

The Alpha Jet Atmospheric EXperiment (AJAX): Three Years of Airborne Ozone and Greenhouse Gas Measurements Over California and Nevada

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The AJAX is an on-going project that has been measuring ozone, carbon dioxide and methane up to 8000 m since January 2011. The project goals are to study photochemical ozone production and investigate the impact of extreme events on western U.S. air quality. Regular missions include flights to Railroad Valley (RRV) in Nevada, onshore-offshore flights in California, and flights to investigate local emissions.

Monthly RRV flights sample vertical ozone profiles over RRV for comparison with Nevada Rural Ozone Initiative surface ozone sites. Airborne measurements aid identification of local and long-range pollution, and correlations between the RRV ozone profile and surface ozone sites highlight the effects of vertical transport within Nevada's complex terrain. Onshore-offshore flights provide a direct assessment of photochemical ozone production and vertical transport above the San Joaquin Valley (SJV), while correlations between the offshore profile and SJV ozone surface sites gives information on transport mechanisms. These flights have identified stratospheric ozone laminae and with modeling efforts have been used to identify ozone standard exceedances resulting from stratosphere-to-troposphere transport (see Figure 1 (right)). The AJAX project is uniquely flexible to incorporate specialized flights with limited planning notice (e.g. sampling emissions from the Yosemite Rim fire). Elevated ozone was observed within the fire plume, yet data from surface sites show no ozone exceedances, shedding light on the plume chemistry which would otherwise not be identified. Future plans include expanding the altitude capability of AJAX through the addition of AirCore for enhanced satellite and model validation.

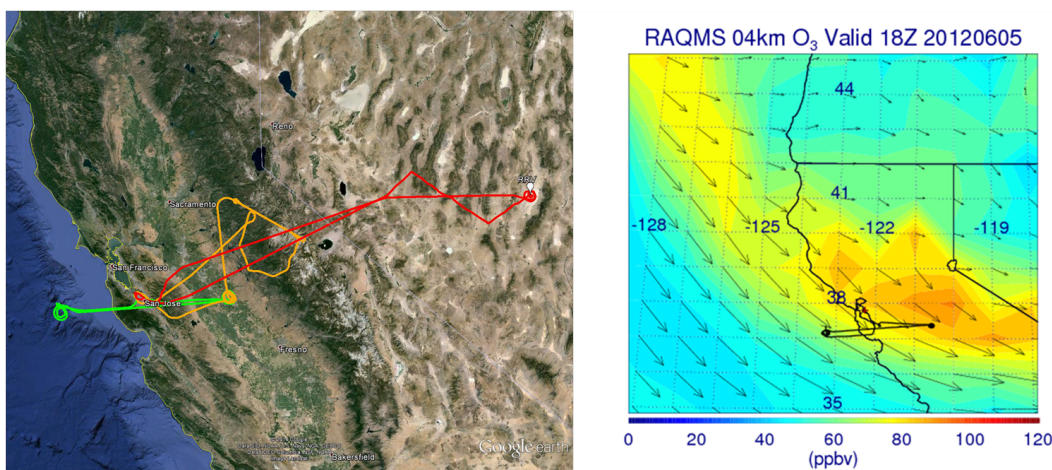


Figure 1. AJAX flight tracks on GoogleTM Earth: Railroad Valley, NV (red), onshore-offshore (green), Yosemite Rim Fire (yellow) (left plot). 4 km O₃ and wind vector map on 5 June 2012 at 1800 UTC from the Realtime Air Quality Modelling System (RAQMS) analyses; the aircraft flight track is shown in black (right plot).