Coast to Cactus Weather Examiner

National Weather Service - San Diego

Volume 16 Number 2 weather.gov/sandiego April 2009

New Hail Criteria

The National Weather Service (NWS) will be changing its criterion for hail size when issuing Severe Thunderstorm Warnings on June 1. It will change from the historical criterion of 0.75 inch (3/4 inch) to 1 inch. NWS Central Region conducted a demonstration in the state of Kansas and adjoining regions over the past four years, utilizing a hail size criterion for issuance of Severe Thunderstorm Warnings of 1 inch in diameter, rather than the historical 3/4 inch threshold. This experiment was based on feedback from local partners (emergency managers, media, public, etc.), as well as scientific research conducted by Texas Tech University which demonstrated that significant property damage does not occur until hailstone sizes reach 1 inch in diameter.

Partner responses have indicated high satisfaction with adoption of the 1 inch hail criterion. Our media partners said warnings are more meaningful because the public knows there is a genuine risk of damage when a Severe Thunderstorm Warning is issued and fewer complaints are fielded from viewers/listeners of excessive interruptions into programming. Emergency managers agree that warnings carry more weight and credibility.

Based on this favorable response, the NWS Western Region (WR) will implement a similar demo for all 8 NWS WR states, on June 1 to catch the main severe weather season for both the northern tier of NWS WR and the southwest monsoon season. For pulse-type storms of moderate strength that are not expected to last long, NWS offices may issue a Short Term Forecast.

The wind criteria for issuing a Severe Thunderstorm Warning will remain 58 mph (50 knots).

Steve Vanderburg, a forecaster at NWS San Diego, discovered that there were 60 severe hail events between 1997 and 2008 in our area of responsibility (San Diego and Orange counties, western Riverside and southwestern San Bernardino counties).

Inside this issue:

Severe hail measuring up to 2.00 inches fell on the Warner Springs and Ranchita area on August 12, 1990. Photos courtesy of John Pederson, weather spotter.

New Hail Criteria—continued

Be weather wise!

Of those 60 events, 37 had hail 0.75 to 0.99 inch in diameter, and 23 events had hail 1 inch or greater. In all but one case, property damage was the result of hail 1 inch or larger.

Jim Purpura, our Meteorologist-in-Charge, was part of a team of meteorologists, emergency managers, media representatives and researchers assembled in 1996 to study possible revisions to the storm classification system. The team concluded that the existing ¾-inch standard was inappropriate because damage rarely occurred with hail that small.

Purpura, who worked in the Norman, Oklahoma office at the time, eventually forwarded the team's recommendation that the severe thunderstorm standard be raised to 1 inch – which can be destructive. But the recommendation languished for years because of administration changes at the weather service.

The largest hail ever recorded in California may surprise you. The following report came from L.B. Spaulding, a resident of Boulevard (in southeast San Diego County) on September 2, 1960:

"On Friday afternoon…occurred the most damaging hail storm in the memory of the oldest inhabitants of the region. When the first large hailstones fell, our son measured one and found that it had a diameter of 2 ¾ inches. Later…he observed many…fully as large as baseballs. But because of the extreme danger of injury, he could not secure one for measurement."

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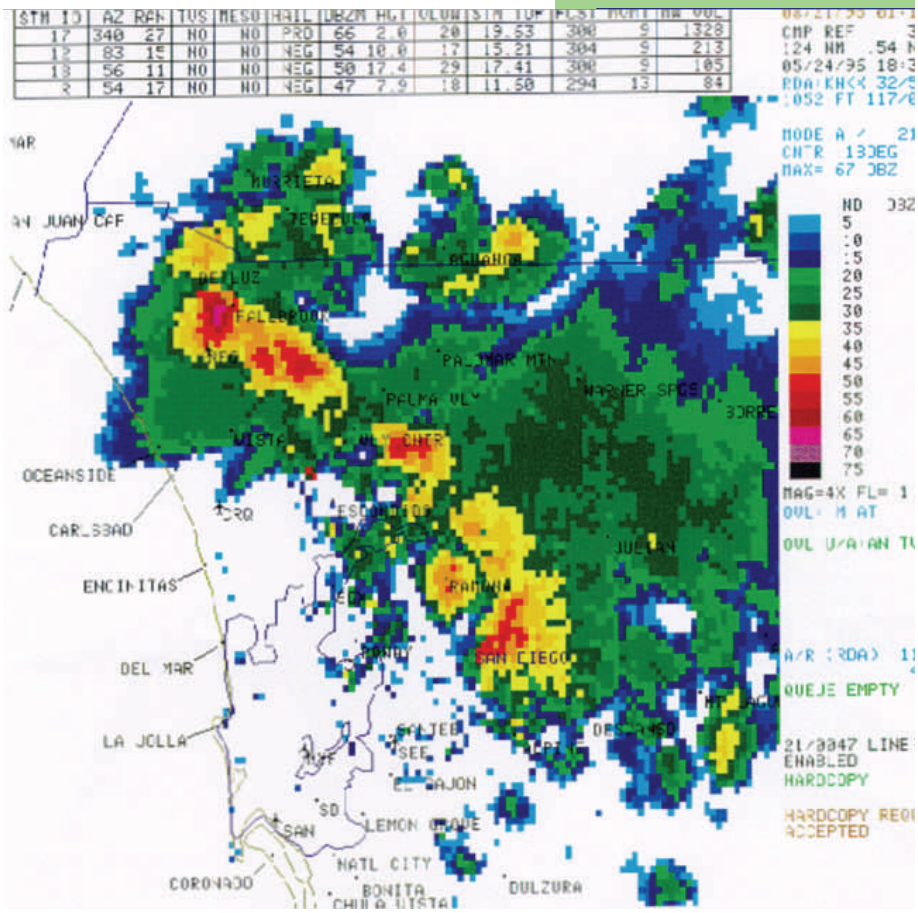
On the same day a report of hail also 2.75 inches in diameter came from the San Jacinto Mountains of Riverside County, but no further details are available. These hailstones are by far the largest hailstones on record in the state since 1950, when hail size began to be monitored and recorded. The most recent occurrence of severe hail in our region was at Ranchita on September 11, 2008, where golf ball size hail (1.75 inch) was reported.

Thunderstorms capable of producing large hail occur during two separate seasons and in different parts of our region. During winter



Radar image of the Fallbrook hailstorm of May 24, 1996.

New Hail Criteria—continued

storms with ample cold air aloft, a few supercell thunderstorms hit the coast and valleys of Southern California each year. During the late summer monsoon season, strong pulse-type thunderstorms hit the mountains and deserts. These monsoon thunderstorms have produced large hail greater than one inch in diameter each year. For more information on hail and how it forms, see: www.srh.noaa.gov/jetstream//tstorms/hail.htm .

While the next few months feature the most benign weather in Southern California, that of coastal low clouds and a persistent marine layer, severe storms can occur with strong low pressure systems. For example, May 22, 2008 will long be remembered for its crazy weather, including four tornadoes around Moreno Valley, accumulating hail all over the Inland Empire, and flash floods in the Santa Ana Mountains. On May 24, 1996, ping pong size hail (1.5 inch) fell in Fallbrook, extensively damaging the avocado crop. These late season spring storms can be very unstable and produce strong thunderstorms.

New NOAA Administrator—Jane Lubchenko

On March 19, 2009, the Senate confirmed President Obama's appointment of Dr. Jane Lubchenko to the post of NOAA Administrator. As the new undersecretary of commerce for oceans and atmosphere, she represents both the first woman and the first marine biologist to hold this position.

Dr. Lubchenko is a graduate of Colorado College, received her Masters degree from the University of Washington and Ph.D. from Harvard University in marine ecology, taught at Harvard for two years, and prior to assuming her new duties as NOAA administrator has been on the faculty at Oregon State University since 1977. Her scientific expertise includes oceans, climate change, and interactions between the environment and human well-being. As a marine ecologist and environmental scientist, she has also been an official or member of numerous professional scientific organizations, while strongly advocating science in both national and international circles.

As she begins her task of leading the 12,800 NOAA employees, Lubchenko is confident in her goals and abilities. She states that "with hard work and the best science as our guide, NOAA can spur the creation of new jobs and industries, revive our fisheries and the economies and communities they support, improve weather forecasting and disaster warnings, provide credible information about climate change to Americans, and protect and restore our coastal ecosystems."

Dr. Lubckenko's colleagues have confidence in her as well. "Jane is the rare person who is both a top flight scientist and skilled policy-maker. Her years of public service with the National Academy of Sciences and the Joint Ocean Commission Initiative and many other organizations have prepared her well for taking the helm of NOAA," says Co-chairman of the Joint Ocean Commission Initiative, Admiral James D. Watkins. She will fit in well with the other scientific leaders in the Obama administration, with a shared view that science should and will play its proper role in the policies set forth by the new government.

Dr. Lubchenko described her first meeting with President Obama: "When I met with the President in Chicago, we discussed ways that NOAA could provide America the best climate change science, restore her ocean's vitality, recharge our economy, and help our nation transition to more sustainable ways of living. His comment was, 'Let's do it!'"

National Tornado Experiment to Begin in May

A collaborative nationwide project exploring the origins, structure and evolution of tornadoes will occur from May 10 through June 13 in the central plain states. The project, **V**erification of **O**rigin of **R**otation in **T**ornadoes **EX**periment2 (VORTEX2 or V2), is the largest and most ambitious attempt to study tornadoes in history and will involve more than 50 scientists and 40 research vehicles, including 10 mobile radars. "Data collected from V2 will help researchers understand how tornadoes form" according to Louis Wicker, research meteorologist with NOAA's National Severe Storms Laboratory and V2 co-principal investigator.

Scientists will sample the environment of supercell thunderstorms — violent thunderstorms capable of producing damaging winds, large hail, and tornadoes. The V2 operations center will be at the National Weather Center in Norman, Okla.

Preliminary results from V2 are scheduled for presentation at Penn State University during fall 2009. At that time, organizers will begin planning details of the second phase of V2 scheduled for May 1- June 15, 2010.

V2 is a $11.9 million program funded by NOAA and the National Science Foundation, 10 universities, and three non-profit organizations.

The original VORTEX program, operated in the central Great Plains during 1994 and 1995, documented the entire life cycle of a tornado for the first time in history. Recent improvements in National Weather Service severe weather warning statistics may be partly due to the application of VORTEX findings. V2 will build on the progress made during VORTEX and further improve tornado warnings and short-term severe weather forecasts. "An important finding from the original VORTEX experiment was that the factors responsible for causing tornadoes happen on smaller time and space scales than scientists had thought," said Stephan Nelson, NSF program director for physical and dynamic meteorology. "New advances will allow for a more detailed sampling of a storm's wind, temperature and moisture environment and lead to a better understanding of why tornadoes form – and how they can be more accurately predicted."

Our own Meteorologist in Charge (MIC), Jim Purpura, will participate. Jim, a Chicago native and former Warning Coordination Meteorologist at the NWS office in Norman, Oklahoma, has a lot of experience and enthusiasm in this field. His role will be to interact with the media, providing information so the researchers can concentrate on the study. He will also be at the V2 operations center gathering and disseminating real time data collected by the project to area forecast offices. He doesn't hide his excitement very well, saying, "I would pay to do this job!"

"I would pay to do this job!"

- Jim Purpura, MIC, NWS San Diego

For more info on the project:

www.vortex2.org

www.nssl.noaa.gov/projects/vortex2

Quarterly Summary

January

San Diego - Lindbergh Field Data - January				
	Max	Min	Avg	Rain
Actual	69.4	50.4	59.9	0.08
Normal	65.8	49.9	57.8	2.28
Anomaly	3.6	0.5	2.1	-2.20
% of normal				4
Max	81	59		0.04
Min	55	42		

High pressure over the Pacific and low pressure over central Canada produced a mostly dry, northwest flow pattern over southern California for the first nine days of the month. A weak upper-level trough of low pressure and cold front swept through the region on the 3rd accompanied by light precipitation of less than 0.25 inch. By the 12th, high pressure moved east and strengthened into an anomalous blocking pattern that stretched the length of the continent. The strong upper-level high center gradually drifted northeast into southern Canada, but kept dry and warm offshore flow over California through the 21st. The block weakened and shifted to the west through the 24th, allowing the jet stream to move south. On the 21st through the 26th periods of mostly light rain and snow developed, first due to a weak upper trough off the coast, and then a persistent moist flow off the Pacific as an upper-level trough deepened along the west coast. Most of the heavier rain fell in Orange County where between 0.5 and 0.75 inch was reported. Big Bear reported 3 inches of snow, otherwise precipitation amounts were less than 0.25 inch. High pressure again rebuilt off the coast and drifted east through the 31st, bringing more dry and mild weather to end the month.

By the end of the month, it was apparent it was going to be anything but a typical January. The meager rainfall amounted to less than 10% of the January average in most cases. The lack of precipitation dropped most seasonal totals back below 100%, although most sites still had 70% or more of their seasonal normal.

January was a month of large contrasts in temperature. After a cool and frosty start, flow turned offshore, bringing days of warm weather and record heat in some cases, and many chilly nights. Numerous record high temperatures in the 80s and even 90s were set between the 11th and the 15th. Average monthly temperatures ranged between 2 and 5 degrees above normal.

February

San Diego - Lindbergh Field Data - February				
	Max	Min	Avg	Rain
Actual	65.0	50.4	57.7	2.63
Normal	66.3	51.5	58.9	2.04
Anomaly	-1.3	-1.1	-1.2	0.59
% of normal				129
Max	82	59		1.41
Min	57	45		

A persistent, upper-level, high pressure ridge, which had been in place over the east Pacific and the west coast of North America much of January, retrograded west during the first week of February. This allowed cold storm systems to amplify southward out of the North Pacific and bring much needed rain and snow to the state. Numerous storm systems pummeled California throughout the month with varying amounts of rain and snow. The spigot was closed for southern California during the final ten days of February as high pressure aloft over northwest Mexico pushed the storm track back to the north.

Quarterly Summary—continued

From February 5th to 8th, a large and slow moving low pressure area brought periods of rain and mountain snow to southwest California. The precipitation was spread over several days, so no significant flooding was reported. Rainfall ranged from less than 0.5 inch in the lower deserts, to 0.5 to 0.75 inch in the high deserts, to 1.5-2.0 inches on the coastal plain, to 2.5-5.0 inches in the foothills and mountains. Freezing levels were fairly high through most of the event, so the greater snowfall totals were above the resorts, where 3 to 9 inches were reported. The largest amount was 14 inches at Pine Cove (6300 ft.).

On February 9th a fast-moving cold front swept through southern California, accompanied by a strong jet stream and gusty winds at the surface. The strong winds, cold air, and snowfall created near blizzard conditions at times in the mountains. Due to the low freezing levels and cold air associated with the storm, resort snow to liquid ratios were quite high resulting in impressive snow totals between 1 and 3 feet. Big Bear Lake reported 20 inches, Running Springs 14 inches, while Idyllwild, Forest Falls and Palomar Mountain had 12 inches. In addition to the heavy snow, several avalanches left up to 20 feet of snow on some mountain roads. Precipitation ranged from less than 0.5 inch at the coast, 1 to 1.5 inch in the valleys, to 1 to 2 inches in the mountains and foothills. Convection boosted amounts in the southern deserts where amounts ranged from 0.40 to 0.90 inch. In the upper deserts, less than 0.25 inch was reported.

On February 16th and 17th a large and cold upper-level low pressure center off the northern California coast steered a strong cold front through southern portions of the state with gusty winds, rain, and snow in the mountains. Rainfall ranged from around 1 inch or less over western San Diego County, to mostly 1 to 2 inches in Orange, Riverside and San Bernardino Counties. Some parts of the Riverside County portion of the Inland Empire reported only 0.50 inch of rain, while local amounts above 3 inches soaked the San Bernardino County Mountain slopes. 1 to 2 feet of snow were common at resort levels. The combination of drifting snow and avalanches closed some mountain roads for several days including the Arctic Circle (SR-18) through the San Bernardino Mountains. In the San Diego County Mountains, precipitation was generally below 2 inches and snowfall considerably less due to the high snow level. Julian was the standout with 2.5 inches of precipitation that fell mostly as rain. No significant flooding was reported.

Avalanche on the Arctic Circle (Highway 18 near Big Bear Lake Dam) on February 17, 2009. Photo courtesy Caltrans.

The frequency of storms during the month held temperatures in check. Monthly averages were between one and four degrees Fahrenheit below normal.

March

March started out with a good potential for more rainfall across California, with an upper-trough in place over the east Pacific and west coast areas. However, the mean trough position developed, and then persisted inland much of the month, which gave us only glancing blows at storms

Quarterly Summary—continued

San Diego - Lindbergh Field Data - March				
	Max	Min	Avg	Rain
Actual	65.5	53.4	59.5	0.18
Normal	66.3	53.6	60.0	2.26
Anomaly	-0.8	-0.2	-0.5	-2.08
% of normal				8
Max	85	57		0.14
Min	60	49		

developing over the interior west. Rainfall and snowfall ended up well below normal, since the main storm track was too far to the north and east. Weak weather systems did manage clouds and some light precipitation at times, and this helped to keep temperatures close to, or a bit below average.

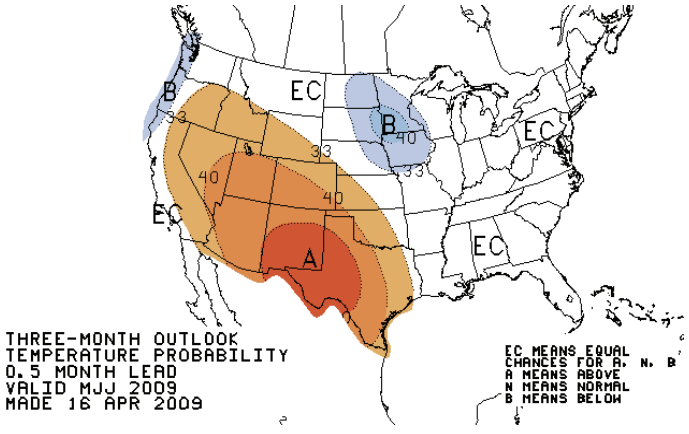
A weakening cold front brought light to locally moderate showers to the region on the 4th, into the morning of the 5th. Most of the rain fell over portions of San Bernardino and Orange Counties with between 0.10 and 0.50 inch reported, except for the desert portion which received less. Rainfall farther south was below 0.10 inch.

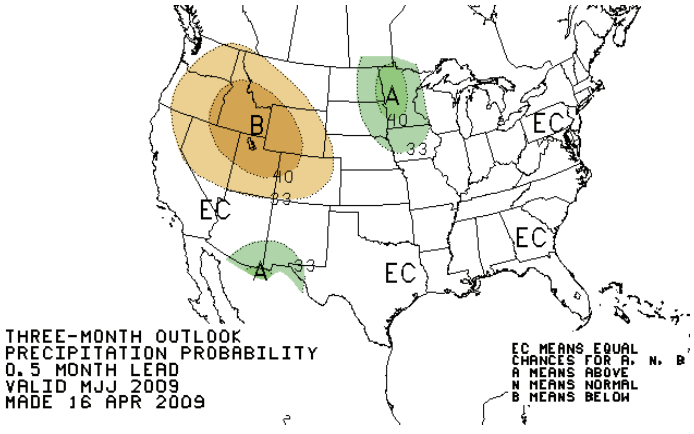
A strong cold front brought light to moderate showers on the 22nd. Rainfall amounts were mostly under 0.25 inch at lower elevations, however in the mountains local amounts between 0.50 and 1 inch were reported. Snow fell above 5000 feet with 2 inches reported at Big Bear Lake in the San Bernardino Mountains.

For the second year in a row, one of our wettest months on average, came in well short of normal for March; most reporting stations came in under 10% of normal. This dragged seasonal totals down significantly, with only a handful of desert sites still at or above 100% for the season. Most areas in and west of the mountains were between 60% and 80% of normal at the end of the month.

Late Spring and Early Summer Outlook

The Climate Prediction Center (CPC) predicts a warmer than normal May, June and July across the Southwest and interior western states, with cooler than normal conditions over the Pacific northwest coast and the northern Great Plains. Below normal precipitation is indicated over the northern Rockies and Great Basin. Above normal precipitation is expected in the northern Great Plains and in the deep Southwest. Could it be an early start to the Southwest Monsoon? For Coastal Southern California, the CPC shows no clear signal for above or below normal conditions for either temperature or precipitation.





Spotter and Skywarn News

During the last few months we have added about 100 new weather spotters to our ranks, swelling the total number of weather spotters to exactly 1,100! Of those, nearly 500 are Skywarn spotters. Spotter training was recently conducted in San Clemente as part of that city's Stormready requirements. In May, Disneyland Resorts in Anaheim and Cal State University in San Marcos will receive spotter training and will also be Stormready. Additional Skywarn training is in the planning stages.

A new means of submitting reports online is in the works. E-spotter has some notable flaws and we hope to work around these to provide you a better, more user friendly reporting experience. We hope to provide you with it before summer, so stay tuned.

There has never been a greater number of well-trained spotters in the history of our region. We need and appreciate the quality reports you send us via e-spotter or by phone. Your reports of significant weather always make a difference and we thank you for your participation!

Standing Lenticular cloud (Altocumulus Lenticularis) above Tahquitz Peak from a Pine Cove perspective on April 23, 2009. Photo courtesy of weather spotter Bill Baker.

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Feedback on weather products and the NWS San Diego website: www.wrh.noaa.gov/sgx/mail/feedback.php?wfo=sgx (don't forget to manually include your return email address if you wish a response!).

Spotter reports online: espotter.weather.gov

Weather Spotter web site: www.wrh.noaa.gov/sgx/spotter/spotter.php

(*Coast to Cactus* can always be found on this page.)

The *Weather Guide,* a weather companion and reference, is available online at:

www.wrh.noaa.gov/sgx/research/Guide/weather_guide.php?wfo=sgx

Southwest California Skywarn© web site: swskywarn.org , e-mail: swskywarn@swSkywarn.org

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