SAFARI 2000 AERONET Ground-based Aerosol Data, Dry Season 2000

Abstract

AERONET (AErosol RObotic NETwork) is an optical ground-based aerosol monitoring network and data archive system. AERONET measurements of the column-integrated aerosol optical properties in the southern Africa region were made by sun-sky radiometers at several sites in August-September 2000 as a part of the SAFARI 2000 dry season aircraft campaign.

AERONET is supported by NASA's Earth Observing System and expanded by federation with many non-NASA institutions. The network hardware consists of identical automatic sun-sky scanning spectral radiometers owned by national agencies and universities. Data from this collaboration provides globally-distributed near-real-time observations of aerosol spectral optical depths, aerosol size distributions, and precipitable water in diverse aerosol regimes.

Background Information

Investigators:
Brent Holben (brent@aeronet.gsfc.nasa.gov)
Tom Eck (Thomas.F.Eck.1@gsfc.nasa.gov)

Project: SAFARI 2000
Data Set Title: SAFARI 2000 AERONET Ground-based Aerosol Data, Dry Season 2000

Sites: Southern Africa

Data Set Citation:

Holben, Brent N. and Tom F. Eck. SAFARI 2000 AERONET Ground-based Aerosol Data, Dry Season 2000. Data set. Available on-line [http://www.daac.ornl.gov] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A.

Data File Information

The data files contain numeric aerosol optical property measurements at various sites in southern Africa. The data files are stored as ASCII files, one file per site per year, in comma-separated-value (.csv) format, with complete descriptive headers. The data are Level 2.0, which means they have been cloud-screened and quality assured.

Three levels of data are available from the AERONET website: Level 1.0 (unscreened), Level 1.5 (cloud-screened), and Level 2.0 (Cloud-screened and quality-assured). (CAUTION: Data presented in the real time data version is unscreened and

may not have final calibration reprocessing.)

AERONET Data Description

Header Parameter	Description
Site	The site name
Lat	Site latitude in degrees
Long	Site longitude in degrees
PI	Site principal investigator(s)
His/Her e-mail	Site principal investigator(s) email address(es)
t0	Initial starting point of data period (used with time_offset to plot time more effectively in spreadsheet)
Column Parameter	**Description**
Date	Date of measurement
Time	Time of measurement (GMT)
Time_offset	Time offset from t0
AOT_XXX	Aerosol optical thickness (unitless) for wavelength channel XXX (-100 = data not available)
Water	Water Vapor measurement in centimeters (0 = data not available) (units = cm^3/cm^2 or g/cm^2)
Air Mass	Optical airmass

For each site there is a Principal Investigator (PI), the person responsible for deployment, maintenance and data collection. The PI would like to be informed of use of that site's data and per the SAFARI 2000 Data Policy, offered co-authorship as appropriate.

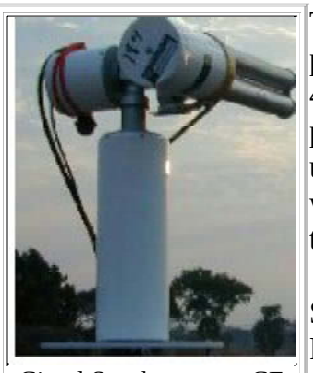
AERONET Site Table

Site Name	Latitude	Longitude	Years Available	PI's
Ascension Island, Atlantic Ocean	-7.976000	-14.415000	1999, 2000, 2001	Brent Holben and Chuck McClain
Bethlehem, RSA	-28.248000	28.333000	2000, 2001	Brent Holben
Etosha Pan, Namibia	-19.175000	15.914000	2000, 2001	Brent Holben
Inhaca Island, Mozambique	-26.041000	32.905000	2000	Brent Holben
Johanesburg, RSA (Joberg)	-26.186000	28.029000	2000	Brent Holben
Kaoma, Zambia	-14.793000	24.795000	2000	Brent Holben
Maun Tower, Botswana	-19.900000	23.550000	2000	Brent Holben
Mongu, Zambia	-15.254000	23.151000	1999, 2000, 2001	Brent Holben
Mwinilunga, Zambia	-11.740000	24.431000	2000	Brent Holben
Ndola, Zambia	-12.995000	28.658000	2000	Brent Holben
Senanga, Zambia	-16.109000	23.293000	2000	Brent Holben
Skukuza, RSA	-24.992000	31.587000	1999, 2000, 2001	Brent Holben

Skukuza Aeroport, RSA	-24.969000	31.593000	2000	Mark Helmlinger
Solwezi, Zambia	-12.171000	26.363000	2000	Brent Holben
Sua Pan, Botswana	-20.533000	26.067000	2000	Mark Helmlinger
Walvis Bay, RSA	-22.658000	14.564000	2000	Jeannette Vandenbosch
Zambezi, Zambia	-13.533000	23.107000	2000	Brent Holben

Instrument Operation and Calibration

Sun-Sky Scanning Spectral Radiometer


Cimel Sunphotometer CE 318-1

The CIMEL Electronique 318A spectral radiometer is a solar powered weather hardy robotically pointed sun and sky spectral radiometer. A sensor head fitted with 25 cm collimators is attached to a 40 cm robot base which systematically points the sensor head at the sun according to a preprogrammed routine. The Cimel controller, batteries, and Vitel satellite transmission equipment are usually deployed in a weatherproof plastic case with dimensions of 30 cm x 62 cm x 46 cm. The total weight of the Cimel sun photometer is approximately 15 kg, with an additional 22 kg contributed by the control box, battery, transmitter, etc., and the weatherproof case.

Standard Sunphotometer: Cimel CE 318-1
Polarized Sunphotometer: Cimel CE 318-2

Instrument Manufacturer:
Cimel Electronique
172, rue de Charonne 75011
Paris, France
Telephone: 331-43487933
Fax: 331-43486261

Data Transmission and Processing


Vitel Transmitter VX1004

Data are transmitted hourly or half-hourly from the memory of the sun photometer microprocessor via the Data Collection Systems (DCS) to the Wallops Receiving Center via transmissions to satellite (GOES, METEOSAT) using VITEL transmitters. These raw data are then transferred hourly from the Wallops receiving station to the Goddard Facility.

The frequencies, channels and transmission windows are assigned by NOAA/NESDIS for GOES, and by EUMETSAT for METEOSAT and GMS, which are broadcast in the 401 to 402 MHz range. The antenna is conical, approximately 40 cm in diameter and 40 cm long.

The instrument-specific calibrations are applied and the raw data are converted to AOT, water vapor (WV), and other derived data products that are made available on the AERONET web site.

Automatic quality control checks (clock accuracy, battery voltages, etc.) are produced along with daily summaries of number of AOT measurements, size distribution ratio, ala, and humidity stat, which are then distributed to site managers h

number of AOT measurements, size distribution retrievals, and humidity status which are then distributed to site managers by e-mail.

Instrument Manufacturer:
Vitel VX1004 Transmitter
Vitel, Inc.
14100 Parke-Long Court
Chantilly, VA 20151 USA
Phone: 703-968-7575
Fax:703-968-7581
http://www.vitelinc.com/ [Internet Link]

Calibration Procedure

AERONET reference instruments are typically recalibrated at Mount Lemon Observatory (MLO), Arizona every 2-3 months using the Langley plot technique. The zero air mass voltages (Vo, instrument voltage for direct normal solar flux extrapolated to the top of the atmosphere [Shaw, 1983]) are inferred to an accuracy of approximately 0.2 to 0.5% for the MLO calibrated reference instruments (Holben et al., 1998). Therefore, the uncertainty in aerosol optical thickness (AOT) due to the uncertainty in zero airmass voltages for the reference instruments is better than 0.002 to 0.005.

The sun-sky radiometers at sites other than GSFC are intercalibrated against a MLO calibrated AERONET reference instrument both before deployment in the field and post-deployment. A linear rate of change in time of the zero airmass voltages is then assumed in the processing of the data from field sites. Our analysis suggests that this results in an uncertainty of approximately 0.01 - 0.02 in AOT (wavelength dependent) due to calibration uncertainty for the field instruments.

Additional Sources of Information

Notice to Users:
The public domain data given here are contributed by the International AERONET Federation. Each site has a Principal Investigator(s) (PI) , responsible for deployment, maintenance and data collection. The PI has priority use of the data collected at the site. The PI is entitled to be informed of any other use of that site data.

Data Set Link: http://aeronet.gsfc.nasa.gov/ [Internet Link]