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CLIMATE, ATMOSPHERIC SCIENCE, AND PHYSICAL OCEANOGRAPHY



UP IN THE AIR – PUTTING AEROSOL TRACKING TOOLS TO THE TEST

*How do aerosols impact clouds and precipitation?
What can this tell us about climate change?*

The uncertainty of the impact of anthropogenic aerosols has proven to be one of the biggest obstacles to understanding global climate change.

Aerosols, including those emitted as air pollution, can alter the earth's energy budget and disrupt the natural processes by which rain-bearing clouds form. It is believed that increasing amounts of soot and other aerosols in the atmosphere have altered rainfall patterns in key mountain regions. They can also lead to brighter clouds which may lessen the effect of global-warming gases. Such climate impacts are still poorly understood, in part, because there are so few in-situ observations and the magnitude of these aerosol effects varies regionally.

To address these challenges, Scripps Oceanography atmospheric scientist **Greg Roberts** is developing small unmanned networks for aerosol measurements. These networks are the future of in-situ atmospheric observations because they will dramatically increase spatial coverage, reliability, and cost-efficiency. Use of miniaturized instrumentation for autonomous unmanned aircraft and remote sites developed by Roberts are already improving scientists' understanding of the earth's atmosphere.

Roberts is also leading efforts to directly measure the chemistry of cloud-active particles by coupling nascent technologies developed at Scripps Oceanography and Colorado State University. This collaborative effort will help determine the sources of cloud condensation nuclei using chemical tracers during a field project that studied precipitation in California's Sierra Nevada Mountains.

In order to advance their aerosol research, Greg Roberts and his science team require modern equipment for analysis and fieldwork:



WISH LIST

Multi-channel analyzer **\$4,500**

Used for analysis and calibration of optical particle counters developed for cloud condensation nuclei instruments.

Mixed signal oscilloscope **\$7,000**

Electronic test equipment that allows multiple signal voltages to be viewed and analyzed.

Environment test chamber **\$17,000**

A tabletop environment chamber with precise temperature and humidity control for calibrating and testing instrumentation before field experiments.

Spectrum analyzer **\$19,000**

Device used to examine the spectral composition of electromagnetic radiation—especially important for deploying instrumentation in unmanned aircraft.

Securing donations to support Scripps students remains an ongoing priority.

