Tropospheric Aerosol Radiative Forcing Observational Experiment (TARFOX)

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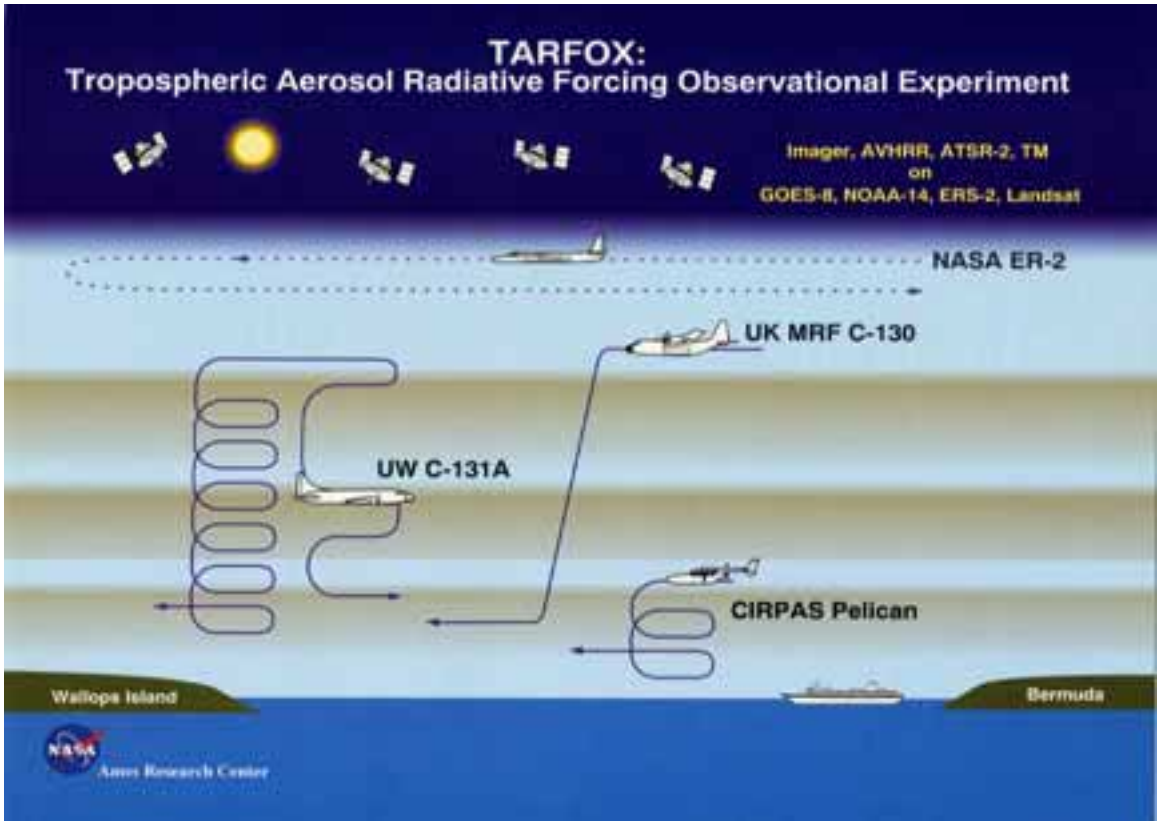
Aerosols (particles suspended in the atmosphere) can affect the climate by changing the way sunlight is scattered and absorbed and also by changing cloud properties. Lack of knowledge about global aerosol properties and effects is now a major source of uncertainty in predicting the future climate. As a result, the International Global Atmospheric Chemistry Program has established a Focus on Atmospheric Aerosols (IGAC/FAA) and endorsed a series of aerosol field campaigns. The Tropospheric Aerosol Radiative Forcing Observational Experiment (TARFOX) is the second in the IGAC/FAA series. TARFOX studies aerosol properties and effects in the US eastern seaboard, where one of the world's major plumes of industrial haze (symbolized by the dark bands in the figure on the reverse) moves from the continent over the Atlantic Ocean.

The TARFOX Intensive Field Campaign (IFC) was conducted July 10-31, 1996. It measured aerosol effects on radiation fields and simultaneously measured the properties of the aerosols causing those effects. Coordinated measurements were made from four satellites, four aircraft, land sites, and ships. Conditions examined ranged from relatively clean to moderately polluted. Aircraft flights were designed to sample the pollution in the multiple haze layers. Aerosol gradients were sampled to help separate aerosol effects from other radiative effects. This also strengthened tests of closure (i.e, consistency) among different measurement and calculation techniques.

A wide variety of closure tests were performed. The results of those tests will be used to assess and reduce uncertainties in estimates of aerosol climate effects, as well as to guide future field programs. An important subset of the closure studies is the testing and improvement of algorithms used to derive aerosol properties and radiative effects from satellite measurements. The resulting validated algorithms will permit extensions of the TARFOX results to other times and locations that have aerosol properties similar to those of the TARFOX IFC.

TARFOX data analyses will continue for several years. However, initial analyses have already yielded the first airborne measurements of aerosol radiative forcing of climate by the US Atlantic plume, the first closure studies of this forcing, and the first chemical apportionment of the optical depth there. In contrast to most previous studies, which have assumed that sulfates are the main cause of urban aerosol radiative effects, the TARFOX measurements suggest that carbonaceous aerosols (which have both natural and anthropogenic sources) may be at least as important as sulfate. More information is available on the TARFOX World Wide Web site, http://geo.arc.nasa.gov/sgg/tarfox/ and will appear in an accompanying brochure insert on TARFOX results.

COLLABORATORS: NASA Goddard and Langley, NOAA, Lawrence Berkeley National Laboratory, University of Washington, Naval Postgraduate School, University of Miami, UK Meteorological Research Flight, and University of Science and Technology of Lille (France).


TARFOX:
Tropospheric Aerosol Radiative Forcing Observational Experiment
Imager, AVHRR, ATSR-2, TM
on
GOES-8, NOAA-14, ERS-2, Landsat
NASA ER-2
UK MRF C-130
UW C-131A
CIRPAS Pelican
Wallops Island
Bermuda
Ames Research Center