

# AQ Forecast Discussion Group

## Research Needs

- Satellite data assimilation
  - Transition global data assimilation techniques to NCEP's GFS system for operational AQ forecasting
  - Improvements to NCEP's global model to do tropospheric chemistry
  - Identified a need for chemical data assimilation workshop to iron out some of the details
  - Use NASA's SAGE-III limb scattering ozone profiles as a risk reduction for NPOESS/OMPS limb profiler
  - Conduct dynamic inversion experiments to improve emissions
  - Use data assimilation to identify flaws in emission inventories
- Data availability in near real-time
  - Operational processing needed for Aura/OMI
  - EPA and NWS submit requests to NOAA for NRT access of OMI and other future missions (e.g., A-train). Will require a dialogue between NASA instrument PI's and NOAA/NESDIS

# AQ Forecast Discussion Group Research Needs (cont.)

- NASA and NOAA support essential for complementary observation systems for trace gases and aerosols
  - Network of ground stations (e.g., lidars)
  - Targeted observations using aircraft
  - Field campaigns
  - Conduct case studies using combination of satellite, ground, and aircraft studies to help models and satellite retrievals
  - Investigate the role of lidars in interpreting satellite column measurement of AOD vs surface PM<sub>2.5</sub>
- NASA, NOAA, and EPA work as a team for future missions so user requirements and needs are met
  - Advocate for a geostationary AQ mission
- Satellite-derived AQ products – QA/QC and product improvements
  - NASA and NOAA leverage resources and capabilities to assess and improve the quality of satellite retrievals (e.g., use MODIS to calibrate GOES AOD retrievals)

# Landscape Characterization & Forecasting

- Prioritized list of joint topics to work on
  - Identify existing datasets, better use of existing data
  - MODIS Emissivity Applications
    - to quantify satellite retrieval errors over land
    - Test use of emissivity into model surface energy budget
  - Research on deriving tree and crop (coarser) species
  - Sensitivity Studies on more frequent land cover information for AQ forecast
  - Development of global land use database updated several times during the year
    - Investigate MODIS land cover type and change, 1km, updated quarterly, 17 classes
    - Use existing products for leaf out
  - Use of satellite derived surface temperature for biogenic and land surface models

# Fires and Forecasting

- How do you hand off emissions coming from fine scale forest service models to regional-to-global scale models
- Trade off studies for complicated/sophisticated plume models in CMAQ to determine if they are cost effective
- Investigate the use of CALIPSO data (backscatter profile, extinction profile) for applications related to smoke plume rise and transport and other AQ applications.
- Recommendations on multi-sensor/multi-platform products (aerosol vertical profile, type (absorption vs scattering), size) for AQ applications and characterizing fire chemistry. Discussion needed at NASA to find out how this is going to happen.
- Impact studies of NRT satellite-derived biomass burning emissions on air quality forecast