

NASA flights seek to improve view of air pollution from space

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(PhysOrg.com) -- Two NASA research airplanes will fly over the Baltimore-Washington region and northeast Maryland this summer as part of a mission to enhance the capability of satellites to measure ground-level air quality from space.

The campaign is called DISCOVER-AQ, which stands for Deriving Information on Surface conditions from Column and Vertically Resolved Observations Relevant to Air Quality. It is one of the five Earth Venture class of investigations selected last year as part of NASA's Earth System Science Pathfinder program. These targeted science investigations complement NASA's larger research missions.

A fundamental challenge for spaceborne instruments monitoring air quality is to distinguish between pollution high in the atmosphere and pollution near the surface where people live. The new NASA field campaign will make measurements from aircraft in combination with ground-based observation sites to help scientists better understand how to observe ground-level pollution from space in the future.

"What we're trying to do with DISCOVER-AQ is to fill the [knowledge gap](#) that limits our ability to monitor [air pollution](#) with satellites," said James Crawford, the mission's principal investigator at NASA's Langley Research Center in Hampton, Va.

Since many countries, including the United States, have large gaps in ground-based networks of air pollution monitors, experts look to

satellites to provide a more complete geographic perspective on the distribution of pollutants.

A fleet of Earth-observing satellites, called the Afternoon Constellation or "A-train" will pass over the DISCOVER-AQ study area each day in the early afternoon. The satellites' data, especially from the Aqua and Aura spacecraft, will give scientists the opportunity to compare the view from space with that from the ground and aircraft.

"The A-Train satellites have been useful in giving us a broader view of air pollution than has ever been seen," said Kenneth Pickering, DISCOVER-AQ's project scientist at NASA's Goddard Space Flight Center in Greenbelt, Md. "DISCOVER-AQ will help interpret that data to improve air-quality analysis and regional air-quality models."

Initial test flights are planned for the week of June 27, with up to 14 science flights starting as early as July 1. The P-3B, a four-engine turboprop, will carry nine instruments. The two-engine UC-12 will carry two instruments. Sampling will focus on an area extending from Beltsville, Md., to the northeastern corner of Maryland in a pattern that follows major roadway traffic corridors. The flight path passes over six ground measurement sites operated by the Maryland Department of the Environment.

NASA investigators will be joined in the air by colleagues from the National Center for Atmospheric Research, the University of California, Berkeley, and the University of Innsbruck in Austria. The 117-foot P-3B will fly low-altitude spiral profiles over the ground stations. These profiles will extend from 15,000 feet to as low as 1,000 feet from the ground. The flights will sample air along traffic corridors at low altitude between ground stations.

The smaller King Air UC-12 will collect data from as high as 26,000

feet. The plane's instruments will look down at the surface, much like a satellite instrument, and measure particulate and gaseous pollution.

The combined scientific resources are what make DISCOVER-AQ a rare opportunity for [air quality](#) researchers. "One instrument is not more important than another," said Jennifer Hains, a research statistician with the Maryland Department of the Environment in Baltimore. "The combination of all of them makes this campaign valuable."

Ground sites maintained by the Maryland Department of the Environment form the backbone of the surface network. These sites will be supplemented by additional instrumentation provided by NASA, the Environmental Protection Agency, Howard University, Pennsylvania State University, the University of Maryland-Baltimore County, and Millersville University in Pennsylvania.

The DISCOVER-AQ flights are the beginning of a four-year campaign that will bring NASA aircraft to Houston and other urban regions. NASA's Langley center manages the Earth System Science Pathfinder program for the agency's Science Mission Directorate in Washington.

More information: www.nasa.gov/discover-aq

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