

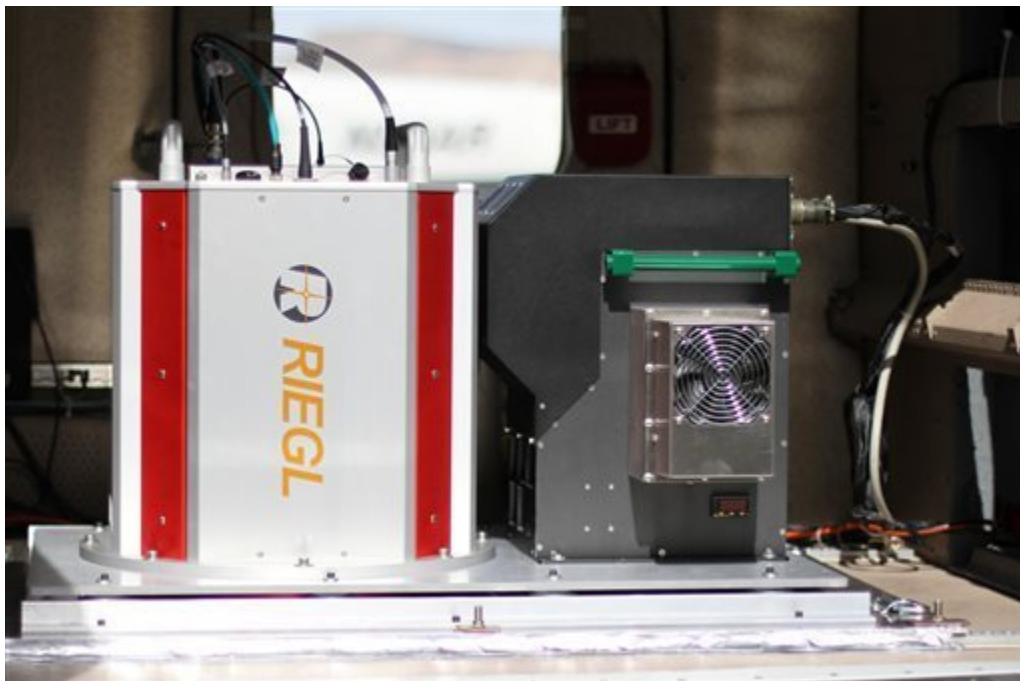
# NASA measures snowpack in California, Colorado

<http://www.fresnobee.com/2014/03/26/3843642/nasa-measures-snowpack-in-california.html>

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In this handout image provided by NASA's Jet Propulsion Laboratory, a scanning lidar, which measure's snow's depth with lasers, left, and an imaging spectrometer that measures how fast the snow is melting into runoff are seen before a flight to measure the snowpack in California's Sierra Nevada mountains on Sunday, March 23, 2014.

NASA JET PROPULSION LABORATORY — AP Photo

FRESNO, Calif. — The snowpack atop mountain peaks in California and Colorado has a new set of eyes watching from high above to better gauge the amount of water that will rumble down rivers and streams each spring as runoff.

In a new mission, NASA fixed a lumbering twin-engine plane with high-tech equipment to make regular snow surveys, starting last weekend in drought-stricken California before the weather front expected to bring snow to the Sierra this week. At an altitude of up to 20,000 feet, the so-called Airborne Snow Observatory measures snowpack's depth and water content with precision.

Improving on the old method of taking snow samples from the ground, scientists said that from the lofty heights they can calculate snow depth to within 4 inches and water content to within 5 percent.

The figures will answer a list of questions about mountain snowpack, said Tom Painter, NASA's lead investigator for the mission.

"About 75 to 80 percent of our water comes from the snowmelt," Painter said. "Understanding the snowpack is really, really important."

For decades, snowpack's water content was based on estimates and fraught with errors. Each month, surveyors hiked out to sparse locations, typically at low and medium elevations. By hand, they plunged a long tube down into the snowpack, pulling up a core sample to be measured.

Yet much of the snowpack is higher up in the mountain ranges and out of reach of surveyors. So NASA is taking a different approach.

The first flight of the year for a de Havilland Twin Otter plane took off recently from Mammoth Yosemite Airport in the heart of the Sierra Nevada.

Lasers first scan the snow to find out its depth, indicating how much water is locked inside. An image is next taken to measure the amount of sunlight reflected and absorbed by the snow to gauge how quickly it will melt into runoff.

Scientists will combine these two pieces of information and track them over time to monitor changes, providing an accurate picture of the runoff, Painter said.

Power-plant managers, water districts, farmers and state officials who operate reservoirs and keep alert for the possibility of flooding will have access to the real-time data measuring snowpack.

"How fast does it melt? Where does it melt? How is it accumulated?" Painter said. "Until this project, we really have not had spatially complete information."

The plane will fly weekly over California's Tuolumne River Basin of the Sierra Nevada, including the Hetch Hetchy Reservoir, which supplies water for 2.6 million people in the San Francisco Bay Area. Monthly flights over Colorado's Uncompahgre River Basin will measure the watershed that supplies much of the western United States.

NASA is making flights to the end of the snowmelt season.

The mission is a collaboration between NASA's Jet Propulsion Laboratory in Pasadena, Calif., and the California Department of Water Resources.

"We can add up how much water there is in the mountain snowpack in the entire basin," said Painter, adding that his team's work is revolutionizing the way snowpack is measured.

Associated Press video journalist Haven Daley contributed to this report.

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