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Bay Breezes

Serving the San Francisco and Monterey Bay Areas

Fall 2009 October 2009

Inside this issue:

Current El Niño event expected continue through Winter

by Warren Blier *Science and Operations Officer*

The term El Niño refers to the large-scale ocean-atmosphere climate phenomenon linked to a periodic warming in sea-surface temperatures across the central and east-central equatorial Pacific (between approximately the Date Line and 120°W). El Niño represents the warm phase of the El Niño/Southern Oscillation (ENSO) cycle, and is sometimes referred to as a Pacific warm episode. (The cool phase of this cycle, corresponding to a Pacific cold episode, is called a La Niña.) The term El Niño was originally used in reference to an annual warming of sea-surface temperatures along the west coast of tropical South America. NOAA's Climate Prediction Center (CPC), which is part of the National Weather Service, declares the onset of an El Niño episode when the 3-month average sea-surface temperature departure exceeds 0.5°C (0.9°F) in the east-central equatorial Pacific [between 5°N - 5°S and 170°W – 120°W, the so-called Nino 3.4 region].

El Niño and La Niña are naturally occurring phenomena that result from interactions between the ocean surface and the atmosphere over the tropical Pacific. Changes in the ocean surface temperatures affect tropical rainfall patterns and atmospheric winds over the Pacific Ocean, which in turn impact the ocean temperatures and currents. The El Niño and La Niña related patterns of tropical rainfall cause changes in the weather patterns around the globe.

During a strong El Niño ocean temperatures can average 2°C – 3.5°C (4°F – 6°F) above normal between the date line and the west coast of South America (bottom left map next page). These areas of exceptionally warm waters coincide with the regions of above-average tropical rainfall. In contrast, during a La Niña temperatures average 1°C – 3°C (2°F – 5°F) below normal over the eastern equatorial Pacific. In turn, this large region of below-average temperatures coincides with the area of well below-average tropical rainfall.

For both El Niño and La Niña the tropical rainfall, wind, and air pressure patterns over the equatorial Pacific Ocean are most strongly linked to the underlying sea-surface temperatures, and vice versa, during December-April. During this period

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Current El Niño

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the El Niño and La Niña conditions are typically strongest, and have the largest impacts on U.S. weather patterns.

El Niño and La Niña episodes typically last approximately 9-12 months. They often begin to form during June-August, reach peak strength during December-April, and then decay during May-July of the next year. However, some prolonged episodes have lasted 2 years and even as long as 3-4 years. While their periodicity can be quite irregular, El Niño and La Niña events occur every 3-5 years on average.

Current El Niño

Over the past several months, an El Niño event has been developing across the equatorial Pacific Ocean. For the latest 4-week period, ending 3 October 2009, equatorial SSTs were at least 0.5 °C (0.9 °F) above average across the Pacific Ocean and at least 1.0 °C (1.8 °F) above average near the Date Line and in the eastern Pacific (Figure 1). At present, the ongoing El Nino event would be categorized as weak-to-moderate.

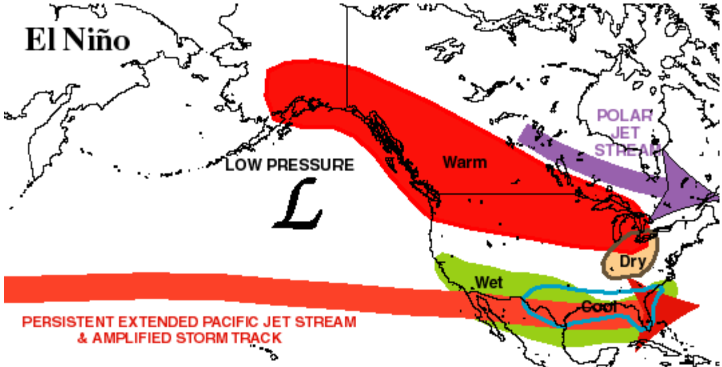

Figure 2. Typical January – March weather anomalies and atmospheric circulation during moderate-to-strong El Niño.

Moderate-to-strong El Niño winters typically feature a strong jet stream and storm track across the southern part of the United States, and less storminess and milder-than-average conditions across the North, as can be seen in Figure 2. For California in particular, this southward and eastward shift of the main region of cyclone formation over the Pacific to just west of California typically results in stormier than normal winters with above-average precipitation – especially for the southern 2/3 of the state. By contrast, weaker El Niño episodes do not appear to have any par-

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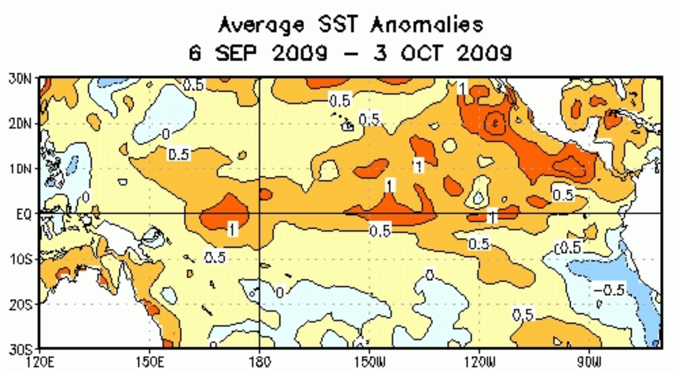

Figure 1. Average SST anomalies (°C) for the period 6 September – 3 October 2009 across the equatorial Pacific Ocean.

Current El Niño

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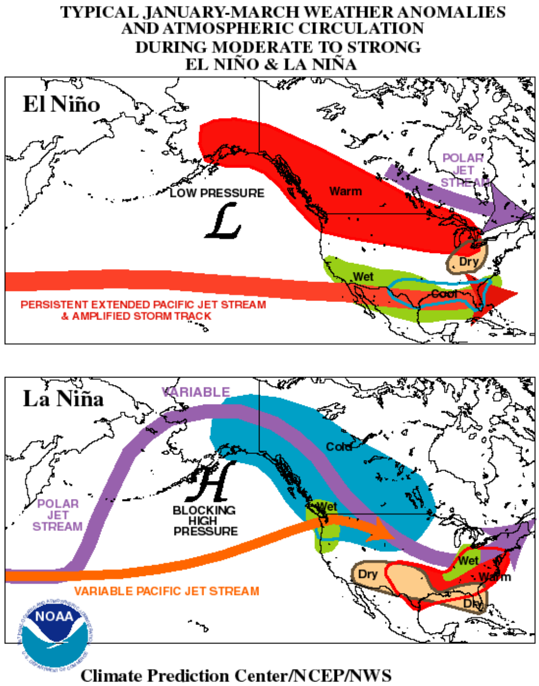
ticular impact on California winter-season precipitation.

So the key question with our presently developing El Niño event is whether it will strengthen over the coming months. Latest observations and dynamical computer-model forecasts indicate it will likely increase in magnitude and last through Northern Hemisphere winter 2009-10 (Figure 3). At least for all but the northernmost portions of our state then, chances of this being a wetter-than-normal winter season are increasing.

For the latest on the current El Nino event, and a lot more information about El Niño and La Niña events in general, please see http://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/enso.shtml



Typical January-March weather and atmospheric circulation during moderate-to-strong El Niño events.

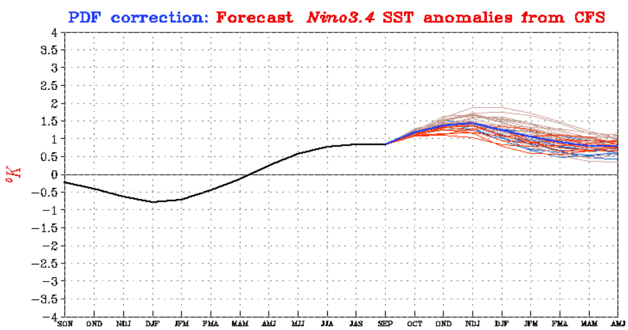


Figure 3. NOAA/NWS National Center for Environmental Prediction (NCEP) Climate Forecast System ensemble forecast SST anomalies for the Nino 3.4 region (the east-central equatorial Pacific between 5°N - 5°S and 170°W – 120°W).

For the Latest Info:

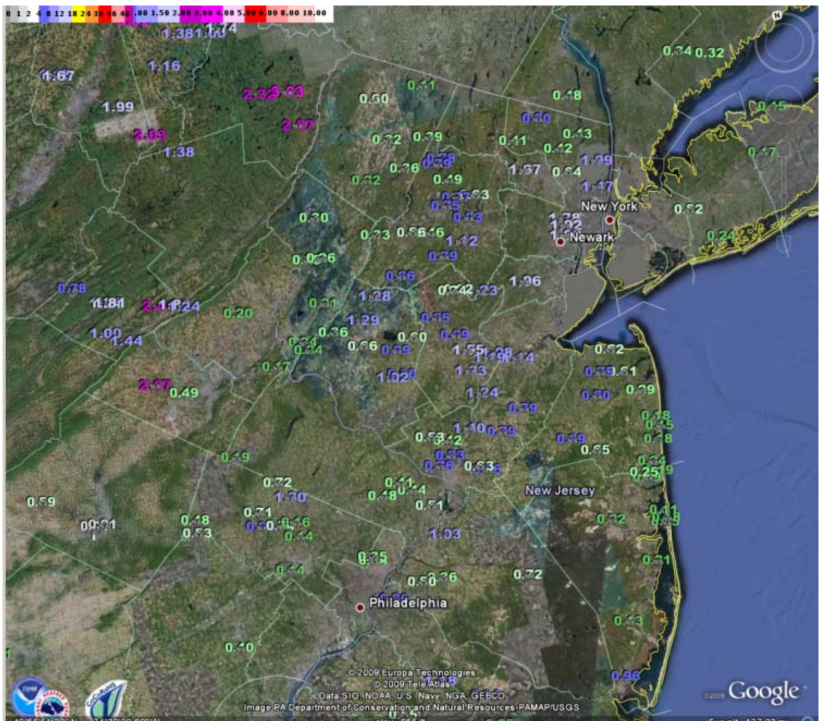
http://elnino.noaa.gov

New Way to View CoCoRaHS Data

By Charles Bell *CoCoRaHS Focal Point*

Data from the Community Collaborative Rain, Hail & Snow Network (CoCoRaHS) is now viewable in programs that can display KML data such as Google Earth. Each day thousands of volunteers across the United States submit their local rainfall totals to the CoCoRaHS site. This information is used by a wide range of interests from meteorologists and hydrologists at the National Weather Service to researchers in many different organizations.

By viewing the data in a KML viewer, you can zoom in to get a more precise depiction of the rainfall distribution. The data can be downloaded at: http://www.srh.noaa.gov/gis/kml/cocorahs/cocorahsPrecip.kmz



Rainfall from the New York/New Jersey/Pennsylvania area on July 29th.

If you would like to join CoCoRaHS and submit your local rainfall data, please go to the following website: http://www.cocorahs.org/Application.aspx Questions about the program should be directed to Charles Bell (charles.bell@noaa.gov).

2008-2009 Rain Year in Review

By Duane Dykema *Climate Focal Point*

The 2008-2009 rain year ended on June 30. For the third consecutive year, precipitation totals were below normal across both the San Francisco Bay Area and Monterey Bay Area. Rainfall totals were generally about 70-80% of normal, which is similar to rainfall totals for the previous year (2007-2008), but somewhat wetter than the 2006-2007 rain year when totals were generally only about 50-70% of normal.

As is typical for California, rainfall was not evenly distributed throughout the rainy season. The season started off relatively dry. In general, rainfall totals for November and December were only about three-quarters of average. However, areas around Monterey Bay received greater than normal rainfall during the month of December.

January is typically the wettest month across northern and central California. But January 2009 was one of the driest Januaries in recorded history. In fact, lack of precipitation during January 2009 was the biggest contributing factor to the overall seasonal shortfalls. Most locations received less than half of their normal January rainfall. The North Bay saw the greatest precipitation deficits in January, picking up only about 10 percent of normal for the month.

The trend reversed sharply in February when several soaking rains rescued the region from severe seasonal rainfall shortages. Most of the region picked up between 150 and 200 percent of normal February rainfall.

A dry pattern returned during March (about two-thirds of normal) and continued into April (less than half of normal). Beneficial rains came late in the season, especially in the North Bay where rainfall totals for the month of May were more than twice the May average. On the next page is a listing of seasonal rainfall totals for several locations around the San Francisco and Monterey Bay Areas. Also listed is normal rainfall for each location as well as the percent of normal. Normal rainfall is based on the 30-year average from 1971 to 2000. Charts on following page.

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What is this?

The image to the right shows what is sometimes called a 'Hole Punch Cloud'. The phenomenon is theorized to occur when ice crystals and super-cooled water drops (liquid state below freezing) co-exist in a cloud, but are then agitated and instantly freeze any super-cooled drops into ice crystals. As the super-cooled drops freeze into ice crystals nearby droplets evaporate and leave a void or hole in the cloud deck. This is a very slimmed down explanation, but for a more detailed description visit the NWS Mobile Office homepage a http://www.srh.noaa.gov/mob/121103hole_punch/holepunch-main.html

Cloud 'hole' over Monterey Bay on 08/28/2009
Photo by: Matt Mehle

2008-2009 Rain Year in Review

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Station Name	2008-2009	Normal Rainfall	Rainfall Percent of Normal
North Bay...			
Angwin	31.95	40.67	79%
Cloverdale	28.6	42.06	68%
Fort Ross	25	37.08	67%
Healdsburg	32.92	42.15	78%
Kentfield	33.53	47.47	71%
Muir Woods	26.53	37.59	71%
Napa	21.16	26.46	80%
Occidental	34.04	55.87	61%
Petaluma	17.67	25.85	68%
Saint Helena	27.43	34.88	79%
San Rafael	24.65	34.29	72%
Santa Rosa	22.46	31.01	72%
Sonoma	18.54	30.64	61%
San Francisco Peninsula...			
Half Moon Bay	20.56	27.96	74%
Pacifica	26.46	29.5	90%
Palo Alto	11.81	15.71	75%
San Francisco Airport	14.57	20.11	72%
San Francisco Downtowr	18.16	22.28	82%
Woodside	20.86	28.71	73%
East Bay...			
Berkeley	23.04	25.4	91%
Concord	17.53	15.72	112%
Livermore	10.92	14.82	74%
Martinez	16.2	19.58	83%
Mount Diablo	19.04	23.96	79%
Newark	10.65	14.85	72%
Oakland	18.55	22.94	81%
Richmond	17.34	23.35	74%
South Bay and Santa Cruz County...			
Ben Lomond	38.99	47.68	82%
Gilroy	13.2	20.6	64%
Los Gatos	20.75	22.64	92%
Mount Hamilton	25.02	23.73	105%
San Jose	11.51	15.08	76%
Santa Cruz	22.06	30.67	72%
Watsonville	15.89	23.25	68%
Monterey County and San Benito County...			
Big Sur Station	35.32	43.2	82%
Carmel Valley	15.69	17.17	91%
Hollister	11.17	13.61	82%
King City	5.97	12.3	49%

Local Forecasters Visit TRACON

by Matt Mehle

A few months ago, meteorologists from the Monterey Forecast Office had the opportunity to take a familiarization trip to the Sacramento Terminal Radar Approach Control facility (TRACON). The purpose of the trip was to familiarize meteorologists with the functions of a TRACON facility and how our meteorological forecasts are utilized by the TRACON. The main function of a TRACON is to control the airspace around airports with high traffic density. In other words, monitoring the arrival and departure demands and mitigating any problems that develops due to weather, mechanical issues or emergencies. A typical TRACON coverage area is roughly a 30-35 mile radius around a larger airport. Nationally there are approximately 200 TRACONs including military facilities. In our case, the Sacramento TRACON is like a 'super' TRACON in that it controls the airspace for airports in the Sacramento/San Joaquin Valleys, westward to San Francisco Bay and southward just past Big Sur including Monterey. Grant it, the Sacramento TRACON covers a large area, but it is not the biggest. San Diego holds the record for the busiest TRACON in the world.

As mentioned above, weather can play a big role for arriving and departing aircraft and that is where the meteorologists come in. By understanding the needs of TRACON, the visiting meteorologists could see first hand how a good weather forecast could lead to 'smooth' operations for the day. A good forecast indicating adverse weather conditions at a Bay Area airport would allow TRACON to plan ahead and schedule incoming aircraft to have minimal impact on regional airspace.

Some information obtained from faa.gov

L to R: Carolina Walbrun, Suzanne Anderson, Brian Tentinger and Charles Bell Photo By: Matt Mehle

Catchin' the Momentum - NOAA Cycling Team in action

Steve Anderson rides the Hellyer Veledrome track in San Jose.

NOAA CYCLING
catch the momentum
NOAACYCLING.ORG

Matt Mehle completed 106 miles in the Marin Century Ride.

Local High Resolution WRF Model

By Brian Tentinger *Modeling Expert*

Since the fall of 2007, the National Weather Service Weather Forecast Office Monterey has been running a local high resolution WRF (Weather Research and Forecasting) numerical model to better predict weather phenomena in the Bay Area and surrounding locations. Forecasters at Monterey WFO have access to a number of weather models produced remotely by other organizations in other parts of the country and world. Now, using the WRF-EMS (Environmental Modeling System), forecasters are able to view forecast model data at a much higher resolution along the central California coast. The local WRF model was set up with a horizontal grid spacing of 3 km, which means that each grid space measures 3 km by 3 km. With this resolution, the model can better represent atmospheric motions and properties, especially along the California coast where surface terrain and ocean interaction are very important.

One of the main goals of implementing a high resolution model was to more accurately predict the coastal stratus and fog near San Francisco International Airport (KSFO) and the airplane approach zone into the Bay Area. After implementing the WRF model, aviation forecasts for airports in the Bay Area should become more accurate resulting in better planning for arrivals and departures thus increasing efficiency and organization for airlines. Most of the operational forecast models in use do not have the ability to resolve the moisture and winds that exist along the coast and how they penetrate into the bays and inland valleys on a daily basis. The WRF model with 3 km resolution however has the ability to resolve the low clouds, the terrain-driven winds, and the diurnally oscillating winds onshore and offshore. Figure 1 displays an image of GOES-West visible satellite from 14 UTC on 15 May 2009. Figure 2 displays an image of cloud water (inches) from forecast hour 14 of the 00 UTC model run of the WRF on 15 May 2009. Comparing these two images reveals a very good forecast of the cloud cover in the Bay Area and the push of

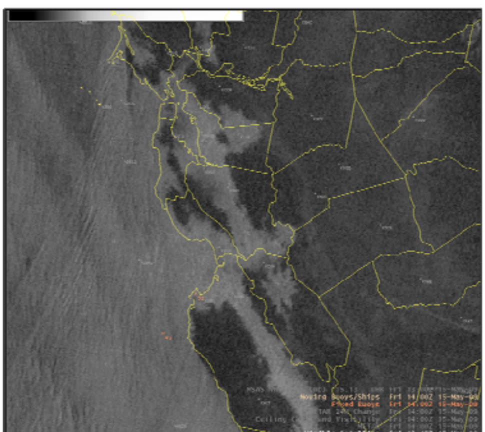

Figure 1. GOES-West visible satellite image for 1345 UTC on 15 May 2009.

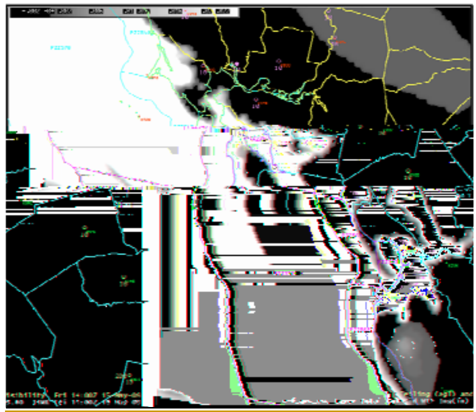

Figure 2. 3 km WRF model cloud water (inches) for 1400 UTC on 15 May 2009.

Local High Resolution WRF Model

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stratus into the East Bay valleys and into extreme southern Santa Clara Valley. The ability of the WRF model to simulate the spatial extent of the stratus is very beneficial to operational forecasting of rapidly changing flight conditions.

Another local phenomenon that occurs in the Bay Area is the strong onshore winds either through the Golden Gate Bridge or through the San Bruno Gap near KSFO. Figure 3 depicts WRF model output of strong winds (23-28 mph) through the Golden Gate and near Angel Island during the afternoon of 22 September 2009. This correlates very well with observations at the same time recording winds 25 – 30 mph at Point Blunt Angel Island.

During a recent event, a weak cold front moved through the region and produced a line of light to moderate rainfall over the Bay Area. The WRF model was able to pick up this line of showers and simulate the spatial extent and intensity of showers very well. Figure 4 shows the 0.5° reflectivity from KMUX radar at 2046 UTC on 13 September 2009, with a line of showers off the coast and maximum reflectivity 40-45 dBZ. Similarly, Figure 5 depicts WRF model reflectivity (1km AGL) at 2200 UTC, also with a line of showers off the coast and max reflectivity 40-45 dBZ.

These results give weight to the local 3 km WRF model, and also allow forecasters to better understand the low-level, detailed, atmospheric conditions occurring in and around the Bay Area.

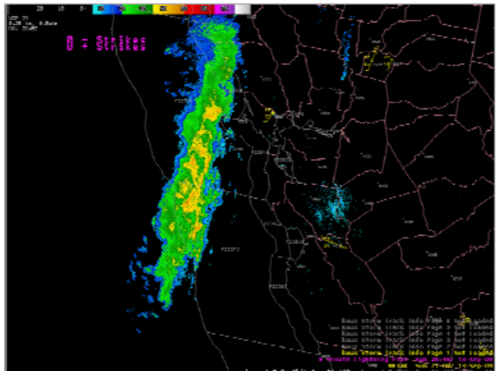

Figure 4. KMUX 0.5° radar reflectivity indicating a line of showers about to move into the Bay Area at 2046 UTC on 13 September 2009.

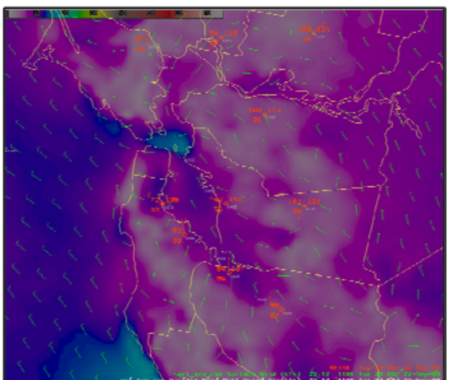

Figure 3. Model surface winds and wind gusts (knots) for 2300 UTC on 22 September 2009.

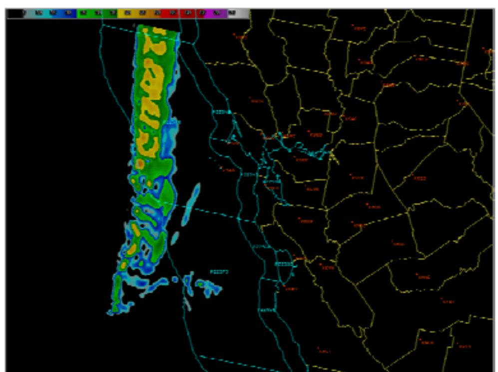

Figure 5. Model reflectivity (1 km AGL) at 2200 UTC on 13 September 2009 indicating rain showers about to move into the Bay Area.

Local IMET works fire near Los Angeles

In early September, Monterey general forecaster and incident meteorologist (IMET), Matt Mehle, was dispatched the Station Fire, which was located near Los Angeles/Pasadena. This record breaking wildfire is the largest fire to impact Los Angeles county and the Angeles National Forest with over 160,000 acres burned. At its peak, over 5,000 personnel were assigned to fight the Station Fire. The Station Fire was one of the most explosive and impressive wildfires Matt has seen as an incident meteorologist. In fact, the Station Fire burned over 50,000 acres in one day. During this extreme fire behavior several pyro-cumulus clouds (See picture right) developed with plume dominated fire behavior. Pyro-cumulus clouds form when intense heating of air at the surface causes a convective column to form. The convective column ascends through the atmosphere, cools and becomes a cloud. Pryo-cumulus clouds are capable of producing strong and erratic winds, rain and even

Pyro-cumulus cloud developing over the Station Fire Photo by: Matt Mehle

2009 Large Wildfire Season Review

By Ryan Walbrun ***Fire Program Manager***

The fire season for the greater San Francisco and Monterey Bay Region started out relatively slow after a busy 2008 fire season. However, beginning August 1st things rapidly changed with the onset of one of the first large fires in the region that would be a prelude to a busy August for firefighters locally. Here is a summary of some of the more significant and large wildfires that occurred within the NWS Monterey area of responsibility. On August 1st the Ponderosa Fire was reported in the Los Padres National Forest in southern Monterey County. The fire grew to 458 acres with Incident Meteorologist (IMET) Ryan Walbrun providing onsite support. The fire was contained on August 7th. The Sam Jones Fire on Fort Hunter Liggett burned 3,468 acres from Aug 2nd- 4th. The Lockheed Fire in Santa Cruz County started August 12th and was contained August 23rd after burning 7,817 acres of timber and brush. NWS Monterey forecaster and IMET Matt Mehle was the on-site meteorologist for this fire. Other fires

Ponderosa Fire as seen from Cone Peak Photo by: Ryan Walbrun

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2009 Large Wildfire Season Review

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of note included the Corral Fire that burned 12,500 acres east of Livermore from August 13-18th. Another spike in fire activity occurred late in the month after a hot and dry spell. The Bryson Fire burned 3,383 acres near Lake San Antonio in southern Monterey County from August 26 -28th. Red Flag Warnings were in effect when the Gloria Fire burned 6,437 acres between August 27-31st on land east of Soledad and west of Pinnacles National Monument. During this same period the Pacheco Fire burned 1650 acres off Hwy 152 on August 29th and 30th. On September 12th a Red Flag Warning for dry lightning was in effect when over 400 dry lightning strikes hit the Bay Area. Over 30 new fires were reported in the East and South Bay Hills with 10 new small fire starts in the North Bay. All of the fires were contained within 1-2 days. Finally from September 21st-23rd the 300 acre Pine Fire burned across far northern Sonoma County. As of early October fire potential remains high as the region awaits the first significant rains of the fall.

Spotter Training and other events!

Upcoming Spotter Training

November 4th
Santa Rosa (Sonoma County)
November 5th
Santa Cruz (Santa Cruz County)
November 12th
San Francisco (San Francisco County)

For more details visit
http://www.wrh.noaa.gov/mtr/

Attention Ham Radio Operators!

Skywarn Recognition Day December 5th, 2009
http://hamradio.noaa.gov

Editor:
Matt Mehle

San Francisco/ Monterey Bay Storm Spotters:

Anytime you observe any of the adjacent weather conditions, please call us with your report.

Please include your name and spotter number when calling.

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Weather Forecast Office
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Mailing Address

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Check us out online at: http://www.weather.gov/sanfrancisco

New mailing address? New e-mail address? New Phone number?

Dear Spotters,

If you have recently moved, changed e-mail addresses or received a new phone number please inform Matthew Mehle, Spotter Program Manager. Updating your information will ensure that the Monterey National Weather Service will be able to keep you up to date on the latest spotter training sessions, newest edition of Bay Breezes and much more.

Corrections can be sent to Matthew Mehle at matthew.mehle@noaa.gov