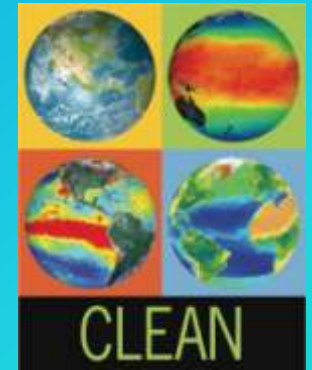




# Meaningful Student-Teacher-Scientist Partnerships



Tamara Shapiro Ledley  
TERC  
Cambridge, Massachusetts



## Climate Literacy Network

Working Towards a Sustainable Future



# Successful Student-Teacher Scientist Partnership: All Involved Benefit

- Scientist sees advantage of having students participate in project
- Students see they are contributing
- Teachers see their students will gain skills and content knowledge

# 10 Major Issues To Be Addressed

- What is the scientific research question?
- What data will the students work with?
- How is data quality checked and controlled?

# 10 Major Issues To Be Addressed

- Are there requirements for participating schools?
- What research tools are needed and what protocols will students and teachers follow?
- What are the logistical issues that need to be addressed?

# 10 Major Issues To Be Addressed

- What background information do the students and teachers need?
- What training is needed for teachers, students, and scientists?

# 10 Major Issues To Be Addressed

- What additional research questions can students developed?
- What are the opportunities for recognizing students and teachers contributions?



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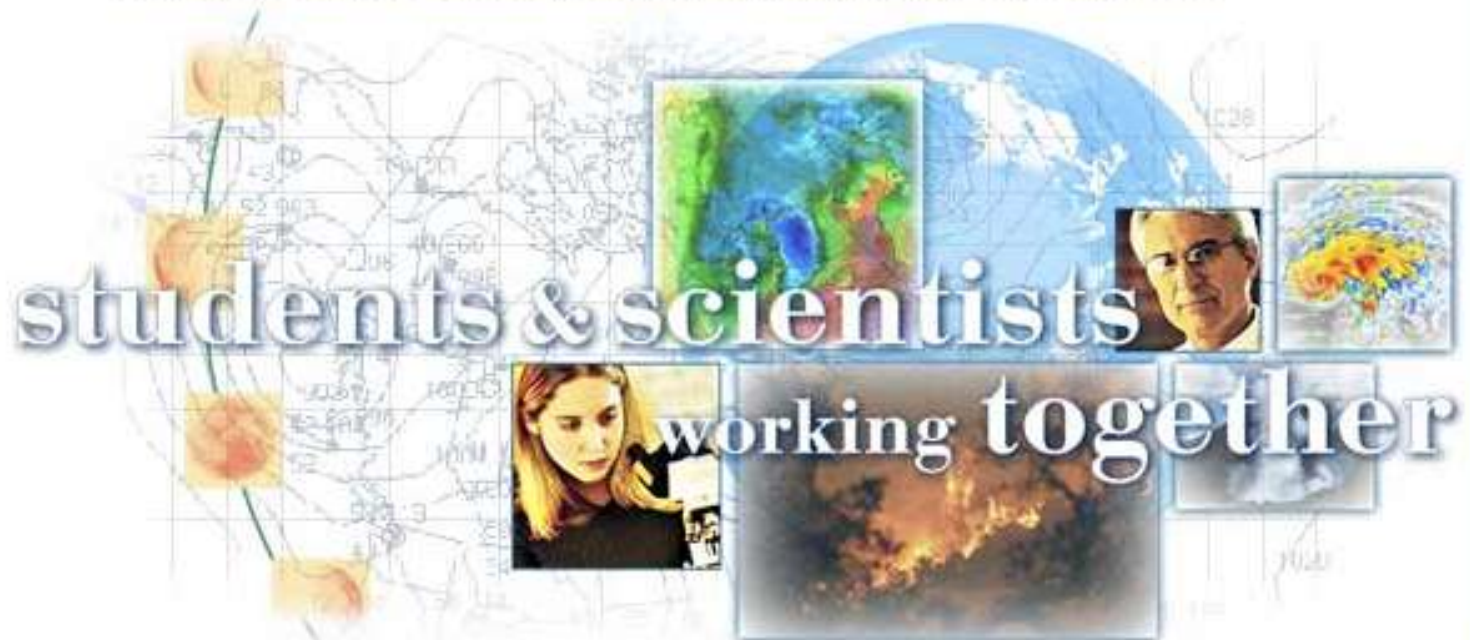
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**ESSN**  
Earth System Scientist Network

**"For students to develop the abilities that characterize science as inquiry, they must actively participate in scientific investigations, and they must actually use the cognitive and manipulative skills associated with the formulation of scientific explanations."**

*....National Science Education Standards; National Academy Press; 1996*



<http://cesse.terc.edu/essn>

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## Projects

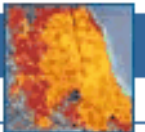
### ▶ Atmospheric Aerosols: Collecting and Correlating Data

Dr. David Brooks—Drexel University, Philadelphia, PA



### ▶ Urban Growth: Using Images Taken From Orbit to Monitor Change

Dr. Julie Robinson—Johnson Space Center, Houston, TX



### ▶ The Arctic: Sensing Change in a Fragile Environment

Dr. Josefino Comiso—Goddard Space Flight Center, Greenbelt, MD





**Project: Atmospheric Aerosols: Collecting and Correlating Data**

▼ Information for Applicants

▶ Introduction

▶ Requirements &amp; Benefits

▶ Communications

▶ Research Options

▶ Data Collection

▶ Data Analysis

▶ Reporting

▶ Resources for Participants

## Introduction

Atmospheric aerosols are tiny liquid or solid particles that are suspended in the atmosphere. Individual particles are too small to be visible, but together they give the air a hazy appearance. These aerosols can influence weather and climate by reducing the amount of sunlight that reaches Earth's surface. They can also affect the health of humans and all living organisms.

Dr. David Brooks has been conducting research to learn more about how the concentration of atmospheric aerosols varies in time and space, and how those variations may be related to other changes on the planet.

In support of Dr. Brooks' research, students participating in the aerosol project will use a sun photometer to take daily measurements of atmospheric aerosols and send the data they collect to Dr. Brooks. They will also work in collaboration with Dr. Brooks and his colleagues as they conduct their own research, exploring the relationship between aerosols and other local atmospheric variables such as humidity or the air quality index.

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USGS Photo by M.P. Doukas

Particles from volcanic eruptions can spread around the world.

## Project: **Atmospheric Aerosols: Collecting and Correlating Data**

▶ Information for Applicants

▼ Resources for Participants

▶ Atmosphere, Aerosols, Health & Climate

▶ Sun Photometer

▶ Collecting Data

▶ Reporting Data

▶ Analyzing Data

▶ Reporting Your Work

### **Atmosphere, Aerosols, Health & Climate**

#### **Atmospheric Aerosols**

The atmosphere contains more than just molecules of gas (e.g., nitrogen, oxygen, etc.) . There are also small solid or liquid particles, called aerosols, suspended in the air.

[> Learn more](#)

#### **Aerosol Optical Thickness**

Aerosol optical thickness is a measure of the extent to which small particles in the atmosphere affect the transmission of sunlight. [>Learn more](#)

#### **Air Quality Index**

The Environmental Protection Agency (EPA) monitors the air for five major pollutants and publishes a daily report called the Air Quality Index. [>Learn more](#)



Atmospheric aerosols contribute to colorful sunsets.