

Ganges Valley Aerosol Experiment

In northeastern India, the fertile land around the Ganges River supports several hundred million people. This river, the largest in India, is fed by monsoon rains and runoff from the nearby Himalayan Mountains. Through an intergovernmental agreement with India, the U.S. Department of Energy's Atmospheric Radiation Measurement (ARM) Climate Research Facility deployed its portable laboratory, the ARM Mobile Facility (AMF), to Nainital, India, in June 2011. During its nine-month deployment for the Ganges Valley Aerosol Experiment (GVAX), the mobile facility will measure the characteristics of particles in the atmosphere—called aerosols—that may be affecting the monsoons that feed the Ganges.

Instruments with the AMF will obtain various measurements of aerosols, such as what they are made of, how big they are, and how they change over time. Combined with data from existing ground stations operated elsewhere on the subcontinent, the measurements will show how aerosols absorb or reflect sunlight and can be used to determine how clouds are affected by high concentrations of pollutants.



The ARM Mobile Facility will gather data at Nainital in northern India.

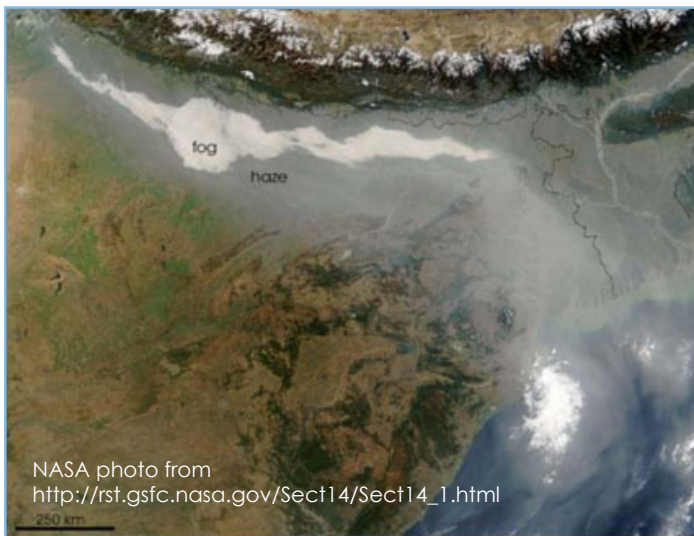
Scientific Objective

Growth in industries such as cement factories, steel mills, and the coal-fired plants that power them has added to existing regional sources of aerosols, such as agricultural burning. Tiny particles in the smoke act as hubs for water droplets and ice crystals to gather and form clouds. As these particles and clouds absorb and scatter sunlight, they change the way heat is distributed in the atmosphere.

Some studies suggest the haze over the Ganges Valley region will increase air temperature and pressure, which might draw moisture from the ocean and intensify the monsoon. Other studies indicate that the increased heat will cause clouds to dry up.

This study starts in the monsoon season and continues through the winter, when high pressure confines smoke from post-harvest field burning and increased fossil fuel use, and extends into the dry, hot season, when winds bring dust from deserts to the west. Data gathered during GVAX will be used to build more accurate computer models of changes in regional weather patterns and will assist in the development of mitigation measures in response to these changes.

GVAX website: <http://www.arm.gov/sites/amf/pgh/>



NASA photo from http://rst.gsfc.nasa.gov/Sect14/Sect14_1.html

ARM Mobile Facility

The AMF consists of shelters, instrumentation, and data and communications systems for climate studies. A full-time technician monitors and maintains the facility to assure that the best and most complete data set is acquired during each deployment. Data are collected 24 hours a day, seven days a week.

For GVAX, measurement capabilities include the standard meteorological instrumentation, broadband and spectral radiometer suite, and remote sensing instruments.

- Aerosol Observing System
- Cimel Sunphotometer
- Microwave Radiometers – baseline, profiler, 3-channel, and narrow field-of-view
- Balloon-Borne Sounding System – sondes launched each day at regular intervals
- Micropulse Lidar
- Doppler Lidar
- Total Sky Imager
- Laser Ceilometer
- Cloud Radar – W-band vertical-pointing
- Atmospheric Emitted Radiance Interferometer
- Sky Radiation System – a collection of radiometers to measure visible diffuse, global, and direct visible and infrared solar radiation
- Ground Radiation System – a collection of radiometers to measure visible and infrared radiation coming from the ground
- Solar Array Spectroradiometer – hemispheric and zenith
- Radar Wind Profiler
- Surface Meteorology Station



Operations Shelters. A minimum of two shipping containers serve as operations shelters. These structures house several instruments, as well as the computers and data systems. They also provide space for a small workshop, office, and spare parts storage.

Data and Communication System. Continuous measurements obtained by the sensors and instruments are collected by computers in the operations shelters. These data are routinely checked for quality and transmitted to the ARM Data Archive for storage and availability to the scientific community.

Using the ARM Mobile Facility. The AMF is available to collaborate with experiments (especially those involving aircraft) from other agencies. It also can accommodate other instruments in addition to, or in place of, the baseline collection. Organizations interested in using the AMF are encouraged to submit proposals at www.arm.gov/campaigns/propose.

Sponsor

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