

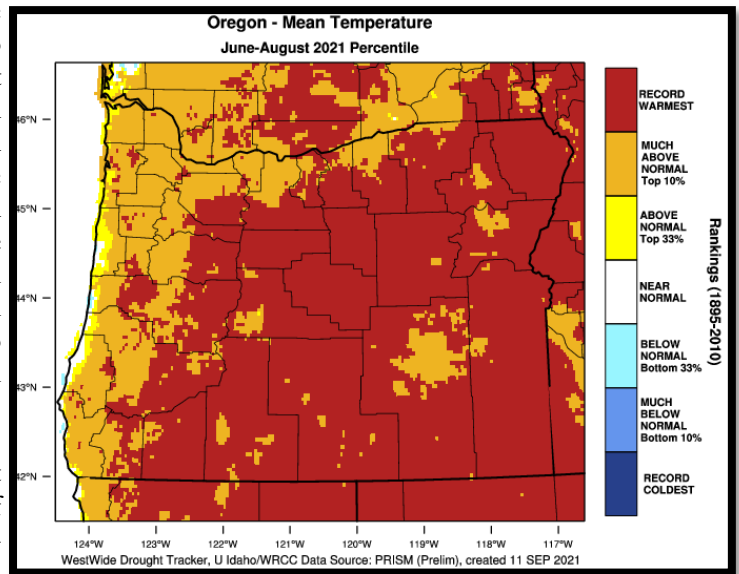


## 2021 - The Hottest Summer on Record

Ryan Sandler, *Warning Coordination Meteorologist*

Away from the pleasant relief of the coast, it sure felt like the hottest summer ever, but was it? First we have to define when summer is. Meteorologists define the months of June, July, and August as meteorological summer. Astronomical summer begins with the summer solstice, which occurred this year on June 20th, and ended on September 22nd. Because I'm a meteorologist, I'll go with meteorological summer.

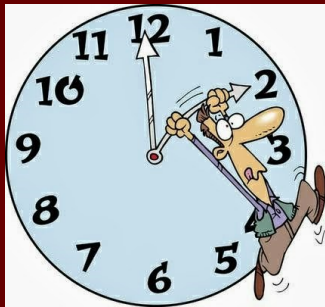
If we look at the average temperature graphic to the right, we see that much of inland southern Oregon and far northern California saw the warmest summer on record. Closer to the coast it was near normal around Coos Bay and Bandon, but above to much above normal elsewhere.



The most notable heat was toward the end of June with a record-smashing heat wave. On June 27th and 28th, Medford reached 113 and 115 degrees, respectively. The 115 degrees tied the all-time record high. Nearly all of the hottest temperatures typically occur between mid July and early August, so having these extremes in late June was unprecedented. Medford reached 100+ degrees on 23 days during this summer, tying the record set in 1990. Even Klamath Falls came within one degree of its all-time record when it rose to 103 degrees on June 28th. Roseburg shattered their all-time high record with 114 degrees on June 27th. Their previous record high was 109 degrees.

June and July were the biggest contributors to the record heat. August was barely above normal, partially because there was so much wildfire smoke across the region. August into early September saw many days with poor air quality across eastern Douglas, Jackson, Klamath, Lake, Siskiyou, and Modoc counties. This period of bad air quality rivaled the bad air quality of late July through August of 2018. I think for most people, the combination of heat, drought, and smoke made it a summer to dream about a wet winter.

Fall Began September 22nd at 12:20 pm PDT.



Daylight Savings Time Ends November 7th! -

Remember to Set Your Clocks Back One Hour!

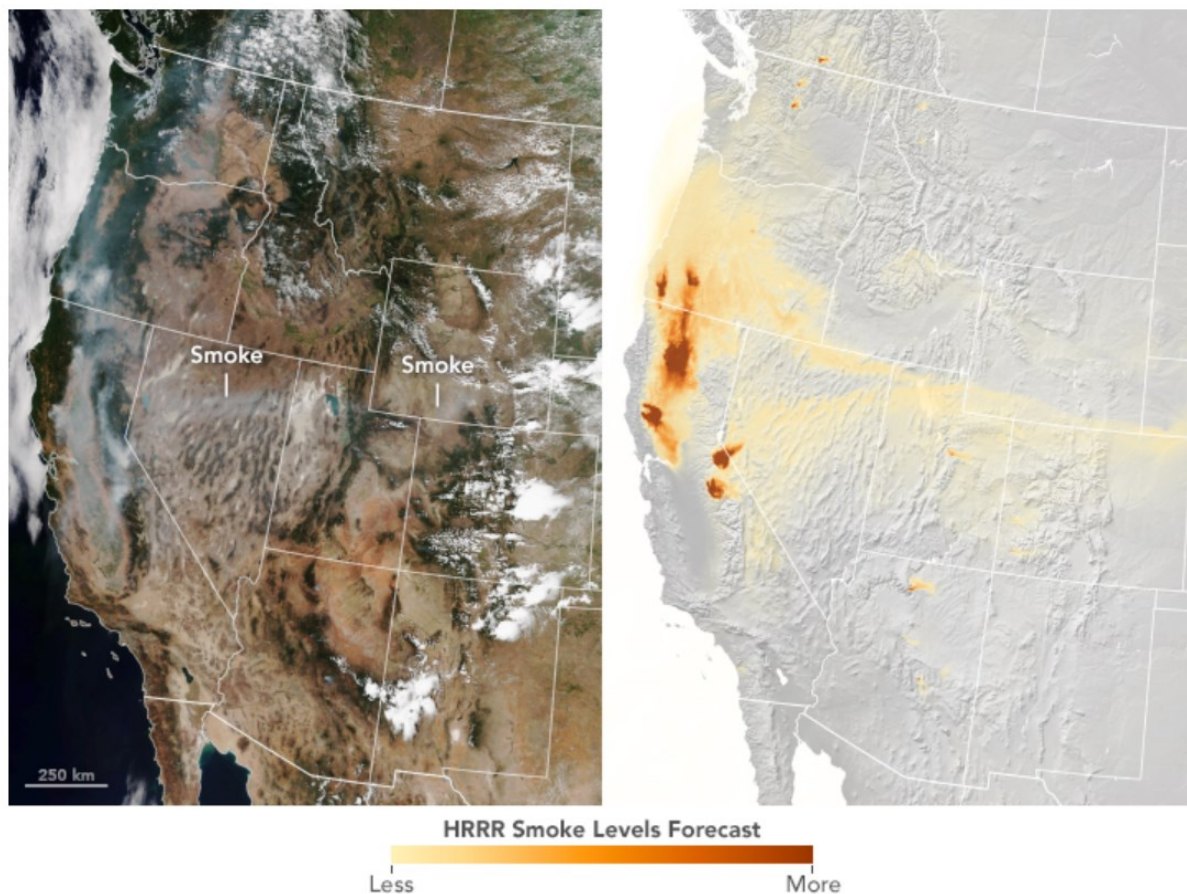
### INSIDE THIS ISSUE

- 2021—Hottest Summer on Record 1
- Atmospheric Rivers* 2
- Smoke's Cycle in the Atmosphere* 3
- Staying "Weather Aware" While on Vacation* 4
- About Our Office and How to Contact Us* 5

## Smoke's Cycle in the Atmosphere

Charles Smith, *Meteorologist*

Someone recently called our office and asked how smoke is removed from the atmosphere. It's a fair question because it's not instantly obvious. Smoke is essentially particulate matter generated by wildfires, campfires or wood stoves. In years past, we've seen smoke and hazy skies in southern Oregon arrive from as far as eastern Russia! That's a very long distance for particulate matter to travel without sinking out of the atmosphere. So why doesn't it just keep swirling around the atmosphere and never fall out? There are two ways smoke is removed from the atmosphere. The first is called dry deposition and it describes the process of gravity pulling the smoke particulates to the surface of the earth, where the particles collide with solid objects, like roads, buildings or trees. Stronger winds and turbulence can aid in this collision process as well as dispersing the smoke into other regions, like the Russia example above. The last process is called wet deposition and it describes the process of how water droplets remove the smoke from the atmosphere. When it rains, the falling raindrop collides with the smoke particle, pushing it to the earth more efficiently than dry deposition. Another way this happens is when smoke particles are used as the centerpiece for cloud droplets, which allows the cloud droplet to form before it rains. These two wet deposition processes are called below-cloud scavenging and in-cloud scavenging respectively. Now you know how smoke is removed from the atmosphere! Dry deposition is the more likely process around this region, although the occasional thunderstorm or rain shower can help clear out the smoke.



Left: VIIRS satellite image showing smoke spread across the western US. Right: Modeled smoke output from the HRRR Smoke Model, corresponding to the smoke depicted on the satellite image on the left.

Image credit: <https://earthobservatory.nasa.gov/images/144190/which-way-will-the-smoke-go>

## Ensemble Modeling Aids in Forecasting Atmospheric Rivers

Mike Stavish, *Science Operations Officer*

With the seasons changing, we'll begin hearing more about atmospheric rivers. Atmospheric Rivers (ARs) are long, narrow bands of high water vapor transport in the atmosphere, which tend to bring large amounts of rainfall to the parts of the west. In the past, one particular flavor of atmospheric river was made popular by its long approach to the west coast with roots near Hawaii - known as the "Pineapple Express."

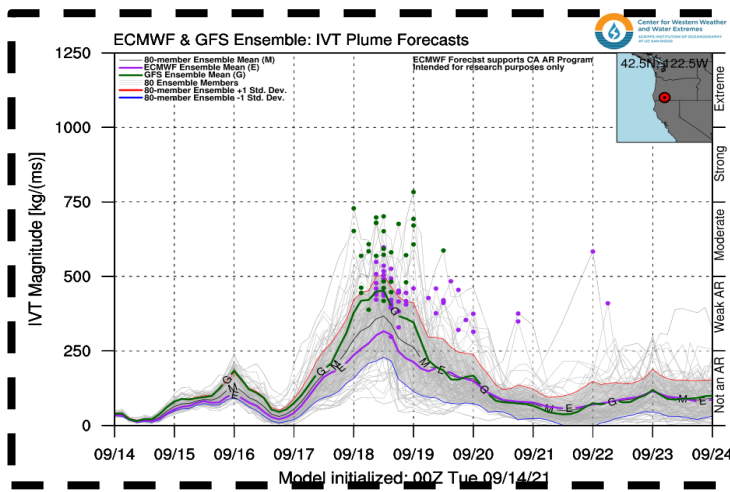


Fig 1. An IVT "plume" forecast showing various magnitudes within a multi-ensemble model AR forecast.

We look at atmospheric rivers by defining them in terms of integrated vapor transport, or IVT. The moisture (water vapor) within an atmospheric river is normally concentrated in the lower atmosphere and aligned in advance of a cold frontal system. As the flow carrying the moisture (the transport) impinges upon the coastal terrain, unusually large amounts of rainfall can occur. In our region, a fair percentage of wintertime precipitation occurs with AR events.

Forecasters have many tools to use when forecasting the impacts of atmospheric rivers. Understanding the potential strength of an AR both in terms of integrated vapor transport (IVT) and duration are important. In addition, forecasters can look at the potential impacts to inland areas as well as coastal areas. A couple of commonly used tools are shown above and to the right. Figure 1 above is an ensemble IVT plume forecast from the Center for Western Weather and Water Extremes at SCRIPPS, UC San Diego. This tool allows forecasters to visualize the potential strength and location of an AR. Figure 2 to the right is an ensemble-based return interval forecast developed at the National Weather Service Western Region Headquarters in Salt Lake City. This image aids forecasters in understanding the rarity of an AR event by placing it into historical context.

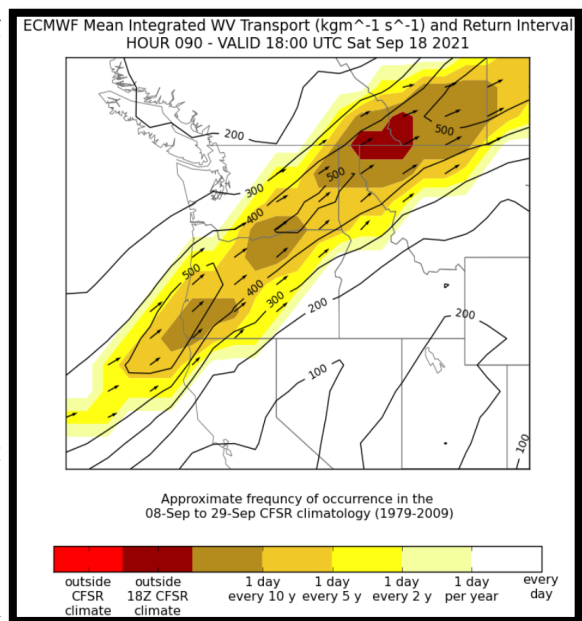


Fig 2. An ensemble-based "return interval" forecast, showing the rarity of the AR event against climatology.

# Staying “Weather Aware” While on Vacation

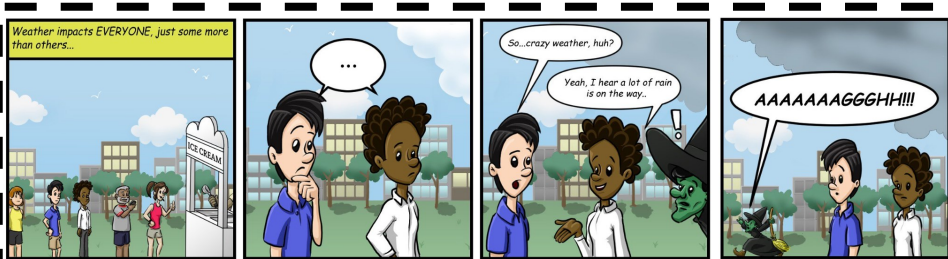
Miles Bliss, *Meteorologist*

Recently, meteorologist Miles Bliss was on leave, taking a vacation in St. Louis, MO to visit friends and old classmates. The Central US was coming out of its own heat wave and had Gulf moisture moving into the area. Towards the end of the trip, thunderstorms formed along a cold front that had stalled over the area. The thunderstorms began to train and back-build, which is a scenario that commonly results in flooding. Miles had read up on the heat impacts in the area and knew that thunderstorms were in the forecast towards the end of his trip. He made sure that plans for outdoor activities or major traveling were kept out of peak heating and limited during thunderstorm days. A fortunate thing considering the road he was staying on flooded. Where it was safe enough to measure for a weather report, Miles measured sixteen inches of water, and this was more than enough to strand multiple vehicles over the course of an hour. Remember, turn around, don't drown!



Flash flooding along Lindell Blvd. in St. Louis, Missouri. The water measured sixteen inches along the side of the road where it was safe to measure. Three cars were stranded and two needed to be pulled off the road when flooding subsided due to water entering the engine  
Photo Credit: Miles Bliss

Locally, in SW Oregon, there are a variety of outdoor activities across many diverse geographic areas. Each one brings you to a region with unique weather risks depending on the time of year. It makes it difficult enough to keep track of it all, let alone the hazards in other parts of the country.



Let's take the southern Oregon coast for example, a popular vacation destination in our area. There are signs on tsunami awareness and sneaker waves along the beaches. Have you read those? Sneaker waves and rough surf are other common hazards along the coast and will increase in commonality as we head into the winter months.

A promotional banner for weather.gov. On the left, it says "KNOW BEFORE YOU GO!" in large blue letters. Below that, it says "Visit weather.gov on your computer...". In the center, there is a laptop displaying the weather.gov website. To the right, a hand is holding a smartphone. Text next to the phone says "...or mobile.weather.gov on your phone!" and "Know the latest conditions and weather alerts!". The NOAA logo is in the bottom right corner.

The best way to stay weather aware begins by monitoring current weather forecasts. Pay attention to the types of weather being predicted and look up the hazards it may bring with the [NWS safety information campaigns](#). Always be sure you have a way to receive alerts.

While in St. Louis, Miles was alerted to the flooding via NOAA weather radio. You may also receive alerts via your cell phone or through a news source. And of course scanning the skies overhead is a tried and true way to get a sense of how the weather is developing around you.

## NATIONAL WEATHER SERVICE - MEDFORD, OREGON



National Weather Service  
Medford Weather Forecast  
Office  
4003 Cirrus Drive  
Medford, OR 97504-4198



Phone: (541) 773-1067

Fax: (541) 776-4344

[ryan.sandler@noaa.gov](mailto:ryan.sandler@noaa.gov)

Newsletter Editor:

Misty Firmin, Meteorologist

[misty.firmin@noaa.gov](mailto:misty.firmin@noaa.gov)

## Visit Our Website!

<http://www.weather.gov/medford>



[www.facebook.com/NWSMedford](http://www.facebook.com/NWSMedford)



[www.twitter.com/NWSMedford](http://www.twitter.com/NWSMedford)

## 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, hydro-meteorological technicians, and administrative assistants, under the direction of the Meteorologist-In-Charge, Christine Riley.

## 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.*

