

Comparison of Trace Gas Profiles over the Chesapeake Bay and Nearby Land in Summer 2014 with Eastern China in Spring 2016 using Aircraft Observations

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Air quality has improved over the eastern United States due to harsher regulations and increased controls over the past decade, but the progress in primary pollutant concentrations is less obvious in other places, such as eastern China. This work compared trace gas and aerosol scattering profiles observed from twin-engine aircraft over the Baltimore/Washington, D.C. region with eastern China. The case study from the University of Maryland's Regional Atmospheric Measurement Modeling and Prediction Program (RAMMPP) occurred on August 5, 2014 over the Chesapeake Bay and nearby land. The case study in China utilized aircraft observations from the Air Chemistry Research in Asia (ARIA) campaign over the North China Plain on May 28, 2016. The first part of this project compared RAMMPP vertical profiles from a spiral over the Bay with nearby land measurements on August 5, 2014. Results show comparable trace gas concentrations and aerosol scattering over the Bay and land, except for carbon monoxide, which displays higher carbon monoxide mixing ratios at all altitudes over the Bay. The second part of this work evaluated vertical profiles over two different spiral locations in the North China Plain. The aircraft observations from ARIA on May 28, 2016 in Hebei Province indicate an ozone episode with concentrations approximately 90 ppbv for the majority of the flight. Comparison of aircraft spirals over two different locations in Hebei show higher trace gas species and scattering at low altitudes (below 1500 meters) over Xingtai than Julu, but comparable concentrations aloft. However, the flight from ARIA displayed higher concentrations of sulfur dioxide, nitrogen dioxide, ozone, and carbon monoxide than the RAMMPP case study. Further work will continue to compare ozone precursor species from RAMMPP and ARIA.