State of California
AIR RESOURCES BOARD

Spatial Variation of Vertical Ozone Distribution over California

RESEARCH PROPOSAL

Resolution 17-36

October 26, 2017

Agenda Item No.: 17-10-3

WHEREAS, the California Air Resources Board (CARB or Board) has been directed to carry out an effective research program in conjunction with its efforts to combat air pollution, pursuant to Health and Safety Code sections 39700 through 39705;

WHEREAS, a research proposal number 2812-287, titled "Spatial Variation of Vertical Ozone Distribution over California," has been submitted by the National Aeronautics and Space Administration's (NASA) Ames Research Center for a total amount not to exceed $65,548;

WHEREAS, the Research Division staff have reviewed Proposal Number 2812-287 and finds that in accordance with Health and Safety Code section 39701, the results of this study will help CARB determine how atmospheric ozone (O_3) transport impacts ground-level O_3, especially on days when the O_3 concentrations exceed the National Ambient Air Quality Standard in the San Joaquin Valley, and will improve the representation of the horizontal and the vertical transport of baseline O_3 in air quality models used to develop the State Implementation Plans; and

WHEREAS, in accordance with Health and Safety Code section 39705, the Research Screening Committee has reviewed and recommends funding the Research Proposal.

NOW, THEREFORE BE IT RESOLVED, that CARB, pursuant to the authority granted by Health and Safety Code sections 39700 through 39705, hereby accepts the recommendations of the Research Screening Committee and staff and approves the Research Proposal.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the Research Proposal as further described in Attachment A, in an amount not to exceed $65,548.

I hereby certify that the above is a true and correct copy of Resolution 17-36 as adopted by the California Air Resources Board.

Rana McReynolds, Clerk of the Board

Resolution 17-36

October 26, 2017

Identification of Attachments to Board Resolution 17-36

Attachment A: "Spatial Variation of Vertical Ozone Distribution over California" Summary and Budget Summary

ATTACHMENT A

"Spatial Variation of Vertical Ozone Distribution over California"

Background

The San Joaquin Valley (SJV) is classified as an extreme ozone (O_3) nonattainment area for the 8-hour O_3 NAAQS. To attain the NAAQS, it is important to understand how various sources in the SJV contribute to the high O_3 concentrations. Recent field studies and modeling work suggest that baseline O_3 over California may be increasing and it may contribute to O_3 exceedances in the SJV under certain meteorological conditions. However, there is a lack of direct and continuous measurements of the O_3 vertical profiles in the SJV which are needed to better characterize the evolution of O_3 layers aloft and understand how they may impact the ground-level O_3 concentrations. The California Baseline Ozone Transport Study (CABOTS) was conducted during the spring and summer of 2016 to address this knowledge gap.

The Alpha Jet Atmospheric eXperiment (AJAX) airborne science project, based out of NASA Ames Research Center, performed eight science flights in coordination with the CABOTS campaign. AJAX measured O_3, carbon dioxide (CO_2), methane (CH_4), water vapor (H_2O), and 3-dimensional winds during each flight. AJAX flights also connected the fixed-location measurements at Visalia (TOPAZ O_3 lidar) and Bodega Bay (ozonesondes). Analyses of these flights will investigate the correlation between the horizontal and the vertical profiles of air pollutants measured offshore and in the SJV. Vertical profiles, time series, back trajectories, tracer-tracer correlations, and comparisons with the fixed-location measurements will be utilized to identify the sources of O_3 features observed during these flights and to assess the overall impact of baseline O_3 on surface locations in the SJV.

Objective

The objective of this project is to calibrate, finalize, and analyze the in-situ trace gas and related atmospheric data collected by the NASA AJAX group during the CABOTS of 2016. This project will support the data analysis conducted by the CABOTS team and the CARB staff to develop a better understand the atmospheric transport of baseline O_3 and determine how it affects ground-level O_3 concentrations in the SJV.

Methods

The proposed work will finalize the in-situ trace gas data collected by the NASA AJAX group during CABOTS through calibrations and extensive data quality assessment. Once finalized, this airborne data will be analyzed in the context of other (sonde, lidar, and surface O_3) measurements made during the CABOTS campaign. The vertical profiles of O_3 along north-south and west-east transects will be compared.

Expected Results
The analysis of multiple near-simultaneous vertical profiles (flights had a duration of approximately 2 hours each) will improve our understanding of the dynamic mechanisms that transport baseline O_3 from the Pacific and into the SJV, and determine how it influences ground-level O_3 concentrations. The results of this study will improve the air quality models currently used in the development of the SIPs and will contribute to regulatory policies addressing O_3 attainment in the SJV.

Significance to the Board
The results of this project will help CARB determine how atmospheric O_3 transport impacts ground-level O_3, especially on days when the O_3 concentrations exceed the NAAQS in the SJV. The information can help evaluate and improve the representation of the horizontal and the vertical transport of baseline O_3 in the air quality and meteorological models used to develop the SIPs.

Contractor:
NASA Ames Research Center

Contract Period:
24 months

Principal Investigator (PI):
Laura Iraci, Ph.D.

Contract Amount:
$65,548

Basis for Indirect Cost Rate:
The State and NASA have agreed to a 13.4 percent indirect cost rate.

Past Experience with this Principal Investigator:
Dr. Laura Iraci is the Principal Investigator of the NASA AJAX team. She has special expertise and extensive experience in processing and analyzing the data collected by the NASA Alpha Jet.

Prior Research Division Funding to the National Aeronautics and Space Administration:

Year	2016	2015	2014
Funding	$ 0	$ 101,281	$ 0

BUDGET SUMMARY

Contractor: NASA Ames Research Center

"Spatial Variation of Vertical Ozone Distribution over California"

DIRECT COSTS AND BENEFITS					
1.	Labor and Employee Fringe Benefits	$	15,842		
2.	Subcontractors	$	25,415		
3.	Equipment	$	0		
4.	Travel and Subsistence	$	352		
5.	Electronic Data Processing	$	6,175[1]		
6.	Reproduction/Publication	$	0		
7.	Mail and Phone	$	30		
8.	Supplies	$	150		
9.	Analyses	$	0		
10.	Miscellaneous	$	9839		
	Total Direct Costs			$	57,803
INDIRECT COSTS					
1.	Overhead	$	7,746		
2.	General and Administrative Expenses	$	0		
3.	Other Indirect Costs	$	0		
4.	Fee or Profit	$	0		
	Total Indirect Costs			$	7,746
TOTAL PROJECT COSTS				**$**	**65,548**

[1]Desktop computers at NASA Ames Research Center must be maintained to federal IT security standards, and a user fee is imposed for these services. The license renewal cost for IDL software (Excelis) is estimated based on recent cost and annual rate of change for a NASA-bundled subscription seat. IDL will be utilized to apply calibration factors and to implement quality assurance screening. IDL is required to allow for cost-effective re-use of existing software routines.

ATTACHMENT 1

S U B C O N T R A C T O R S' B U D G E T S U M M A R Y

Subcontractor: Bay Area Environmental Research Institute

Description of subcontractor's responsibility: The subcontractor will work with the PI to finalize the AJAX data, investigate the chemical composition of the multiple air masses sampled, and explore the meteorological data captured by AJAX during CABOTS.

DIRECT COSTS AND BENEFITS					
1.	Labor and Employee Fringe Benefits	$	21,197		
2.	Subcontractors	$	0		
3.	Equipment	$	0		
4.	Travel and Subsistence	$	0		
5.	Electronic Data Processing	$	0		
6.	Reproduction/Publication	$	0		
7.	Mail and Phone	$	0		
8.	Supplies	$	0		
9.	Analyses	$	0		
10.	Miscellaneous	$	0		
	Total Direct Costs			$	21,197
INDIRECT COSTS					
1.	Overhead	$	4,218		
2.	General and Administrative Expenses	$	0		
3.	Other Indirect Costs	$	0		
4.	Fee or Profit	$	0		
	Total Indirect Costs			$	4,218
TOTAL PROJECT COSTS				**$**	**25,415**