8888	88.8888
306	15	48	.0257	.0407	.0621	88.8888	.0492	.0315	.0203	.0420	.0434	88.8888	88.8888	88.8888
306	15	54	.0258	.0424	.0593	88.8888	.0501	.0360	.0221	.0410	.0435	88.8888	88.8888	88.8888
306	15	57	.0286	.0443	.0665	88.8888	.0552	.0374	.0235	.0422	.0479	88.8888	88.8888	88.8888
306	16	0	.0273	.0424	.0692	88.8888	.0585	.0329	.0233	.0454	.0461	88.8888	88.8888	88.8888
306	16	3	.0220	.0398	.0595	88.8888	.0526	.0329	.0207	.0396	.0429	88.8888	88.8888	88.8888
306	16	6	.0267	.0427	.0636	88.8888	.0539	.0314	.0197	.0412	.0457	88.8888	88.8888	88.8888
306	16	15	.0233	.0389	.0752	88.8888	.0554	.0248	.0158	.0390	.0426	88.8888	88.8888	88.8888
306	16	18	.0260	.0434	.0858	88.8888	.0629	.0263	.0160	.0425	.0462	88.8888	88.8888	88.8888

9999

AEROSOL OPTICAL DEPTH (DEP. CAL.) FOR DAY 1102-- 500. NM.

JD	TIME(LT)		J203	J208	UM32	SH97	SH99	J201	J204	J206	J207	SN07	SER1	SER2
306	14	45	.0301	.0339	.0303	88.8888	.0320	.0323	.0311	.0327	.0312	88.8888	88.8888	88.8888
306	14	48	.0299	.0360	.0332	88.8888	.0375	.0331	.0311	.0305	.0331	88.8888	88.8888	88.8888
306	14	51	.0331	.0364	.0359	88.8888	.0411	.0350	.0343	.0327	.0367	88.8888	88.8888	88.8888
306	14	54	.0342	.0376	.0348	88.8888	.0415	.0360	.0335	.0326	.0364	88.8888	88.8888	88.8888
306	14	57	.0323	.0355	.0354	88.8888	.0407	.0379	.0360	.0323	.0357	88.8888	88.8888	88.8888
306	15	0	.0329	.0391	.0361	88.8888	.0426	.0366	.0361	.0335	.0369	88.8888	88.8888	88.8888
306	15	3	.0308	.0354	.0329	88.8888	.0381	.0334	.0325	.0290	.0328	88.8888	88.8888	88.8888
306	15	6	.0338	.0366	.0344	88.8888	.0374	.0353	.0343	.0314	.0351	88.8888	88.8888	88.8888
306	15	9	88.8888	.0344	.0329	88.8888	.0334	.0339	.0337	.0300	.0311	88.8888	88.8888	88.8888
306	15	12	.0311	.0338	.0323	88.8888	.0351	.0330	.0335	.0270	.0312	88.8888	88.8888	88.8888
306	15	15	.0295	.0344	.0314	88.8888	.0339	.0329	.0328	.0304	.0307	88.8888	88.8888	88.8888
306	15	18	.0308	.0332	.0310	88.8888	.0382	.0315	.0314	.0300	.0319	88.8888	88.8888	88.8888
306	15	21	.0306	.0328	.0317	88.8888	.0376	.0309	.0318	.0314	.0309	88.8888	88.8888	88.8888
306	15	24	.0277	.0324	.0294	88.8888	.0368	.0310	.0288	.0260	.0305	88.8888	88.8888	88.8888
306	15	27	.0289	.0314	.0291	88.8888	.0333	.0309	.0302	.0274	.0288	88.8888	88.8888	88.8888
306	15	30	.0287	.0318	.0310	88.8888	.0355	.0308	.0308	.0284	.0294	88.8888	88.8888	88.8888
306	15	33	.0280	.0299	.0292	88.8888	.0340	.0295	.0289	.0280	.0287	88.8888	88.8888	88.8888
306	15	36	.0283	.0307	.0307	88.8888	.0342	.0298	.0285	.0265	.0298	88.8888	88.8888	88.8888
306	15	39	.0273	.0321	.0307	88.8888	.0365	.0308	.0304	.0281	.0310	88.8888	88.8888	88.8888
306	15	42	.0308	.0322	.0320	88.8888	.0365	.0320	.0317	.0293	.0305	88.8888	88.8888	88.8888
306	15	45	.0299	.0315	.0320	88.8888	.0367	.0310	.0319	.0275	.0309	88.8888	88.8888	88.8888
306	15	48	.0315	.0325	.0359	88.8888	.0375	.0309	.0328	.0306	.0321	88.8888	88.8888	88.8888
306	15	54	.0321	.0341	.0348	88.8888	.0369	.0324	.0326	.0305	.0332	88.8888	88.8888	88.8888
306	15	57	.0329	.0349	.0366	88.8888	.0389	.0339	.0352	.0322	.0347	88.8888	88.8888	88.8888
306	16	0	.0323	.0347	.0371	88.8888	.0390	.0339	.0346	.0323	.0335	88.8888	88.8888	88.8888
306	16	3	.0307	.0327	.0340	88.8888	.0367	.0319	.0324	.0304	.0318	88.8888	88.8888	88.8888
306	16	6	.0325	.0328	.0355	88.8888	.0387	.0328	.0328	.0310	.0337	88.8888	88.8888	88.8888
306	16	15	.0325	.0328	.0370	88.8888	.0369	.0318	.0334	.0312	.0326	88.8888	88.8888	88.8888
306	16	18	.0355	.0348	.0403	88.8888	.0405	.0342	.0364	.0338	.0346	88.8888	88.8888	88.8888

9999

AEROSOL OPTICAL DEPTH (INDEP. CAL.) FOR DAY 1102-- 500. NM.

JD	TIME(LT)		J203	J208	UM32	SH97	SH98	J201	J204	J206	J207	SN07	SER1	SER2
306	14	45	.0305	.0303	.0314	88.8888	.0385	.0312	.0340	.0298	.0265	88.8888	88.8888	88.8888
306	14	48	.0302	.0325	.0342	88.8888	.0438	.0320	.0339	.0277	.0285	88.8888	88.8888	88.8888
306	14	51	.0335	.0329	.0369	88.8888	.0473	.0340	.0371	.0300	.0323	88.8888	88.8888	88.8888
306	14	54	.0345	.0342	.0358	88.8888	.0476	.0350	.0362	.0299	.0320	88.8888	88.8888	88.8888
306	14	57	.0327	.0322	.0364	88.8888	.0467	.0369	.0386	.0296	.0314	88.8888	88.8888	88.8888
306	15	0	.0333	.0359	.0370	88.8888	.0484	.0357	.0387	.0309	.0327	88.8888	88.8888	88.8888
306	15	3	.0312	.0323	.0338	88.8888	.0438	.0325	.0351	.0265	.0287	88.8888	88.8888	88.8888
306	15	6	.0341	.0335	.0353	88.8888	.0430	.0344	.0367	.0289	.0311	88.8888	88.8888	88.8888
306	15	9	88.8888	.0314	.0338	88.8888	.0388	.0330	.0361	.0275	.0272	88.8888	88.8888	88.8888
306	15	12	.0314	.0308	.0332	88.8888	.0404	.0322	.0359	.0247	.0273	88.8888	88.8888	88.8888
306	15	15	.0298	.0315	.0322	88.8888	.0390	.0321	.0351	.0281	.0270	88.8888	88.8888	88.8888
306	15	18	.0311	.0304	.0318	88.8888	.0432	.0307	.0336	.0278	.0283	88.8888	88.8888	88.8888
306	15	21	.0309	.0301	.0325	88.8888	.0425	.0301	.0339	.0292	.0274	88.8888	88.8888	88.8888
306	15	24	.0280	.0298	.0302	88.8888	.0416	.0302	.0310	.0239	.0271	88.8888	88.8888	88.8888
306	15	27	.0292	.0288	.0299	88.8888	.0379	.0302	.0323	.0253	.0254	88.8888	88.8888	88.8888
306	15	30	.0290	.0293	.0317	88.8888	.0400	.0301	.0328	.0264	.0262	88.8888	88.8888	88.8888
306	15	33	.0283	.0275	.0299	88.8888	.0384	.0288	.0308	.0261	.0256	88.8888	88.8888	88.8888
306	15	36	.0285	.0283	.0314	88.8888	.0384	.0291	.0304	.0247	.0268	88.8888	88.8888	88.8888
306	15	39	.0275	.0298	.0313	88.8888	.0405	.0302	.0322	.0263	.0281	88.8888	88.8888	88.8888
306	15	42	.0310	.0300	.0327	88.8888	.0404	.0313	.0335	.0276	.0277	88.8888	88.8888	88.8888
306	15	45	.0301	.0294	.0327	88.8888	.0405	.0304	.0336	.0259	.0282	88.8888	88.8888	88.8888
306	15	48	.0317	.0305	.0365	88.8888	.0411	.0303	.0344	.0290	.0295	88.8888	88.8888	88.8888
306	15	54	.0323	.0322	.0353	88.8888	.0402	.0318	.0341	.0291	.0308	88.8888	88.8888	88.8888
306	15	57	.0331	.0331	.0372	88.8888	.0420	.0333	.0366	.0308	.0324	88.8888	88.8888	88.8888
306	16	0	.0325	.0331	.0376	88.8888	.0419	.0334	.0359	.0310	.0313	88.8888	88.8888	88.8888
306	16	3	.0309	.0311	.0345	88.8888	.0395	.0314	.0336	.0291	.0298	88.8888	88.8888	88.8888
306	16	6	.0327	.0313	.0359	88.8888	.0414	.0323	.0340	.0298	.0317	88.8888	88.8888	88.8888
306	16	15	.0326	.0316	.0374	88.8888	.0392	.0315	.0344	.0302	.0310	88.8888	88.8888	88.8888
306	16	18	.0356	.0336	.0407	88.8888	.0426	.0339	.0373	.0328	.0331	88.8888	88.8888	88.8888

9999

AEROSOL OPTICAL DEPTH (DEP. CAL.) FOR DAY 1103-- 380. NM.

JD	TIME(LT)		J203	J208	0932	SH97	SH98	J201	J204	J206	J207	SH07	SE41	SE42
307	14	42	.0695	.0698	.0637	88.8888	88.8888	.0780	.0781	.0701	.0690	88.8888	88.8888	88.8888
307	14	45	.0736	.0700	.0591	88.8888	88.8888	.0847	.0799	.0756	.0689	88.8888	88.8888	88.8888
307	14	48	.0783	.0774	.0687	88.8888	.0649	.0883	.0836	.0773	.0788	88.8888	88.8888	88.8888
307	14	51	.0816	.0807	.0709	88.8888	.0821	.0874	.0901	.0828	.0805	88.8888	88.8888	88.8888
307	14	54	.0812	.0826	.0692	88.8888	.0804	.0954	.0918	.0808	.0824	88.8888	88.8888	88.8888
307	14	57	.0805	.0822	.0710	88.8888	.0765	.0990	.0888	.0817	.0834	88.8888	88.8888	88.8888
307	15	0	.0774	.0802	.0725	88.8888	.0743	.0936	.0864	.0825	.0814	88.8888	88.8888	88.8888
307	15	3	.0778	.0769	.0700	88.8888	.0718	.0930	.0837	.0803	.0804	88.8888	88.8888	88.8888
307	15	6	.0793	.0839	.0750	88.8888	.0504	.0902	.0885	.0830	.0829	88.8888	88.8888	88.8888
307	15	9	.0819	.0844	.0799	88.8888	.0777	.1059	.0897	.0823	.0875	88.8888	88.8888	88.8888
307	15	12	.0822	.0863	.0765	88.8888	.0744	.0964	.0897	.0843	.0852	88.8888	88.8888	88.8888
307	15	15	.0820	.0843	.0770	88.8888	.0789	.0960	.0886	.0848	.0869	88.8888	88.8888	88.8888
307	15	18	.0864	.0901	.0856	88.8888	.0876	.0993	.0907	.0912	.0900	88.8888	88.8888	88.8888
307	15	21	.0888	.0948	.0857	88.8888	.0856	.0926	.0939	.0928	.0930	88.8888	88.8888	88.8888
307	15	24	.0872	.0945	.0901	88.8888	.0923	.0934	.0954	.0924	.0942	88.8888	88.8888	88.8888
307	15	27	.0901	.0972	.0946	88.8888	.0921	.0971	.0954	.0949	.0983	88.8888	88.8888	88.8888
307	15	30	.0910	.0947	.0895	88.8888	.0942	.0996	.0955	.0957	.0968	88.8888	88.8888	88.8888
307	15	33	.0908	.0941	.0938	88.8888	.0987	.1037	.0948	.0945	.0973	88.8888	88.8888	88.8888
307	15	36	.0911	.1012	.0931	88.8888	.0956	.1015	.0957	.0968	.1005	88.8888	88.8888	88.8888
307	15	39	.0893	.0951	.0977	88.8888	.1004	.0991	.0920	.0949	.0965	88.8888	88.8888	88.8888
307	15	42	.0901	.0962	.0970	88.8888	.0998	.0998	.0904	.0995	.0971	88.8888	88.8888	88.8888
307	15	45	.0865	.0949	.0962	88.8888	.0991	88.8888	.0865	.0929	.0960	88.8888	88.8888	88.8888
307	15	48	.0873	.0971	.1019	88.8888	.1018	88.8888	88.8888	.0963	.0969	88.8888	88.8888	88.8888
307	15	51	.0896	.0988	.1088	88.8888	.1016	.1013	.0946	.0973	.1002	88.8888	88.8888	88.8888
307	15	54	.0922	.1032	.1175	88.8888	.1056	.0998	.0939	.1013	.1031	88.8888	88.8888	88.8888
307	15	57	.0942	.1035	.1110	88.8888	.1153	.1013	.0953	.1035	.1072	88.8888	88.8888	88.8888
307	16	0	.0969	.1054	.1237	88.8888	.1137	.1023	.0929	.1064	.1066	88.8888	88.8888	88.8888
307	16	3	.0996	.1104	.1301	88.8888	.1186	.1008	.0985	.1092	.1131	88.8888	88.8888	88.8888
307	16	6	.1011	.1106	.1270	88.8888	.1270	.1049	.0963	.1108	.1135	88.8888	88.8888	88.8888
307	16	9	.1021	.1133	.1419	88.8888	.1335	.1060	.0955	.1126	.1155	88.8888	88.8888	88.8888
307	16	12	.1036	.1160	.1708	88.8888	.1370	.1055	.0953	.1152	.1185	88.8888	88.8888	88.8888
307	16	15	.1019	.1149	88.8888	88.8888	.1479	.0998	.0904	.1117	.1184	88.8888	88.8888	88.8888
307	16	18	.1005	.1093	88.8888	88.8888	.1569	.0941	.0855	.1077	.1179	88.8888	88.8888	88.8888
9999														

AEROSOL OPTICAL DEPTH (INDEP. CAL.) FOR DAY 1103-- 380. NM.

JD	TIME(LT)		J203	J208	UM32	SH97	SH98	J201	J204	J206	J207	SM07	SER1	SER2
307	14	42	.0553	.0705	.0992	88.8888	88.8888	.0678	.0510	.0708	.0715	88.8888	88.8888	88.8888
307	14	45	.0597	.0707	.0939	88.8888	88.8888	.0748	.0532	.0763	.0714	88.8888	88.8888	88.8888
307	14	48	.0647	.0781	.1029	88.8888	.0767	.0785	.0575	.0780	.0813	88.8888	88.8888	88.8888
307	14	51	.0683	.0814	.1044	88.8888	.0937	.0779	.0644	.0834	.0829	88.8888	88.8888	88.8888
307	14	54	.0682	.0833	.1020	88.8888	.0917	.0860	.0668	.0815	.0847	88.8888	88.8888	88.8888
307	14	57	.0677	.0828	.1031	88.8888	.0876	.0898	.0643	.0823	.0856	88.8888	88.8888	88.8888
307	15	0	.0649	.0809	.1039	88.8888	.0851	.0846	.0624	.0831	.0836	88.8888	88.8888	88.8888
307	15	3	.0656	.0776	.1007	88.8888	.0824	.0843	.0602	.0809	.0826	88.8888	88.8888	88.8888
307	15	6	.0674	.0845	.1049	88.8888	.0607	.0816	.0656	.0836	.0850	88.8888	88.8888	88.8888
307	15	9	.0703	.0850	.1091	88.8888	.0878	.0975	.0673	.0829	.0896	88.8888	88.8888	88.8888
307	15	12	.0709	.0869	.1050	88.8888	.0842	.0882	.0679	.0849	.0872	88.8888	88.8888	88.8888
307	15	15	.0710	.0849	.1047	88.8888	.0885	.0880	.0674	.0853	.0888	88.8888	88.8888	88.8888
307	15	18	.0757	.0906	.1126	88.8888	.0970	.0915	.0700	.0917	.0919	88.8888	88.8888	88.8888
307	15	21	.0784	.0953	.1120	88.8888	.0947	.0851	.0738	.0933	.0949	88.8888	88.8888	88.8888
307	15	24	.0770	.0950	.1156	88.8888	.1011	.0862	.0759	.0929	.0960	88.8888	88.8888	88.8888
307	15	27	.0803	.0977	.1193	88.8888	.1007	.0900	.0765	.0954	.1000	88.8888	88.8888	88.8888
307	15	30	.0815	.0952	.1134	88.8888	.1025	.0927	.0772	.0962	.0985	88.8888	88.8888	88.8888
307	15	33	.0816	.0946	.1169	88.8888	.1068	.0971	.0771	.0950	.0990	88.8888	88.8888	88.8888
307	15	36	.0822	.1017	.1155	88.8888	.1033	.0952	.0786	.0972	.1021	88.8888	88.8888	88.8888
307	15	39	.0807	.0956	.1193	88.8888	.1078	.0930	.0755	.0953	.0980	88.8888	88.8888	88.8888
307	15	42	.0818	.0966	.1178	88.8888	.1070	.0939	.0744	.0999	.0986	88.8888	88.8888	88.8888
307	15	45	.0786	.0953	.1162	88.8888	.1061	88.8888	.0712	.0933	.0974	88.8888	88.8888	88.8888
307	15	48	.0797	.0974	.1211	88.8888	.1085	88.8888	88.8888	.0967	.0982	88.8888	88.8888	88.8888
307	15	51	.0823	.0992	.1272	88.8888	.1080	.0960	.0806	.0977	.1015	88.8888	88.8888	88.8888
307	15	54	.0852	.1035	.1350	88.8888	.1117	.0948	.0805	.1017	.1044	88.8888	88.8888	88.8888
307	15	57	.0876	.1038	.1278	88.8888	.1211	.0965	.0825	.1038	.1084	88.8888	88.8888	88.8888
307	16	0	.0906	.1057	.1396	88.8888	.1193	.0977	.0807	.1067	.1078	88.8888	88.8888	88.8888
307	16	3	.0936	.1107	.1452	88.8888	.1238	.0965	.0869	.1095	.1142	88.8888	88.8888	88.8888
307	16	6	.0955	.1109	.1413	88.8888	.1319	.1009	.0854	.1111	.1145	88.8888	88.8888	88.8888
307	16	9	.0968	.1136	.1553	88.8888	.1381	.1021	.0852	.1129	.1164	88.8888	88.8888	88.8888
307	16	12	.0986	.1162	.1834	88.8888	.1413	.1019	.0857	.1155	.1194	88.8888	88.8888	88.8888
307	16	15	.0972	.1151	88.8888	88.8888	.1520	.0964	.0814	.1119	.1192	88.8888	88.8888	88.8888
307	16	18	.0962	.1095	88.8888	88.8888	.1607	.0910	.0772	.1079	.1186	88.8888	88.8888	88.8888

9999

AERUSUL OPTICAL DEPTH (DEP. CAL.) FOR DAY 1103-- 500. NM.

JD	TIME(LT)	J203	J208	UM32	SH97	SH98	J201	J204	J206	J207	SH07	SE81	SE82
307	7 27	88.8888	.0193	.0215	88.8888	.0214	88.8888	88.8888	88.8888	.0191	88.8888	88.8888	.0272
307	7 30	88.8888	.0218	.0228	88.8888	.0225	88.8888	88.8888	88.8888	.0204	88.8888	88.8888	.0314
307	7 33	88.8888	.0205	.0203	88.8888	.0220	88.8888	88.8888	88.8888	.0211	88.8888	88.8888	.0312
307	7 36	88.8888	.0228	.0216	88.8888	.0223	88.8888	88.8888	88.8888	.0202	88.8888	88.8888	.0305
307	7 39	88.8888	.0228	.0223	88.8888	.0226	88.8888	88.8888	88.8888	.0223	88.8888	88.8888	.0318
307	7 42	88.8888	.0214	.0156	88.8888	.0208	88.8888	88.8888	88.8888	.0206	88.8888	88.8888	.0335
307	7 45	88.8888	.0203	.0189	88.8888	.0221	88.8888	88.8888	88.8888	.0209	88.8888	88.8888	.0302
307	7 48	88.8888	.0231	.0241	88.8888	.0250	88.8888	88.8888	88.8888	.0243	88.8888	88.8888	.0319
307	7 51	88.8888	.0244	.0213	88.8888	.0244	88.8888	88.8888	88.8888	.0239	88.8888	88.8888	.0341
307	7 54	88.8888	.0211	.0194	88.8888	.0202	88.8888	88.8888	88.8888	.0225	88.8888	88.8888	.0323
307	7 57	88.8888	.0223	.0202	88.8888	.0217	88.8888	88.8888	88.8888	.0212	88.8888	88.8888	.0327
307	8 0	88.8888	.0217	.0220	88.8888	.0225	88.8888	88.8888	88.8888	.0222	88.8888	88.8888	.0332
307	8 3	88.8888	.0227	.0221	88.8888	.0241	88.8888	88.8888	88.8888	.0215	88.8888	88.8888	.0354
307	8 6	88.8888	.0237	.0212	88.8888	.0230	88.8888	88.8888	88.8888	.0214	88.8888	88.8888	.0320
307	8 9	88.8888	.0242	.0224	88.8888	.0245	88.8888	88.8888	88.8888	.0226	88.8888	88.8888	.0348
307	8 12	88.8888	.0241	.0226	88.8888	.0240	88.8888	88.8888	88.8888	.0253	88.8888	88.8888	.0332
307	8 15	88.8888	.0242	.0220	88.8888	.0241	88.8888	88.8888	88.8888	.0229	88.8888	88.8888	.0318
307	8 18	88.8888	.0274	.0237	88.8888	.0252	88.8888	88.8888	88.8888	.0244	88.8888	88.8888	.0361
307	8 21	88.8888	.0270	.0271	88.8888	.0291	88.8888	88.8888	88.8888	.0264	88.8888	88.8888	.0362
307	14 42	.0488	.0538	.0501	88.8888	.0554	.0534	.0507	.0599	.0500	88.8888	88.8888	88.8888
307	14 45	.0546	.0527	.0496	88.8888	.0731	.0522	.0508	.0592	.0511	88.8888	88.8888	88.8888
307	14 48	.0542	.0570	.0542	88.8888	.0698	.0552	.0500	.0637	.0540	88.8888	88.8888	88.8888
307	14 51	.0560	.0590	.0558	88.8888	.0727	.0580	.0558	.0655	.0563	88.8888	88.8888	88.8888
307	14 54	.0551	.0583	.0582	88.8888	.0710	.0570	.0564	.0634	.0576	88.8888	88.8888	88.8888
307	14 57	.0532	.0587	.0566	88.8888	.0612	.0577	.0572	.0603	.0573	88.8888	88.8888	88.8888
307	15 0	.0546	.0580	.0546	88.8888	.0600	.0573	.0555	.0660	.0557	88.8888	88.8888	88.8888
307	15 3	.0558	.0571	.0543	88.8888	.0609	.0530	.0522	.0606	.0542	88.8888	88.8888	88.8888
307	15 6	.0551	.0588	.0562	88.8888	.0581	.0579	.0569	.0623	.0581	88.8888	88.8888	88.8888
307	15 9	.0560	.0584	.0576	88.8888	.0592	.0598	.0577	.0637	.0583	88.8888	88.8888	88.8888
307	15 12	.0572	.0602	.0573	88.8888	.0635	.0581	.0592	.0631	.0594	88.8888	88.8888	88.8888
307	15 15	.0574	.0586	.0561	88.8888	.0630	.0567	.0575	.0625	.0570	88.8888	88.8888	88.8888
307	15 18	.0585	.0623	.0595	88.8888	.0623	.0610	.0609	.0662	.0603	88.8888	88.8888	88.8888
307	15 21	.0611	.0650	.0599	88.8888	.0664	.0611	.0622	.0633	.0613	88.8888	88.8888	88.8888
307	15 24	.0602	.0626	.0627	88.8888	.0685	.0626	.0614	.0672	.0632	88.8888	88.8888	88.8888
307	15 27	.0633	.0651	.0649	88.8888	.0647	.0638	.0652	.0681	.0639	88.8888	88.8888	88.8888
307	15 30	.0634	.0632	.0630	88.8888	.0685	.0633	.0639	.0656	.0633	88.8888	88.8888	88.8888
307	15 33	.0622	.0641	.0635	88.8888	.0670	.0645	.0625	.0660	.0626	88.8888	88.8888	88.8888
307	15 36	.0633	.0667	.0631	88.8888	.0690	.0661	.0653	.0668	.0628	88.8888	88.8888	88.8888
307	15 39	.0610	.0634	.0623	88.8888	.0652	.0640	.0629	.0667	.0633	88.8888	88.8888	88.8888
307	15 42	.0623	.0645	.0638	88.8888	.0671	.0649	.0639	.0667	.0623	88.8888	88.8888	88.8888
307	15 45	.0614	.0623	.0635	88.8888	.0643	88.8888	.0632	.0647	.0621	88.8888	88.8888	88.8888
307	15 48	.0621	.0647	.0657	88.8888	.0654	88.8888	88.8888	.0652	.0629	88.8888	88.8888	88.8888
307	15 51	.0632	.0654	.0683	88.8888	.0701	.0672	.0666	.0681	.0655	88.8888	88.8888	88.8888
307	15 54	.0657	.0683	.0709	88.8888	.0704	.0685	.0673	.0682	.0670	88.8888	88.8888	88.8888
307	15 57	.0668	.0685	.0713	88.8888	.0727	.0686	.0703	.0691	.0683	88.8888	88.8888	88.8888
307	16 0	.0688	.0688	.0719	88.8888	.0734	.0675	.0698	.0707	.0682	88.8888	88.8888	88.8888
307	16 3	.0708	.0703	.0739	88.8888	.0761	.0696	.0735	.0732	.0710	88.8888	88.8888	88.8888
307	16 6	.0722	.0713	.0743	88.8888	.0766	.0714	.0735	.0746	.0716	88.8888	88.8888	88.8888
307	16 9	.0740	.0722	.0776	88.8888	.0819	.0717	.0750	.0751	.0734	88.8888	88.8888	88.8888
307	16 12	.0765	.0744	.0811	88.8888	.0831	.0744	.0768	.0766	.0749	88.8888	88.8888	88.8888
307	16 15	.0758	.0739	.0791	88.8888	.0828	.0749	.0765	.0764	.0744	88.8888	88.8888	88.8888
307	16 18	.0759	.0729	.0781	88.8888	.0844	.0726	.0778	.0743	.0745	88.8888	88.8888	88.8888
9999													

AEROSOL OPTICAL DEPTH (INDEP. CAL.) FOR DAY 1103-- 500. NM.

JD	TIME(LT)	J203	J208	UM32	SH97	SH98	J201	J204	J206	J207	SN07	SER1	SER2
307	7 27	88.8888	.0177	.0220	88.8888	.0242	88.8888	88.8888	88.8888	.0170	88.8888	88.8888	.0448
307	7 30	88.8888	.0201	.0233	88.8888	.0255	88.8888	88.8888	88.8888	.0183	88.8888	88.8888	.0479
307	7 33	88.8888	.0188	.0208	88.8888	.0251	88.8888	88.8888	88.8888	.0189	88.8888	88.8888	.0484
307	7 36	88.8888	.0209	.0222	88.8888	.0256	88.8888	88.8888	88.8888	.0179	88.8888	88.8888	.0486
307	7 39	88.8888	.0209	.0229	88.8888	.0260	88.8888	88.8888	88.8888	.0198	88.8888	88.8888	.0507
307	7 42	88.8888	.0194	.0162	88.8888	.0244	88.8888	88.8888	88.8888	.0180	88.8888	88.8888	.0532
307	7 45	88.8888	.0182	.0196	88.8888	.0259	88.8888	88.8888	88.8888	.0183	88.8888	88.8888	.0507
307	7 48	88.8888	.0209	.0248	88.8888	.0289	88.8888	88.8888	88.8888	.0215	88.8888	88.8888	.0532
307	7 51	88.8888	.0222	.0220	88.8888	.0284	88.8888	88.8888	88.8888	.0210	88.8888	88.8888	.0562
307	7 54	88.8888	.0188	.0201	88.8888	.0244	88.8888	88.8888	88.8888	.0195	88.8888	88.8888	.0551
307	7 57	88.8888	.0199	.0209	88.8888	.0260	88.8888	88.8888	88.8888	.0181	88.8888	88.8888	.0563
307	8 0	88.8888	.0192	.0227	88.8888	.0270	88.8888	88.8888	88.8888	.0190	88.8888	88.8888	.0576
307	8 3	88.8888	.0201	.0229	88.8888	.0287	88.8888	88.8888	88.8888	.0182	88.8888	88.8888	.0606
307	8 6	88.8888	.0210	.0220	88.8888	.0277	88.8888	88.8888	88.8888	.0180	88.8888	88.8888	.0580
307	8 9	88.8888	.0215	.0232	88.8888	.0294	88.8888	88.8888	88.8888	.0191	88.8888	88.8888	.0616
307	8 12	88.8888	.0213	.0234	88.8888	.0290	88.8888	88.8888	88.8888	.0217	88.8888	88.8888	.0607
307	8 15	88.8888	.0213	.0229	88.8888	.0293	88.8888	88.8888	88.8888	.0191	88.8888	88.8888	.0600
307	8 18	88.8888	.0245	.0246	88.8888	.0304	88.8888	88.8888	88.8888	.0206	88.8888	88.8888	.0650
307	8 21	88.8888	.0240	.0280	88.8888	.0346	88.8888	88.8888	88.8888	.0225	88.8888	88.8888	.0659
307	14 42	.0491	.0502	.0512	88.8888	.0619	.0523	.0536	.0570	.0453	88.8888	88.8888	88.8888
307	14 45	.0550	.0491	.0506	88.8888	.0795	.0511	.0536	.0564	.0465	88.8888	88.8888	88.8888
307	14 48	.0546	.0535	.0552	88.8888	.0761	.0541	.0528	.0609	.0494	88.8888	88.8888	88.8888
307	14 51	.0563	.0556	.0568	88.8888	.0788	.0570	.0585	.0628	.0518	88.8888	88.8888	88.8888
307	14 54	.0554	.0549	.0592	88.8888	.0770	.0560	.0591	.0607	.0532	88.8888	88.8888	88.8888
307	14 57	.0535	.0555	.0576	88.8888	.0671	.0568	.0598	.0577	.0530	88.8888	88.8888	88.8888
307	15 0	.0549	.0548	.0556	88.8888	.0657	.0563	.0581	.0634	.0515	88.8888	88.8888	88.8888
307	15 3	.0561	.0539	.0553	88.8888	.0665	.0521	.0547	.0581	.0502	88.8888	88.8888	88.8888
307	15 6	.0554	.0558	.0571	88.8888	.0636	.0570	.0594	.0598	.0541	88.8888	88.8888	88.8888
307	15 9	.0563	.0554	.0585	88.8888	.0646	.0590	.0601	.0613	.0544	88.8888	88.8888	88.8888
307	15 12	.0575	.0573	.0581	88.8888	.0688	.0572	.0615	.0608	.0556	88.8888	88.8888	88.8888
307	15 15	.0577	.0558	.0570	88.8888	.0681	.0558	.0598	.0602	.0533	88.8888	88.8888	88.8888
307	15 18	.0588	.0595	.0603	88.8888	.0672	.0602	.0631	.0640	.0567	88.8888	88.8888	88.8888
307	15 21	.0614	.0623	.0607	88.8888	.0712	.0603	.0643	.0611	.0578	88.8888	88.8888	88.8888
307	15 24	.0605	.0600	.0635	88.8888	.0732	.0618	.0635	.0651	.0598	88.8888	88.8888	88.8888
307	15 27	.0635	.0625	.0657	88.8888	.0693	.0631	.0673	.0661	.0606	88.8888	88.8888	88.8888
307	15 30	.0637	.0608	.0638	88.8888	.0729	.0626	.0658	.0637	.0601	88.8888	88.8888	88.8888
307	15 33	.0624	.0618	.0642	88.8888	.0712	.0637	.0643	.0641	.0596	88.8888	88.8888	88.8888
307	15 36	.0636	.0644	.0638	88.8888	.0731	.0654	.0672	.0650	.0598	88.8888	88.8888	88.8888
307	15 39	.0612	.0612	.0630	88.8888	.0692	.0633	.0647	.0649	.0604	88.8888	88.8888	88.8888
307	15 42	.0625	.0624	.0645	88.8888	.0709	.0643	.0656	.0650	.0596	88.8888	88.8888	88.8888
307	15 45	.0616	.0603	.0641	88.8888	.0679	88.8888	.0649	.0631	.0595	88.8888	88.8888	88.8888
307	15 48	.0623	.0627	.0663	88.8888	.0690	88.8888	88.8888	.0637	.0604	88.8888	88.8888	88.8888
307	15 51	.0634	.0635	.0689	88.8888	.0734	.0666	.0681	.0666	.0631	88.8888	88.8888	88.8888
307	15 54	.0659	.0665	.0714	88.8888	.0737	.0679	.0687	.0668	.0646	88.8888	88.8888	88.8888
307	15 57	.0670	.0668	.0718	88.8888	.0758	.0681	.0717	.0677	.0661	88.8888	88.8888	88.8888
307	16 0	.0690	.0672	.0724	88.8888	.0763	.0670	.0711	.0694	.0661	88.8888	88.8888	88.8888
307	16 3	.0709	.0688	.0744	88.8888	.0788	.0692	.0747	.0720	.0690	88.8888	88.8888	88.8888
307	16 6	.0724	.0698	.0747	88.8888	.0792	.0709	.0746	.0734	.0697	88.8888	88.8888	88.8888
307	16 9	.0742	.0708	.0780	88.8888	.0843	.0713	.0761	.0740	.0717	88.8888	88.8888	88.8888
307	16 12	.0766	.0731	.0815	88.8888	.0855	.0741	.0779	.0755	.0732	88.8888	88.8888	88.8888
307	16 15	.0759	.0727	.0794	88.8888	.0849	.0746	.0775	.0754	.0728	88.8888	88.8888	88.8888
307	16 18	.0760	.0718	.0785	88.8888	.0864	.0723	.0787	.0734	.0731	88.8888	88.8888	88.8888

9999

AEROSOL OPTICAL DEPTH (DEP. CAL.) FOR DAY 1104-- 380. NM.

JD	TIME(LT)		J203	J208	UM32	SH97	SH98	J201	J204	J206	J207	SN07	SER1	SER2
308	7	3	-.0185	-.0063	88.8888	88.8888	-.0031	88.8888	88.8888	-.0082	-.0009	88.8888	88.8888	88.8888
308	7	6	-.0150	-.0010	.0318	88.8888	-.0068	88.8888	88.8888	-.0035	.0014	88.8888	88.8888	88.8888
308	7	9	-.0123	.0003	.0321	88.8888	.0060	88.8888	88.8888	-.0011	.0038	88.8888	88.8888	88.8888
308	7	12	-.0075	.0025	.0246	88.8888	.0041	88.8888	88.8888	.0015	.0077	88.8888	88.8888	88.8888
308	7	15	-.0068	.0040	.0226	88.8888	.0094	88.8888	88.8888	.0027	.0057	88.8888	88.8888	88.8888
308	7	18	-.0047	.0064	.0154	88.8888	.0116	88.8888	88.8888	.0035	.0070	88.8888	88.8888	88.8888
308	7	21	-.0036	.0058	.0115	88.8888	.0051	88.8888	88.8888	.0043	.0066	88.8888	88.8888	88.8888
308	7	24	-.0026	.0051	.0154	88.8888	.0065	88.8888	88.8888	.0055	.0089	88.8888	88.8888	88.8888
308	7	27	-.0019	.0051	.0084	88.8888	.0057	88.8888	88.8888	.0053	.0069	88.8888	88.8888	88.8888
308	7	30	-.0026	.0043	.0079	88.8888	.0078	88.8888	88.8888	.0038	.0053	88.8888	88.8888	88.8888
308	7	33	-.0004	.0071	.0077	88.8888	.0099	88.8888	88.8888	.0015	.0096	88.8888	88.8888	88.8888
308	7	36	-.0014	.0022	.0077	88.8888	.0076	88.8888	88.8888	.0025	.0048	88.8888	88.8888	88.8888
308	7	39	.0011	.0060	.0076	88.8888	.0096	88.8888	88.8888	.0063	.0100	88.8888	88.8888	88.8888
308	7	42	.0021	.0099	.0075	88.8888	.0054	88.8888	88.8888	.0080	.0103	88.8888	88.8888	88.8888
308	7	45	.0044	.0109	.0035	88.8888	.0091	88.8888	88.8888	.0087	.0124	88.8888	88.8888	88.8888
308	7	48	.0051	.0082	.0069	88.8888	.0105	88.8888	88.8888	.0092	.0116	88.8888	88.8888	88.8888
308	7	51	.0059	.0076	.0063	88.8888	.0098	88.8888	88.8888	.0092	.0108	88.8888	88.8888	88.8888
308	7	54	.0054	.0098	.0090	88.8888	.0089	88.8888	88.8888	.0074	.0151	88.8888	88.8888	88.8888
308	7	57	.0061	.0099	.0045	88.8888	.0078	88.8888	88.8888	.0085	.0110	88.8888	88.8888	88.8888
308	8	0	.0071	.0113	.0100	88.8888	.0065	88.8888	88.8888	.0105	.0130	88.8888	88.8888	88.8888
308	8	3	.0097	.0124	.0084	88.8888	.0117	88.8888	88.8888	.0119	.0182	88.8888	88.8888	88.8888
308	8	6	.0038	.0077	.0034	88.8888	.0081	88.8888	88.8888	.0071	.0109	88.8888	88.8888	88.8888
308	8	9	.0036	.0074	.0014	88.8888	.0060	88.8888	88.8888	.0065	.0119	88.8888	88.8888	88.8888
308	8	12	.0031	.0066	.0023	88.8888	-.0010	88.8888	88.8888	.0050	.0125	88.8888	88.8888	88.8888
308	8	15	.0043	.0070	.0062	88.8888	-.0003	88.8888	88.8888	.0086	.0137	88.8888	88.8888	88.8888
308	8	18	.0034	.0042	-.0028	88.8888	.0001	88.8888	88.8888	.0058	.0104	88.8888	88.8888	88.8888
308	8	21	.0033	.0052	-.0026	88.8888	-.0043	88.8888	88.8888	.0033	.0075	88.8888	88.8888	88.8888
308	8	24	.0028	.0050	-.0028	88.8888	-.0044	88.8888	88.8888	.0022	.0061	88.8888	88.8888	88.8888
308	8	27	.0033	.0040	-.0061	88.8888	-.0048	88.8888	88.8888	.0033	.0076	88.8888	88.8888	88.8888
308	8	30	.0040	.0056	-.0038	88.8888	-.0069	88.8888	88.8888	.0039	.0067	88.8888	88.8888	88.8888
9999														

AEROSOL OPTICAL DEPTH (INDEP. CAL.) FOR DAY 1104-- 380. NM.

JD	TIME(LT)		J203	J208	UM32	SH97	SH98	J201	J204	J206	J207	SN07	SER1	SER2
308	7	3	-.0219	-.0062	88.8888	88.8888	-.0002	88.8888	88.8888	-.0081	-.0003	88.8888	88.8888	88.8888
308	7	6	-.0187	-.0008	.0411	88.8888	-.0036	88.8888	88.8888	-.0034	.0021	88.8888	88.8888	88.8888
308	7	9	-.0164	.0005	.0422	88.8888	.0095	88.8888	88.8888	-.0009	.0046	88.8888	88.8888	88.8888
308	7	12	-.0119	.0028	.0356	88.8888	.0080	88.8888	88.8888	.0017	.0084	88.8888	88.8888	88.8888
308	7	15	-.0115	.0042	.0344	88.8888	.0135	88.8888	88.8888	.0029	.0066	88.8888	88.8888	88.8888
308	7	18	-.0097	.0066	.0280	88.8888	.0160	88.8888	88.8888	.0038	.0079	88.8888	88.8888	88.8888
308	7	21	-.0090	.0061	.0250	88.8888	.0097	88.8888	88.8888	.0046	.0075	88.8888	88.8888	88.8888
308	7	24	-.0083	.0054	.0297	88.8888	.0114	88.8888	88.8888	.0057	.0100	88.8888	88.8888	88.8888
308	7	27	-.0079	.0054	.0235	88.8888	.0109	88.8888	88.8888	.0057	.0080	88.8888	88.8888	88.8888
308	7	30	-.0089	.0046	.0238	88.8888	.0133	88.8888	88.8888	.0041	.0064	88.8888	88.8888	88.8888
308	7	33	-.0070	.0074	.0244	88.8888	.0157	88.8888	88.8888	.0018	.0108	88.8888	88.8888	88.8888
308	7	36	-.0084	.0026	.0252	88.8888	.0136	88.8888	88.8888	.0029	.0060	88.8888	88.8888	88.8888
308	7	39	-.0062	.0063	.0260	88.8888	.0160	88.8888	88.8888	.0067	.0114	88.8888	88.8888	88.8888
308	7	42	-.0055	.0103	.0266	88.8888	.0120	88.8888	88.8888	.0084	.0117	88.8888	88.8888	88.8888
308	7	45	-.0036	.0113	.0234	88.8888	.0160	88.8888	88.8888	.0091	.0138	88.8888	88.8888	88.8888
308	7	48	-.0031	.0086	.0276	88.8888	.0177	88.8888	88.8888	.0096	.0131	88.8888	88.8888	88.8888
308	7	51	-.0027	.0080	.0278	88.8888	.0173	88.8888	88.8888	.0096	.0124	88.8888	88.8888	88.8888
308	7	54	-.0035	.0103	.0313	88.8888	.0166	88.8888	88.8888	.0078	.0167	88.8888	88.8888	88.8888
308	7	57	-.0031	.0104	.0276	88.8888	.0158	88.8888	88.8888	.0090	.0126	88.8888	88.8888	88.8888
308	8	0	-.0024	.0118	.0339	88.8888	.0148	88.8888	88.8888	.0109	.0147	88.8888	88.8888	88.8888
308	8	3	-.0002	.0129	.0331	88.8888	.0202	88.8888	88.8888	.0124	.0200	88.8888	88.8888	88.8888
308	8	6	-.0063	.0082	.0288	88.8888	.0169	88.8888	88.8888	.0077	.0127	88.8888	88.8888	88.8888
308	8	9	-.0068	.0079	.0276	88.8888	.0151	88.8888	88.8888	.0071	.0137	88.8888	88.8888	88.8888
308	8	12	-.0076	.0071	.0293	88.8888	.0084	88.8888	88.8888	.0056	.0144	88.8888	88.8888	88.8888
308	8	15	-.0067	.0076	.0338	88.8888	.0093	88.8888	88.8888	.0092	.0157	88.8888	88.8888	88.8888
308	8	18	-.0079	.0048	.0256	88.8888	.0100	88.8888	88.8888	.0064	.0124	88.8888	88.8888	88.8888
308	8	21	-.0083	.0058	.0265	88.8888	.0058	88.8888	88.8888	.0039	.0096	88.8888	88.8888	88.8888
308	8	24	-.0090	.0056	.0271	88.8888	.0059	88.8888	88.8888	.0028	.0082	88.8888	88.8888	88.8888
308	8	27	-.0088	.0046	.0244	88.8888	.0058	88.8888	88.8888	.0039	.0098	88.8888	88.8888	88.8888
308	8	30	-.0085	.0062	.0275	88.8888	.0039	88.8888	88.8888	.0045	.0089	88.8888	88.8888	88.8888

9999

AEROSOL OPTICAL DEPTH (DEP. CAL.) FOR DAY 1104-- 500. NM.

JD	TIME(LT)		J203	J208	UB32	SH97	SH98	J201	J204	J206	J207	SN07	SEN1	SEN2
308	7	3	.0074	.0053	88.8888	88.8888	.0096	88.8888	88.8888	.0073	.0056	88.8888	88.8888	88.8888
308	7	6	.0083	.0061	.0125	88.8888	.0107	88.8888	88.8888	.0057	88.8888	88.8888	88.8888	88.8888
308	7	9	.0081	.0065	.0095	88.8888	.0104	88.8888	88.8888	.0081	.0087	88.8888	88.8888	88.8888
308	7	12	.0085	.0068	.0099	88.8888	.0105	88.8888	88.8888	.0091	88.8888	88.8888	88.8888	88.8888
308	7	15	.0081	.0072	.0097	88.8888	.0103	88.8888	88.8888	.0087	.0089	88.8888	88.8888	88.8888
308	7	18	.0078	.0075	.0093	88.8888	.0116	88.8888	88.8888	.0094	.0083	88.8888	88.8888	88.8888
308	7	21	.0085	.0074	.0091	88.8888	.0112	88.8888	88.8888	.0096	.0085	88.8888	88.8888	88.8888
308	7	24	.0087	.0072	.0093	88.8888	.0122	88.8888	88.8888	.0102	.0087	88.8888	88.8888	88.8888
308	7	27	.0079	.0078	.0072	88.8888	.0119	88.8888	88.8888	.0092	.0082	88.8888	88.8888	88.8888
308	7	30	.0071	.0071	.0081	88.8888	.0119	88.8888	88.8888	.0087	.0079	88.8888	88.8888	88.8888
308	7	33	.0093	.0084	.0071	88.8888	.0119	88.8888	88.8888	.0100	.0098	88.8888	88.8888	88.8888
308	7	36	.0075	.0068	.0075	88.8888	.0126	88.8888	88.8888	.0096	.0106	88.8888	88.8888	88.8888
308	7	39	.0081	.0089	.0096	88.8888	.0134	88.8888	88.8888	.0107	.0102	88.8888	88.8888	88.8888
308	7	42	.0097	.0104	.0099	88.8888	.0150	88.8888	88.8888	.0141	.0122	88.8888	88.8888	88.8888
308	7	45	.0094	.0089	.0099	88.8888	.0147	88.8888	88.8888	.0124	.0113	88.8888	88.8888	88.8888
308	7	48	.0081	.0094	.0106	88.8888	.0157	88.8888	88.8888	.0140	.0130	88.8888	88.8888	88.8888
308	7	51	.0103	.0102	.0113	88.8888	.0147	88.8888	88.8888	.0150	.0117	88.8888	88.8888	88.8888
308	7	54	.0098	.0107	.0128	88.8888	.0151	88.8888	88.8888	.0135	.0126	88.8888	88.8888	88.8888
308	7	57	.0105	.0107	.0094	88.8888	.0144	88.8888	88.8888	.0144	.0117	88.8888	88.8888	88.8888
308	8	0	.0112	.0111	.0104	88.8888	.0147	88.8888	88.8888	.0122	.0124	88.8888	88.8888	88.8888
308	8	3	.0129	.0130	.0140	88.8888	.0194	88.8888	88.8888	.0170	.0141	88.8888	88.8888	88.8888
308	8	6	.0100	.0094	.0112	88.8888	.0183	88.8888	88.8888	.0150	.0120	88.8888	88.8888	88.8888
308	8	9	.0072	.0100	.0098	88.8888	.0147	88.8888	88.8888	.0138	.0131	88.8888	88.8888	88.8888
308	8	12	.0071	.0102	.0090	88.8888	.0131	88.8888	88.8888	.0147	.0137	88.8888	88.8888	88.8888
308	8	15	.0056	.0094	.0108	88.8888	.0133	88.8888	88.8888	.0141	.0089	88.8888	88.8888	88.8888
308	8	18	.0090	.0095	.0108	88.8888	.0122	88.8888	88.8888	.0160	.0129	88.8888	88.8888	88.8888
308	8	21	.0056	.0084	.0078	88.8888	.0129	88.8888	88.8888	.0121	.0125	88.8888	88.8888	88.8888
308	8	24	.0061	.0060	.0079	88.8888	.0105	88.8888	88.8888	.0141	.0109	88.8888	88.8888	88.8888
308	8	27	.0051	.0079	.0073	88.8888	.0109	88.8888	88.8888	.0119	.0112	88.8888	88.8888	88.8888
308	8	30	.0077	.0092	.0086	88.8888	.0126	88.8888	88.8888	.0118	.0088	88.8888	88.8888	88.8888

9999

AEROSOL OPTICAL DEPTH (INDEP. CAL.) FOR DAY 1104-- 500. NM.

JD	TIME(LT)		J203	J208	DM32	SH97	SH98	J201	J204	J206	J207	SN07	SER1	SER2
308	7	3	.0075	.0044	88.8888	88.8888	.0112	88.8888	88.8888	.0066	.0055	88.8888	88.8888	88.8888
308	7	6	.0084	.0052	.0128	88.8888	.0124	88.8888	88.8888	.0049	88.8888	88.8888	88.8888	88.8888
308	7	9	.0082	.0055	.0098	88.8888	.0123	88.8888	88.8888	.0073	.0074	88.8888	88.8888	88.8888
308	7	12	.0086	.0057	.0102	88.8888	.0125	88.8888	88.8888	.0082	88.8888	88.8888	88.8888	88.8888
308	7	15	.0082	.0060	.0100	88.8888	.0125	88.8888	88.8888	.0077	.0073	88.8888	88.8888	88.8888
308	7	18	.0079	.0062	.0097	88.8888	.0139	88.8888	88.8888	.0084	.0067	88.8888	88.8888	88.8888
308	7	21	.0086	.0060	.0095	88.8888	.0136	88.8888	88.8888	.0085	.0067	88.8888	88.8888	88.8888
308	7	24	.0089	.0058	.0098	88.8888	.0148	88.8888	88.8888	.0090	.0068	88.8888	88.8888	88.8888
308	7	27	.0081	.0063	.0077	88.8888	.0146	88.8888	88.8888	.0079	.0062	88.8888	88.8888	88.8888
308	7	30	.0072	.0054	.0086	88.8888	.0148	88.8888	88.8888	.0074	.0058	88.8888	88.8888	88.8888
308	7	33	.0095	.0067	.0076	88.8888	.0149	88.8888	88.8888	.0087	.0075	88.8888	88.8888	88.8888
308	7	36	.0076	.0050	.0080	88.8888	.0158	88.8888	88.8888	.0082	.0083	88.8888	88.8888	88.8888
308	7	39	.0083	.0070	.0102	88.8888	.0167	88.8888	88.8888	.0092	.0078	88.8888	88.8888	88.8888
308	7	42	.0099	.0085	.0105	88.8888	.0186	88.8888	88.8888	.0126	.0097	88.8888	88.8888	88.8888
308	7	45	.0097	.0068	.0105	88.8888	.0184	88.8888	88.8888	.0108	.0086	88.8888	88.8888	88.8888
308	7	48	.0083	.0073	.0112	88.8888	.0195	88.8888	88.8888	.0123	.0102	88.8888	88.8888	88.8888
308	7	51	.0105	.0080	.0119	88.8888	.0187	88.8888	88.8888	.0132	.0089	88.8888	88.8888	88.8888
308	7	54	.0100	.0084	.0134	88.8888	.0192	88.8888	88.8888	.0117	.0097	88.8888	88.8888	88.8888
308	7	57	.0108	.0084	.0102	88.8888	.0186	88.8888	88.8888	.0125	.0087	88.8888	88.8888	88.8888
308	8	0	.0114	.0086	.0111	88.8888	.0191	88.8888	88.8888	.0103	.0092	88.8888	88.8888	88.8888
308	8	3	.0132	.0104	.0147	88.8888	.0239	88.8888	88.8888	.0149	.0108	88.8888	88.8888	88.8888
308	8	6	.0102	.0068	.0120	88.8888	.0230	88.8888	88.8888	.0129	.0087	88.8888	88.8888	88.8888
308	8	9	.0075	.0074	.0106	88.8888	.0195	88.8888	88.8888	.0117	.0096	88.8888	88.8888	88.8888
308	8	12	.0073	.0075	.0098	88.8888	.0181	88.8888	88.8888	.0125	.0102	88.8888	88.8888	88.8888
308	8	15	.0059	.0066	.0117	88.8888	.0183	88.8888	88.8888	.0118	.0052	88.8888	88.8888	88.8888
308	8	18	.0093	.0066	.0117	88.8888	.0174	88.8888	88.8888	.0137	.0091	88.8888	88.8888	88.8888
308	8	21	.0059	.0054	.0087	88.8888	.0183	88.8888	88.8888	.0097	.0087	88.8888	88.8888	88.8888
308	8	24	.0064	.0029	.0088	88.8888	.0160	88.8888	88.8888	.0116	.0070	88.8888	88.8888	88.8888
308	8	27	.0055	.0048	.0082	88.8888	.0165	88.8888	88.8888	.0094	.0071	88.8888	88.8888	88.8888
308	8	30	.0080	.0060	.0096	88.8888	.0184	88.8888	88.8888	.0092	.0047	88.8888	88.8888	88.8888
9999														