NATIONAL WEATHER SERVICE - MEDFORD, OREGON

Spring 2017
Volume 6, Issue 1

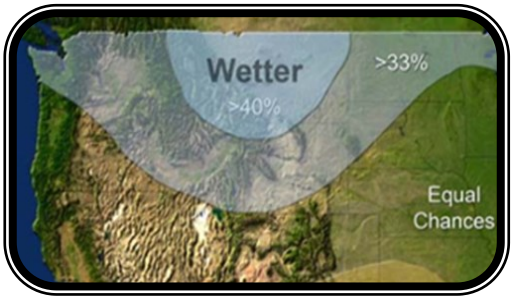
# THE CRATER CHRONICLE

## *The Wild Winter of 2016-17*

Ryan Sandler, *Warning Coordination Meteorologist*

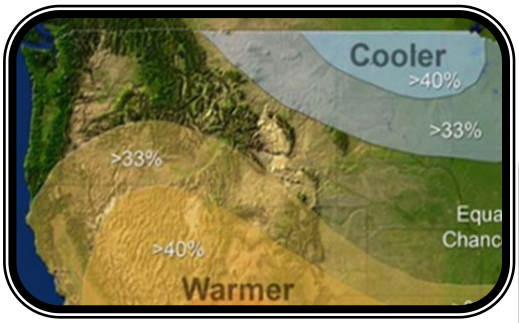
As I write this in early March, the snow was flying with big flakes outside my Medford window.

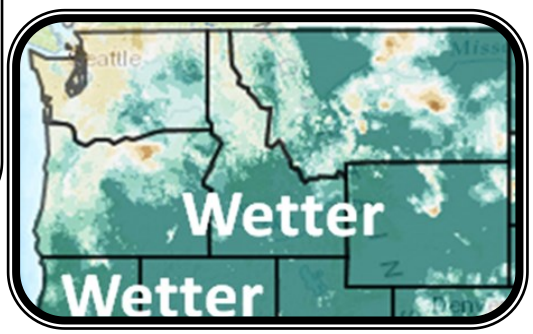
The ground was warm enough to melt the snow, but it still seemed like winter. Why has it felt like such a harsh winter? Maybe it was the expectation of a typical winter.



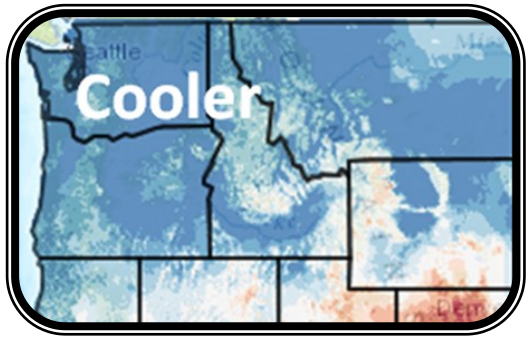

**Temperature & Precipitation Winter Outlook (Dec/Jan/Feb)**

Back in October, the official temperature and precipitation winter seasonal outlooks (pictured left) were for "equal chances", although temperature tilted slightly toward warmer than normal east of the Cascades and south of the Siskiyous. A weak La Niña settled in which usually means cooler and wetter from the Siskiyous north. It turned out to be cooler and wetter across our area (pictured below), much like a typical La Niña winter except for northern California which was much wetter. At this time, we really don't know why this winter was wetter than expected over so much of the West Coast.




**What actually happened: Conditions were wetter and cooler than normal**




How unusual has this winter been? Let's look at December, January, and February for Medford where we have 106 years for comparison. This winter's average temperature was the 47th coldest out of 106 years so no big deal, just a little colder than normal. This winter's

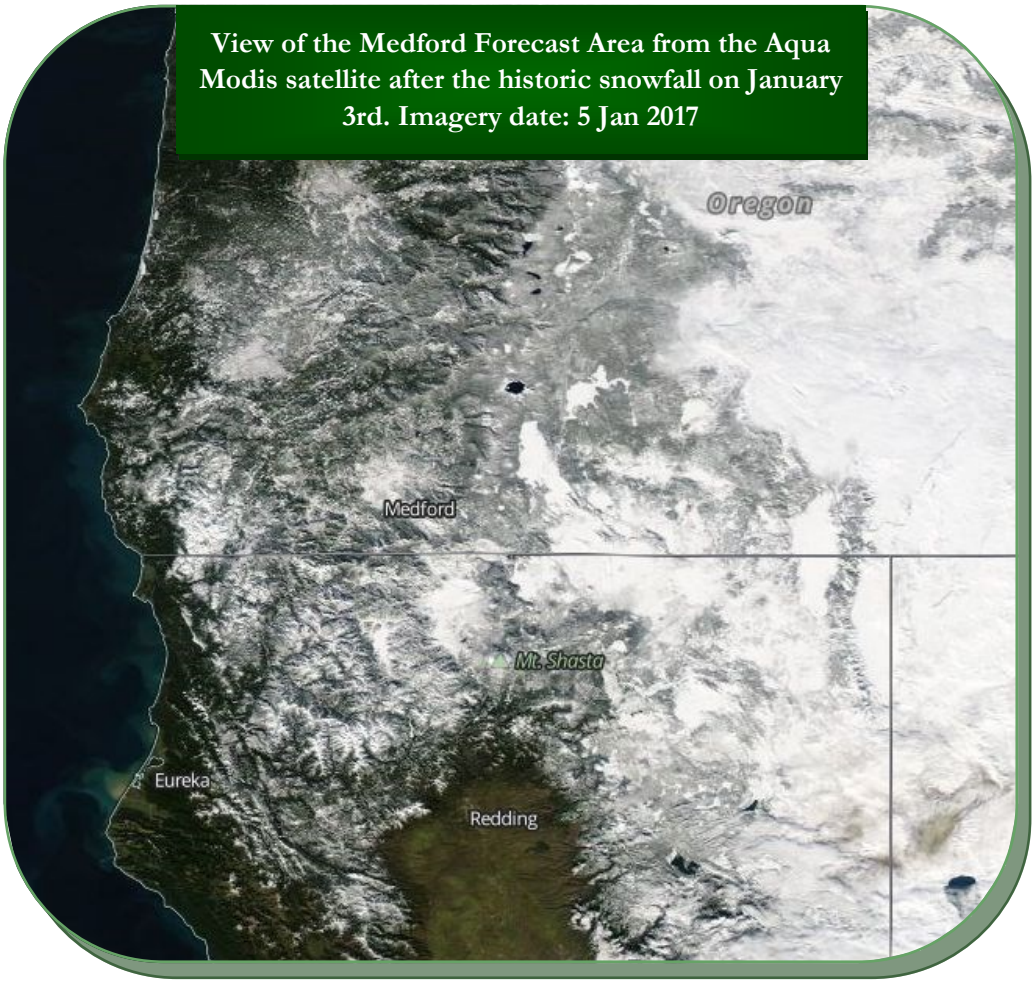
**INSIDE THIS ISSUE**



**Spring Began on March 20th at 3:29 am PDT.**

precipitation was the 8th wettest out of 106 years which was impressively wet and a real drought buster. The Crater Lake National Park snowpack of 12 feet on March 1st was the 16th greatest out of 89 years. Compare this to two years ago when there was only 3 feet of snowpack on March 1st.

I have a theory as to why this has felt like such a harsh winter. The past two winters were the warmest on record, so we may have acclimatized to these mild conditions. The low elevation valleys west of the Cascades, where many of us live, had way more snow than usual with much of it coming in one or two big snowstorms. The almost foot of total winter snow we've had at the Medford Airport was more snowfall than the past five winters combined!




**View of the Medford Forecast Area from the Aqua Modis satellite after the historic snowfall on January 3rd. Imagery date: 5 Jan 2017**

Hopefully, it's true that If March comes in like a lion, it will go out like a lamb.

## In Remembrance: James Bunker, 1966-2016

James "Jim" Bunker, former Cooperative Program Manager at WFO Medford, passed away at his home in New Jersey on December 29th, 2016 at the age of 50.

Jim was born on April 15th, 1966 in Salida, CO. He joined the US Air Force after high school, serving his country as a weather specialist during Operation Desert Storm. After 10 years in the USAF, Jim became a meteorologist technician with the National Weather Service in Alaska, before transferring to Guam, then to Medford in 2006. Jim ran the Cooperative program here, keeping the equipment running and the data flowing, until he was promoted to Observation Program Leader in Mount Holly, NJ in 2013.

Jim is remembered for his enthusiasm, passion, and his sense of humor. He will be missed by his family and his friends across the country and the world.

# National Weather Service Frost & Freeze Program

John Lovegrove, *Meteorologist- In-Charge*

At one time, the National Weather Service conducted a rather extensive agricultural frost and freeze program. Thermometers were set up at key agricultural stations throughout an area and monitored by NWS forecasters. Specific forecasts were written during the frost and freeze season for each key site. It was later determined that this infringed upon work more suited for the private sector to accomplish so the program was abolished.

It is part of the mission of the National Weather Service to help protect property. Plants, gardens and crops are one kind of property that we help protect. So, a frost/freeze program continued but it was more generalized for public use. Part of this generalization was to set specific dates for the start and end of when notices would be sent out. For the Medford forecast area, this was in mid-May and mid-September. A few years ago, we realized this was not the best way to operate the program. A warm spring would cause trees, vines and other plants to start growth earlier than usual and conversely a cool spring would delay growth. Also, coastal areas are not used to freezing temperatures at *any* time of the year.

We developed a sliding scale based upon what impacts the cold temperatures would cause. Very early in the spring, temperatures generally need to dip into the middle 20s to cause harm. As growth continues, this threshold rises until the freezing point can cause harm. We work closely with Oregon State University Extension Service and State of California Extension to determine the stage of growth of the plants. This determines when we issue bulletins for the cold. This sliding scale explains why freeze warnings are at first issued for temperatures falling to 26° or lower but later in the spring that criteria rises to 28° and eventually 32°. Once the freeze warning criteria reaches the freezing point, we begin to issue frost advisories for temperatures between 36° and 32°.

In the fall, warnings and advisories are issued until there is a killing freeze. At that time, the program is suspended until the following spring.

As with all of our warnings and advisories, you can view a detailed map of the expected hazard area by visiting http://www.wrh.noaa.gov/map/?wfo=mfr or by clicking on the "Detailed Hazards" tab on our main webpage.

| Location | Elevation (Feet) | 90% Chance 32F After | 50% Chance 32F After | 10% Chance 32F After |
|---|---|---|---|---|
| Bandon | 20 | Feb 15 | Mar 25 | Apr 21 |
| Gold Beach | 50 | Jan 2 | Feb 22 | Apr 3 |
| Medford Airport | 1330 | Mar 19 | Apr 13 | May 4 |
| Medford Ag Station | 1400 | Apr 6 | Apr 28 | May 19 |
| Ashland (*Cold Spot) | 1750 | Apr 25 | May 11 | May 31 |
| Grants Pass | 920 | Mar 23 | Apr 18 | May 9 |
| Cave Junction | 1280 | Apr 11 | May 1 | May 21 |
| Ruch | 1550 | Apr 24 | May 12 | Jun 4 |
| Roseburg | 420 | Feb 16 | Mar 21 | Apr 17 |
| Riddle | 680 | Mar 4 | Apr 2 | May 1 |
| Winchester | 460 | Feb 26 | Mar 28 | Apr 23 |
| Mount Shasta | 3590 | Apr 30 | May 19 | Jun 8 |
| Yreka | 2630 | Apr 28 | May 17 | Jun 3 |
| Klamath Falls | 4100 | May 5 | May 29 | Jun 23 |

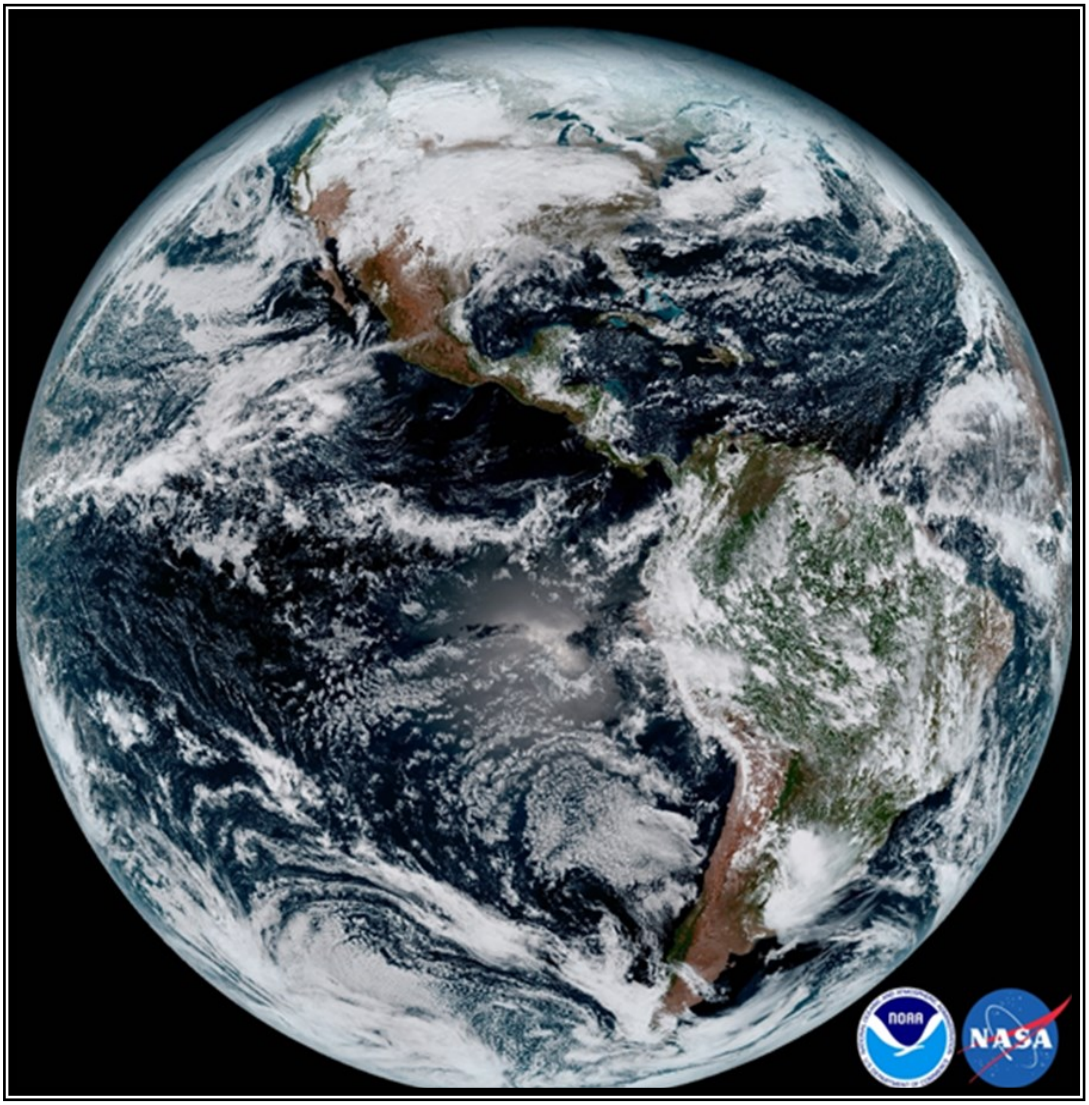
Graph above shows the chance of freezing temperatures for select locations around the forecast area. For a look at frost dates, visit the NWS Medford Ag page.

# GOES-16 First Images

By Marc Spilde, *Meteorologist*

**Note: All GOES-16 data posted here are preliminary, non-operational and are undergoing testing. Users bear all responsibility for inspecting the data prior to use and for the manner in which the data are utilized.**

After the launch of GOES-R from Kennedy Space Center in November 2016 and its successful placement in geostationary orbit, the first images from the satellite, now known as GOES-16, are hot off the press! The satellite's Advanced Baseline Imager (ABI), which boasts 3x more spectral channels, 4x greater resolution and more than 5x faster refresh rates than previous GOES imagers, broadcast its first images back to Earth in early January. They are spectacular.

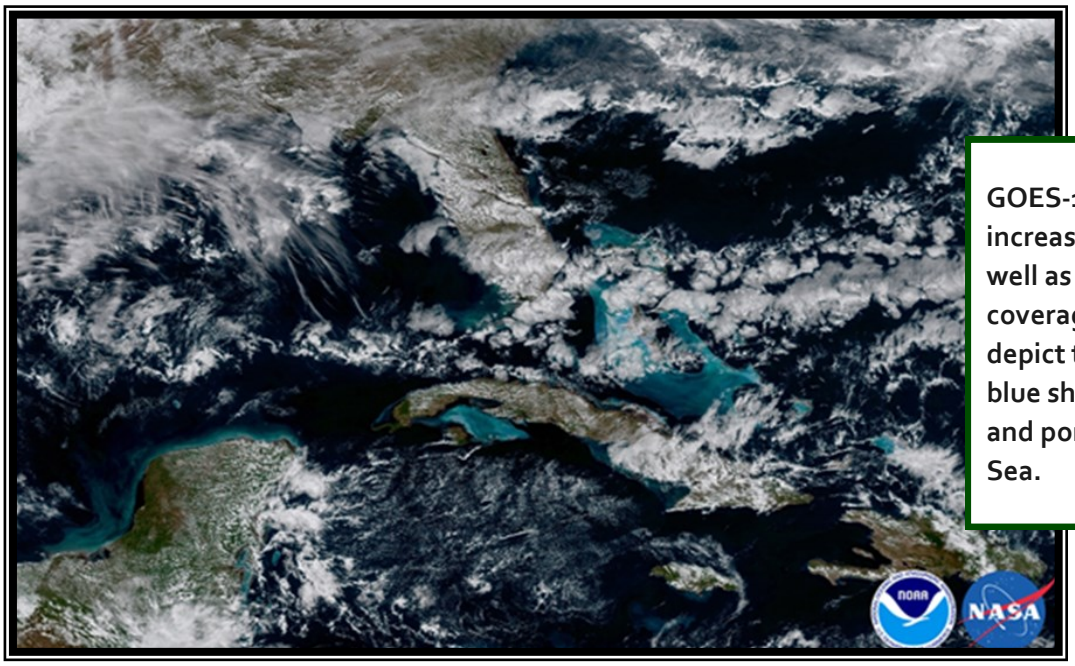



This "blue marble" full-color composite image was taken on January 15, 2017 using several of the satellite's new 16 spectral bands. This type of image will be produced every 15 minutes in the GOES-16 era, much faster and at much greater detail than with previous GOES satellites.

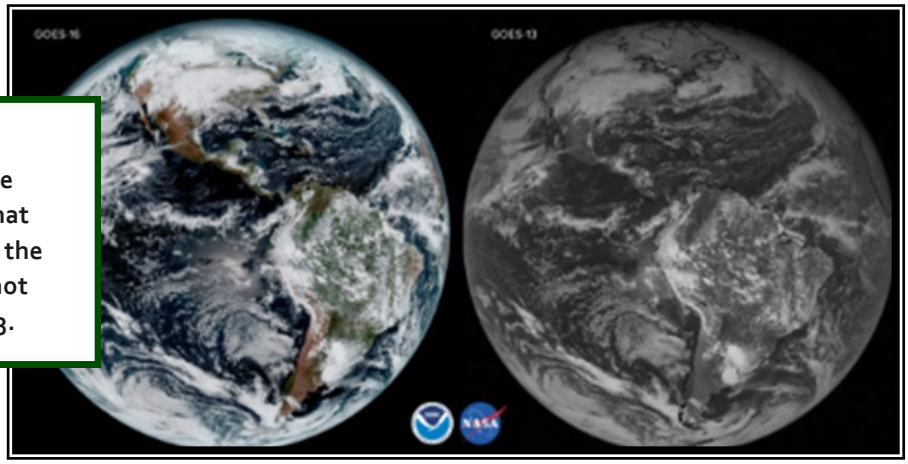
In May 2017, the satellite's operational orbit will be determined by NOAA's Office of Satellite and Product Operations and will be based upon the health and performance of the current GOES constellation (network of satellites) - GOES-13 (East), 14 (spare) and 15 (West). The satellite will then move to that location around November 2017. The next satellite in the 4th generation of GOES (GOES-S) is tentatively set for launch in March 2018.

There are seemingly limitless applications of the new imagery that weather forecasters will utilize to help provide more accurate and timely forecasts for all types of weather. The imagery will also help provide important impact-based decision support services and ultimately save lives and property.

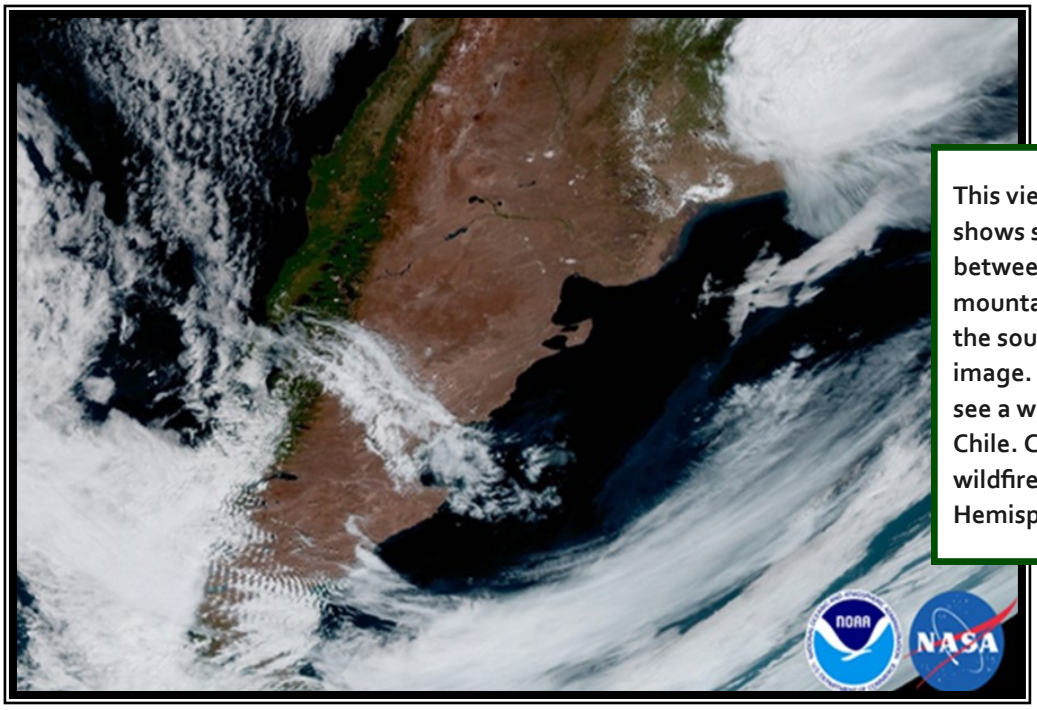
To see more of GOES-16's breathtaking images and animations, please check out NOAA's NESDIS (National Environmental Satellite Data and Information Service) site.



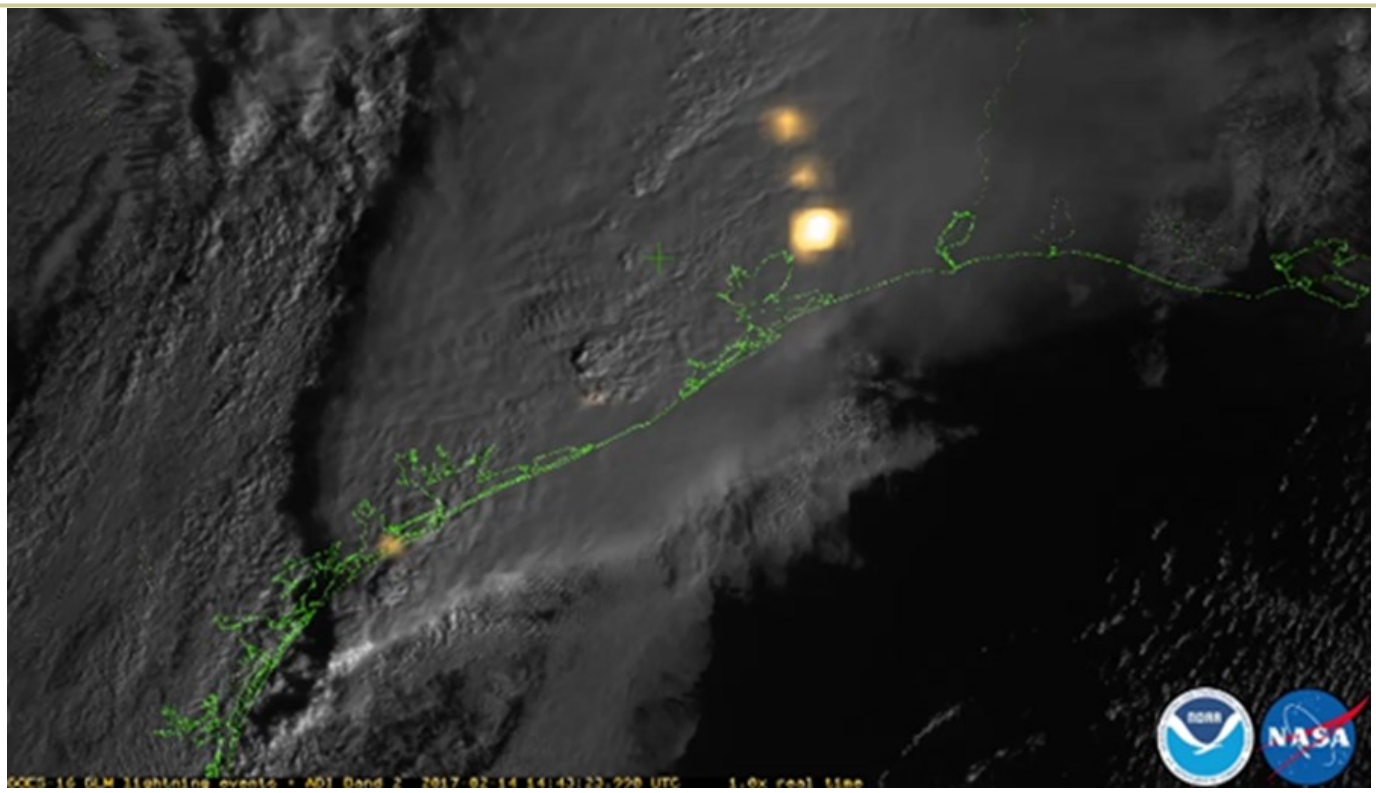
GOES-16 ABI shows off its increased spatial resolution as well as the enhanced spectral coverage, with the ability to depict the shallow waters (light blue shades) near the Bahamas and portions of the Caribbean Sea.



Imagers like GOES-13 (right), do not have the spectral capabilities that GOES-16 (left) has, so the "true color" image is not possible with GOES-13.



This view of South America shows striking differences between land & water, with mountain wave clouds evident at the southern portion of the image. If you look closely, you see a wildfire burning in northern Chile. Chile has been ravaged by wildfires in the Southern Hemisphere summer of 2017.

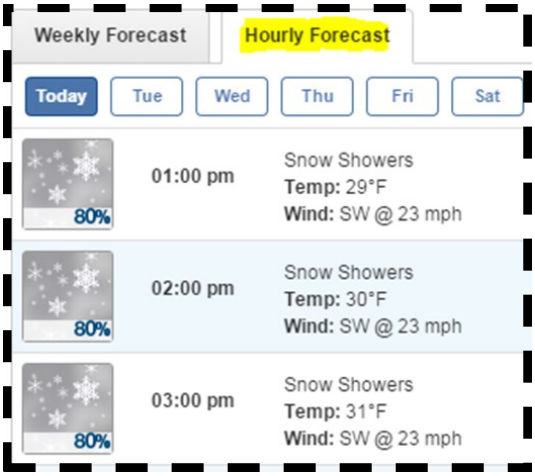


Another important instrument was packaged aboard GOES-16 and is called the Geostationary Lightning Mapper (GLM). This is the first instrument of its kind - the first lightning detector in geostationary orbit. Its first images were transmitted on March 6, 2017 (thunderstorms along the NE Texas coastline near Houston). These images provide critical information to forecasters, which will help them pinpoint more quickly the locations where severe weather is possible. Rapid increases in lightning (lightning jumps) are a signal of thunderstorm intensification, indicating the potential for severe weather.

## New Point Forecast Web Pages—Shad Keene, *Meteorologist*

You will soon notice a change (scheduled for early April) to point forecast web pages, the site-specific forecasts that users bookmark or access by weather.gov/medford or weather.gov. Much of the work on these web pages is behind the scenes, but there are some important improvements that should create a better user experience. First, there will be easy access to hourly forecast data via the "Hourly" button, highlighted in the image below. If you've ever wondered, "What's the temperature going to be at 11am?", this is now the easiest way to find that information in plain language.

Additionally, for a mobile device, the page will automatically detect your location if you allow it. This is not new technology, but it's new to NWS point forecast pages and should make it easier to find forecasts on the go. Lastly, there will be a change to the way you view hazard products. If you find it beneficial to read our weather hazard text products (Winter Storm Warnings, etc), the links to these products will be available via clicking a drop-down menu entitled "Click here for hazard details and duration", highlighted below in yellow.




So please explore these pages and tell us what you think by using the comments/questions link at the bottom of the point forecast web page. We appreciate your feedback and want to develop and maintain web pages that serve your needs as much as possible.

# Oroville Dam vs Lost Creek Dam

## *Could the same problem happen?*

Spencer Higginson, *Service Hydrologist*

The Oroville Dam captured the nation's attention this winter. Intense rainfall and massive snowmelt oftentimes has serious consequences. The problem at Oroville arose when a relatively small spot on the spillway was damaged. Within the drainage area above the dam, there was a snow pack of 150+% above normal. Combine that with continuous heavy rain and you are asking a lot of a dam trying to capture that amount of water. Once they tried to release water to prepare for the huge inflows and to prevent the use of the emergency spillway, the small damage worsened quickly. This forced them to reduce the amount of water to try to avoid further damage. Even so, it led to damage and evacuations and unintended impacts that are still being realized. This article is not meant to critique how the Oroville Dam has been managed. We just don't know enough yet. Instead, this is to give a little background before comparing it to the largest dam within the Medford Weather Forecast Office area of responsibility which is the Lost Creek Dam (aka William L. Jess Dam) on the Rogue River which forms Lost Creek Lake in Jackson County, Oregon.

Oroville Dam Spillway with significant erosion damage on Feb 28th, 2017. Glancing at the workers on the spillway gives you a sense of the enormity of the situation. Photo credit: Mercury News

While the Oroville and Lost Creek dams are similar in that they are both earth-fill dams, the Oroville Dam is substantially larger than our local Lost Creek Dam. The height of the Oroville dam is 770 feet and is the tallest dam in the United States. In comparison, the Lost Creek Dam is only 327 feet high. The drainage area above Lost Creek Dam is 674 square miles. The drainage area above the Oroville Dam is roughly 3,600 square miles. The capacity of a reservoir is measured in acre-feet. An acre-foot is how much water it would take to cover 1 acre with 1 foot of water. The capacity of Lost Creek Lake is 465,000 acre-feet while the capacity of Oroville is around 8 times greater at 3,537,577 acre-feet. The Oroville Dam spillway has a capacity of 250,000 cubic feet per second (CFS). To put that into perspective, the Rogue River has only surpassed 100,000 CFS twice in its recorded history. So the Oroville spillway was built to handle a mind-boggling amount of water. The spillway at Lost Creek Dam is cut through bedrock and is lined with concrete in some areas and transitions to exposed

Spillway gates at Lost Creek Dam (Jackson County Oregon), from the lake side (right) and spillway side (left). Photo Credit: Misty Duncan, NWS Meteorologist

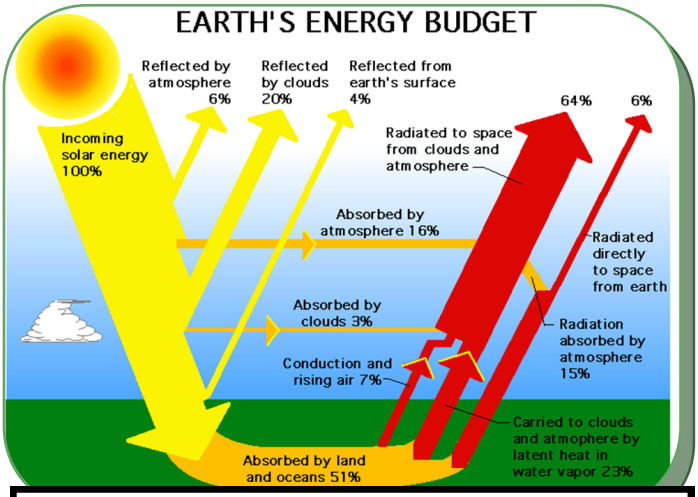
View of the spillway from above the spillway gates. Photo Credit: Misty Duncan, NWS Meteorologist

bedrock in others. The benefit to being contained within the bedrock, the spillway itself has very little risk of developing a problem. The weakest point of the spillway is the gates that would allow water to flow down the spillway. The spillway has never been needed at Lost Creek, but the gates are tested regularly to ensure that they will function accordingly should the need ever arise.

# Why Isn't the Longest/Shortest Day also the Hottest/Coldest Day?

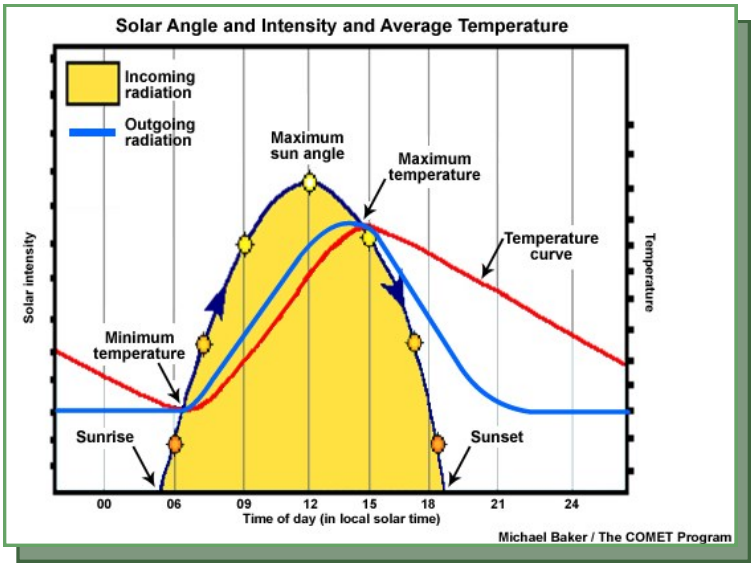
Misty Duncan, *Meteorologist Intern*

In the previous edition of the Crater Chronicle, I explained that the Earth has seasons due to the tilt of its axis. This tilt causes the focus and intensity of the sun's heat to vary throughout the year. It is most intense on the summer solstice and is least intense on the winter solstice. If the sun's heat is most intense in the middle of June, then why is it that the Northern Hemisphere typically experiences the hottest temperatures in July and August? Conversely, if the sun's heat is least intense in December, then why do the coldest temperatures occur in January and February? The short answer is that there is a lag in seasonal temperatures because of the earth's energy budget.




https://pmm.nasa.gov/education/lesson-plans/global-energy-budget

There are many different ways the earth handles the incoming solar radiation. Computer models use a complicated equation, but it basically boils down to what comes in vs what goes out. Looking at the figure to the right, about 30% of incoming radiation is bounced back out of the atmosphere either by the atmosphere itself, clouds, or the earth's surface while about 20% of the sun's heat is absorbed by the atmosphere and clouds. That leaves about half of what comes in to be absorbed by the oceans and land surfaces. Eventually, the earth will emit the same amount of energy it received back out to space (outgoing radiation). However, the earth takes longer to release that same amount of energy than it does to absorb it. This delay is the reason the hottest and coldest temperatures lag behind the days in which the maximum/minimum amount of incoming solar radiation occur. Although incoming energy from the sun is at its peak in June, it is still greater than the amount of outgoing energy from the earth. When the incoming matches the outgoing , the warmest/coolest temperatures occur.



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## Our Vision

*Professionals focusing on science, teamwork, and customer service to design and deliver the best decision-support information to our community.*

## Our Mission

*Our team at the National Weather Service Office in Medford strives to deliver the best observational, forecast, and warning information through exceptional customer service, extensive training and education, maintaining quality electronic systems, and relying upon an outstanding team of weather spotters and cooperative observers. We do this within the overall mission of the NWS to build a Weather-Ready Nation:*

*To provide weather, hydrologic, and climate forecasts and warnings for the United States, its territories, adjacent waters and ocean areas, for the protection of life and property and the enhancement of the national economy. NWS data and products form a national information database and infrastructure which can be used by other governmental agencies, the private sector, the public, and the global community.*

## Our Values

*Trust, Integrity, Professionalism, Service, Teamwork, Ingenuity, Expertise, and Enthusiasm.*

## About Us

The Weather Forecast Office in Medford, Oregon, is one of more than 120 field offices of the National Weather Service, an agency under the National Oceanic and Atmospheric Administration and the United States Department of Commerce. The Weather Forecast Office in Medford serves 7 counties in southwestern Oregon and 2 counties in northern California, providing weather and water information to more than a half-million citizens. We are also responsible for the coastal waters of the Pacific Ocean from Florence, Oregon, to Point St. George, California, extending 60 miles offshore. The office is staffed 24 hours a day, 7 days a week, and 365 days a year by a team of 26 meteorologists, hydrologists, electronic technicians, hydrometeorological technicians, and administrative assistants, under the direction of Meteorologist-In-Charge John Lovegrove.