

State of California
AIR RESOURCES BOARD

RESEARCH PROPOSAL

Resolution 09-62

December 9, 2009

Agenda Item No.: 09-10-1

WHEREAS, the Air Resources 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 2689-265, entitled "Three-Dimensional Measurements of Aerosol Mixing State During CalNex Using Aircraft Aerosol Time-of-Flight Mass Spectrometry," has been submitted by the University of California, San Diego;

WHEREAS, the Research Division staff has reviewed and recommended this proposal for approval; and

WHEREAS, the Research Screening Committee has reviewed and recommends for funding:

Proposal Number 2689-265, entitled "Three-Dimensional Measurements of Aerosol Mixing State During CalNex Using Aircraft Aerosol Time-of-Flight Mass Spectrometry," has been submitted by the University of California, San Diego, for a total amount not to exceed \$400,000.

NOW, THEREFORE, BE IT RESOLVED that the Air Resources Board, pursuant to the authority granted by Health and Safety Code section 39703, hereby accepts the recommendation of the Research Screening Committee and approves the following:

Proposal Number 2689-265, entitled "Three-Dimensional Measurements of Aerosol Mixing State During CalNex Using Aircraft Aerosol Time-of-Flight Mass Spectrometry," has been submitted by the University of California, San Diego, for a total amount not to exceed \$400,000.

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 effort proposed herein, and as described in Attachment A, in an amount not to exceed \$400,000.

I hereby certify that the above is a true and correct copy of Resolution 09-62, as adopted by the Air Resources Board.


Lori Andreoni, Clerk of the Board

ATTACHMENT A**“Three-Dimensional Measurements of Aerosol Mixing State During CalNex Using Aircraft Aerosol Time-of-Flight Mass Spectrometry”****Background**

Particles in the atmosphere impact human health and climate, the former by inhalation, and the latter primarily by modifying radiative transfer in the atmosphere. Climate effects are modulated by particle concentration, chemical composition, size distribution, dry air light scattering by particles, the interaction between clouds and particles (“cloud brightening”), and by light absorption by particles. Unlike health effects, which are similar wherever the particles are inhaled, the location of the particles in the atmospheric column can modify the climate effects.

Objective

This project will help meet one of the goals of the CalNex program, which is examining both air quality and climate effects of air pollution over California. This project will conduct detailed measurements of the properties of individual particles as encountered by an aircraft. This will be the first time that these types of measurements will be made from an aircraft in California. The Addition of this project to CalNex will significantly enhance efforts to characterize the effects of particles on air quality and climate in California.

Methods

This study will conduct time-, size-, and chemical composition- resolved particle measurements using single-particle aerosol time-of-flight mass spectrometry (ATOFMS) aboard two third-party measurement platforms participating in CalNex, an aircraft operated by Center for Interdisciplinary Remotely-Piloted Aircraft Studies under the direction of Professor John Seinfeld of Caltech, and an oceanographic ship operated by the National Oceanic and Atmospheric Administration (NOAA) under the direction of Dr. Patricia Quinn of NOAA. In both cases, the motivation for adding particle characterization is to both directly observe particle composition, and to provide measurement support to interpretation of other instruments, including particle physical measurements and gas-phase observations already planned for these platforms.

Expected Results

There are two primary scientific targets of the ATOFMS sampling. The first is to determine the vertical variation of aerosol composition and aerosol optical characteristics over California for comparison with models and observations from other regions and to interpret the role of aerosols in climate processes. The second is to use the detailed aerosol data to characterize the chemical history of air masses encountered during sampling in order to identify pollutant sources and to observe the effects of aging on their physical and chemical states.

Significance to the Board

Aerosols exert strong influence on climate, either exacerbating or counteracting the effects of greenhouse gases, depending on their chemical composition and physical characteristics. Aerosols also have adverse health effects which need to be controlled. The data collected in this study will support both ARB's climate and health effects programs by clarifying the sources and effects of airborne particles over the state.

Contractor:

Scripps Institution of Oceanography, University of California, San Diego (UCSD)

Contract Period:

24 months.

Principal Investigator (PI):

Professor Kimberly Prather

Contract Amount:

\$400,000

Cofunding:

The proposed project is an ARB contribution to CalNex 2010, which is a collaborative study with the National Oceanic and Atmospheric Administration (NOAA) to address scientific questions which bear upon the ability to formulate policy related to mitigation of air pollution and climate change. NOAA is contributing resources and direct funding to CalNex conservatively estimated at \$15,000,000. The NOAA contributions include a dedicated research vessel and multiple research aircraft, ground support, planning, and direct funding of contracted measurements.

Basis for Indirect Cost Rate:

The State and the UC system have agreed to a ten percent indirect cost rate.

Past Experience with this Principal Investigator:

ARB has successfully worked with Professor Prather since the mid-1990s. The ATOFMS instruments to be used in this study and data analysis techniques for dealing with the very large data sets they produce have been largely developed under a series of contracts between ARB and Professor Prather. In addition, Professor Prather has participated in multiple field projects with ARB, including SCOS97, the Riverside Organic Aerosol Study (SOAR), and studies of roadway emissions in Southern California.

Prior Research Division Funding to UCSD:

Year	2008	2007	2006
Funding	\$591,261	\$194,304	\$174,998

BUDGET SUMMARY

Contractor: Scripps Institution of Oceanography, University of California, San Diego

Three-Dimensional Measurements of Aerosol Mixing State During CalNex Using Aircraft
Aerosol Time-of-Flight Mass Spectrometry

DIRECT COSTS AND BENEFITS

1.	Labor and Employee Fringe Benefits	\$ 145,841
2.	Subcontractors	\$ 0
3.	Equipment	\$ 99,750 ¹
4.	Travel and Subsistence	\$ 23,240
5.	Electronic Data Processing	\$ 0
6.	Reproduction/Publication	\$ 0
7.	Mail and Phone	\$ 641
8.	Supplies	\$ 68,925 ²
9.	Analyses	\$ 0
10.	Miscellaneous	<u>\$ 36,737</u>
Total Direct Costs		\$375,135

INDIRECT COSTS

1.	Overhead	\$ 24,865
2.	General and Administrative Expenses	\$ 0
3.	Other Indirect Costs	\$ 0
4.	Fee or Profit	<u>\$ 0</u>
Total Indirect Costs		\$24,865

TOTAL PROJECT COSTS

\$400,000

^{1,2} New components and backup parts for airborne and ship ATOFMS operations. ATOFMS are hand-built instruments for which spare parts are not commercially available on an "as needed" basis, thus reliable field operations require redundant major components (pumps, lasers, etc.) be kept on hand.