NATIONAL WEATHER SERVICE - MEDFORD, OREGON

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The Crater Chronicle

Have a question you'd like to see answered in the next edition? Send it our way! The next issue will be published in March 2017 for the Spring edition.

Submit a Question for the Next Issue of the Crater Chronicle's "Ask A Meteorologist" Column!

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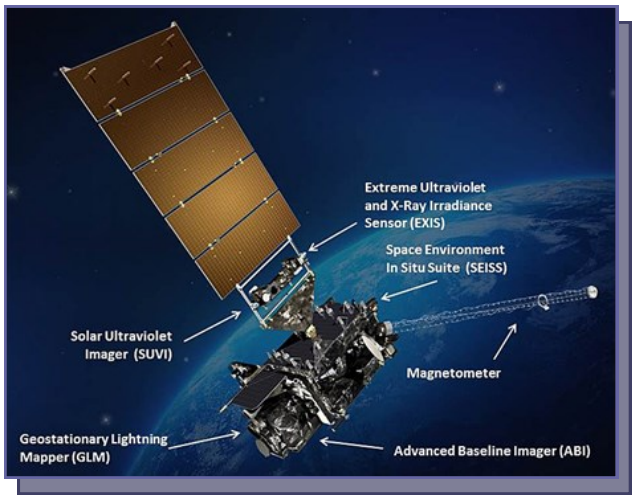
INSIDE THIS ISSUE

GOES-R SATELLITE LAUNCHES ~ NOW GOES-16

Marc Spilde, *Meteorologist*



The National Oceanic and Atmospheric Administration (NOAA), in a joint effort with the National Aeronautics and Space Administration (NASA), successfully launched the first in its next generation of satellites into space with the launch of GOES-R from Kennedy Space Center, Cape Canaveral, FL, on November 19, 2016. NOAA's GOES (Geostationary Operational Environmental Satellite) program supports weather forecasting, severe storm tracking, space weather monitoring and meteorology research. At 6:42 pm EST, a United Launch Alliance Atlas V 541 rocket lifted off from Space Launch Complex 41 carrying the GOES-R payload into space.

Ten days later, the satellite reached geostationary orbit (altitude ~22,300 miles) around Earth and is now officially known as GOES-16. GOES-16 will remain in its checkout (test) location at 89.5 degrees West longitude for approximately one year. After the testing phase is complete, the satellite will be deployed to its operational location, which is yet to be determined. Three more satellites in the GOES-R series (GOES-S, T, and U) are scheduled to launch over the next eight years. These will eventually replace the current suite of Western Hemisphere satellites (GOES-13, 14, and 15) and GOES-S is next in line for launch in March 2018. Each satellite in the GOES-R series is designed for 10 years of on-orbit operation preceded by up to five years of on-orbit storage. This is expected to extend the GOES mission through at least 2036.

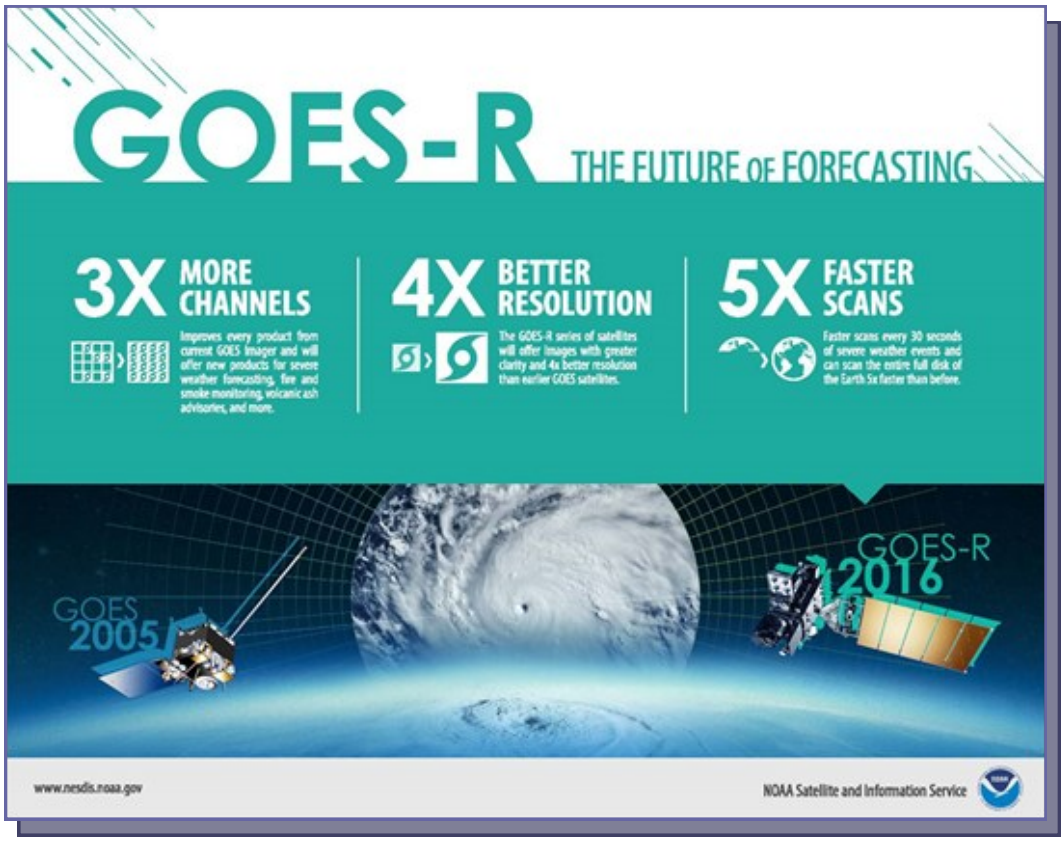
NOAA satellites maintain a vital role in providing complete and uninterrupted views of atmospheric conditions. These are essential for the prediction of all weather phenomena, from large mid-latitude cyclones to severe local storms. The GOES-16 spacecraft, with the Advanced Baseline

Photos: United Launch Alliance

Imager (ABI) and the Geostationary Lightning Mapper (GLM) instruments onboard, will provide the near-continuous imagery and atmospheric measurements of Earth's Western Hemisphere, including total lightning data. These two atmospheric instruments combined with four other solar and space weather monitoring instruments will raise environmental awareness to new heights.

GOES-16 marks a technological advance in geostationary environmental observations. Compared to the current GOES system, the instruments and data processing provide:

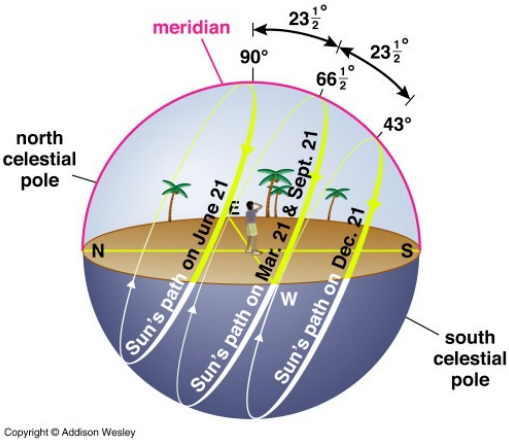
- Three times more spectral data
- Four times better spatial resolution
- Five times faster coverage
- Real-time mapping of total lightning activity
- Increased thunderstorm and tornado warning lead time
- Improved hurricane track and intensity forecasts
- Improved solar x-ray flux monitoring
- Improved monitoring of solar flares and coronal mass ejections
- Improved geomagnetic storm forecasting



The collective observations from GOES-16's ABI and GLM will offer new observing capabilities to improve forecasts for a variety of phenomena including tropical and mid-latitude cyclones, thunderstorms, coastal fog, low clouds, air quality, high winds, ocean turbidity, wildfires, volcanoes and changing climate conditions.

Astronomy Happenings

Misty Duncan, *Meteorologist Intern*

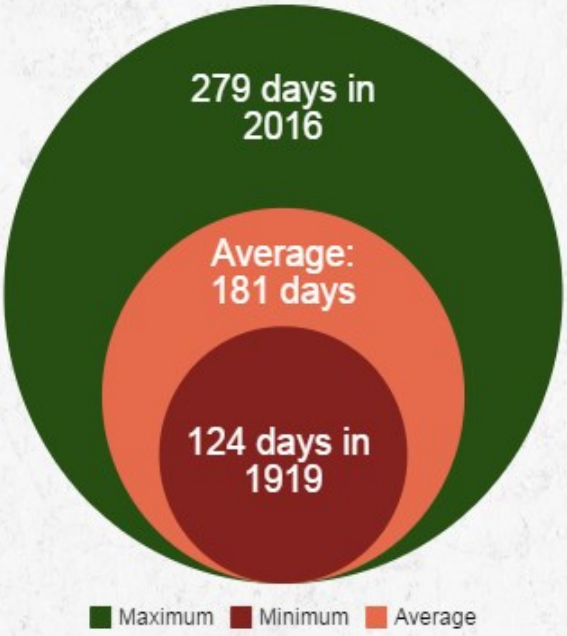


Winter Solstice: December 21st, 2:44 am PST

The astronomical start of winter fell on Wednesday December 21st at 2:44 am PST. The winter solstice marked the time when the Northern Hemisphere had completely tilted away from the sun. The sun's rays were at it's least intensity in the Northern Hemisphere because the position of the sun was at its farthest point south of the equator; directly over the Tropic of Capricorn in the Southern Hemisphere. After the winter solstice, the Northern Hemisphere will continue tilting toward the sun until it reaches the summer solstice; marking the astronomical start of summer. The winter solstice also marked the shortest day of the year. On this day, there were only 9 hours of daylight in southwest Oregon! Compare this to the summer solstice on June 20th when there are 15 hours of daylight!

Medford's latest first frost/freeze dates on record!

Number of Days between Freezing Temperatures



Medford's Airport records go back to 1911!

2016 Growing Season Records:

- Longest number of days between freezing temperatures: 279 days
- Earliest last freeze date: 2/29/2016
- Latest first freeze date: 12/5/2016
- Ties for longest number of days between frost: 205 days
- Latest first frost date: 11/18/2016

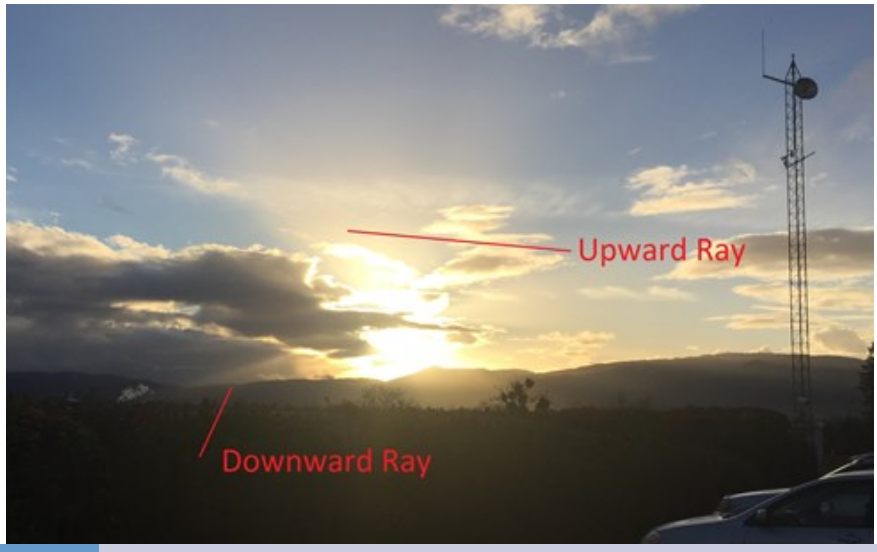
Optical Phenomena - Part 3

John Lovegrove, *Meteorologist-In-Charge*

This is the final installment on optical phenomena. The first two parts discussed phenomena caused by water drops and ice crystals. This part covers everything else.

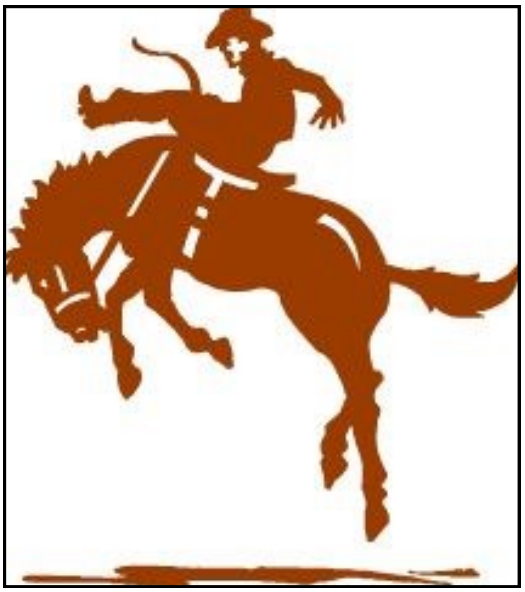
The first question is a very basic one - why is the sky blue? Sunlight is a mix of all the colors of the visible spectrum - from violet to red. The violet and blue light has the shortest wavelengths while red is the longest. The wavelength of blue light is around 450 nanometers. The molecules in Earth's atmosphere scatter that light by a process known as Rayleigh scattering. All colors of light are affected by the scattering but blue is scattered the most. That gives the sky its color. The blue isn't uniform with a deeper, darker blue overhead fading to near white at the horizon. The change in color is due to the amount of atmosphere the light has to pass through to reach our eyes. Towards the horizon, the light passes through quite a bit of air so the other colors are also scattered. When all the colors combine together, it makes white. Straight overhead, the atmosphere is at its thinnest so only the blue shows.

Another common sight in the sky are crepuscular rays. These are the beams of light coming out between clouds. These are simply beams of sunlight shining through clouds that become visible due to dust and other particles in the air. The dark areas are the shadows of the clouds. The rays can seem to converge towards the sun. This is due to the observer's perspective; similar to standing on railroad tracks are seeing the rails converge in the distance. The rays can point either upward or downward depending upon the angle of the sun to the clouds.



Weather Spotters - Time to Get Back in the Saddle

Ryan Sandler, *Warning Coordination Meteorologist*



With all the technology available to us, you may be surprised to hear that weather spotters are our most important asset when the weather turns bad. Satellites show the top of clouds and moisture in the atmosphere. Doppler radars show where precipitation is likely falling and winds above the surface. The weather balloon data is valuable for forecasting but is only launched twice a day from our office. Weather stations have useful information but can be spaced far from one another. We even use webcams, mainly from ODOT and Cal-Trans, but a picture can't give you all the details and these are used mainly during the daytime.

We have more than 1000 weather spotters on our list but only hear from a tiny fraction of you when the weather is significant or severe. **We want to hear from you!** Sometimes we will call you if we think there may be severe weather at your location but it's much better to for you to call us first. Especially since you may see something that we don't even know is going on! Never assume we already know. Even is we already do, then your report will help us to confirm what we think is occurring. Our weather reporting criteria can be found at http://www.wrh.noaa.gov/mfr/skywarn/data.php. We have different criteria for different regions. An inch of rain in a day at the coast is no big deal but an inch of rain in a day in Klamath Falls is very rare. If you have lived in your area for a long time, then you know best when the weather is unusual so the expression "you know it when you see it" applies for calling us.

Most of the spotter reports we do receive are from fall through spring as storms move across the region with heavy rain, snow, or high winds. The summer is our quieter time but we do get some severe weather. There is an educational website where you can register for free online spotter training at https://www.meted.ucar.edu/. Online classes include the "Role of the Skywarn Spotter" and "Skywarn Spotter Convective Basics". These two online classes combined will take you around 2 hours to complete.

If you are interested in setting up a home weather station, then the best training you can find is at http://www.cocorahs.org/. CoCoRaHS is an acronym for the Community Collaborative Rain, Hail and Snow Network. CoCoRaHS is a national grassroots, non-profit, community-based, high-density precipitation network made up of volunteers of all ages and backgrounds who take daily measurements of precipitation right in their own backyards. Volunteers report their daily observations on their interactive website and these observations are viewable in both map and table form within a few minutes. All you need is a basic 4 inch rain gauge which is about $40 including shipping while a full weather station can range from $150 to $500+. CoCoRaHS also has many free weather and climate webinars you can watch going back to 2011.

Weather spotters...it's time to get back in the saddle and give us a call with your spotter-only phone number we provided. When you call, give us your spotter ID and tell us about the significant weather and when it occurred. If you don't remember your spotter ID, then give us your name and location and we'll look it up.

Why does the Earth have Seasons?

Misty Duncan, *Meteorologist Intern*

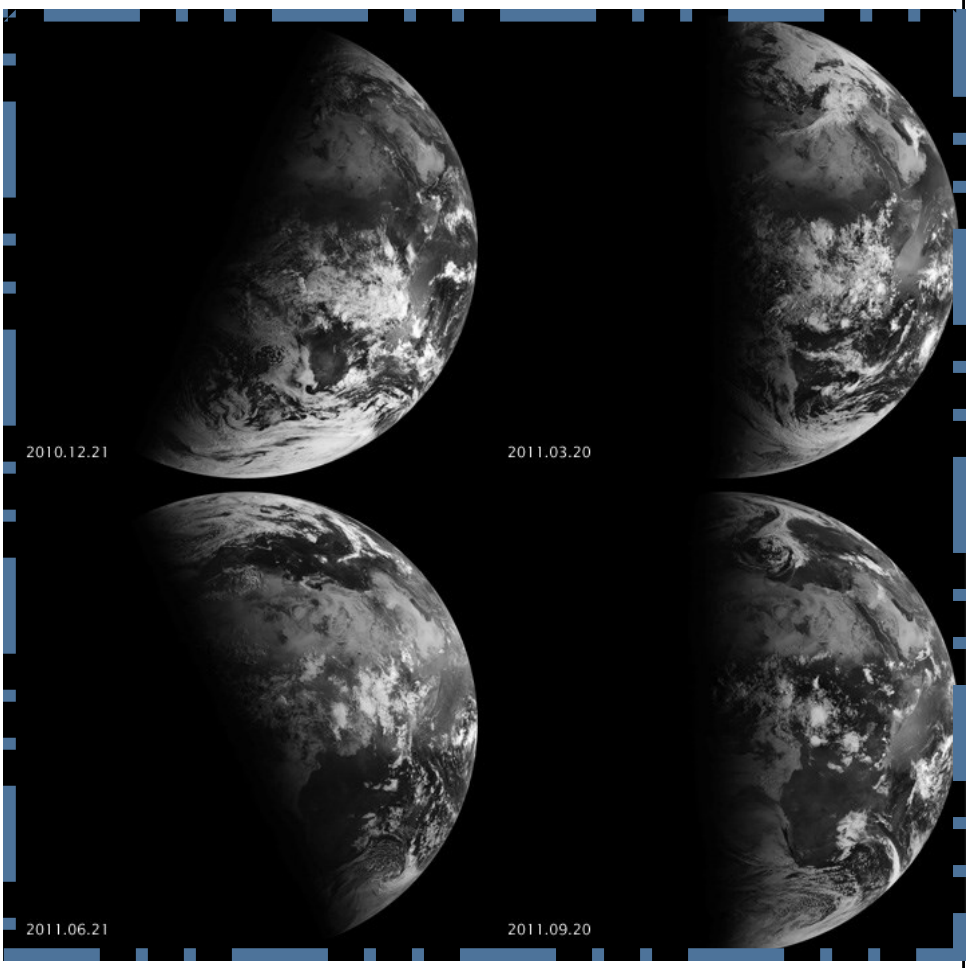
Before I knew anything about meteorology, I believed the reason we had seasons was because of the distance between the earth and the sun. I thought that the earth was at its furthest from the sun in January and closest in July and that was why it is cold in January and hot in July. Boy was I wrong! If that were the case, then why does the southern hemisphere have their summer (winter) while the northern hemisphere has winter (summer)? Why does the earth even have seasons to begin with? I understood that the sun is responsible for the weather we experience on this planet, but what I didn't realize was that it's the differences in intensity of the sun's heat that drives the change in the seasons.

So what changes the intensity of the sun's heat? It's all due to the tilt of the earth, which changes the distribution of the sun's heat at different times of the year. As the earth travels around the sun, the focus of sun's heat and intensity varies because of the 23.5° angle tilt of the earth's axis. This tilt causes the top and bottom halves of the earth (hemispheres) to tilt either toward or away from the sun during its orbit. Summer occurs in the hemisphere which is tilted ***toward*** the sun. When that hemisphere is tilted toward the sun, the sun's heat is the most intense and direct, making for warmer temperatures. The opposite is true for the hemisphere that is tilted ***away*** from the sun; they experience winter. When the hemisphere is tilted away from the sun, the sun's heat and intensity is much less, which makes temperatures much cooler.

Solstices/Equinoxes: You've probably heard of the summer and winter solstices and/or the vernal and autumnal equinoxes. These celestial events mark the instances when the tilt of the earth has caused the sun to be either at its highest point in the sky (summer), the lowest (winter) or the sun is directly over the equator. When the hemisphere has tilted as far as it will toward (away from) the sun, this is called the summer (winter) solstice. These are also either the longest days (summer solstice) or longest nights (winter solstice) of the year. After this point, the earth's tilt will cause the focus of the sun's heat and intensity shift to the opposite hemisphere. The equinoxes mark the time between the solstices where the sun is directly over the equator. The word equinox is Latin for "equal night" and is used because on these days there are equal amounts of daytime and nighttime hours. The exact amount of time varies by latitude, but to give you an idea on the length of daylight, the amounts for Medford, Oregon are listed below:

⇒ Summer Solstice: 15 hours of daylight
⇒ Winter Solstice: 9 hours of daylight
⇒ Equinoxes: 12 hours of daylight/ nighttime

So if the sun's heat is at its most intense on the summer solstice, why isn't it the warmest day of the year? Or why isn't it the coldest day of the year on the winter solstice? Stay tuned to the next edition, where I'll explain this time lag which is due to the earth's energy budget.



Satellite images from the EUMETSAT's Meteosat-9, showing sunlight distribution on each of the equinoxes and solstices. Notice the bottom right, the summer solstice, there is more sunlight focused on the northern hemisphere vs the southern hemisphere. Compare that to the top right, where there is more sunlight focused on the southern hemisphere during which they are experiencing summer and the northern hemisphere is experiencing winter. Photo credit: NASA

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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.