

IMPROVED UNDERSTANDING OF THE MAGNITUDE OF TRANS-PACIFIC LONG RANGE TRANSPORTED OZONE ALOFT AT CALIFORNIA'S COAST

I. OBJECTIVE

The objective of this project is to collect upper air ozone data at two sites on the California coast to aid in State Implementation Plan air quality modeling for the State. The project will collect a vertical snapshot of ozone concentrations on a near daily basis, for four months in the late spring and summer. ARB and the scientific community will benefit from a more complete characterization of ozone which acts as the baseline for California's ozone air quality. This knowledge is necessary for the design of effective State Implementation Plans (SIP) to attain the current and future national ambient air quality standards (NAAQS) for ozone.

II. BACKGROUND

Because health effects research has consistently led to more stringent ambient air quality standards for ozone, California must continue to achieve significant new reductions in ozone precursor emissions. The SIP planning process must demonstrate how ground-level ambient ozone will be reduced over time to levels below the health-based standards. At the same time, baseline ozone concentrations have been increasing. Intermittent field studies have documented instances of elevated ozone concentrations aloft (associated with global, regional, and local sources) that could potentially be relevant to ground level exceedances. There have been limited, episodic campaigns of instrumented aircraft flights sponsored by federal, state, and regional groups (e.g., the National Oceanic and Atmospheric Administration [NOAA], the National Aeronautics and Space Administration [NASA], the San Joaquin Valley Air Pollution Control District, the ARB) as well as weekly ozonesonde launches on the north coast of the State (sponsored by NOAA) to investigate ozone events and processes. But these isolated efforts do not provide sufficient information to fully understand the spatial and temporal variations in baseline ozone concentrations entering California. Modeling exercises focused on the contributions of long-range transport and the stratosphere to ozone in the western United States (including California) have been conducted. However, these photochemical models rely on atmospheric boundary conditions specified by coarse resolution global models that have not performed well historically in California due to its complex terrain and meteorology. To better understand the contributions of the external pollution sources and atmospheric processes to high surface ozone concentrations in the State, a routine monitoring program is needed to document incoming layers of ozone aloft from the Pacific Ocean. The data and information collected in this project will help to validate and improve the atmospheric boundary conditions used in the ozone SIP modeling. This research project is a necessary first step toward understanding the difficult policy relevant question of what is the contribution of Pacific long-range transported ozone to surface sites in the state. Additional surface and upper air ozone measurements in specific locations of interest will be needed to estimate the contribution of long-range transported ozone aloft to surface ozone at a surface site.

III. SCOPE OF WORK

To better quantify the magnitude, and the spatial and temporal variations in baseline ozone concentrations entering California, particularly on high ozone days in the San Joaquin Valley, ozonesondes would be launched six times a week during the late spring and summer from two coastal sites. Potential tasks include:

- Review and synthesize the available data and modeling results to identify any critical gaps that can be filled with an ozonesonde deployment.
- Launch ozonesondes from two coastal sites once a day to collect the vertical profiles of ozone concentrations. The data will be processed and fully screened and validated for quality assurance (QA) and quality control. Draft data will be submitted to ARB on a monthly basis. The full QAed data base will be submitted to ARB at the end of the deployment.
- Prepare and submit a final report to ARB for approval.

IV. DELIVERABLES

- Quarterly progress reports and conference calls;
- Draft final report;
- Peer-reviewed publication(s), as appropriate;
- Final report and research seminar in Sacramento;
- All data and analyses generated through the course of this project;
- Additional deliverables to be determined in consultation with ARB staff.

V. TIMELINE

It is anticipated this project will be completed in 36 months from the start date. This schedule allows 30 months for the completion of all work through delivery of a draft final report; the last 6 months are for ARB review of the draft final report and the delivery of a revised final report and data files to ARB. The estimated budget for this project is \$400,000.