

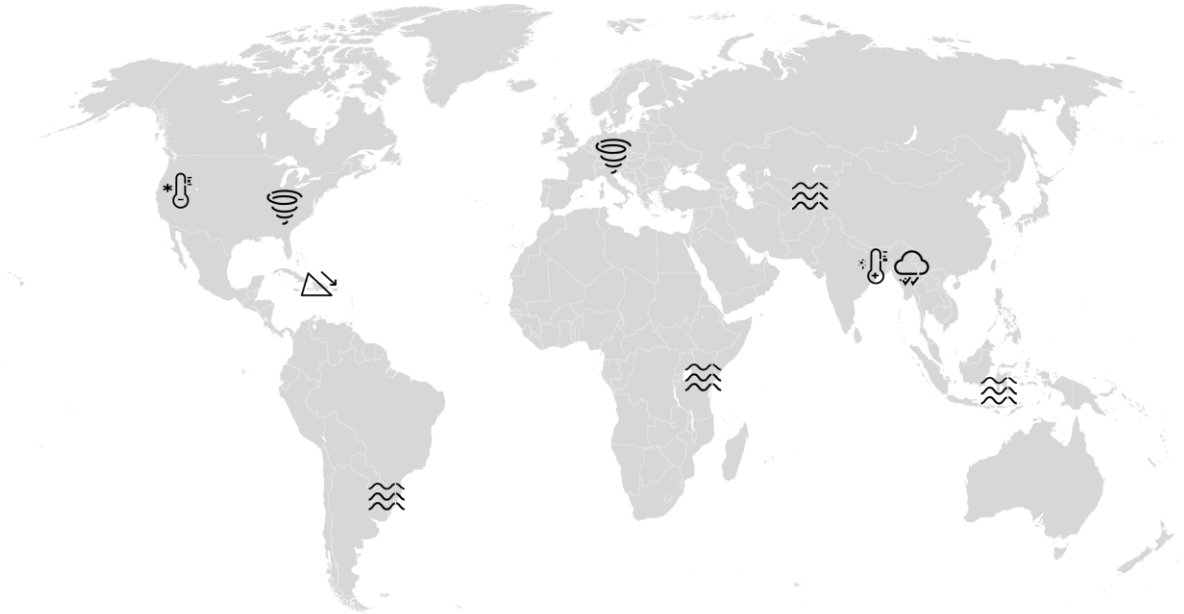
AON

Weekly Cat Report

May 10, 2024



Executive Summary



Event	Affected Region(s)	Fatalities	Economic Loss (\$)	Page
SCS & Flooding (Update)	United States	13	Billions	3
Flooding (Update)	Brazil	107	1.46 billion	7
Severe Convective Storm	India	1	Millions	10
Flooding & Landslide	Indonesia	12	Unknown	10
Landslide & Flooding	Haiti	13	Unknown	10
Heatwave	Bangladesh	15	N/A	10
Flooding & Landslide (Update)	Eastern Africa	400+	Unknown	10
Severe Convective Storm	Western & Central Europe	0	Millions	10
Winter Weather	United States	0	Negligible	11
Flooding & Landslide	Tajikistan, Kyrgyzstan	3	Unknown	11

Please note that any financial loss estimate is preliminary and subject to change. These estimates are provided as an initial view of the potential financial impact from a recently completed or ongoing event based on early available assessments. Significant adjustments may inevitably occur. All losses in US dollars (\$) unless noted otherwise.

Along with this report, we continue to welcome users to access current and historical natural catastrophe data and event analysis on Impact Forecasting's Catastrophe Insight website: <http://catastropheinsight.aon.com>

United States: SCS & Flooding (Update)

Overview

Another active period of severe weather and flooding continued into a second week across the Great Plains, Midwest, and southeast U.S. on May 2-8. More heavy rainfall exacerbated ongoing, significant flooding across eastern Texas, including the city of Houston. Powerful storms and violent tornadoes caused extensive damage, especially within Texas, Oklahoma, Michigan, Tennessee, and the Carolinas. Total economic and insured losses from the past two weeks will likely reach into the billions USD.

Meteorological Recap

May 2-5

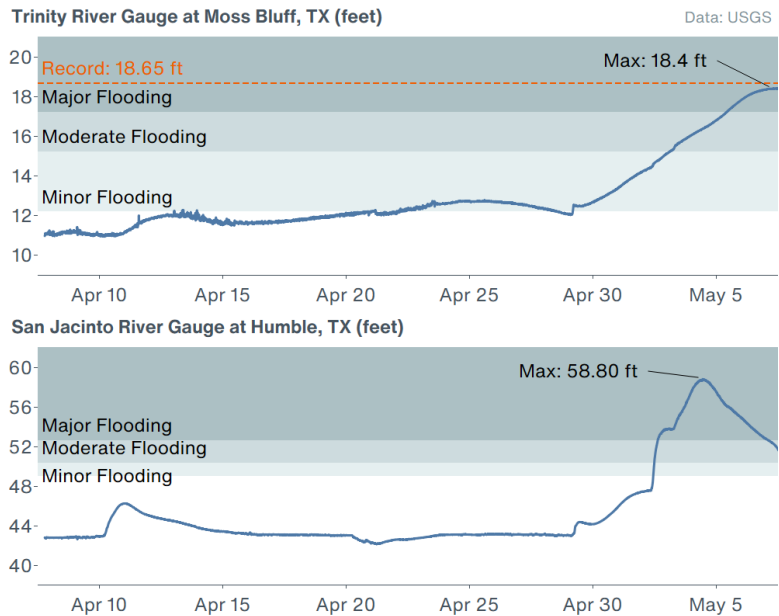
After days of heavy rainfall at the end of April, more torrential rain fell across eastern Texas on May 2-5. According to the National Weather Service (NWS) office in Houston (TX), several locations just north of Houston received over 20 inches (508 mm) of rain on April 28-May 5, with a local maximum of 23.32 inches (592 mm) seen near Lake Livingston. Parts of northeast Texas also reported heavy rainfall, including Bosque, Erath, and Hamilton counties just south of the Dallas-Fort Worth metro area.

The tremendous amount of rain also led to significant river flooding, even well after the storms had passed. The Trinity, San Jacinto, Brazos, and Navasota Rivers in eastern Texas were among the most flooded as many river gauges recorded water levels not seen since Hurricane Harvey in 2017.

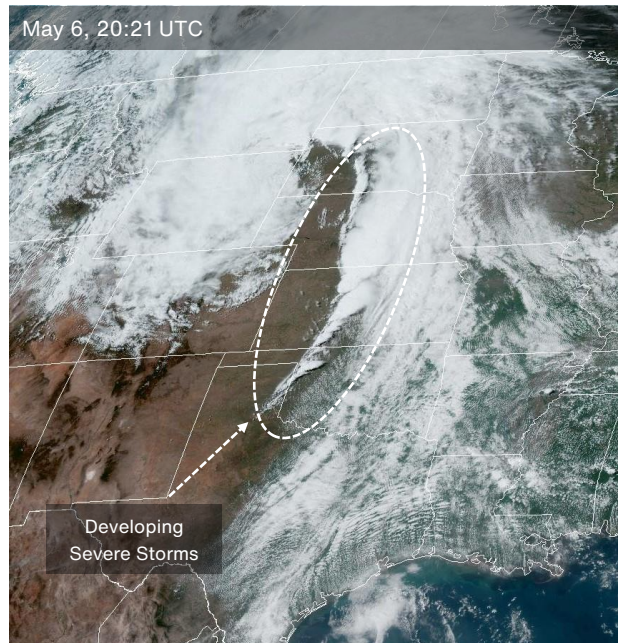
In addition to the heavy rain, severe storms also affected parts of the central United States on May 2-4. Over 230 preliminary storm reports were submitted to the Storm Prediction Center (SPC) from western Texas to northern Illinois. Aside from large hail and damaging winds, many storms also produced tornadoes, including a high-end EF-3 tornado with peak winds of 165 mph (266 kph) near Hawley (TX).

May 6-8

After a brief break on May 5, a substantial, multi-day severe weather outbreak began affecting parts of the Great Plains and Midwest on May 6. On this day, the SPC issued a rare "High Risk", their highest

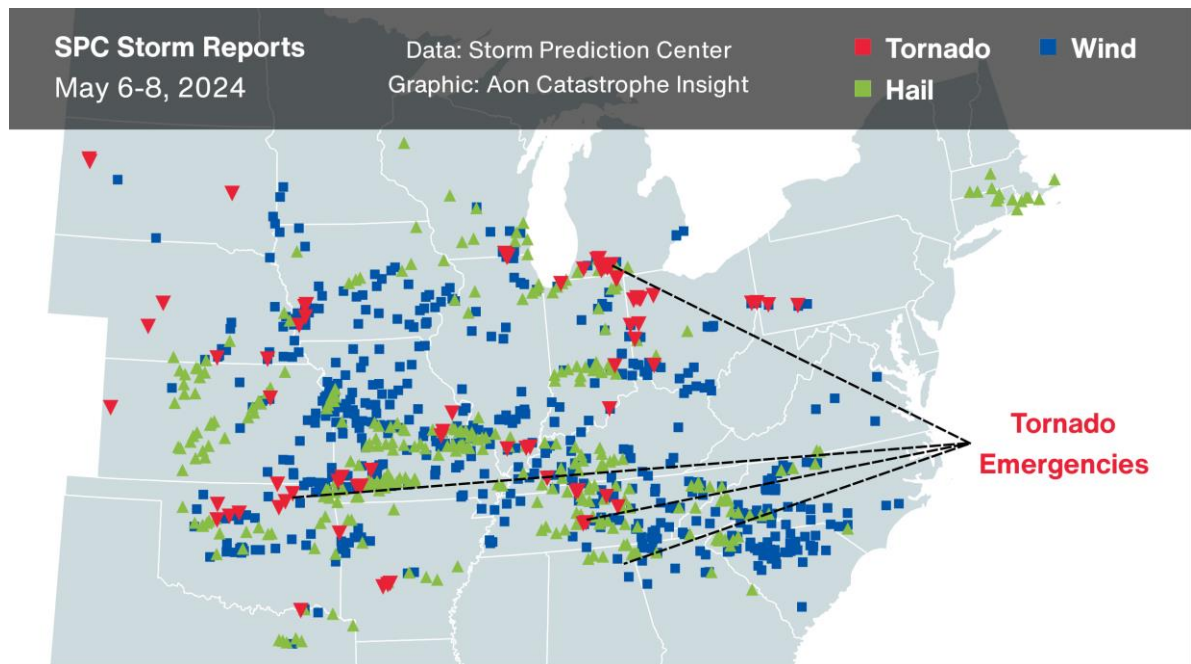


categorical severe weather risk level, for central Oklahoma and southern Kansas due to the high probability of some storms producing intense, long-tracked tornadoes. By the following morning, about 38 preliminary tornado reports had been submitted to the SPC, many of which came from Oklahoma. Most notably, the NWS office in Tulsa (OK) issued a tornado emergency for Osage and Washington counties as a large tornado directly tore through the towns of Barnsdall and Bartlesville in northeast Oklahoma. After damage surveys were later conducted by the NWS, this powerful twister was assigned an EF-4 rating with estimated winds up to 175 mph (282 kph).



On May 7, much of the severe weather shifted to the Midwest and Great Lakes region. Intense storms packed with hail up to 4 inches (10.2 cm) and wind gusts exceeding 60 mph (97 kph) were primarily seen across Illinois, Wisconsin, Indiana, Michigan, and Ohio. In southern Michigan, another tornado emergency was issued for Branch County by the local NWS office. This was the first tornado emergency ever issued within the state of Michigan, and the nearby towns of Portage and Kalamazoo (MI) were directly hit by this large twister.

The following day, another round of severe storms heavily impacted an area spanning from Kansas to the Carolinas. The SPC received a remarkable 762 preliminary storm reports on May 8 alone, most of which were hail and wind reports. Notably, there were several reports of very large hail over 3 inches (7.6 cm) in diameter, which primarily came from Missouri, Tennessee, and North Carolina.



Incredibly, two more tornado emergencies were issued on May 8 in northern Alabama and southern Tennessee. NWS surveys later confirmed a high-end EF-2 tornado in DeKalb County (AL) along with an EF-3 tornado in Marshall, Maury, and Williamson (TN) counties. Additionally, parts of Tennessee also experienced separate impacts from flash flooding due to slow-moving storms. In fact, two rare flash flood emergencies were issued by the NWS for Robertson and Sumner counties in northern Tennessee. More severe weather is expected to occur over the southern U.S. on May 9-10, and any additional impacts will be included in the next Weekly Cat Report.

Event Details



Flooding in Texas (left) and tornado damage in Barnsdall, Oklahoma (right)

Source: Texas DEM (left), Tulsa FD (right)

Oklahoma, Michigan, Tennessee

After 6 severe weather-related deaths were reported last week (see previous Weekly Cat Report), more violent tornadoes this week were responsible for 3 additional deaths in Oklahoma (1) and Tennessee (2). Some of the most extensive tornado damage occurred in northeast Oklahoma within Bartlesville and Barnsdall. According to local officials, around 1,200 homes were damaged across both towns, of which 70 were completely destroyed. Further east, another large tornado caused significant damage within the Kalamazoo (MI) metro area. The powerful twister heavily damaged a large FedEx facility, destroyed 30 mobile homes, and injured at least 16 people. Extensive impacts seen in southern Michigan prompted officials to declare a state of emergency for Kalamazoo, St. Joseph, Branch, and Cass counties.

In Tennessee, deadly tornadoes and flash flooding caused major damage in several areas. According to officials, a large EF-3 twister injured 12 people and damaged 105 homes throughout Maury County (TN), including 40 homes that were completely destroyed. Further north, flashing flooding impacted multiple state counties, including Robertson and Sumner, which led to numerous road closures and prompted dozens of water rescues.

Texas, the Carolinas, and Elsewhere

Over the past week, much of eastern Texas continued to suffer through considerable flash and river flooding. Since the onset of heavy rainfall on April 28, more than 600 people have been rescued from flood waters, including over 230 people in the Houston metro area alone. The widespread, severe floods

have caused two deaths, damaged at least 800 structures, and affected dozens of counties. Elsewhere across the state, severe weather also affected numerous communities. Most notably, a strong tornado struck the town of Hawley, leading to one death and destroying at least 30 homes.

Additionally, large hail and strong winds impacted much of North and South Carolina. Downed trees and power lines caused one death, widespread property damage, and power outages for more than 152,000 customers. More notable hail damage was reported elsewhere, including within Kansas City (MO), Michigan City (IN), and parts of southeast Missouri near St. Louis.

Several other states saw various, scattered reports of severe weather damage over the past week. This included tornado damage in northern Alabama and straight-line wind damage in Kansas and Arkansas.

Financial Loss

After two weeks of widespread, persistent severe weather and flooding damage across the United States, total economic and insured losses will likely reach into the billions USD.

Brazil: Flooding (Update)

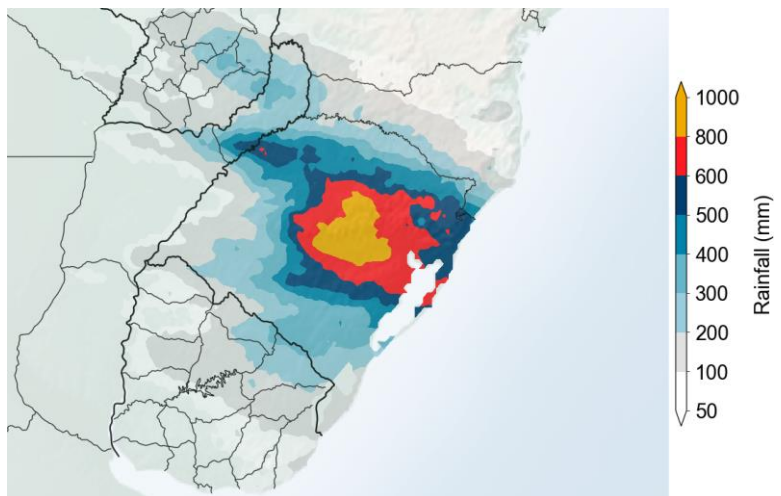
Overview

Following the torrential rainfall and thunderstorms that resulted in damaging floods over the past few days and weeks, casualties and material losses continue to increase across the Brazilian state of Rio Grande do Sul. By all accounts, southern Brazil is currently facing the nation's worst flooding event in over 80 years. Given the catastrophic flooding impacts, total economic losses will likely reach into the billions USD.

Meteorological Recap

Since late April, a series of storms has developed along a stalled front, producing an exceptional period of heavy rainfall over southern Brazil. The National Institute of Meteorology (INMET) continuously issued alerts due to heavy rain and severe storms from April 22 until early May. Notably, the most severe flood warning from INMET has been in effect over the Brazilian state of Rio Grande do Sul since April 29.

As a result of torrential rainfall that has repeatedly fallen over Rio Grande do Sul between April 26 and May 4, many locations within this state have seen record-breaking rainfall accumulations. The table below highlights the largest 24-hour rainfall totals from this event, according to INMET. Some areas received more than **800 mm (31.5 in)** of rain over several days – well above this region's typical monthly precipitation totals of 100 to 200 mm (3.9 – 7.9 in) for the month of May. The current meteorological pattern is believed to be connected with the El Niño phenomenon which typically brings elevated rainfall across southern Brazil.



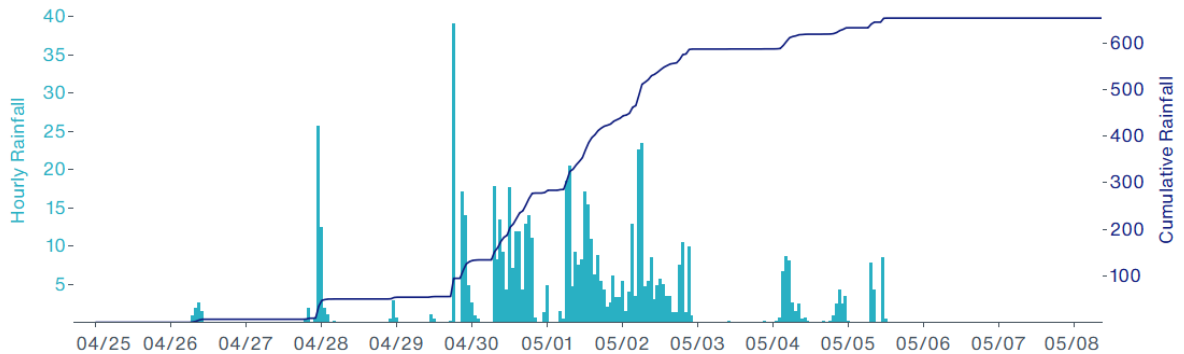
9-day (Apr 26 – May 4) rainfall totals

Source: NOAA CPC

Location	24-hour Rainfall (mm / in)
Soledade	246.2
Santa Maria	215.4
Ibirubá	192.6
Bento Gonçalves	184.0
Serafina Corrêa	175.4

Location	Rainfall May 1-8 (mm / in)	Average May Rainfall (mm / in)
Bento Gonçalves	449.2	130.3
Caxias do Sul	447.8	131.4
Santa Maria	356.5	136.6
Santa Vitória do Palmar	317.8	119.2
Cruz Alta	330.3	148.8

Rainfall in Bento Gonçalves Apr 25 - May 8 (mm)



Data: INMET

Hydrological Response

In response to extreme rainfall, several local rivers have reached record-breaking water levels during the event. For instance, the **Taquari River** at Lajeado City recently reached 34 meters (111.5 ft), which is over 4 meters (13.1 ft) above the previous record set during a catastrophic flooding event in 1941.

In **Porto Alegre**, a metro area home to about 4 million people, the ongoing flooding is considered to be the worst on record over the last 80 years. At 5.31 meters (17.4 ft), the current water levels along the **Guaiba River** have easily exceeded the previous record of 4.76 meters (15.6 ft) that was set in 1941. Interestingly, the current flood protection system around Porto Alegre was put in place right after the severe floods of 1941. The system was designed to protect the city from water levels up to 6 meters (19.7 ft) - meaning that this system was intended to withstand the current levels of the Guaiba River. Unfortunately, some of these floodgates failed while others were not sealed correctly. As a result, a large volume of water was able to inundate the city. Although the operation was not perfect, the destruction would likely have been far greater without any flood protection.

Event Details

The **Rio Grande do Sul** state in southern Brazil has suffered through extensive impacts from heavy rainfall, widespread flooding, and numerous landslide events. According to the State Civil Defense (as of May 9), 107 people have been confirmed dead, almost 1,500 have been injured, and more than 500 others are still missing. Catastrophic flooding has affected around 1.7 million people across nearly 430 municipalities within the state. Thousands of people have been rescued, more than 400,000 have been displaced, and about 1.4 million experienced power



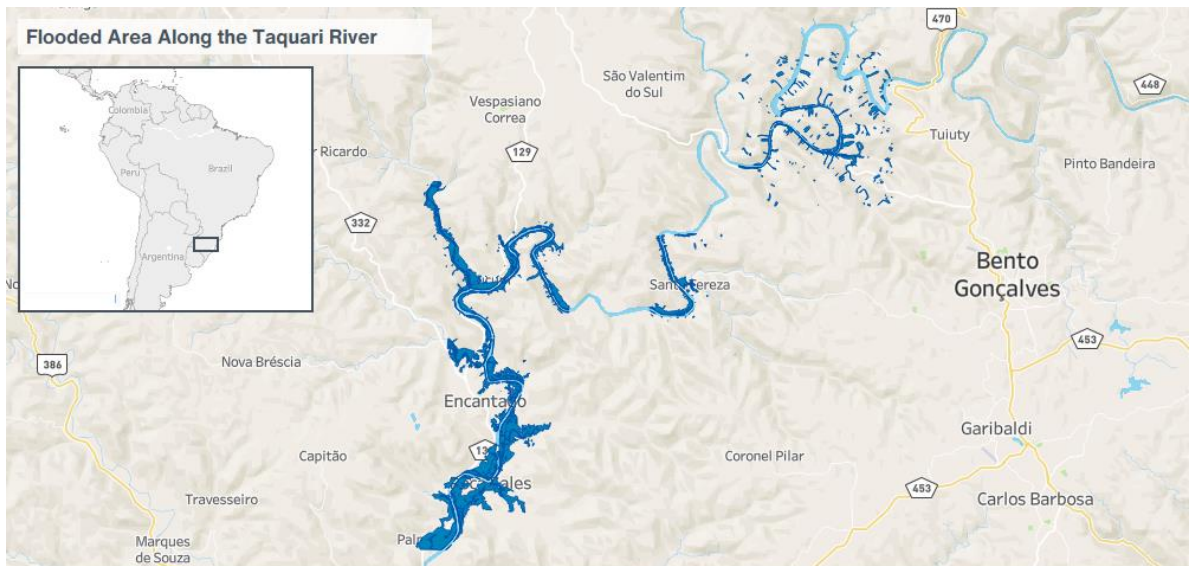
Flooding in Porto Alegre

Source: Civil Defense of Rio Grande do Sul

outages. According to the latest statements from authorities, more than 85,000 homes have already been damaged or destroyed.

Porto Alegre, the state's capital, was among the worst impacted. Severe flooding has shut down 5 out of the 6 nearby water treatment facilities, leading to a water crisis across the city. Transportation throughout the city has also been shut down as the main airport, bus terminals, and roads have been completely inundated.

Additional flood-related impacts were also reported within the states of Santa Catarina and Parana.



Data: Copernicus EMS

Financial Loss

The municipalities of Rio Grande do Sul affected by floods and storms have already recorded BRL7.5 billion (\$1.46 billion) in financial losses since the end of April, according to figures published on May 9 from the National Confederation of Municipalities (CNM). Most of this estimate comes from damages within the housing sector, which amounts to BRL4.4 billion (\$856 million). Notable damages have also been incurred in agriculture, livestock, industry, local businesses, and other services.

Natural Catastrophes: In Brief

Severe Convective Storm (India)

Hailstorms and heavy rain struck several parts of India's Manipur State on May 5, resulting in significant damage to houses, vehicles, and crops. Authorities reported at least one death and more than 15,400 damaged properties in the districts of Bishnupur, Imphal West, Imphal East, Thoubal, Kakching, Tengnoupal, Kangpokpi, Noney, and Churachandpur. The government issued INR69 million (\$1 million) in funds to assist in repairing.

Flooding & Landslide (Indonesia)

Indonesia's South Sulawesi province has been affected by flooding and landslides since May 3 after heavy rainfall that felt particularly over Luwu Regency. The National Disaster Management Agency (BNPB) reported 12 deaths and thousands of impacted households. Floodwaters and landslides caused material damage to more than 210 houses, about 1,400 hectares (3,500 acres) of crops, and local infrastructure.

Landslide & Flooding (Haiti)

Heavy rainfall has affected northwestern Haiti since May 3, resulting in no fewer than 13 fatalities and dozens of destroyed houses due to a landslide event in the Cap-Haïtien. More than 2,200 buildings have been affected by flooding across the entire department of Nord.

Heatwave (Bangladesh)

Millions of people across Southeastern and Southern Asia have been impacted by heatwave conditions over the past two weeks (see the latest Weekly Cat Report). Bangladesh was one of the affected with at least 15 heat-related fatalities, most of them reported in the Magura district, southwestern Bangladesh.

Flooding & Landslide (Eastern Africa) - Update

The death toll due to severe flooding and landslide events has continued to increase across Eastern Africa. In Kenya, tropical storm Hidaya brought additional rain, which is currently affecting 38 of the 47 counties in the country. As of May 3, 210 people have died, 164 have been injured, and almost 200,000 have been displaced across Kenya. The total number of flood-related deaths in Eastern Africa has surpassed 400. However, this is expected to rise as dozens of people remain missing in several affected countries, including Tanzania, Burundi, Rwanda, and Somalia (see previous Weekly Cat Report).

Severe Convective Storm (Western & Central Europe)

An outbreak of locally severe storms occurred in parts of Western and Central Europe on May 5-6. Hailstones with a maximum diameter of 3 cm (1.2 in) and strong wind gusts were reported primarily across southern Germany and Czechia. The event resulted in relatively minor losses due to the small hailstone sizes. Fire brigades carried out hundreds of interventions, mostly due to fallen trees and flooded cellars.

Winter Weather (United States)

A rare, May winter storm brought heavy precipitation and high winds to the U.S. Intermountain West on May 6-7. California, Utah, Montana, Wyoming, and Colorado were especially impacted as many areas received 1-2 feet (300-600 mm) of snow and recorded wind gusts over 80 mph (130 kph). Notably, Lake Tahoe (CA) recorded its highest daily snowfall total for 2024 on May 4. Impacts were limited to traffic disruptions and power outages.

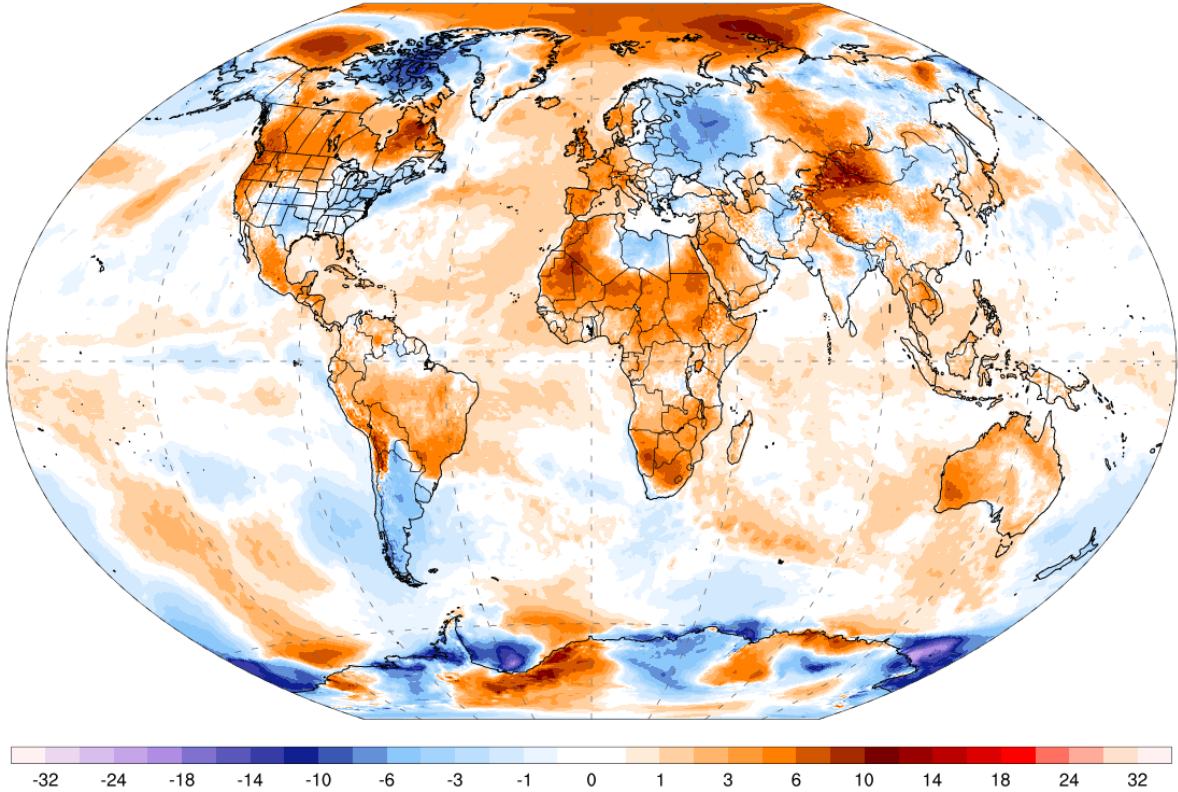
Flooding & Landslide (Tajikistan, Kyrgyzstan)

Since May 5, intense rainfall has triggered widespread flash flooding and landslides across Tajikistan and Kyrgyzstan. According to local media, multiple landslides across the Sughd, Khatlon, and Gorno-Badakhshan provinces led to 3 deaths in Tajikistan. More minor flooding and landslide impacts were reported in neighboring Kyrgyzstan, particularly within the Jalal-Abad region.

Global Temperature Anomaly Forecast

GFS 2m T Anomaly (°C) [CFSR 1979-2000 baseline]
Days 1-3 Avg | Fri, May 10, 2024

ClimateReanalyzer.org
Climate Change Institute | University of Maine

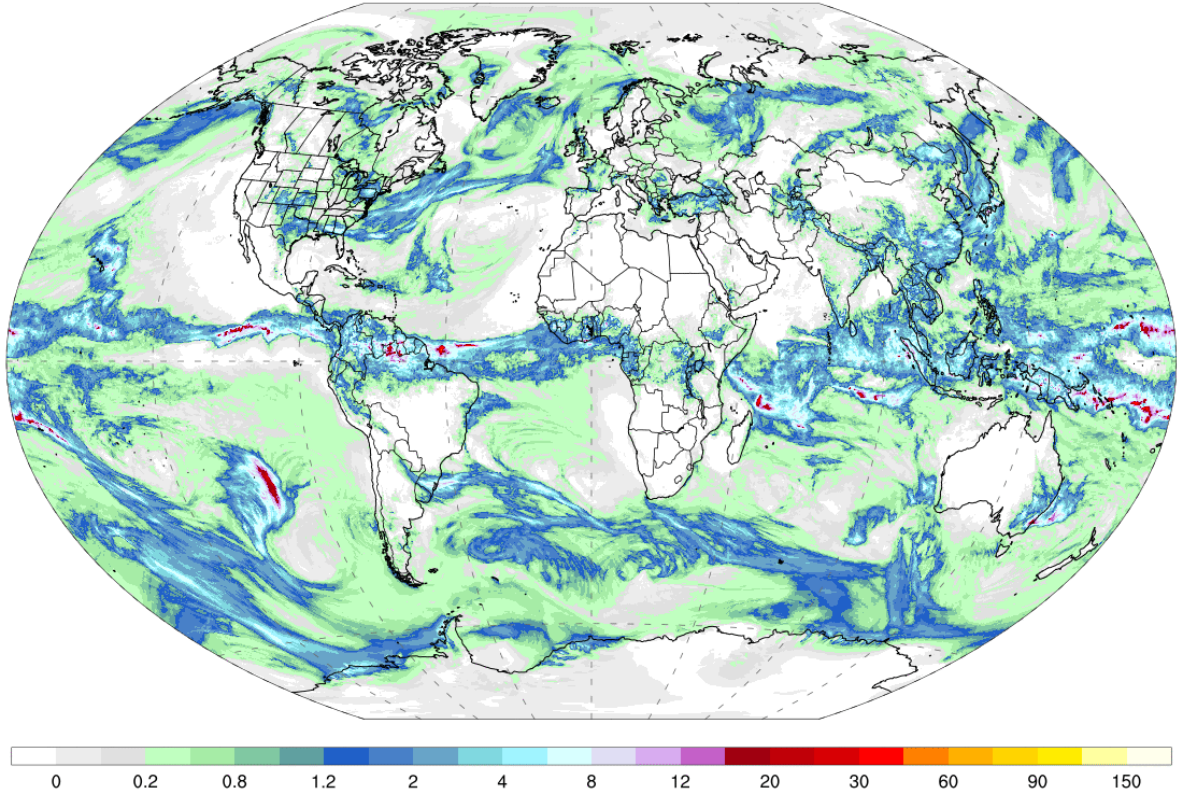


Source: Climate Reanalyzer, Climate Change Institute, University of Maine, USA

Global Precipitation Forecast

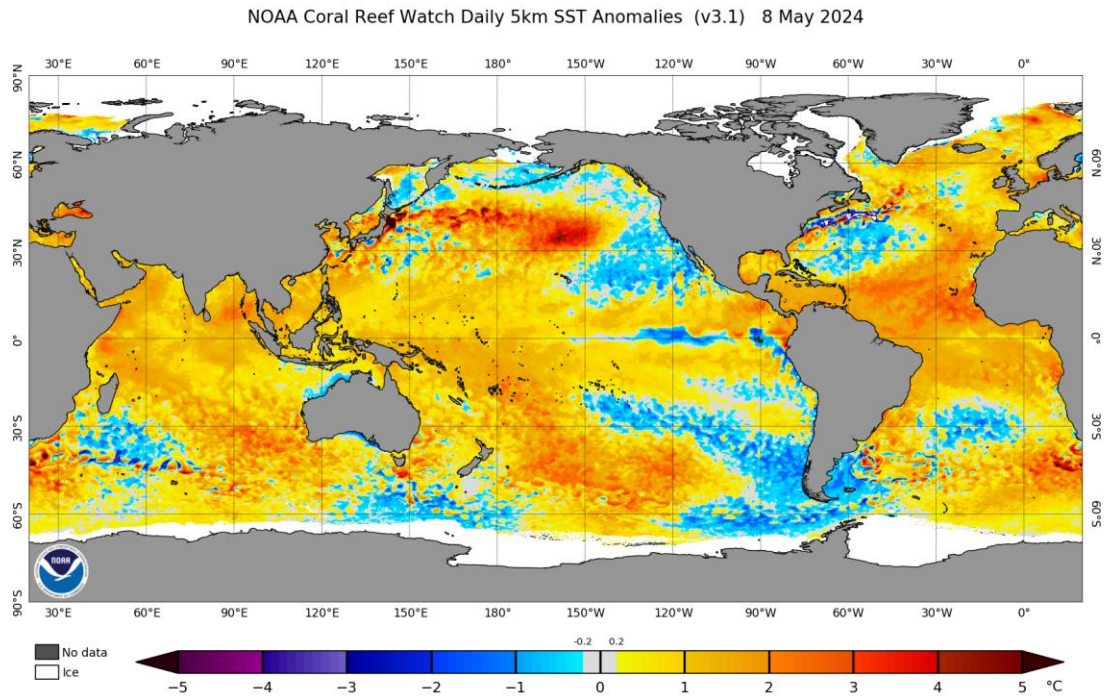
GFS Accumulated Precipitation (cm)
Days 1-3 Total | Fri, May 10, 2024

ClimateReanalyzer.org
Climate Change Institute | University of Maine



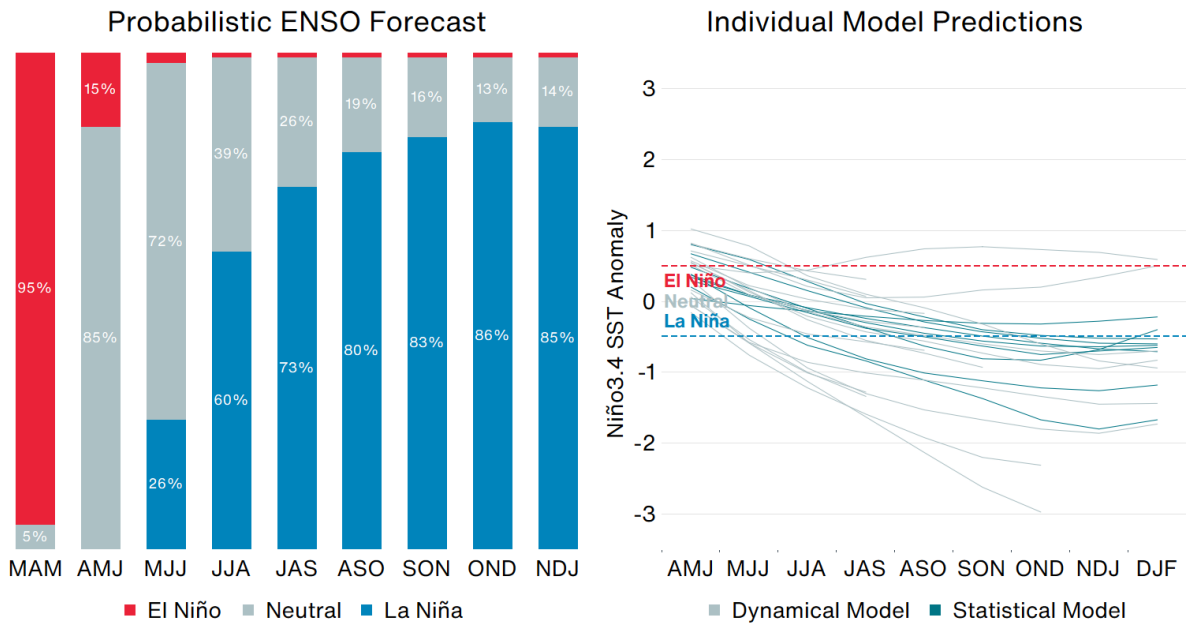
Source: Climate Reanalyzer, Climate Change Institute, University of Maine, USA

Weekly Sea Surface Temperature (SST) Maps (°C)



El Niño-Southern Oscillation (ENSO)

Probabilistic ENSO Model Projections: April 2024



El Niño: Warm phase of an ENSO cycle. Sea surface temperatures of +0.5°C occur across the east-central equatorial Pacific.

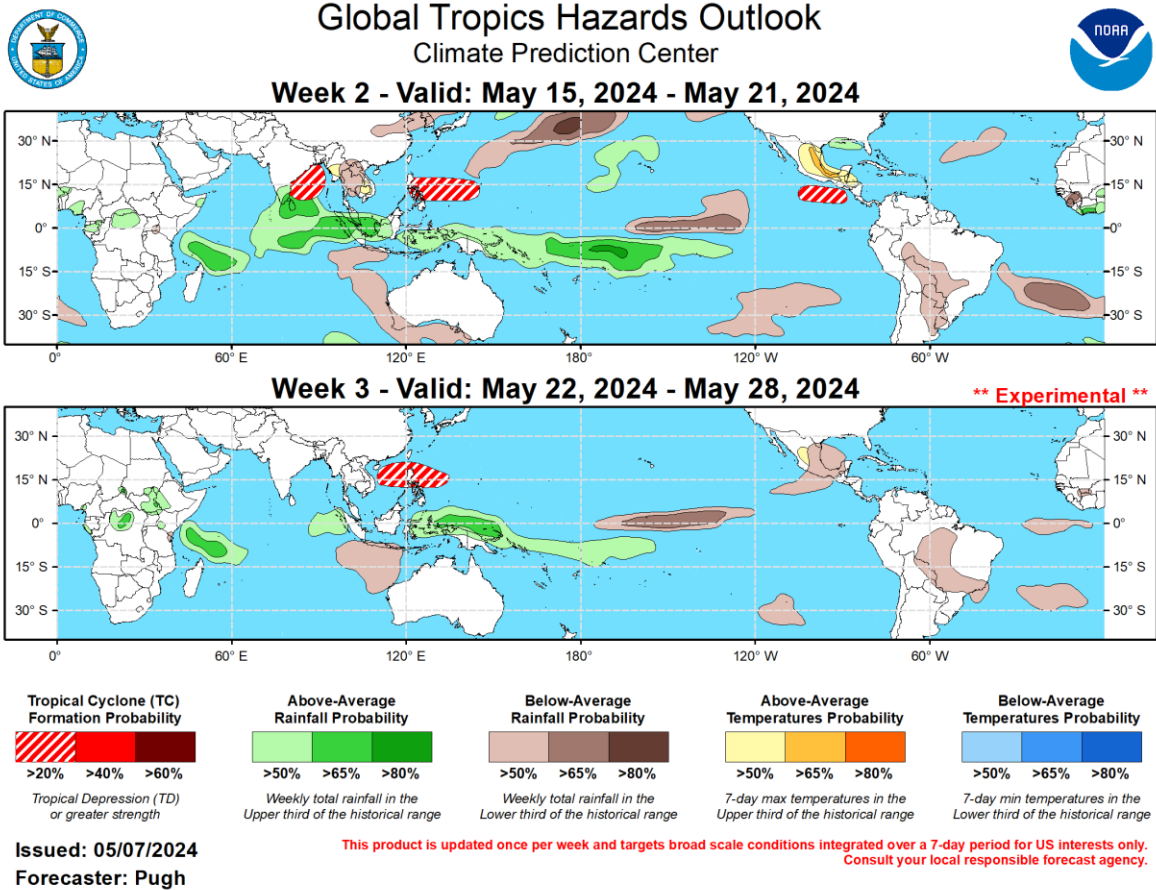
La Niña: Cool phase of an ENSO cycle. Sea surface temperatures of -0.5°C occur across the east-central equatorial Pacific.

Neutral: A period when neither El Niño nor La Niña conditions are present.

El Niño (La Niña) is a phenomenon in the equatorial Pacific Ocean characterized by a five consecutive 3-month running mean of sea surface temperature (SST) anomalies in the Niño 3.4 region that is above the threshold of +0.5°C (-0.5°C). This is known as the Oceanic Niño Index (ONI).

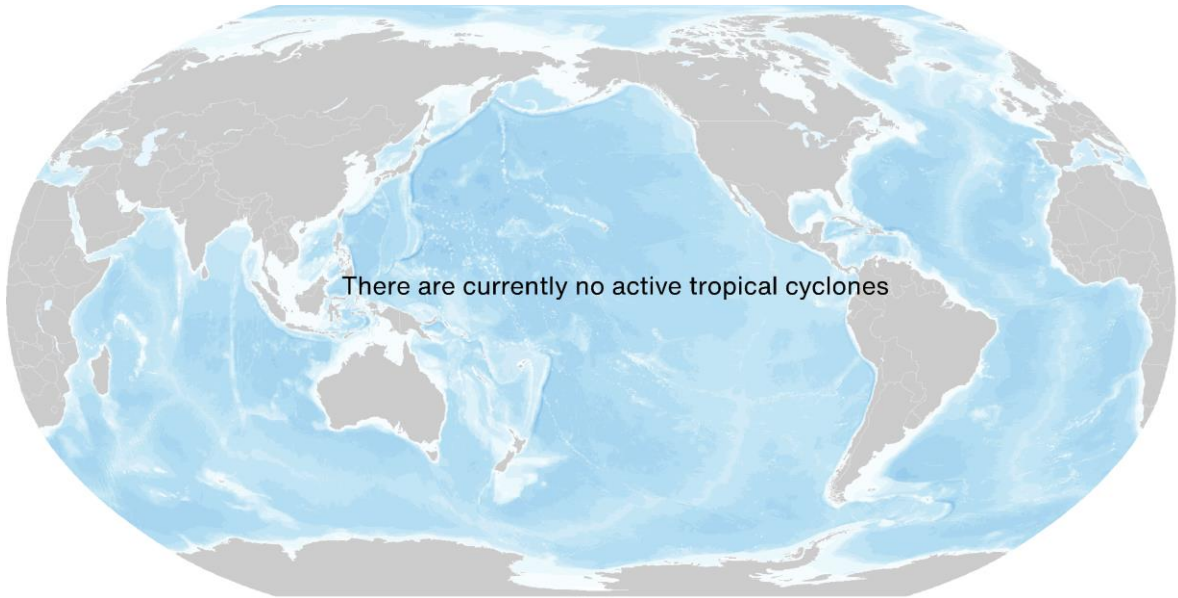
Source: NOAA, Columbia University | Graphic: Aon Catastrophe Insight

Global Tropics Outlook



Source: Climate Prediction Center (NOAA)

Current Tropical Cyclone Activity



🌀 Tropical Depression
 🌀 Tropical Storm
 🌀 Category 1
 🌀 Category 2
 🌀 Category 3
 🌀 Category 4
 🌀 Category 5

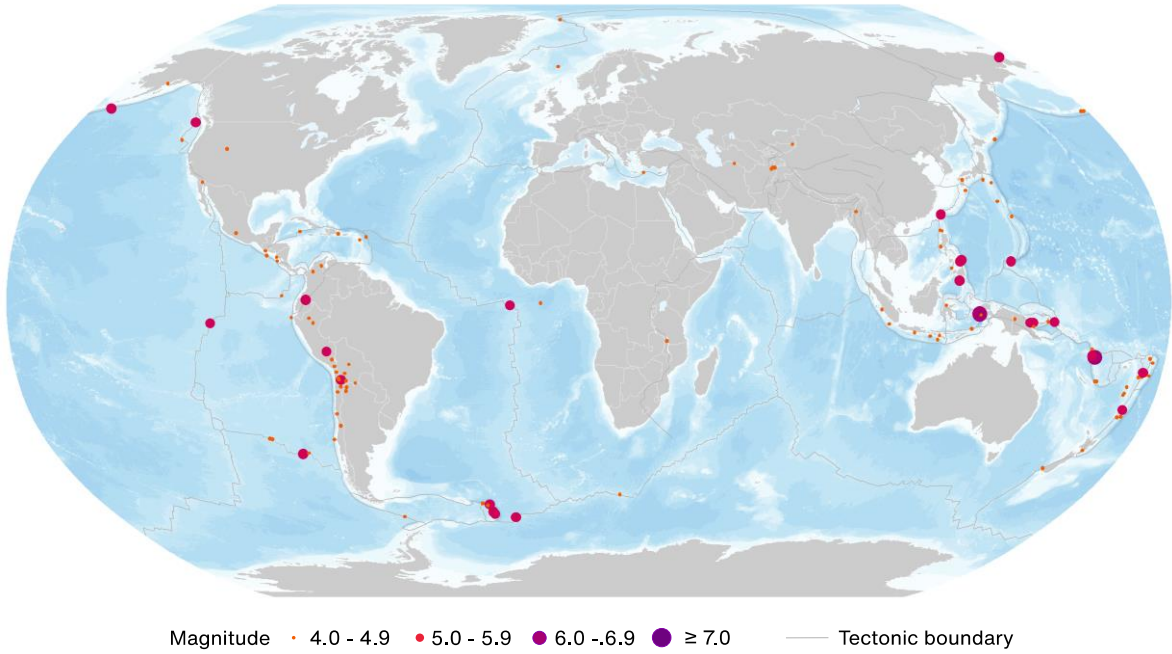
Name	Location	Winds	Center

* TD: Tropical Depression, TS: Tropical Storm, HU: Hurricane, TY: Typhoon, CY: Cyclone

** N: North, S: South, E: East, W: West, NW: Northwest, NE: Northeast, SE: Southeast, SW: Southwest

Source: National Hurricane Center, Joint Typhoon Warning Center, Central Pacific Hurricane Center (NOAA)

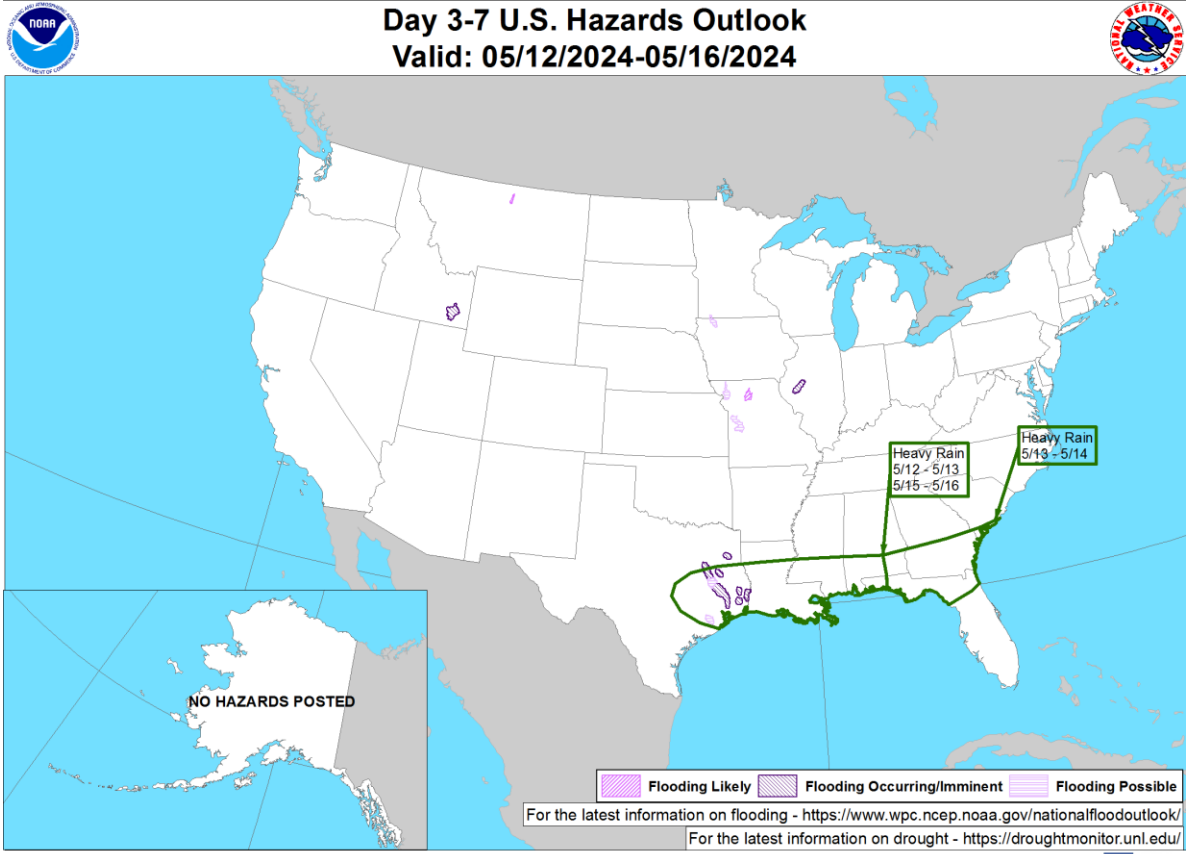
Global Earthquake Activity ($\geq M4.0$): May 3-9



Date (UTC)	Location	Magnitude	Epicenter
5/5/2024	3.31S, 130.97E	6.2	15 km (9 mi) WSW of Fakfak, Indonesia
5/8/2024	15.14S, 168.00E	6.1	99 km (62 mi) ENE of Luganville, Vanuatu

Source: United States Geological Survey

U.S. Hazard Outlook

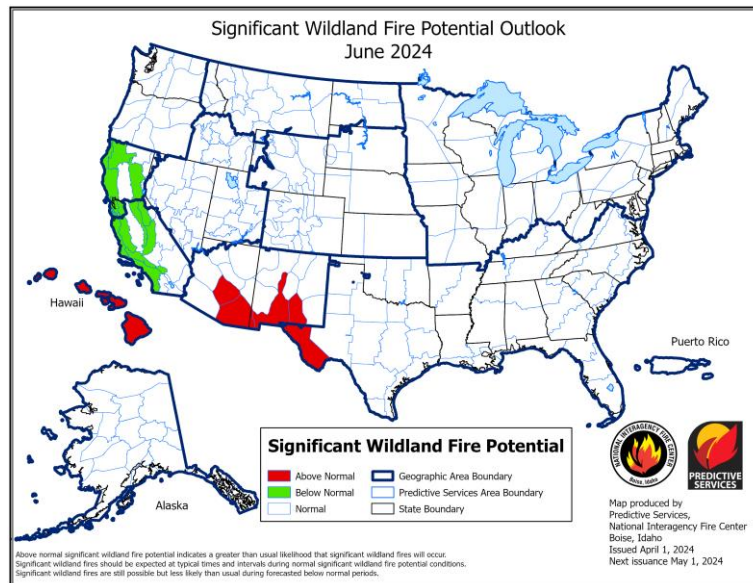
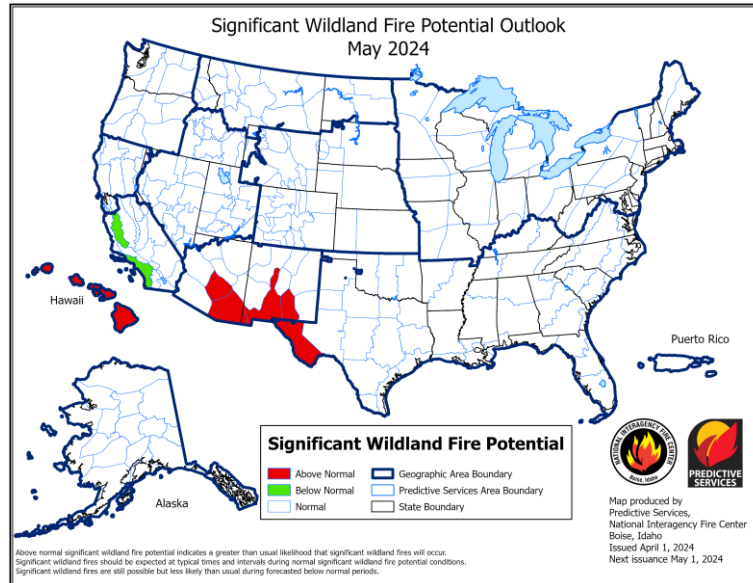


Weather Prediction Center
Made: 05/09/2024 03:23 PM EDT

Follow us:  
www.wpc.ncep.noaa.gov

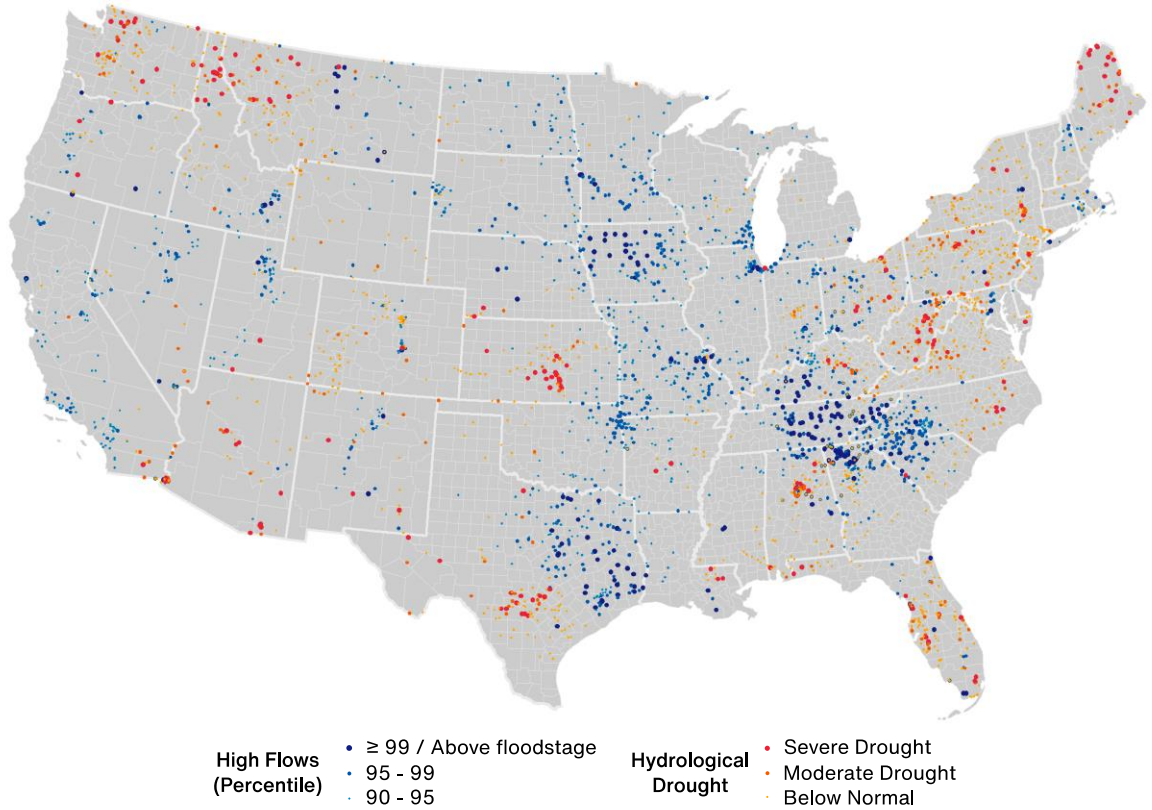
Source: Climate Prediction Center (NOAA)

U.S. Wildfire: Significant Fire Risk Outlook & Activity



Source: NIFC

U.S. Current Riverine Flood Risk



A $\geq 99^{\text{th}}$ percentile indicates that estimated streamflow is greater than the 99th percentile for all days of the year. This methodology also applies for the other two categories. A stream in a state of severe drought has 7-day average streamflow of less than or equal to the 5th percentile for this day of the year. Moderate drought indicates that estimated 7-day streamflow is between the 6th and 9th percentile for this day of the year and 'below normal' state is between 10th and 24th percentile.

Source: United States Geological Survey

Source Information

United States: SCS & Flooding (Update)

National Weather Service (NWS)

Storm Prediction Center (SPC)

United States Geological Survey (USGS)

NOAA GOES

Texas Division of Emergency Management (DEM)

Tulsa Fire Department (FD)

'This was the real deal': 1,200 homes impacted by Bartlesville tornado, *2 News Oklahoma*

Demolition begins on damaged homes in Barnsdall, *News On 6*

Woman dead, 100+ homes damaged after tornado tears through Maury County, *WKRN*

At least 3 dead as severe storms rip through central, southeast U.S., *CBC*

3 dead, including 5-year-old boy, as Texas flooding eases: 'We are out of the woods now', *ABC News*

Kansas City's most recent spring storm leaves plenty of hail damage in its wake, *KMBC News 9*

Large hail damages vehicles in Michigan City, *WSBT 22*

Storm damage reports in Annapolis, Mo., including school, *KFVS 12*

Counties southwest of metroplex swept by flood waters, *NBC DFW*

Floodwaters start receding around Houston area as recovery begins following rescues and evacuations, *AP News*

Brazil: Flooding (Update)

Copernicus EMS

Civil Defense of Rio Grande do Sul

The National Institute of Meteorology (INMET)

The National Confederation of Municipalities (CNM)

Too much water, and not enough: Brazil's flooded south struggles to access basic goods, *AP News*

Porto Alegre could 'still be dry' if flood protection systems worked properly, *The Brazilian Report*

Deaths in Brazil floods rise to 107, horse rescued from rooftop, *Reuters*

More intense rain expected as Brazilian flood death toll reaches 107, *CNN*

Natural Catastrophes: In Brief

Indonesian National Disaster Management Agency (BNPB)

UN Office for the Coordination of Humanitarian Affairs (UN OCHA)

ReliefWeb

NOAA

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