

Southwest Winter Storms of 2004/2005

National Oceanic and Atmospheric Administration

National Climatic Data Center

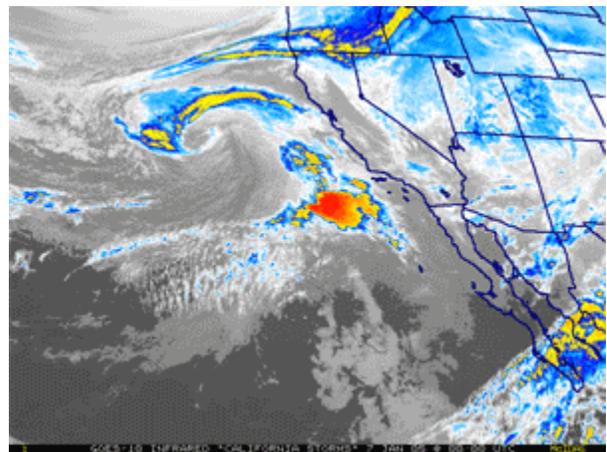
March 10, 2005

Overview

Winter in the southwestern U.S. was punctuated by a series of major Pacific storms that brought extreme, and in some cases, record precipitation to California and much of the Southwest. The cost of damage in parts of the region will run into the tens of millions of dollars and more than 20 people were killed in the combination of rain and snow. The first major Pacific storm of the season impacted California on October 19th, and after a quiet November, moisture-laden storm systems moved off the Pacific Ocean affecting southern California from December 27th through January 13th and then further storms came ashore in February. The rain and snow triggered flooding and mudslides and disrupted travel for much of the region. Below is a synopsis of the conditions that produced this historic precipitation season, as well as some lists of rain and snow records and a preliminary description of the major impacts.

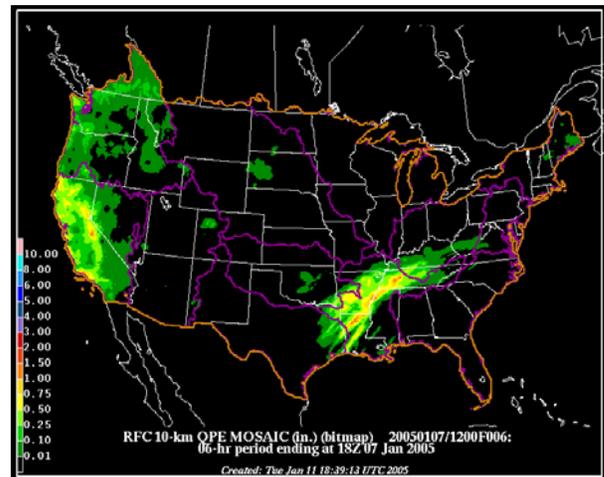
Meteorology

As can be seen in the animated image to the right, a spinning low pressure system moved onshore from the eastern Pacific on January 7th to impact California and finally as far as the east coast later the same week. This was the second consecutive week of major storms for California. The consistent track of these storms can be blamed on a feature of the climate system colloquially known as the 'Pineapple Express'. This refers to a sub-tropical jet stream that brings moisture-laden air directly from the tropics, over the Hawaiian Islands and onto the west coast of the U.S. The moisture brought by the Pacific jet is also further squeezed out against the high topography of coastal California, in this case producing rain amounts of 5-10 inches over a large area of the state in just a few days. In the Sierra Nevada mountains the moisture was delivered as snow with over 10 feet falling across the Lake Tahoe region between December 27th and January 3rd. Nevada, Arizona and Utah also received heavy snowfall from the storms.



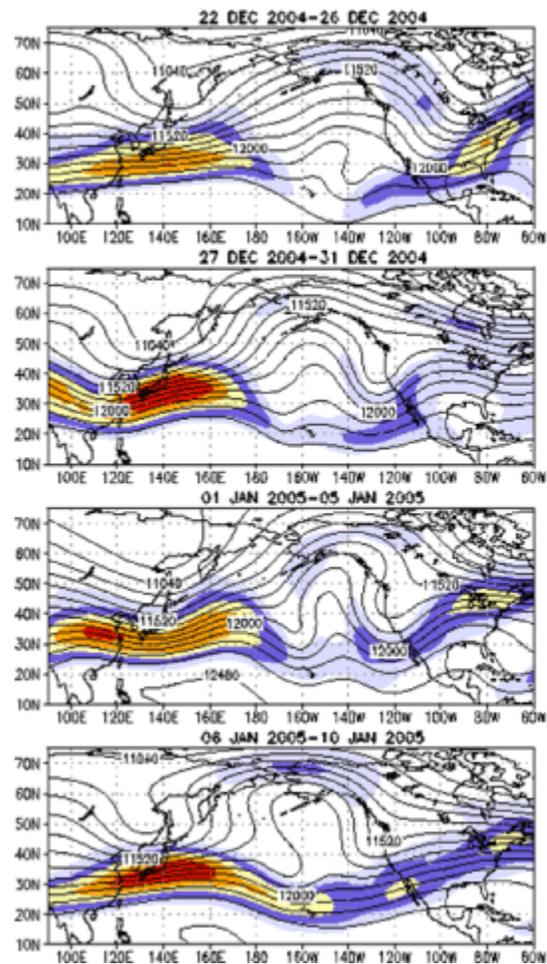
[Animated satellite image showing Pacific storm as it moves onshore.](#)

The animated image to the right (click for animation) shows accumulated 6-hourly radar estimates of total precipitation from January 7th-13th. The progression of the storm across the nation is evident on the 12th and 13th as well as its eventual exit off the east coast on the 13th and 14th. Rainfall amounts for California and other regions are described below along with impacts of the storms.



[Animated image of rain spreading across country from major Pacific storm.](#)

At the beginning of 2005, the Pacific Ocean displayed signs of being in a weak El Niño episode. A composite pattern of previous El Niños suggests that a [typical El Niño-related precipitation pattern over the United States in winter](#) is drier than average conditions in the Pacific Northwest and more-than-average rain and snow in the Southwest and southern California. Despite the similarity between the late December-January 2004/2005 pattern and the El Niño composite for the West, El Niño does not appear to be the primary contributing factor for these heavy precipitation events. According to NOAA's Climate Prediction Center, a feature of the climate system known as the Madden-Julian Oscillation or MJO, often associated with accelerating and augmenting a developing El Niño, [may have provided more moisture to the California storms](#). As can be seen in the image to the left showing the Pacific jet stream undercutting the high pressure ridge to its north in the Gulf of Alaska, moisture was able to be funneled directly from the deep tropics and onshore into southern California. This pattern of the Pacific jet was influenced by the eastward movement of the MJO (and associated convection) from the western Pacific into the central Pacific and helped fuel the California storms.



[MJO-related positioning of the jet-stream.](#)

Records and Totals

- Los Angeles:
 - had its wettest 15-day period on record as a result of the storms. Rainfall from December 27th 2004-January 10th 2005 totaled 16.97 inches, wetter than any 15 consecutive days since records began in 1877. The previous record was set in January 1969 when 14.63 inches fell between the 13th and 27th.
 - had its second highest seasonal (July-June) total (through January 10th) on record - 22.35 inches. In the 1889-1890 season, 26.73 inches fell through January 10th. Even if LA received no more rain through the end of the season, it would still be the 16th wettest season on record.
 - has already surpassed its seasonal average rainfall by over 7 inches (as of January 10th), and exceeds the season-to-date (July 1st-January 10th) by over 17 inches. More rain fell in during the December 27th-January 10th period than during a normal season in LA.
 - For the 5-day period January 6th-11th, over 20 inches of rain was recorded at some mountain weather stations in Santa Barbara, Ventura and LA County locations, and over 12 inches fell in Beverly Hills. LA Airport received over 5 inches and downtown LA, over 6 inches. For downtown LA, this is more rain in 5 days than you would expect in the entire season up to January 10th.
- In the Mojave Desert, Barstow, California has already received 119% of its seasonal (July-June) rainfall total with 5.15 inches falling from July 1st to January 18th. This translates to a season-to-date percentage of 505%.
- Las Vegas, Nevada reached 96% of its seasonal rainfall total by January 18th. A total of 4.42 inches and 475% of its season-to-date total
- Over an inch of rain fell in 24-hours (on January 13th) in much of the Mississippi and Ohio Valley as the storm tracked eastward. Over 2 inches was exceeded locally.
- The North Hills of Reno received nearly 7 feet of snow between December 28th and January 11th, with over 38 inches falling between January 7th-11th.
- Ski resorts in the Sierra Nevada received between 6-8 feet of snow, and even below 7000 feet, the average was 4-6 feet for January 7th-11th. Tahoe City received nearly 4.5 feet during the same period. For the entire period of the storms (Dec 28th-Jan 11th), Tahoe City received 118 inches of snow, or nearly 10 feet.

Impacts

- Over 20 people were killed in the storms from a combination of floods, avalanches, landslides and weather-related car-accidents. Dozens of rescues occurred during the worst of the storm, with people being plucked from floodwaters to motorists being rescued from snow-bound vehicles.
- Travel was disrupted for thousands of people across the West. An Amtrak train derailed in snow as it was eastbound from Oakland. Reno Airport was closed twice in one week, the second time for 12 hours as snow ploughs could not keep up with the rate of snowfall. The Airport has only been closed one other time in 40 years (AP).
- Flooding occurred as far east as Ohio and Kentucky as rain fell on top of snow. Flooding in southern Indiana caused hundreds of people to evacuate and 28 of Ohio's 88 counties were declared a State of Emergency over the weekend of the 8th/9th of January. Power outages affected a quarter of a million people in Ohio from the storms and several people were believed to have died from carbon monoxide poisoning while they used generators during the blackout (AP).
- Flooding also washed out roads and bridges across the West and Southwest cutting off several communities in northern Arizona and southern Utah. Nearly 20 houses were washed away or condemned due the flooding of the Santa Clara River in Utah. Over 100 homes were affected by floodwater in Overton, Nevada, a small town about 50 miles northeast of Las Vegas (NBC, AP).
- Mudslides contributed to the death toll in California where the hillside above La Conchita, in Ventura County, gave way on the 10th burying over a dozen homes underneath feet of mud. Ten people were believed to have died in the incident (AP). Other less extensive mudslides occurred throughout the region, including one in Los Angeles' Elysian Park area that killed a homeless man.
- Damage to the region from the storms will total over \$100 million (AP).

Contact Information

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Citing This Report

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