

AERONET Update (April, 2010)

Dear colleagues:

I hope this message finds you all well. I have several points to bring to your attention outlined below.

What is AERONET and AERONET
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What is AERONET and AERONET

AERONET, as I use it in this write up, refers to the comprehensive program of network instruments described by Holben et al, 1998, that contribute to the total database. The AERONET program is a federation of many contributors from individual PIs with one instrument or programs with many instruments that have their own network names such as AEROCAN, SONDA, AEROSIBNET etc. The Goddard group, sometimes known as AERONET, and PHOTONS have special AERONET management responsibilities to maintain instruments within their domain such as calibration and database management. Recently RIMA has joined that process and AEROCAN will take on those responsibilities soon along with CSUNET and new Chinese program. The entire database and thus sub networks are linked to a common processing system and database managed at GSFC. There are several databases and processing systems located in Canada, France, Spain, China, Brazil that are dynamically linked to the NASA/Goddard system providing a near real-time data processing and backup, thus maintaining the integrity of the data products and security of the database. The AERONET website is a dynamic means of gaining information on the AERONET operational and research activities and acquiring unprocessed and processed data from the AERONET database. Other websites such a PHOTONS provides access to the PHOTONS portion of the AERONET database.

Collaboration with other networks

For many years AOD databases have come and all have gone for reasons of calibration uncertainty, different data processing, varying protocols,

mechanical/optical variations... that is lack of standardization. AERONET was born out of that chaos with the fundamental tenant of imposing standardization on all aspects of the network. The result has been a tremendously successful program based on all participants following the AERONET instrument, calibration, processing and data delivery standardization. AERONET has developed the closest thing to a global aerosol properties database with demonstrated results, being cited in well over 1500 journal articles. This achievement has been facilitated by our public domain data policy. Clearly AERONET is the only globally distributed network and database that captures the diversity of aerosol environments across the planet.

The World Meteorological Organization's Global Atmospheric Watch (GAW) and Baseline Surface Radiation Network are developing global AOD and OD databases respectively based on contributions from various types of instrumentation within several networks and individual observations. Both GAW and BSRN are soliciting from me, as the spokesman for AERONET, access the AERONET data or metadata to enhance those databases. This issue was discussed at the Hangzhou workshop and has evolved since that time. Given that AERONET is publically available, the database managers have full access to the AERONET database. I feel obligated to the AERONET community to maintain recognition of PI contributions which the AERONET website does extremely well. I also feel that selecting only part of the AEROENT database such as AOD may diminish the overall perceived value of AERONET to the outside community. Thus my approach is to treat all the soliciting entities equally, that is, access to the data will be to link to the AERONET website thus preserving the integrity of the total database and fidelity of our PI acknowledgments. Clearly any participating AERONET PI may provide the actual data to any database entities but it will be the PIs responsibility to meet such requests. Note that downloading data from the AERONET web server is straight forward, fast and should not raise issues. For NASA acquired data, we will allow links to the AERONET website which is much the way the Synergy tool functions. Developing new and adequate means of delivering data is very difficult for outsiders and I prefer that data requests go through the AERONET website.

Hangzhou AERONET Workshop

The AERONET Workshop and Science meeting was held at Hangzhou, China August 2009. This follows the first workshop held at Goddard in 1998, followed by 2004 in Huelva, Spain. The Hangzhou workshop was primarily for those participants in south and east Asia that have not had the advantage of meeting their fellow colleagues and provide a forum for learning instrument maintenance, data processing, the data products and understanding the issues of participating in the greater AERONET project such as calibration, standardization etc. We also had several sessions addressing new directions/products that could be offered. Overall I felt the meeting was very successful and well attended. This meeting was followed by a science meeting emphasizing research from sun photometry including AERONET, SKYNET and PFR.

Several points from the workshop I'd like to emphasize:

•Site Managers

- Good site management = a good data record
- Please work with our Goddard, Lille or Spanish maintenance staff
- Check your data record weekly
- Your efforts are fundamental to the programs success
- Thank you for your dedication

•Site PIs

- Diversity and spatial distribution of the program is in your hands
- Support the site managers and work with the network management
- Check your data
- Everyone is grateful for your collaboration

•Data Users-

- Look at the data before you use it
- Acknowledge those that have made the data possible
- Publish

January AERONET calibration workshop:

The January AERONET calibration workshop was open to those that are currently or anticipate being a calibration facility. This included staff from Goddard AERONET PHOTONS, from RIMA, AEROCAN, CARSNET/CMA and from IRSA/CAS. We spent three days going into great depth on calibration procedures, new calibration approaches, tracking data bases all with the intention that AERONET data may be traced back to community accepted standards and that our long term goal of imposing standardization across the network is maintained to insure the highest accuracy for all provided products.

Of particular note is the plan to include the vicarious sky radiance calibration and laboratory sun calibration in parallel to our standard sphere and Langley calibrations. The vicarious work presented by Li and developed during his tenure with PHOTONS shows great potential for transferring the highly accurate sun calibration immediately to the sky calibration with a priori knowledge of the optical field of view. This method also would allow sky radiance calibration in the UV wavelengths, currently not used but does open possibilities for future measurements and research.

The manufacture's detector temperature response is sometimes not adequate particularly at low temperatures. Temperature correction upgrade discussions were led by Joel Schafer and Thierry Podvin based on their recent work. All instruments processed thru PHOTONS and GSFC will now have a temperature assessment made from -35°C to +45°C. Those not yet evaluated will have an improved generic temperature correction applied based on averaging the laboratory observations. These corrections are particularly important for the 1020

nm Si band measurements but will be made for all wavelengths. The overall correction for all wavelengths is within our assumed accuracy of ± 0.01 to 0.02 but the difference at 1020 nm for clean low temperature sites is obvious. Currently the corrections are applied only to selected instruments that experience cold temperatures from the time of temperature characterization forward. We expect to apply the generic characterization in the months ahead to all instruments once the reference instruments are characterized and new calibrations computed. We expect that we will be able to apply these data to the historical data record but it requires developing the algorithms to apply to the reference instruments during the Langley Vo assessments and flagging issues of temperature anomalies, that will be complicated and implemented under Version 3.

Level 2 SDA released:

I'm very pleased to announce the release of Quality Assured (level 2) fine and coarse mode AOD at 500 nm developed by Norm O'Neill at Sherbrooke, University, Quebec, Canada. Kudos to the AEROENT team particularly David Giles for shepherding this through our vetting process. Please view the website write up that describes the products that are now available through the download tool: http://aeronet.gsfc.nasa.gov/new_web/aot_levels_versions.html

Only level 1.5 data are available for the microtops MAN database due to spectral limitations, (see the MAN website below).

2009 SeaPRISM data QA'd:

In February, Giuseppe Zibordi made his annual QA assessment of SeaPRISM normalized water leaving radiance data. The SeaPRISM program is expanding the distribution under the banner AERONET-OC (http://aeronet.gsfc.nasa.gov/new_web/ocean_color.html).

SolRad-NET (<http://solrad-net.gsfc.nasa.gov/>)

The SolRad-NET program under the guidance of Joel Schafer has substantially expanded the availability of co-located solar flux pyranometers from a number of available sources. For potential expansion to new sites please contact Joel.

Maritime Aerosol Network (MAN):

http://aeronet.gsfc.nasa.gov/new_web/maritime_aerosol_network.html

The MAN network continues to add collaborators that have collected data from the Microtops handheld sunphotometer providing AOD measurements over the oceans, inland seas and coastal waters. Alexander Smirnov has published one paper with a second in preparation describing MAN and analysis of the data for maritime aerosol characterization and satellite validation. All MAN data are calibrated against AERONET reference instruments and processed using the AERONET processing system.

Version 3

Version 2 was implemented in 2006. Version 3 is planned for beta testing in approximately 6 months and I hope operational release will be in early 2011. This

release is necessary due to improved cloud screening for AOD that has implications for the entire data amount and quality of data available to the user. Included in the release will be the issues addressed above plus new mid day inversions using PP and or Almucantars. The inversions will include uncertainty estimates for all parameters including sphericity. Also better climatology corrections for NO₂ and O₃ will be implemented. The 'cloud mode', cloud optical depth that has been in the works for nearly a decade will be operational under Version 3 although a provisional version (level 1.5) will be released under Version 2 this spring.

These and other enhancements to the AERONET processing system known as demonstrat lie with the considerable efforts of Ilya Slutsker.

We continue to explore the possibility to retrieve CO₂ from sun photometry.

Hardware

The cimel dual filter wheel polar instrument continues to evolve into a more mechanically stable instrument. Word from the company is they will upgrade all earlier versions of the instrument to the current version. AERONET does provide spectral linear polarization for the data from those instruments. Further products will be developed, however, AERONET still views the dual filter wheel instrument as a development project not yet ready for operational network use. Refinements in measurement protocol, data acquisition, calibration, data processing and algorithm development are necessary and on-going.

Calibration reminder:

The labs (Goddard, PHOTONS and RIMA) spend a great deal of time calibrating instruments. It is very important to deploy instruments to the field as soon as they are received from the calibration lab. Similarly an instrument should be returned for calibration as soon as it is removed from the field. As a reminder the pre and post field calibration is interpolated through the field measurement period that is nominally one year. Please help us to insure that the pre and post calibrations preformed at our labs are close to the first and last field measurements.

The Staff:

I am very please to introduce you all to Peter Kenny who began work on April 5 at Goddard. He will be working with Alex Tran and Mikhail Sorokin in the AERONET lab. Over the course of several years I'm sure he will be in touch with many of you in one way or another.

Kudos to all staffs of the greater AERONET program. Below are those that attended the Calibration workshop.

The Goddard group (USA):

Alex Tran, Mikhail Sorokin, Tom Eck, Joel Schafer, Alexandr Sinyuk, David Giles, Ilya Slutsker, Amy Scully, Brent Holben, Peter Kenny

Photons staff (France),

Luc Blarel, Thierry Podvin

RIMA Staff (Spain):

Alberto Berjon and Carlos Toledano

AEROCAN Staff (Canada):

Ihab Abboud, Bruce McArthur from Environment Canada

CARSNET/CMA (China):

Huizheng Che

ISRA/CSUNET (China):

Zhengqiang Li

All the best,

Brent Holben