

Working Group on Data Management and Analysis



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GEWEX and Other
Global, Long-Term
Datasets

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GEWEX WORKING GROUP: AEROSOLS

MEMBERSHIP

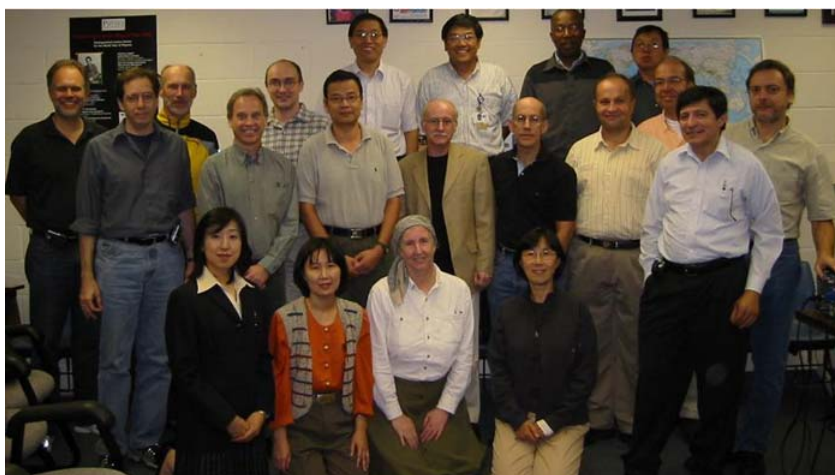
Zhanqing Li (co-chair, GRP representative), T. Zhao (co-chair), M. Mishchenko (GACP representative).

Report for the GEWEX Newsletter

1st Workshop on the GEWEX Global Aerosol Products Assessment (GAPA)
2006 September 14-15, College Park, University of Maryland, USA

Aerosols are a major atmospheric variable influencing both the transfer of radiative energy, and the conversion of water vapor into cloud droplets and raindrops. As such, most GCMs are now incorporating aerosol parameters and physical processes linking aerosols with the energy and water cycles so that aerosol direct and indirect effects on climate can be computed. Over the years, numerous global aerosol products have been generated from past (e.g. AVHRR, TOMS, POLDER) and current satellite sensors (e.g. MODIS, MISR, CALIPSO), and more are expected from future sensors (e.g. APS, OMPS, and VIIRS). As the number of aerosol products increases, discrepancies among the products also increase. Data users, especially modelers, are confronted with an ever-increasing challenge to decide which product to use and how much uncertainty exists in the different products.

Under the auspices of the Global Energy and Water Cycle Experiment (GEWEX) and the GEWEX Radiation Panel (GRP), a working group (GAPA) was recently established to assess the quality and compatibility of global aerosol product with a focus on the GEWEX Aerosol Climatology Product (GACP). The group is led by Z. Li (a GRP member) and X. Zhao from the University of Maryland (UMD), with members representing all major teams producing global aerosol products. The photo shows a partial list of the members attending the first kick-off meeting held from September 14-15, 2006, in College Park, Maryland, USA.



First row from left: A. Higurashi (NIES, Japan), C. Hsu (GSFC/NASA), L. Remer (GSFC/NASA), M. Chin (GSFC/NASA), O. Torres (UMD/NASA); Centre row from left: R. Kahn (JPL/NASA), D. Diner (JPL/NASA), M. Wang (NOAA), I. Laszlo (NOAA), D. Winker (LaRC/NASA), Z. Obradovic (Temple University); last row: H. Maring (HO/NASA), B. Holben (GSFC/NASA), S. Vucetic (Temple University), Z. Li (UMD), S. Tsay (GSFC/NASA), C. Ichoku (UMD/NASA), T. Zhao (UMD/NOAA), M. Schulz (CEA, France), M. Mishchenko (GISS/NASA)

PLAN OF WORK

The objectives of the working group are to:

- 1) Use current data sets to assess and improve the confidence level in the 30-year satellite aerosol climatology of aerosol optical depth (AOD) and Angstrom exponent from AVHRR/TOMS;
- 2) Understand and resolve discrepancies among all major global aerosol products and to document uncertainties;
- 3) Produce improved, consistent, unified global aerosol products that link both historical, current, and future satellite observations for long-term trend studies and climate studies.

The workshop was charged to:

- 1) Review major global aerosol products;
- 2) Evaluate all key issues in aerosol retrievals such as sensor calibration, cloud screening, algorithm, surface effects, synergy;
- 3) Develop a strategy for identifying major sources of discrepancies among the aerosol products;
- 4) Estimate the range of uncertainties on various time and space scales;
- 5) Develop a roadmap for reconciling the differences and for generating unified consistent products.

During the two-day meeting, aerosol product development teams provided updates of various products (AVHRR-GACP, AVHRR-PATMOS, AVHRR-NIES, TOMS, SeaWiFS, MODIS, MODIS-Deep Blue, MISR, CALIPSO) and detailed descriptions of the retrieval procedures. Such information is instrumental in understanding the causes for any discrepancies. A couple of comparative studies/analyses were presented that helped gain some insight into the impact of different assumptions made in the retrieval algorithms (e.g. aerosol size distribution, refractive index, surface spectral albedo ratio, etc.) on the differences in the retrieved aerosol quantities. It was noted that the MODIS aerosol product is upgraded in its latest release (version 5) to correct some errors in the AOD retrieval over land. New advances in aerosol remote sensing technology were introduced, such as the CALIPSO mission and the deep-blue method. An upcoming newer version (version 2) of the widely used ground-based AERONET product is expected to produce more realistic aerosol size distributions and single scattering albedos. Issues associated with spatial and temporal matching between satellite and ground aerosol retrievals were discussed. A new computationally more efficient retrieval approach based on machine-learning techniques appears to offer some guidance toward the development of a highly integrated algorithm that can incorporate all available satellite data. In parallel with satellite remote sensing of aerosols, model simulations of global aerosol distributions have made remarkable progress. Over land, the quality of the AODs simulated by some models is at par with that of remotely sensed AODs, while the latter is superior over oceans. This suggests the importance of exploiting the synergy between model simulations and remote sensing. Joint experimental studies are planned to quantify and eventually remove discrepancies between the various aerosol products, which will lead to a coherent aerosol product derived from all available sensors that is compatible with the long-term historical product of the GACP.

For more information and update of the GAPA activities, please visit:

http://www.atmos.umd.edu/~zli/GAPA/gapa_main.htm

List of GAPA Members Attending the 1st Workshop

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1st Workshop on the Assessment of Global Aerosol Products

Aerosol Working Group (AWG) for the GEWEX Radiation Panel

14-15 September 2006
Earth System Science Interdisciplinary Center
University of Maryland, College Park, MD 20742

Meeting Goals

- (1) Formation of the new aerosol working group (AWG) under the GEWEX Radiation Panel (GRP)
- (2) Planning for joint assessment of satellite aerosol retrievals in support of the production of consistent long-term aerosol data products for climate studies.

Agenda - Final

Thursday AM

Chair: Z. Li	
0830-0835:	Welcome Remarks and Meeting Logistics (Z. Li, P. Arkin, R. Dickerson, Linda Carter)
0835-0900:	Introduction of the GEWEX Products Assessment Initiative (W.B. Rossow)

0900-0930: GACP report (M. Mischenko)
 0930-1000: The TOMS long-term record of aerosol properties from near UV observations (O. Torres).
 1000-1030: A critical examination of the MODIS aerosol products and their usefulness in estimating global aerosol radiative effects and forcing (L. Remer)
 1030-1100: Break

Chair: H. Maring

1100-1130: Inter-comparison of MODIS, AVHRR and TOMS aerosol products and algorithms (Z. Li)
 1130-1200: MISR Aerosol Product Strengths and Limitations for Large-Scale and Long-Term Climate Studies (R. Kahn)
 1200-1300: Lunch (provided)

Thursday PM

Chair: W. Rossow

1300-1330: Analysis of historical PATMOS AVHRR aerosol data in support of long-term trend study (T. Zhao)
 1330-1400: An evaluation of single- and multi-channel aerosol optical depth retrievals (I. Laszlo)
 1400-1430: MODIS and GLI aerosol analysis with 4-channel algorithm and the comparison with SPRINTARS model simulations (A. Higurashi).
 1430-1500: Progress toward the CALIPSO aerosol product (D. Winker)
 1500-1530: Break

Chair: T. Zhao

1530-1600: Improvements in AERONET aerosol products based on Version 2 processing and synergism with parameters (B. Holben)
 1600-1630: Issues in validating satellite aerosol products against ground-based observations (C. Ichoku)
 1630-1700: Aerosol products over oceans derived from SeaWifs and MODIS (M. Wang)

1730: End of the day

Friday AM

Chair: M. Mischenko

0900-0930: Developing a long-term vision: Recommendations from the August 2005 Williamsburg NASA Aerosol Strategy Workshop (D. Diner)
 0930-1000: Combined use of model and satellite data for evaluating near-term to long-term aerosol trends (M. Chin)
 1000-1030: Aerosol model evaluation challenges with reference to AeroCom (M. Schulz)
 1030-1100: Break

Chair: L. Remer

1100-1130: Global MODIS aerosol product using the deep algorithm over land (C. Hsu)
 1130-1200: Data mining support for aerosol retrieval and analysis (Z. Obradovic)
 1200-1300: Lunch (Provided)

Friday PM

1300-1600: Group discussions
 Issues to be addressed
 (1) Cloud screening methods
 (2) Surface effects
 (3) Aerosol models
 (4) Retrieval algorithm
 (5) satellite-ground comparison issues
 (6) Synergy issues
 (7) Strategy and roadmap for generating integrated consensus long-term global aerosol products
 (8) Organization and collaboration

1600-1630: Break
 1630-1730: Action items and recommendations
 Concluding Remarks (Hal Maring)

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