

# Study: Loss of water in drought caused Sierra Nevada to rise

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This Dec. 21, 2016 photo shows the eastern Sierra Nevada, with Mt. Whitney, the second-highest peak in the U.S., the largest of three pinnacles at center, near Lone Pine, Calif. Loss of water from rocks during drought caused California's Sierra Nevada to rise nearly an inch in height from October 2011 to October 2015, according to a new NASA study made public Wednesday, Dec. 13, 2017. The study also found that in the following two years of increased snow and rain, the rocks in the range regained about half as much water as was lost during the drought and the return of the weight caused the height of the mountains to fall about half an inch. (AP Photo/Brian Melley)

Loss of water from rocks during drought caused California's Sierra Nevada to rise nearly an inch (2.5 centimeters) in height from October

2011 to October 2015, according to a new NASA study made public Wednesday.

The study also found that in the following two years of increased snow and rain, the rocks in the range regained about half as much water as was lost during the drought and the return of the weight caused the height of the mountains to fall about half an inch (1.3 centimeters).

"This suggests that the solid Earth has a greater capacity to store water than previously thought," study leader Donald Argus of NASA's Jet Propulsion Laboratory in Pasadena, California, said in a statement Wednesday.

The water at issue is inside cracks within fractured rocks and is not the water that runs off mountains to supply cities and farms. The amount lost in 2011-2015 was 45 times the amount that Los Angeles uses in a year, according to the study published in the *Journal of Geophysical Research: Solid Earth*.

The north-south-trending Sierra Nevada runs about 400 miles (644 kilometers) along California's border with Nevada.

The study used data from 1,300 Global Positioning System stations in the mountains of California, Oregon and Washington that were placed for measurement of subtle tectonic motion in active faults and volcanoes and can detect elevation changes of less than a tenth of an inch (0.3 centimeters).



This Feb. 2, 2017 file photo shows fog and mist shroud the snow-covered Sierra Nevada near Echo Summit, Calif. Loss of water from rocks during drought caused California's Sierra Nevada to rise nearly an inch in height from October 2011 to October 2015, according to a new NASA study made public Wednesday, Dec. 13, 2017. The study also found that in the following two years of increased snow and rain, the rocks in the range regained about half as much water as was lost during the drought and the return of the weight caused the height of the mountains to fall about half an inch. (AP Photo/Rich Pedroncelli, File)

"One of the major unknowns in mountain hydrology is what happens below the soil. How much snowmelt percolates through fractured rock straight downward into the core of the mountain?" said Jay Famiglietti, jet propulsion lab scientist who participated in the research. "This is one of the key topics that we addressed in our study."

The researchers had to account for other reasons why the surface of the Earth rises and falls, including tectonic uplift or the extensive pumping

of groundwater in the Central Valley, which runs along the Sierra.



In this June 6, 2017 file photo, a Caltrans rotary blower clears snow from Highway 120 in the Sierra Nevada near Yosemite National Park, Calif. Loss of water from rocks during drought caused California's Sierra Nevada to rise nearly an inch (2.5 centimeters) in height from October 2011 to October 2015, according to a new NASA study made public Wednesday, Dec. 13, 2017. The study also found that in the following two years of increased snow and rain, the rocks in the range regained about half as much water as was lost during the drought and the return of the weight caused the height of the mountains to fall about half an inch. (AP Photo/Rich Pedroncelli, File)

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