

Research Flights Take NASA Scientists Over Gulf Oil Spill

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The Gulf oil slick is visible as a bright diagonal swath in this image taken at 28,000 feet from a camera mounted on Langley's B-200 research airplane. Credit: NASA

(PhysOrg.com) -- A team from NASA's Langley Research Center in Hampton, VA, made research flights over the Gulf of Mexico this week to help investigate potential uses of satellites for monitoring the thickness and dispersal of oil spills and the oil¹s impact on marine life.

The flights were part of a NASA-wide mobilization of its remotesensing assets to help assess and research the spread and impact of the Deepwater Horizon BP oil spill. Langley's King Air B-200, outfitted with two sensing instruments, flew Monday and Tuesday over the <u>oil</u> <u>slick</u> created by the explosion of a drilling rig nearly three weeks ago.



Data gathered during the flights will underpin a new effort to use satellite data to enhance monitoring and detection of oil spills. Other measurements taken during the flights could be used to observe the <u>ecological impact</u> of the oil spill by observing the density of phytoplankton - critical in the marine food chain - in Gulf waters.

The B-200 flew both the High Spectral Resolution Lidar (HSRL), from NASA Langley (Chris Hostetler, principal investigator) and the Research Scanning Polarimeter (RSP), from NASA's Goddard Institute for Space Studies in New York (Brian Cairns, principal investigator). NASA atmospheric scientists have often flown the two instruments together to better understand the <u>climate impact</u> of clouds and aerosols - man-made and natural <u>airborne particles</u> such as pollution or dust. The instruments were designed to study the atmosphere, but were flown over the Gulf in an experimental capacity to see if their measurements could help verify whether similar <u>NASA satellite</u> instruments in space could be used to monitor oil spills and the biology of the Gulf.

The HSRL emits pulses of laser light through the atmosphere and then captures how aerosols and clouds scatter or absorb the light. These observations provide scientists with information about the amount and type of particles in the air. The RSP measures polarized light to get a more accurate reading of aerosols' reflective and absorptive properties. These observations are complementary to the HSRL's, which improves the value of both instruments. During this week's flights, instead of measuring how particles in the air affect the lidar's laser light, scientists were looking at how the lidar's beam reflected off the surface of the water and particles below the surface.

When the lidar hits an oil patch, it will reflect in a different way than it does over open water. The way the sun and <u>laser light</u> reflect off the ocean surface may tell scientists how thick and dense the oil is. Likewise, scientists believe the lidar backscatter can determine the



density of phytoplankton near the surface, said Yongxiang Hu, a Langley research scientist working on the project.

"One of the things we really want to do is look at the biological changes," Hu said.

For both observing phytoplankton and the properties of the oil spill, the HSRL flight is ultimately a verification method for the similar lidar instrument on the Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations (CALIPSO) satellite. CALIPSO will provide a steady stream of data to scientists. Its orbit has already taken it over the Gulf at least 16 times since the oil spill. Plus, CALIPSO's previous three-plus years of operation could provide a strong baseline of measurements for comparison. Scientists are still conducting research to determine the quality of that data for ocean-observing purposes.

Both of these research efforts are being explored through a two-year project competitively funded by the NASA Applied Sciences Program's Gulf of Mexico Initiative, with Sonia Gallegos of the Naval Research Laboratory as principal investigator. In collaboration with NRL and NOAA, NASA Langley scientists are attempting to create a spaceborne monitoring system to detect and measure oil spills in the future, particularly in the Gulf. The system would combine the measurements of a suite of NASA satellite instruments. The two-year project also aims to develop a capability to observe changes in phytoplankton, which could be a key indicator of the health of all marine life in the Gulf.

Provided by JPL/NASA

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