

Update on AVIRIS Data Collection and Analysis

Victor F. Labson, PhD
Director, USGS Crustal Geophysics and Geochemistry Science Center
Box 25046 Federal Center, Denver, CO 80225
(303)236-1312, vlabson@usgs.gov

Thank you Madam Deputy Secretary,

My report is an update on the USGS' and collaborators' use of the NASA Airborne Visible/Infrared Imaging Spectrometer - the AVIRIS. This is a tool we used to map and characterize oil on the sea-surface and onshore. It is uniquely suited to this application as it has the ability to map the volume of oil present on the surface and its chemistry.

In layman's terms, AVIRIS is much like a digital camera which measures visible and near-infrared light in 224 bands in a vast number of pixels. Every chemical compound has a unique spectrum, or combination of reflection or absorption, similar to our sensitivity to color in the visible spectrum. This technique is what scientists use to determine their results.

This project has two phases; the first phase established an average daily discharge rate of spilled oil. NASA deployed the AVIRIS to the Gulf in May to support this effort. The resulting discharge rate is included in a peer-reviewed USGS report.

The second phase, and this report's topic, is focused on mapping the amount of oil that can be recovered, assessing the oil chemistry, and providing information to understand impacts of the oil spill on coastal ecosystems, and natural and economic resources in the Gulf.

The oil budget, which will be produced in this second phase, is an accounting of the total amount of a discharge entering and leaving the Gulf. The volume of surface oil is measured by the AVIRIS and added to the contained, skimmed, burned, and estimated oil lost through natural and chemical dispersion, and evaporation and dissolution to provide an insight into the oil present on the surface and in the subsurface. This insight is critical to understanding the chemical evolution of the oil prior to landfall, its degradation and transformation, and the potential for transfer of heavy metal and organic contaminants to the seawater.

This second phase has two deployments of the AVIRIS, a low-altitude, high-resolution survey, and a high-altitude, broad-area survey. The low-altitude survey was conducted from July 3rd through the 12th and the results are being processed and interpreted currently. Concurrent ship-borne and coastal spectral calibration, and sampling of the oil for chemical characterization was conducted and the samples are now being analyzed in the USGS Denver laboratories. The AVIRIS surveyed both impacted and potentially impacted coastal areas and examined in detail a 150 square mile area around the spill site.

The detailed area was flown morning and afternoon of July 9 and on July 12 to aid in understanding the changes in sea-surface oil over time.

The USGS is analyzing the chemical composition of spill-related samples. The suite includes two samples of relatively pure, fresh oil provided by BP, samples of the dispersant, Corexit, and samples of oil and seawater collected by the USGS from the ocean surface, and oil-affected beaches and marshes. The oil and water samples are being analyzed for oil- and dispersant-related compounds in support of the oil budget estimations and the AVIRIS mapping of weathered oil.

Field work for the characterization of oil contamination in the southern Louisiana marshes was performed around the areas of Grand Isle, Barataria Bay and the end of the Mississippi delta in two of the major wetland ecosystem types. Oil, water, sediment and vegetation samples and reflectance measurements of non-impacted and impacted marsh plants have been made for the analysis of the AVIRIS data. Preliminary pre-impact maps of vegetation composition and extent and preliminary post-impact maps of oiled marsh have been created. Studies are continuing to quantify and characterize the nature of oil impacts on the marshes.

The high-altitude survey deployment is scheduled to start about August 4. The mission is to cover a broad area of the Gulf mapping sea-surface oil, and to fly the full extent of potentially oiled coastline. It is anticipated that contemporaneous sampling will be conducted along shore, and if warranted, at sea.

The USGS effort has been greatly assisted by NASA and its Jet Propulsion Laboratory, The US Coast Guard, several units of NOAA, and the area and incident commands.

Madam Deputy Secretary, this concludes my report. I would be happy to answer any questions you may have.