AERONET Version 3 Release—Providing significant improvements for multi-decadal global aerosol database and near real-time validation

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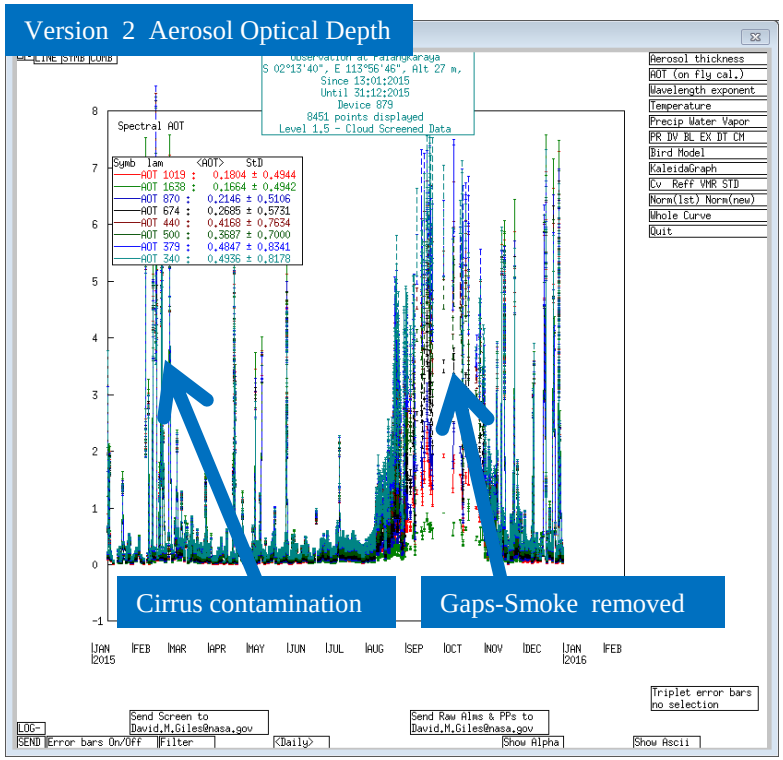

Figure 1

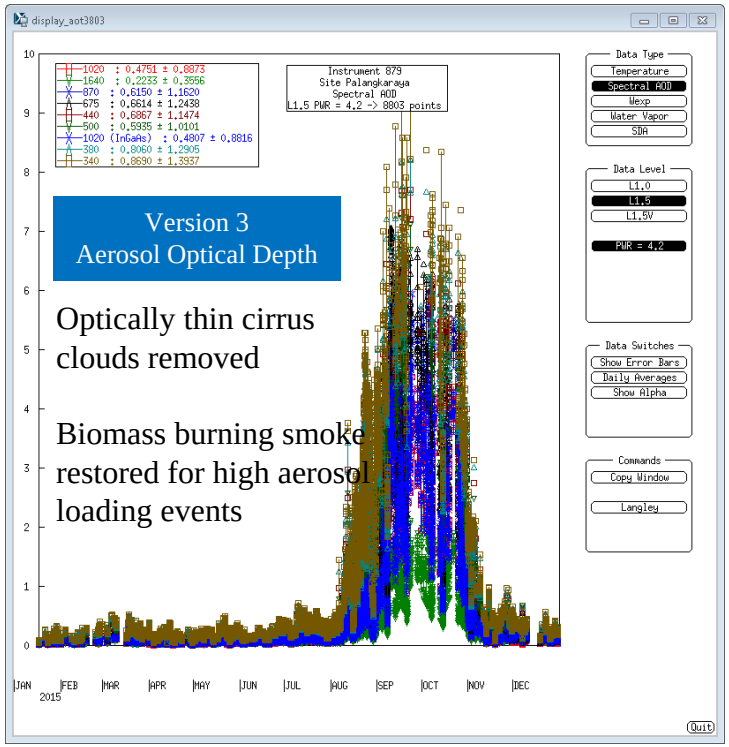

Figure 2

Aerosols are highly variable in space, time and properties. Global assessment from satellite platforms and model predictions rely on validation from AERONET, a highly accurate ground-based network. Ver. 3 represents a significant improvement in accuracy and quality.

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Data Sources: All data are collected by the federated partners of the AERONET program that contribute to AERONET's public domain database.

Figure 1: *This figure shows the V2 screened aerosol optical depth (AOD) data for 2015 in Borneo which is typically characterized by low AOD most of the year but in 2015 a severe biomass burning season enhanced by a very strong el Nino produced extraordinarily high AOD in August through November reducing visibility to a few hundred meters for weeks. Note the high spikes throughout the year due to very stable cirrus clouds that are very difficult to remove from the aerosol data. During very heavy smoke events, the radiometric signal is weak such that many gaps in the data can occur.*

Figure 2: *The same 2015 Borneo dataset but screened with Version 3 that does a superior job removing cirrus contaminated data while restoring data from the strong extinction caused by heavy smoke in August through November. Improved data corrections, cloud screening and quality assurance algorithms have been developed, revised and tested over the past three years and V3 data are now available at http://aeronet.gsfc.nasa.gov.*

Version 3 processing is anchored to a completely revised data management system known as 'Demonstrat'. With the growth to over 600 federated sites distributed world wide, AERONET required a more efficient system of calibration, processing, archive and distribution to serve NASA, AERONET's collaborators and the aerosol community.

The sun and sky scanning spectral radiometer , AKA cimel*, is standard equipment across the network, being largely unchanged for more than 23 years. Imposing standardization of the equipment, calibration, processing, and all phases of data management combined with an open data policy has allowed the project to serve the global community, provide data for fundamental research and serve as a model for other NASA networks.*

Scientific significance, societal relevance, and relationships to future missions: AERONET is the world standard for ground-based remote sensing of aerosol properties for it's accuracy, availability and global distribution. By the nature of the physics, ground-based aerosol measurements are more accurate than model estimates and satellite retrievals, thus AERONET has become the world validation reference for all modeling efforts and satellite systems. Version 3 by improving the accuracy moves our scientific understanding of aerosol properties, distributions and processes forward. The near real-time data available under Version 3 is a critical component of many aerosol related NASA field missions, most recently KORUS-AQ in S. Korea. The value to the community is tracked in the number of citations of the Holben et al. 1998 AERONET reference paper that currently exceeds 4000.