AQAST Independent Project Plan, 2013

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**Project duration:** May 1, 2013 – April 31, 2014

**Title:** Atmospheric processes affecting emission sector contributions to O$_3$ and PM$_{2.5}$ episodes

**Problem to be solved:** State agencies and regional planning offices, in the Midwest and nationally, need improved information on processes affecting ozone and particulate matter, especially on the most polluted days.

**Project description:**

The coming year will advance two related, satellite-based projects of direct relevance to air quality managers:

1) Working with the Wisconsin DNR and LADCO, we are characterizing the relative contribution of anthropogenic emission sectors to episodes of elevated ozone and PM$_{2.5}$ in the Great Lakes region. Particular emphasis will be placed on impact of above-lake processes on the coastal regions, and how these processes interact with emission sources (e.g. free tropospheric mixing entraining power plant emissions; stable boundary layer trapping urban transportation emissions). We currently use 2007 emissions from LADCO (these will be updated to 2011 as available), and conducted the CONUS simulation at 36 km x 36 km. We will continue to conduct sensitivity simulations on state-to-state transport, and the effect of near-lake counties, over the Great Lakes Region (GLR) domain (12 km x 12 km). Model results are compared with OMI NO$_2$ and MODIS AOD data over both the CONUS and GLR domain. This is an extension of our Year 1 & 2 proposed activity, and relates to Deliverables in the 2013 Project Year.

2) Working with the U.S. EPA and the U.N. Task Forces on Hemispheric Transport of Air Pollutants (HTAP), we will quantify how hemispheric transport compares to emissions from U.S. emission sectors (electricity, transportation, etc.) in contributing to ground-level O$_3$ and PM$_{2.5}$ on the peak vs. non-peak pollution days. Ground-based measurements and satellite data will be used to evaluate sectoral emission estimates and model performance on the “dirtiest” O$_3$ and PM$_{2.5}$ days, as well as for cleaner days. This work will be based on 2007 emissions from LADCO and 2007 MOZART global boundary conditions. We will compare 2007 results with 2010, when 2010-base-year emission inventory and boundary conditions are made available for the HTAP inter-comparison. This work is a continuation of Year 2 IP activities.

**Deliverables:**

- Report on the evaluation of the LADCO inventory versus OMI NO2 (KNMI product) across the U.S. and the Great Lakes Region. Peer-reviewed publication will also be submitted.
- Peer-reviewed publication on contribution of electricity, transportation, biogenics and other sources to ozone and PM$_{2.5}$.

**Expected AQ management outcomes:**

- Improved SIP planning for LADCO states on ozone and particulate matter
- Development of methods and data sources to support satellite analysis with CMAQ