

An Airborne Particulate Monitor for Spacecraft, Phase II Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)



ABSTRACT

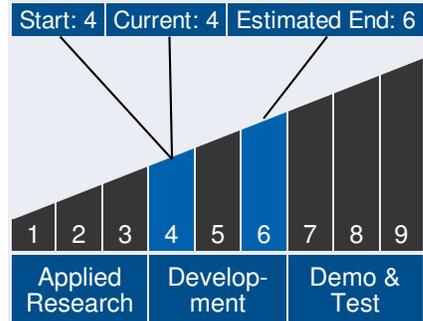
A compact instrument will be developed to provide long-term monitoring of the number concentration and approximate size of airborne particles in microgravity environments such as found aboard spacecraft cabins. Particles as small as 10 nm will be detected by a self-sustaining, tippable, water-based condensation particle counter. This will be coupled to an optical sizing instrument to provide particle concentration and approximate sizing from 10 nm to >20 micrometers. Knowledge of the concentration and size of airborne particles on manned spacecraft is needed to assess environment to which astronauts are exposed, and to provide early warning of on-board fire. Especially important are those in the submicrometer size range. Yet to date there is no zero-gravity technique for long-term monitoring these fine particles at the low concentrations generally present. Our innovation, a tippable, self-sustaining, water-based condensation particle counter, will provide this measurement. Individual particles as small as 10nm are detected through condensational enlargement to form optically detectable droplets. Unlike other condensational methods all liquid water required for measurement is contained within, and recaptured by, the wick of the instrument. All water transport is by capillary action, and thus enabling operation at zero gravity. Combined with ultrafine particle precut, and standard optical particle counting and sizing for larger particles, this instrument system will provide particle number concentration and approximate sizing from 10 nm to above 20 micrometers.



Table of Contents

- Abstract 1
- Anticipated Benefits 1
- Technology Maturity 1
- Management Team 1
- U.S. Work Locations and Key Partners 2
- Technology Areas 2
- Image Gallery 3
- Details for Technology 1 3

Technology Maturity



ANTICIPATED BENEFITS

To NASA funded missions:

Potential NASA Commercial Applications: NASA could use this instrument to monitor airborne particle concentrations aboard the International Space Station or other manned spacecraft. Such data are needed (1) to establish the levels and sources of airborne particulate to which crew are exposed, and (2) to

Management Team

Program Executives:

- Joseph Grant
- Laguduva Kubendran

Program Manager:

- Carlos Torrez

Continued on following page.

An Airborne Particulate Monitor for Spacecraft, Phase II Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)

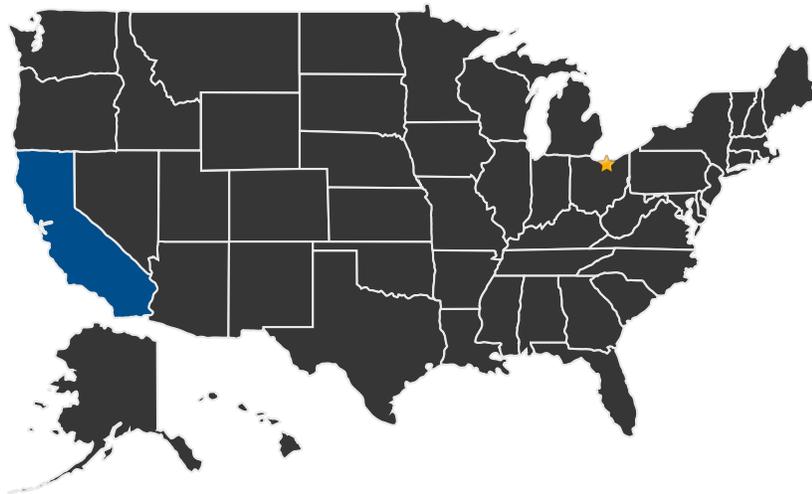


provide a signature of background levels to enable earlier detection of smoke particles from fires.

To the commercial space industry:

Potential Non-NASA Commercial Applications: This instrument would be uniquely suitable for measuring concentrations on moving platforms, inside aircraft, on school buses, or in indoor environments such as offices and schools. It would be used for community monitoring networks, and by aerosol research laboratories as a handy, non-toxic measurement.

U.S. WORK LOCATIONS AND KEY PARTNERS



■ U.S. States
With Work

★ **Lead Center:**
Glenn Research Center

Other Organizations Performing Work:

- Aerosol Dynamics, Inc. (Berkeley, CA)

PROJECT LIBRARY

Management Team (cont.)

Principal Investigator:

- Susanne Hering

Technology Areas

Primary Technology Area:

Human Health, Life Support, and Habitation Systems (TA 6)

- └ Environmental Monitoring, Safety, and Emergency Response (TA 6.4)
 - └ Sensors: Air, Water, Microbial, and Acoustic (TA 6.4.1)

An Airborne Particulate Monitor for Spacecraft, Phase II Project

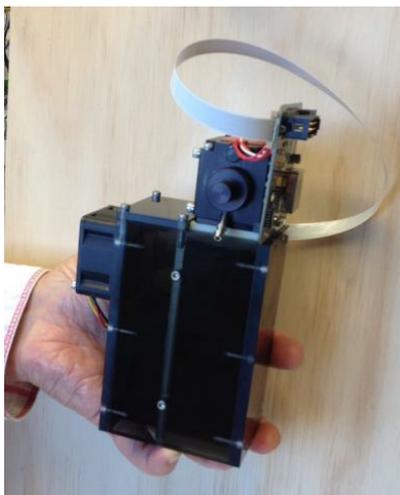
SBIR/STTR Programs | Space Technology Mission Directorate (STMD)



Presentations

- Briefing Chart
 - (<http://techport.nasa.gov:80/file/23173>)

IMAGE GALLERY



An Airborne Particulate Monitor for Spacecraft, Phase II

DETAILS FOR TECHNOLOGY 1

Technology Title

An Airborne Particulate Monitor for Spacecraft, Phase II

Potential Applications

NASA could use this instrument to monitor airborne particle concentrations aboard the International Space Station or other manned spacecraft. Such data are needed (1) to establish the levels and sources of airborne particulate to which crew are exposed, and (2) to provide a signature of background levels to enable earlier detection of smoke particles from fires.