

Atmospheric Composition Working Group Report

S. Kondragunta (NOAA) and D. Westphal (NRL)
Co-Chairs

Working Group Membership

Member	Affiliation	Expertise/Areas where contributions are critical
Byun, Daewon	NOAA/ARL	Air quality model development and assimilation
Carey, Ken	JCSDA/Noblis	Organize and coordinate meetings
Da Silva, Arlindo	NASA/GSFC	Trace gas and aerosol assimilation
Flynn, Lawrence	NOAA/NESDIS/STAR	Algorithm/product development
Huang, Ho-Chun	NOAA/NWS/NCEP	Aerosol assimilation
Kondragunta, Shobha	NOAA/NESDIS/STAR	Algorithm/product development
Long, Craig	NOAA/NWS/NCEP	Ozone assimilation
Lu, Sarah	NOAA/NWS/NCEP	Global model development and aerosol assimilation
McQueen, Jeff	NOAA/NWS/NCEP	Air quality model development
Pawson, Steve	NASA/GSFC	Ozone assimilation
Pierce, Brad	NOAA/NESDIS/STAR	Global model development and aerosol and ozone assimilation
Westphal, Doug	NRL/MMD	Global model development and aerosol assimilation

Chemical Data Assimilation

- Initializing chemistry and transport models with timely observations of trace gases and aerosols is expected to improve model predictions. But, many challenges exist:
 - State of the art systems are still evolving,
 - Lack of vertical information in satellite data,
 - Lack of speciation information for aerosols in satellite data,
 - Lack of sensitivity to boundary layer ozone changes in satellite data,
 - Sensors/products that provide vertical information have sparse spatial coverage and/or not flown on operational satellites.

JCSDA Atmospheric Composition Working Group Charter

- **Working group objectives**

- Foster collaboration and coordination across the partner organizations with the goal of stimulating complementary rather than redundant efforts,
- Encourage transparency between the JCSDA organizations by facilitating the exchange of information describing the interests, goals, approaches, and successes of each organization,
- Assist JCSDA management with setting relevant priorities for the external research program, reviewing proposals, etc.
- Obtain requirements for constituent satellite data assimilation and provide feedback to JCSDA management

- **Working group responsibilities**

- Conduct regular meetings
- Freely share data usage guidelines, algorithm descriptions, and code used for monitoring and assimilation of atmospheric composition satellite data,
- Maintain an inventory of JCSDA and its partners use of atmospheric composition data and identify shortfalls,
- Provide input as needed to JCSDA reports and planning documents

First ACWG Meeting

- Kick-off meeting held on January 29, 2010
 - Charter was discussed and revised. Consensus was to let the WG focus on a limited set of goals/objectives that focused on advising the JCSDA management on priorities and recommendations,
 - New members were proposed and subsequently approved by the JCSDA management,
 - Develop an inventory of JCSDA and partner use of atmospheric constituents data.

Second ACWG Meeting

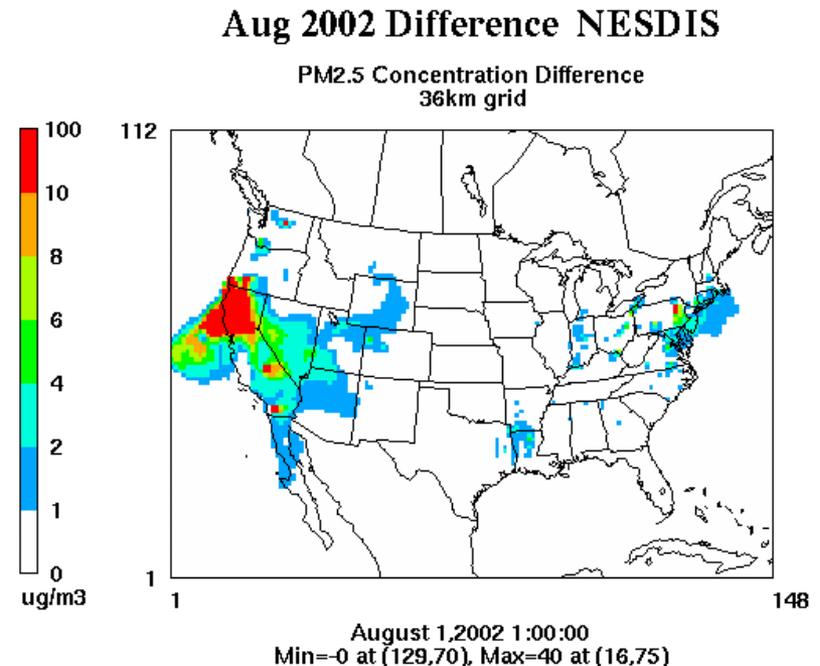
- Second meeting held on March 26, 2010
 - New members to the working group were introduced,
 - Name change from “air quality WG” to “atmospheric composition WG” proposed and subsequently approved by the JCSDA management,
 - Working group charter was finalized,
 - Short presentations from NRL, STAR, NCEP, and NASA on satellite data assimilation activities were provided.

Current Activities at Partner Organizations

- Aerosol Optical Depth Assimilation
 - Operational at NRL/FNMOC (NASA satellite data only - MODIS) in Navy Aerosol Analysis and Prediction System
 - In development at NASA (NASA satellite data only – MODIS and OMI) for Goddard Earth Observation System-5
 - In development at NWS/NCEP/EMC (NASA satellite data only - MODIS) for Global Forecasting System
 - In development at STAR (NOAA and NASA satellite data – GOES and MODIS) for Community Multiscale Air Quality model and Realtime Air Quality Modeling System
- Ozone assimilation
 - Operational at NWS/NCEP/EMC (NOAA satellite data – SBUV/2) in Global Forecasting System
 - In development at NWS/NCEP/CPC (NOAA and NASA satellite data – SBUV/2 and OMI) in Global Forecasting System
 - In development at STAR (NASA satellite data – OMI and MLS) in Realtime Air Quality Modeling System
- Trace gases other than ozone
 - No activities at this time

Current Activities at Partner Organizations (Cont.)

- Different organizations using different approaches to derive emissions but the goal is the same – to accurately represent fire emissions in the global and regional models.
 - NRL Fire Location and Modeling of Burning Emissions (FLAMBE)
 - Currently GOES and MODIS. Expanding to use Metosat-9, MTSAT-1R
 - NASA Quick Fire Emissions Data (QFED)
 - Currently based on MODIS fire detections
 - STAR Global Biomass Burning Emissions Product (GBBEP)
 - GOES, Metosat-9, MTSAT-1R, INSAT-3D (after launch)



Pouliot et al., 2008 SPIE meeting:
Demonstrating the impact of biomass burning emissions on surface PM2.5 concentrations for August 2002.

JSDI FY10 Funded Activity

- One air quality proposal with three sub-tasks has been funded:
 - Modify the NCEP GSI to ingest satellite aerosol products (*lead – Bill Lapenta of NCEP*)
 - Global Biomass Burning Emissions Product (GBBEP) from a Constellation of Geostationary Satellites for Operational Use in NWS/NCEP GFS-GOCART (*lead – Shobha Kondragunta of STAR*)
 - Implementation of GOES and OMI Total Column Ozone Assimilation within NAM-CMAQ to improve Operational Air Quality Forecasting capabilities (*lead – Brad Pierce of STAR*)

Conclusions

- List of satellite data used in atmospheric constituents assimilation systems.
 - Ozone
 - SBUV/2, OMI, MLS, and TES
 - Aerosols
 - MODIS and GOES
 - Fires
 - AVHRR, MODIS, GOES
- ACWG focus is not to just expand the list of satellite data but rather to develop assimilation systems that can sustain over time and have the ability to add new measurements as they become available.