Air Quality Data Assimilation
Session Report

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Participants:
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Topics Covered

• Seven presentations
  – Aerosol assimilation
    • GFS-GOCART coupling completed
    • Demonstrated the impact of biomass burning emissions on CMAQ PM2.5 predictions
  – Ozone assimilation
    • Demonstrated ozone forecast improvements by using additional advanced satellite data compared to traditional SBUV/2 data assimilation
  – Trace gas product development from GOME-2
    • Algorithm development work underway. Preliminary NO2 trace gas retrievals developed. Operational implementation in 2008
  – Photochemical parameterization of ozone and water vapor for NWP models
    • The new scheme reduced ozone forecast errors
Atmospheric Chemistry/Aerosols/Air Quality

• **Long Term Vision:**
  – Provide a 4-D analysis for air quality prediction while improving the weather analysis & forecasts via radiative feedback
    • Exploit GSI and ESMF framework
  – Species to be assimilated/predicted:
    • Trace gases: CO, CH4, O3, NO2
    • Aerosols: AOD, PM2.5, PM-Coarse
  – **Why:**
    • Provide improved air and sea surface temperature analysis
    • Provide initial/boundary for Air Quality Forecast Capability

– **Current and Future Satellites**
  • Aerosols: MODIS, VIIRS, GOME-2
  • Trace Gases: OMI, GOME-2, AIRS/IASI
Atmospheric Chemistry/Aerosols/Air Quality

• Methodology:
  – Radiance Assimilation (long-term)
    • Continued CRTM development
      – Polarization in the UV/VIS
    • Need for accurate 3-D error co-variances
    • Begin 1-D variational experiments
    • Continue forward model improvements for ozone/PM

  – Product development/assimilation (short-term):
    • Demonstrate the impact on regional/global forecasts (AOD, trace gases)
    • Aerosols: AOD, PM2.5, PM-Coarse
    • Forecast verification
New Satellite Products

• Request JCSDA to continue the support of the development of trace gas and aerosol products from new satellite sensors
  – OMI total and profile ozone
  – GOME-2 total and profile ozone
  – GOME-2 aerosol products (absorbing and scattering aerosol optical depth)
  – GOME-2 NO2, H2CO, etc.
  – AIRS CO, CH4, etc.
  – Similar NPP/NPOESS instruments and products in the future
  – New innovative algorithm approaches using combination of measurements in the UV and IR