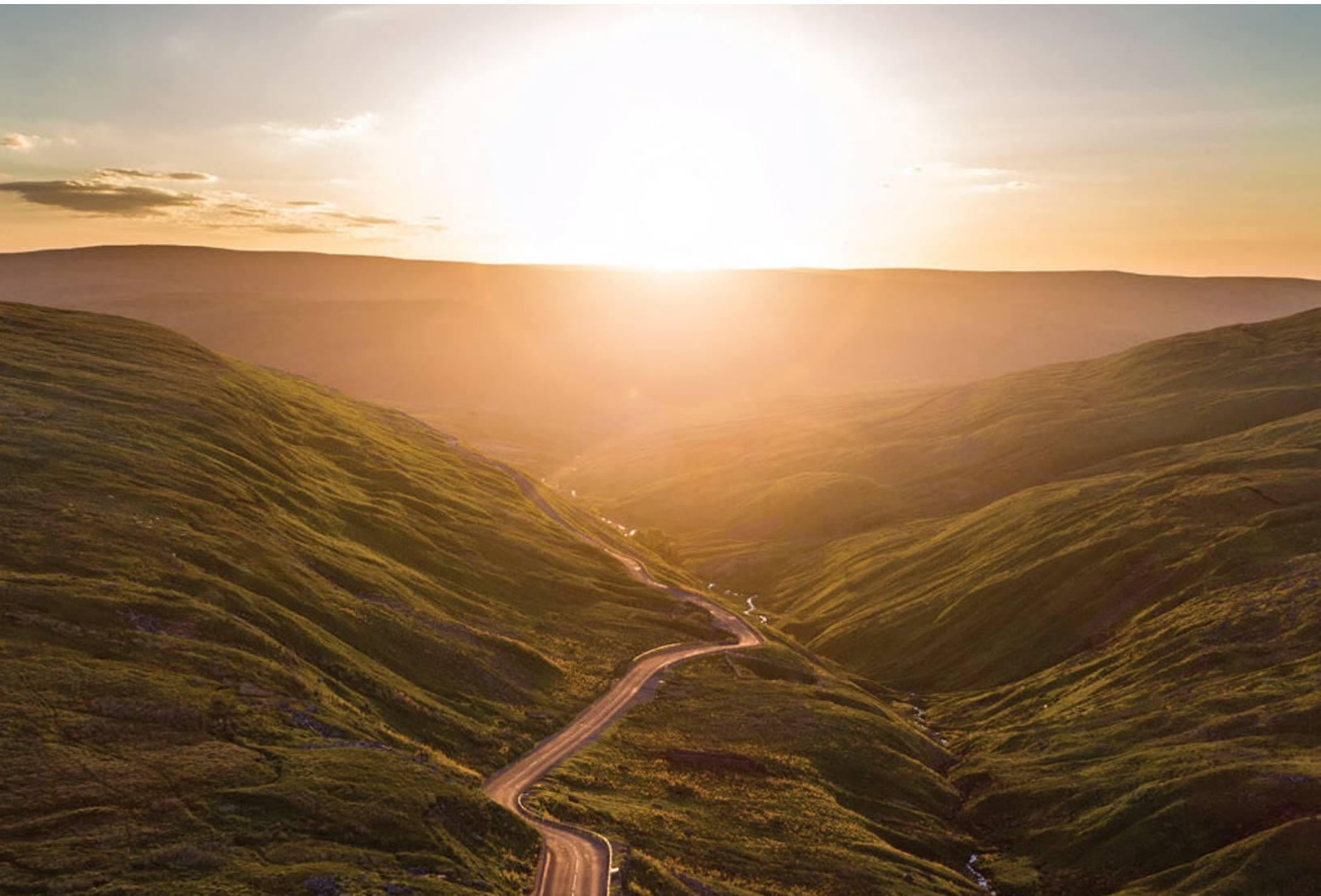
Weekly Cat Report

April 5, 2024



Executive Summary

Event	Affected Region(s)	Fatalities	Economic Loss ($)	Page
Earthquake	Taiwan	10	100s of millions	3
SCS, Flooding, Winter Weather	United States	5	100s of millions	6
Flooding & Windstorm	Europe	7	10s of millions	9
Severe Convective Storm	India	5	10s of millions	11
Flooding	Afghanistan	0	Unknown	11
SCS, Flooding, Landslide	Pakistan	10	Unknown	11
Flooding	Kazakhstan	4	Unknown	11
Flooding & SCS	Brazil	0	Unknown	11
Severe Convective Storm	Nigeria	1	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.

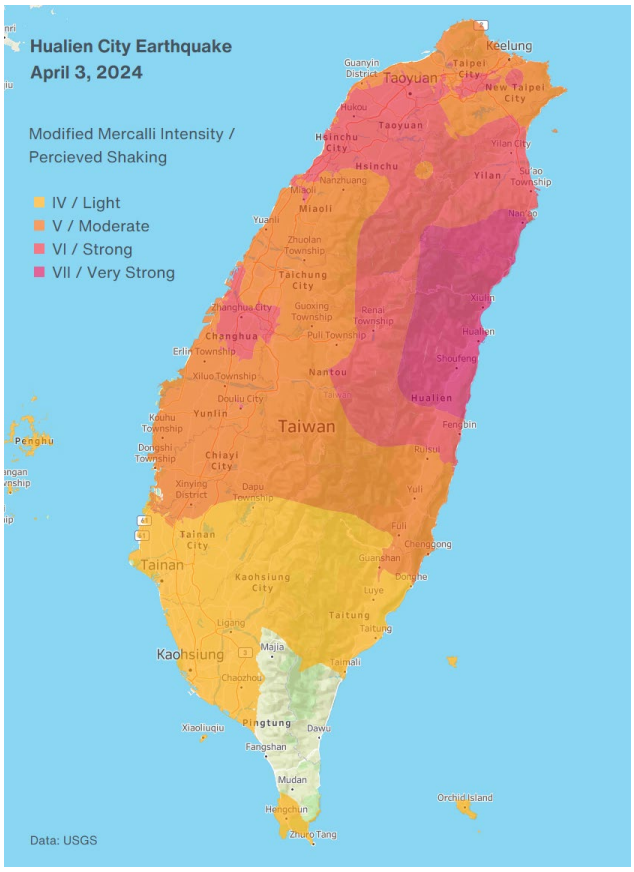
Along with this report, we continue to welcome users to access current and historical natural catastrophe data and event analysis on Impact Forecasting's Catastrophe Insight website: http://catastropheinsight.aon.com

Taiwan: Earthquake

Overview

A strong, magnitude-7.4 earthquake occurred early on April 3 about 18 km (11 mi) south of Hualien City in eastern Taiwan. It is the island's largest and deadliest earthquake in 25 years since the devastating 1999 Jiji Earthquake. It also caused secondary impacts, including multiple landslides and tsunami near the epicenter. Thus far, officials have reported at least 10 fatalities, more than a thousand injuries, along with significant material damage to residential and commercial property.

Seismological Recap



A magnitude-7.4 earthquake (according to the USGS) struck just off the east coast of Taiwan near the city of Hualien on April 3 around 8 AM local time at a depth of nearly 35 km (22 mi). Central Weather Administration in Taiwan reported a magnitude of 7.2. This earthquake occurred as a result of reverse faulting near the boundary between the Eurasia and Philippine Sea plates. It was followed by a M6.5 aftershock 13 minutes after the initial quake, with dozens of weaker tremors recorded afterwards.

Multiple landslides were seen throughout Taiwan. Additionally, Japan issued its first tsunami warning for the nearby island of Okinawa for the first time in 26 years. A tsunami wave of 0.3 m (11.8 inches) was observed by the Japan Meteorological Agency at Okinawa Islands.

Historical Comparison

This tectonically complex region has historically produced many other large earthquakes exceeding a magnitude of 7. In the last 50 years, six other M7+ earthquakes have occurred within 250 km (155 mi) of the April 2 earthquake. The last earthquake of this scale occurred on September 21, 1999, when a M7.7 quake struck near the town of Jiji in central Taiwan. Catastrophic impacts unfolded soon after as more than 2,400 people were killed, over 11,300 were injured, and tens of thousands of buildings were completely destroyed, resulting in total economic damage close to $25 billion (2024 inflated). The September 1999 quake is considered to be Taiwan's second deadliest natural disaster in the island's recorded history.

The recent earthquake is considered to be Taiwan's largest tremor in 25 years (see Table below showing the strongest earthquakes since 1980).

Date	Magnitude	Most Affected County	Fatalities
Sep 21, 1999	7.7	Jiji	2,415
Apr 3, 2024	7.4	Hualien	10
Nov 15, 1986	7.4	Hualien	15
Dec 26, 2006	7.1	Pingtung	2
Apr 31, 2002	7.1	Hualien	5

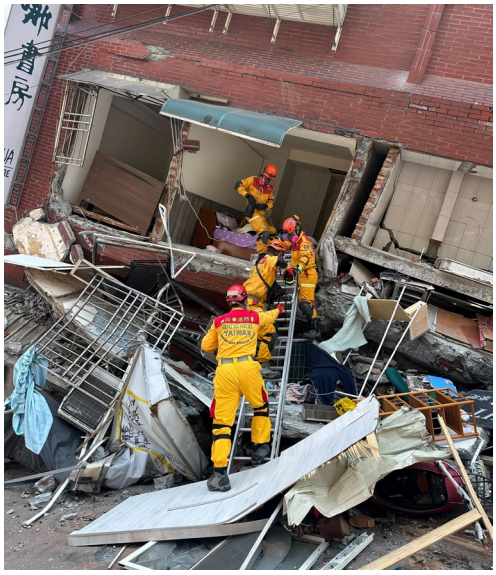
Event Details

According to USGS, more than 13 million people were exposed to strong shaking, including Taipei City, Taiwan's capital, with a population of nearly 8 million. More than 3 million others felt very strong or even severe shaking.

As of April 5, Taiwan's National Fire Agency (NFA) reported at least 10 fatalities and more than 1,100 injured people. The total death toll is expected to further rise as about 700 people remain stranded and 18 are still missing. All fatalities occurred in **Hualien County**. NFA recorded more than 1,150 earthquake-related incidents. At least 370,000 customers lost power.

Modified Mercalli Intensity	Perceived Shaking	Population Affected
V	Moderate	3,911,000
VI	Strong	13,065,000
VII	Very Strong	2,922,000
VIII	Severe	153,000

Taiwan's Central Emergency Operation Center reported about 2,500 cases of damage nationwide, including 780 buildings and notable damages to local infrastructure. The Ministry of Education said that about 430 schools across Taiwan reported sustaining damage due to the earthquake, resulting in an estimated loss of NT$470 million ($15 million) alone. Most of the losses were incurred in Taipei, New Taipei, and Hualien counties. Many structures across the affected area were saved from severe structural damages as more stringent building codes were introduced after a disastrous earthquake in 1999.



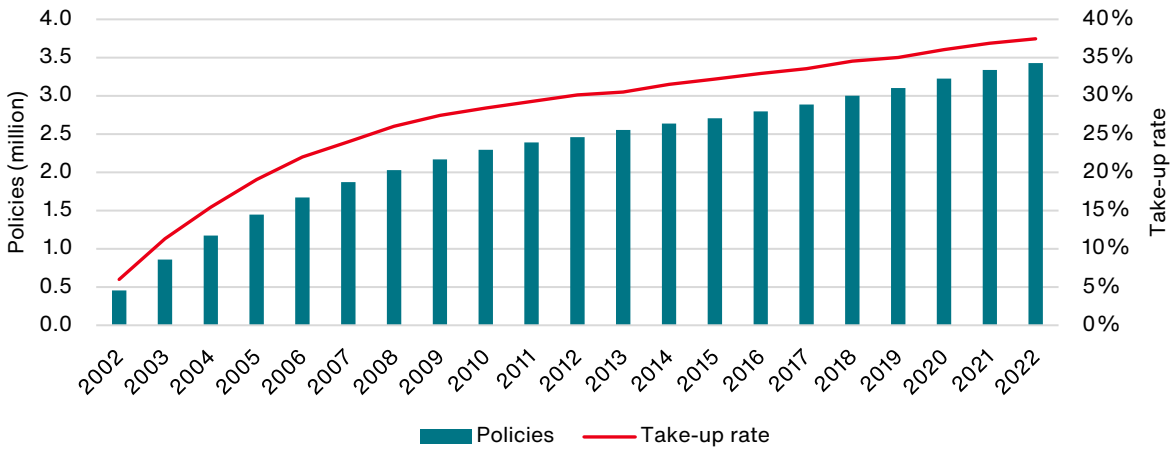
Earthquake damage in Hualien City
Source: CECC

Financial Loss

Although damage assessments are still ongoing across the affected area, total economic losses have a high potential to reach hundreds of millions USD, according to the initial evaluation of USGS PAGER methodology.

The event is likely to result in a notable event for the local insurance industry due to relatively high take-up rates. Residential earthquake insurance is facilitated by the Taiwan Residential Earthquake Insurance Fund (TREIF) organization through an insurance pool system and since its inception in 2002 (after the devastating 1999 Jiji Earthquake, the take-up rate has increased to nearly 40% - as shown on the data below, provided by TREIF:

TREIF Policies in force and national take-up rate



However, the region most affected by the April 3 tremor has one of the highest protection gaps in the country.

Region	Policies	Households	Take-up Rate (%)
Taipei City	391,463	960,263	40.77%
New Taipei City, Keelung	817,219	1,891,000	43.22%
Taoyuan	408,572	902,272	45.28%
Hsinchu	183,280	401,024	45.70%
Miaoli	60,621	193,482	31.33%
Taichung	460,129	1,083,929	42.45%
Nantou	39,529	174,252	22.68%
Changhua	95,276	423,066	22.52%
Yunlin	46,236	228,851	20.20%
Chiayi, Tainan	316,572	1,022,989	30.95%
Kaohsiung, Pintung, Penghu	486,645	1,453,526	33.48%
Hualien, Taitung	**55,818**	**205,964**	**27.10%**
Yilan	61,090	185,632	32.91%
Kinmen and other isles	6,405	27,400	23.38%

United States: SCS, Flooding, Winter Weather

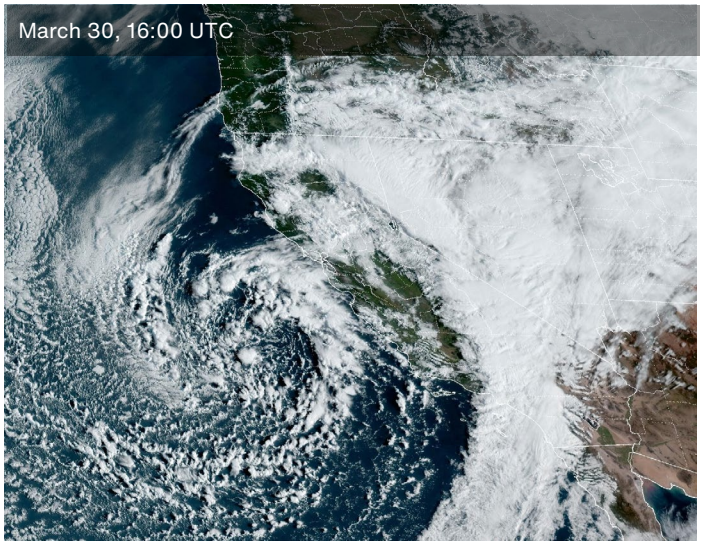
Overview

A long-lasting, multi-hazard weather system crossed over the continental United States on March 29-April 5. Strong winds and heavy rain were seen from California to Maine, and heavy snow fell over the Great Lakes and New England. Notably, a large severe weather outbreak caused widespread damage from the Great Plains to the Mid-Atlantic, while significant river flooding affected many communities along the Ohio River. Economic and insured losses could reach into the hundreds of millions USD.

Meteorological Recap

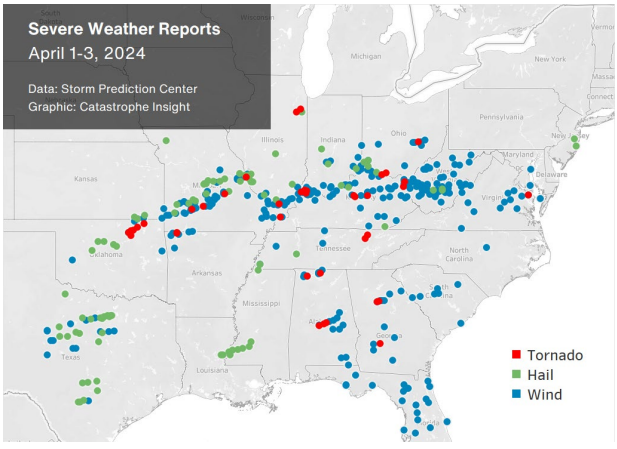
March 29-31

Ahead of a large, upper-level trough from the Pacific Ocean, persistent showers and storms impacted much of California on March 29-31. Along the coast, numerous cities and towns from San Francisco to San Diego saw strong winds up to 60 mph (95 kph) and heavy rainfall. Much of the heaviest rain fell within a few hours on March 30, which led to new daily rainfall records being set at LAX and San Diego Airports. Further inland, another minor coating of snow fell over the Sierra Nevada and other Southern California mountain ranges.



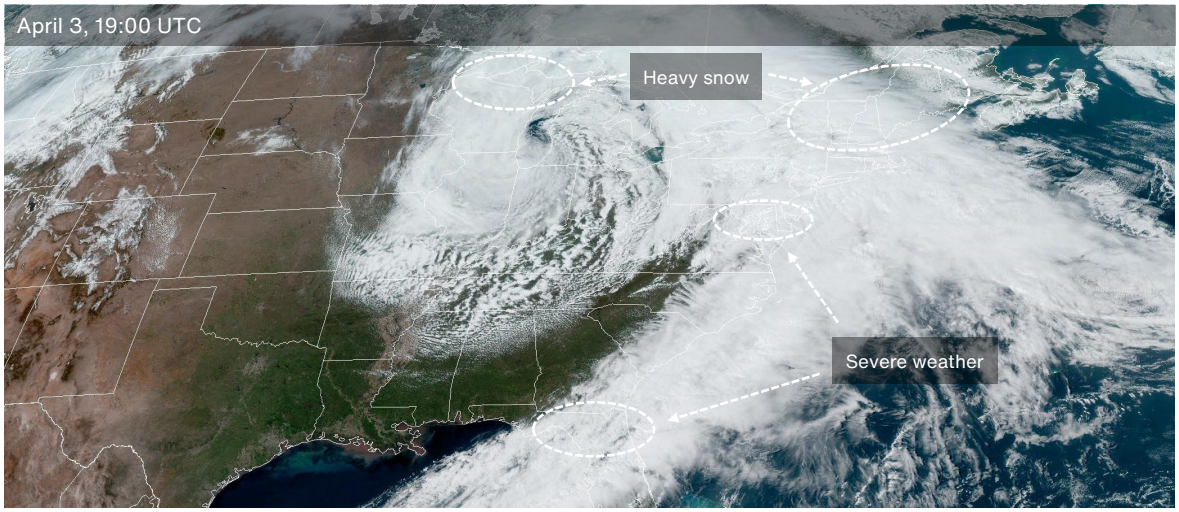
April 1-2

The aforementioned upper-level trough then moved further east into the central U.S. where a surface low-pressure system began developing on April 1. As this system slowly moved toward the Great Lakes, a large severe weather outbreak occurred across the Great Plains, Southeast, Midwest, and Mid-Atlantic primarily on April 1-2. On these two consecutive days, more than 670 storm reports were submitted to the Storm Prediction Center. Heavy rain, strong wind gusts up to 102 mph (165 kph), and hailstones up to 4.5 inches (11.4 cm) were reported from Texas to West Virginia.



Notably, SPC received nearly 60 tornado reports, with most originating from the Ohio River Valley.

April 3-5



By April 3, this same low-pressure system began to stall over the Great Lakes as a new area of low pressure developed within the Mid-Atlantic region. This stalling feature triggered a late-season snow event for northern Wisconsin and Michigan's upper peninsula where over 10 inches (250 mm) of snow was measured in several locations.

At the same time, severe weather and heavy rain was seen over northern Florida and again over the Mid-Atlantic. Several rounds of heavy rain within the Ohio River Valley caused many rivers to swell, including around Pittsburgh (PA) where a river gauge at Point State Park nearly reached major flood stage at 28.37 feet (8.65 m). Further east, this new low-pressure system generated powerful winds and heavy precipitation over most of the Northeast. In the New England interior, many areas saw over 18 inches (460 mm) of snowfall. The combination of heavy, wet snow and wind gusts over 60 mph (95 kph) was particularly impactful across Maine and New Hampshire.

Event Details

Heavy rain and flooding caused damage to numerous roads in California, including a partial collapse of the famous U.S. Highway 1 in Santa Barbara County. More flooding incidents occurred in Oklahoma, Ohio, West Virginia, Kentucky, and Pennsylvania, causing 1 death and minor property damage.

Notable tornado-related impacts were seen across several states, including Oklahoma, Tennessee, Kentucky, and Georgia, leading to 1 death. More extensive straight-line wind damage occurred in dozens of locations, including St. Louis, Cincinnati, and Louisville.

Tornado damage in Kentucky
Source: NOAA DAT

Winter weather impacts from this past week were also substantial. Around 800,000 people lost power between Wisconsin, Michigan, and many other states in the Northeast. Strong winds and heavy snow created hazardous travel conditions, leading to dozens of vehicle crashes and canceled flights. Officials in the northeast U.S. reported 3 weather-related fatalities along with widespread downed trees and power lines.

Financial Loss

Given the extensive severe weather, flooding, and winter weather impacts seen from coast to coast in the U.S., total economic and insured losses may reach into the hundreds of millions USD.

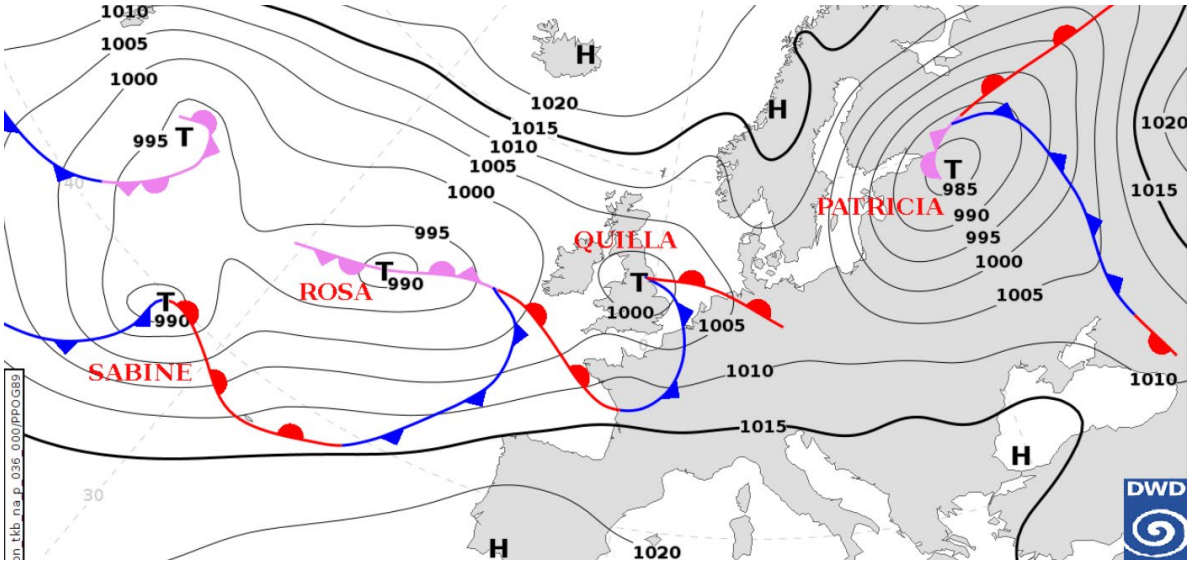
Europe: Flooding & Windstorm

Overview

An active cyclonic pattern in Europe replaced the previous synoptic setting characterized by a deep trough over Western Europe and ended the extreme influx of the Saharan dust into Central Europe. Associated hazards included renewed bouts of flooding in parts of France, as well as episodes of strong winds in several countries.

Meteorological Recap

After a prolonged period of a deep trough residing over Western Europe, associated with strong, southerly winds and an extreme influx of Saharan dust into Central Europe, the synoptic situation over the European continent changed to a more active pattern with multiple successive lows traversing in a zonal direction in early April. This weather pattern generated strong winds and localized heavy rainfall that triggered flooding, particularly in France between March 30 and April 4. Intense winds and localized storms were also reported elsewhere in the region.



Synoptic situation on April 3 with several successive lows
Source: DWD

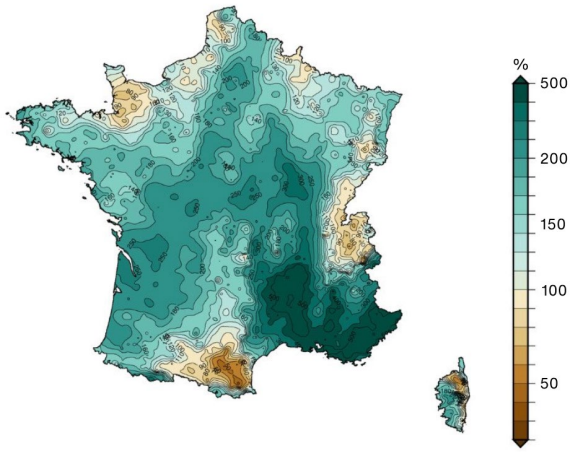
Météo France issued their first red flood warning on March 30 and continued to issue these warnings for several days. Warnings were successively valid for the departments of Vienne, Indre-et-Loire, Saône-et-Loire, Côte-d'Or, and Yonne. Several other departments were under orange flood alert during this period.

Event Details

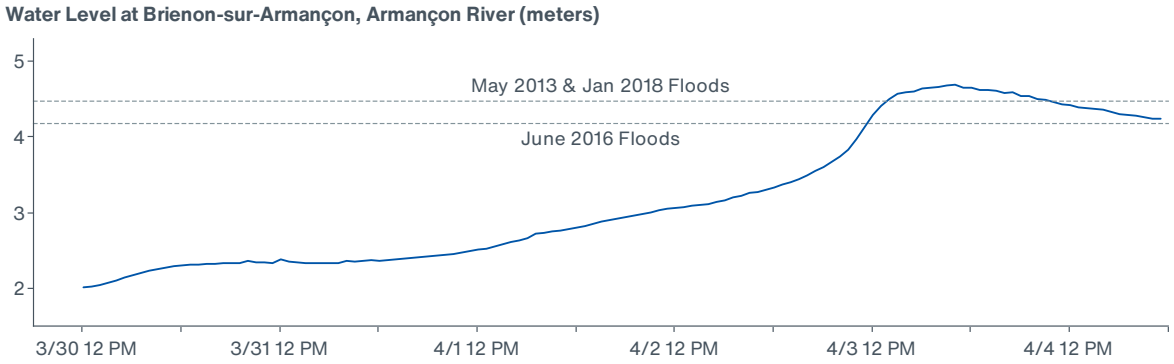
Parts of **France** experienced notable flooding. Several regions have been affected by floods in recent days, including the regions of Centre-Val de Loire, Nouvelle-Aquitaine, and Bourgogne-Franche-Comté, but the situation was particularly notable in the Yonne department. Hundreds of people were evacuated.

It is noteworthy that the amount of precipitation recorded in France during the month of March was above normal in most regions, as shown on the map on the right.

Below is an example of water level data from Brienon-sur-Armançon in the Yonne department, where the crest exceeded historical levels reached in 2013, 2018, and 2016.



March Precipitation Anomaly (1991-2020 baseline)
Source: Météo France



Data: Vigicrues

As frontal systems progressed eastward, several countries experienced strong winds. Notably, severe gusts in the Malopolska region of southern **Poland** resulted in five fatalities. On April 3, severe winds in the **Russian** capital of Moscow claimed two lives and 17 injuries. Gusty winds also resulted in some material damage in the Czech Republic, Austria, Slovakia, Ukraine, Belarus, Romania, and elsewhere.

Financial Loss

Hazards associated with the active synoptic situation were relatively localized and unlikely to result in significant losses. The effects of flooding in France were mainly concentrated in several departments of the Bourgogne-Franche-Comté region. Additional losses were incurred due to strong winds, with notable intensity in southern Poland and in Moscow.

Natural Catastrophes: In Brief

Severe Convective Storm (India)

Powerful thunderstorms ripped through the states of West Bengal and Assam in northeast India during the afternoon of March 31. Intense winds, heavy rain, and hail caused widespread damage to many homes and agricultural fields, especially within the towns of Manipur and Jorhat. Notably, a large tornado caused significant impacts within the Jalpaiguri district, resulting in 5 deaths and over 500 injuries.

Flooding (Afghanistan)

Heavy rainfall accompanied by flooding has been affecting various parts of Afghanistan since March 29, particularly the provinces of Faryab, Daikundi, and Nangarhar. Media and UN OCHA reported hundreds of affected people, several injured, along with notable infrastructural and structural damage to around 540 houses across the affected area.

SCS, Flooding, Landslide (Pakistan)

Since March 31, strong storms and heavy rain have heavily impacted parts of northwest Pakistan. Large hail, flooding, and landslides damaged many homes within at least seven districts across the Khyber Pakhtunkhwa Province. As of April 3, local authorities have reported 10 fatalities and 12 injuries.

Flooding (Kazakhstan)

Above-average temperatures in recent days have caused widespread snowmelt, leading to damaging flash flooding incidents across parts of northern and eastern Kazakhstan. At least 20 different locations have declared a state of emergency as over 1,400 buildings, over 50 roads, and 4 bridges have been damaged due to flood waters. As of April 2, officials have reported 4 deaths and over 15,000 evacuations.

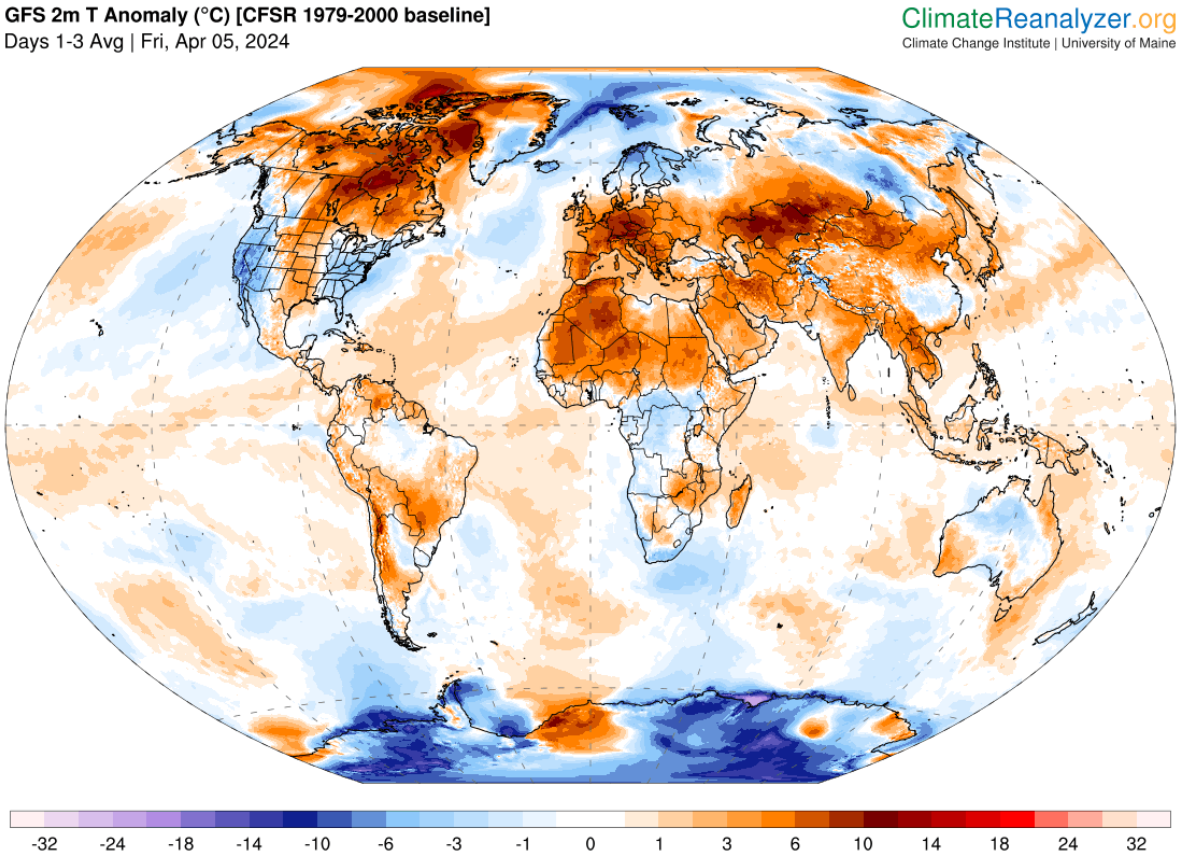
Flooding & SCS (Brazil)

Since April 1, Maranhão State in northeast Brazil has experienced heavy rainfall and severe storms, prompting state of emergency declarations for at least 13 municipalities. According to the Pan American Health Organization (PAHO), over 2,300 people have been displaced due to flooding.

Severe Convective Storm (Nigeria)

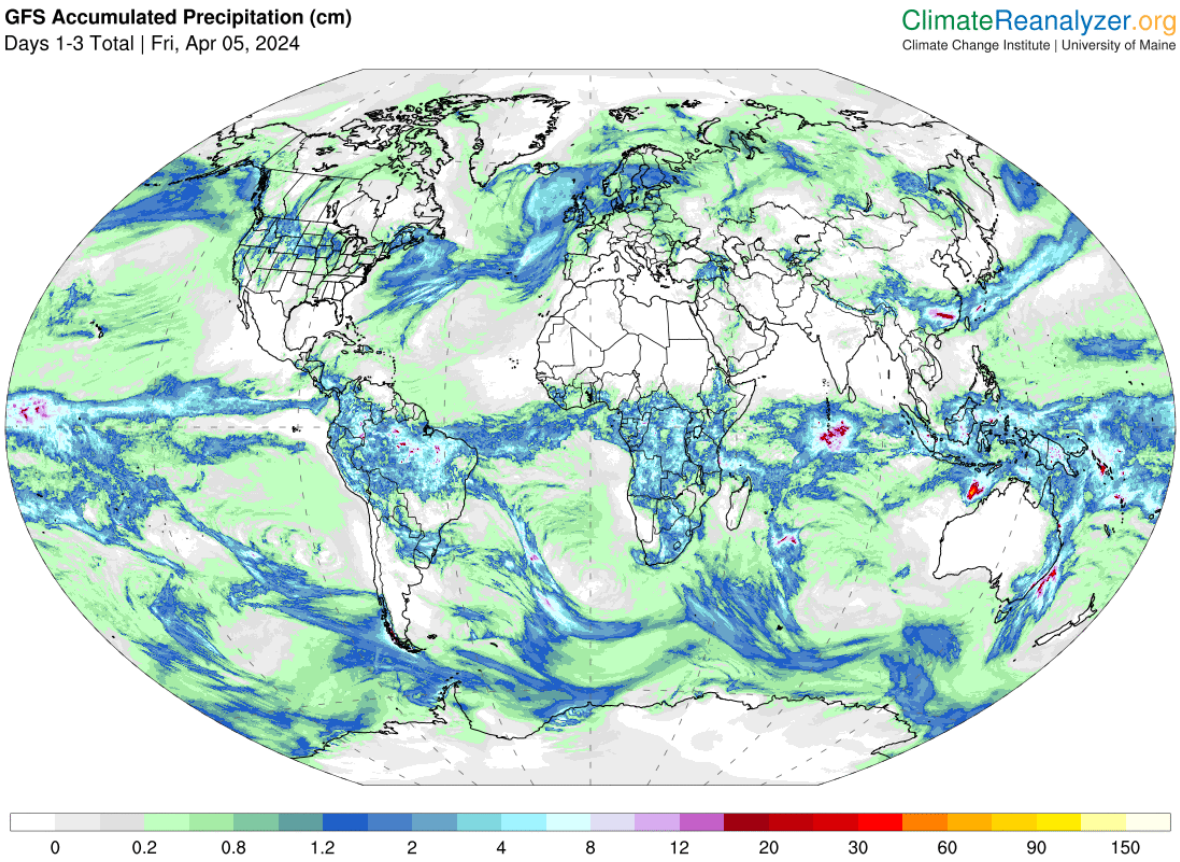
One person was killed, 7 others were injured and over 100 houses were destroyed in Agbashi Community of Nigerian Nasarawa State due to the storm that occurred on April 3 and generated damaging wind gusts.

Global Temperature Anomaly Forecast



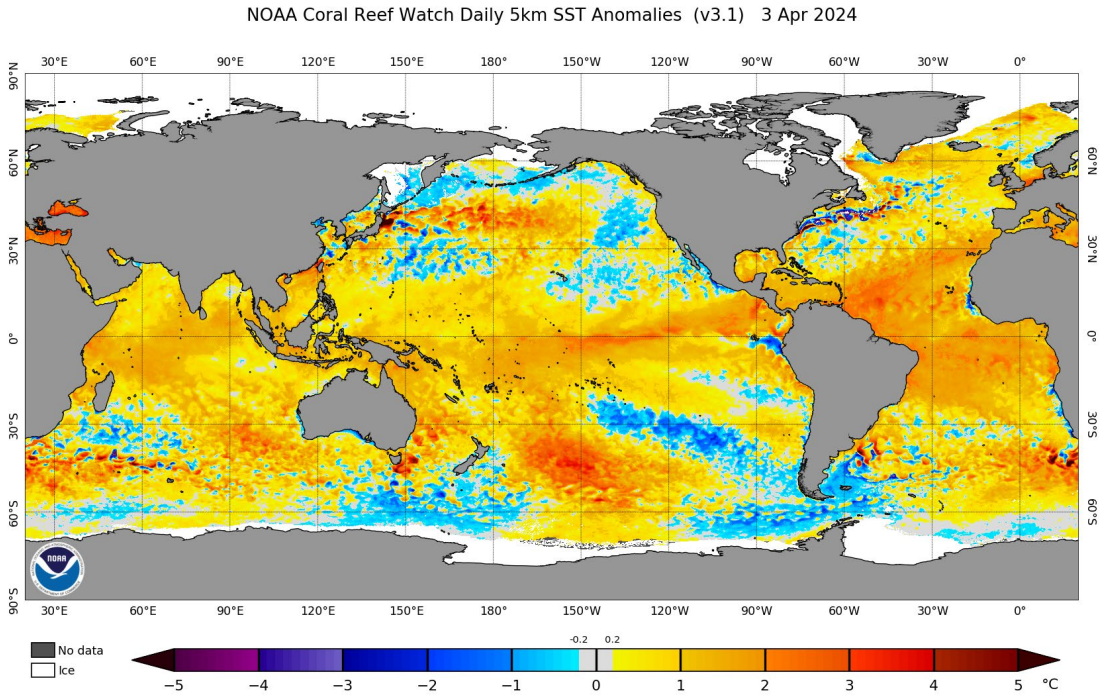
Source: Climate Reanalyzer, Climate Change Institute, University of Maine, USA

Global Precipitation Forecast

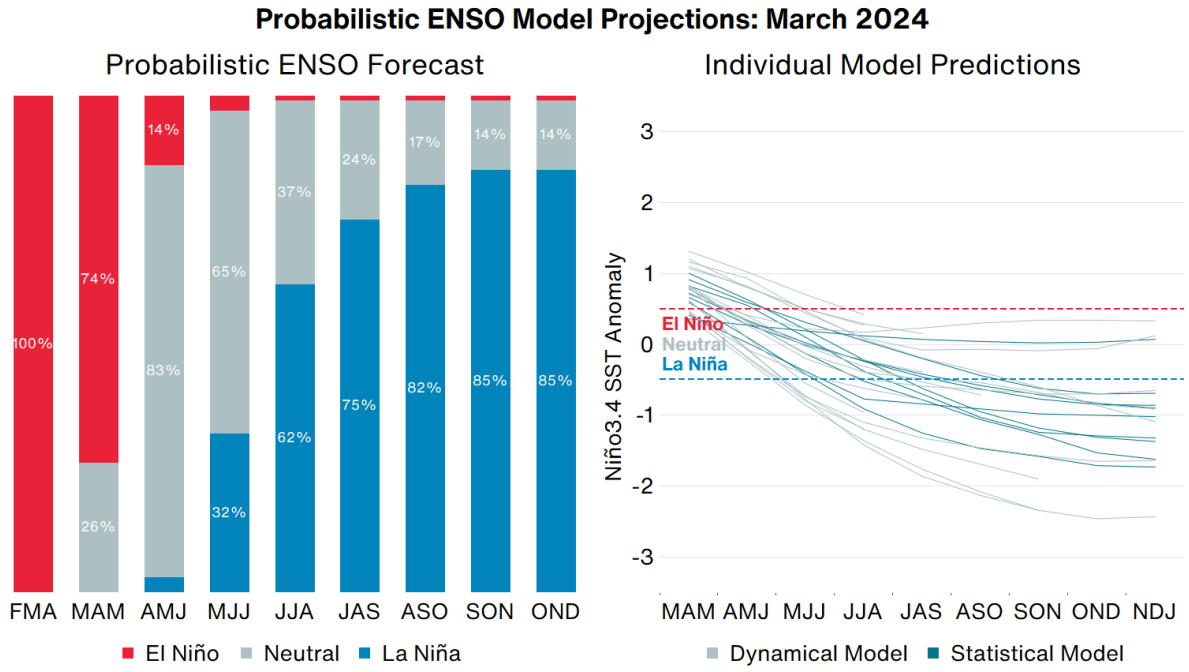


Source: Climate Reanalyzer, Climate Change Institute, University of Maine, USA

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



El Niño-Southern Oscillation (ENSO)



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

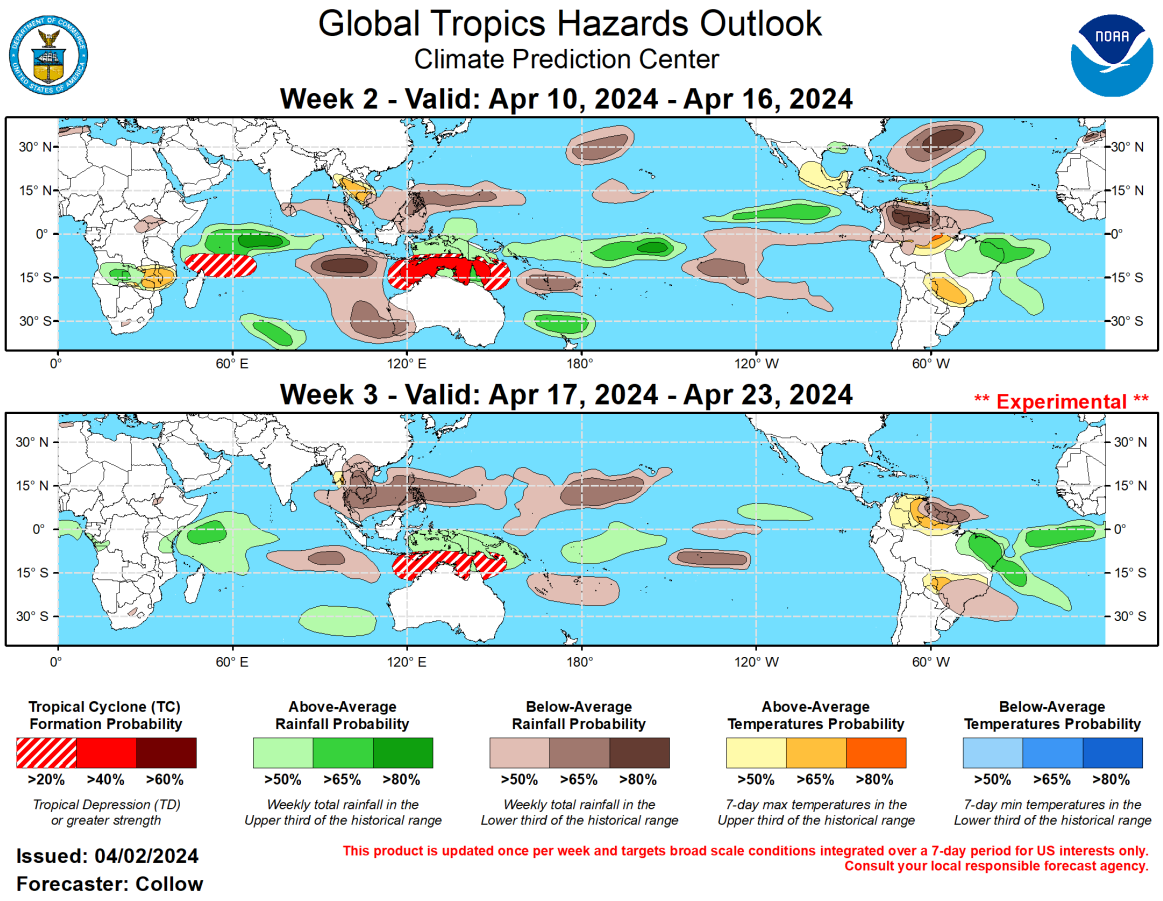
La Niña: *Cool phase of an ENSO cycle. Sea surface temperatures of -0.5°C occur across the east-central equatorial Pacific.*

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).

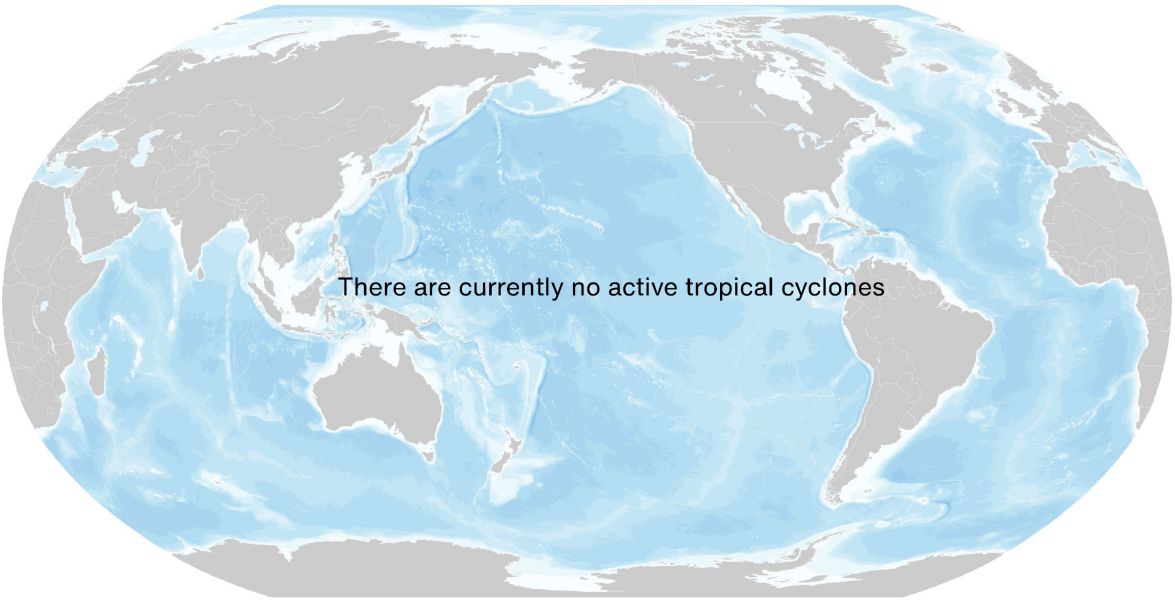
Source: NOAA, Columbia University | Graphic: Aon Catastrophe Insight

Global Tropics Outlook



Source: Climate Prediction Center (NOAA)

Current Tropical Cyclone Activity



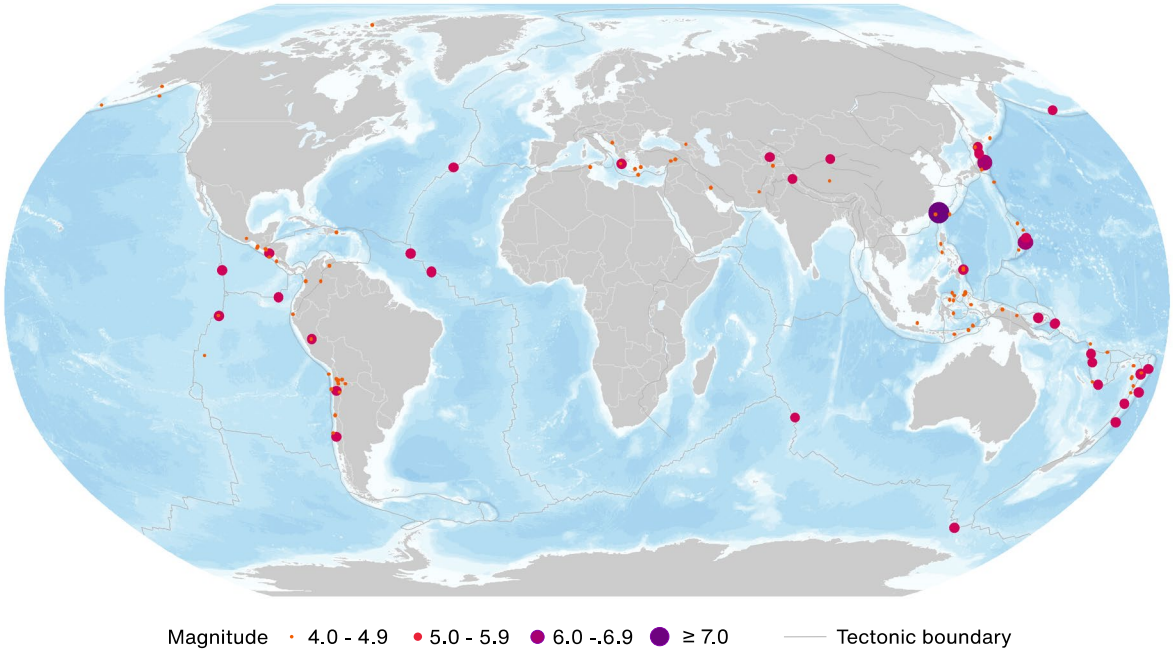
Tropical Depression Tropical Storm Category 1 Category 2 Category 3 Category 4 Category 5

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)

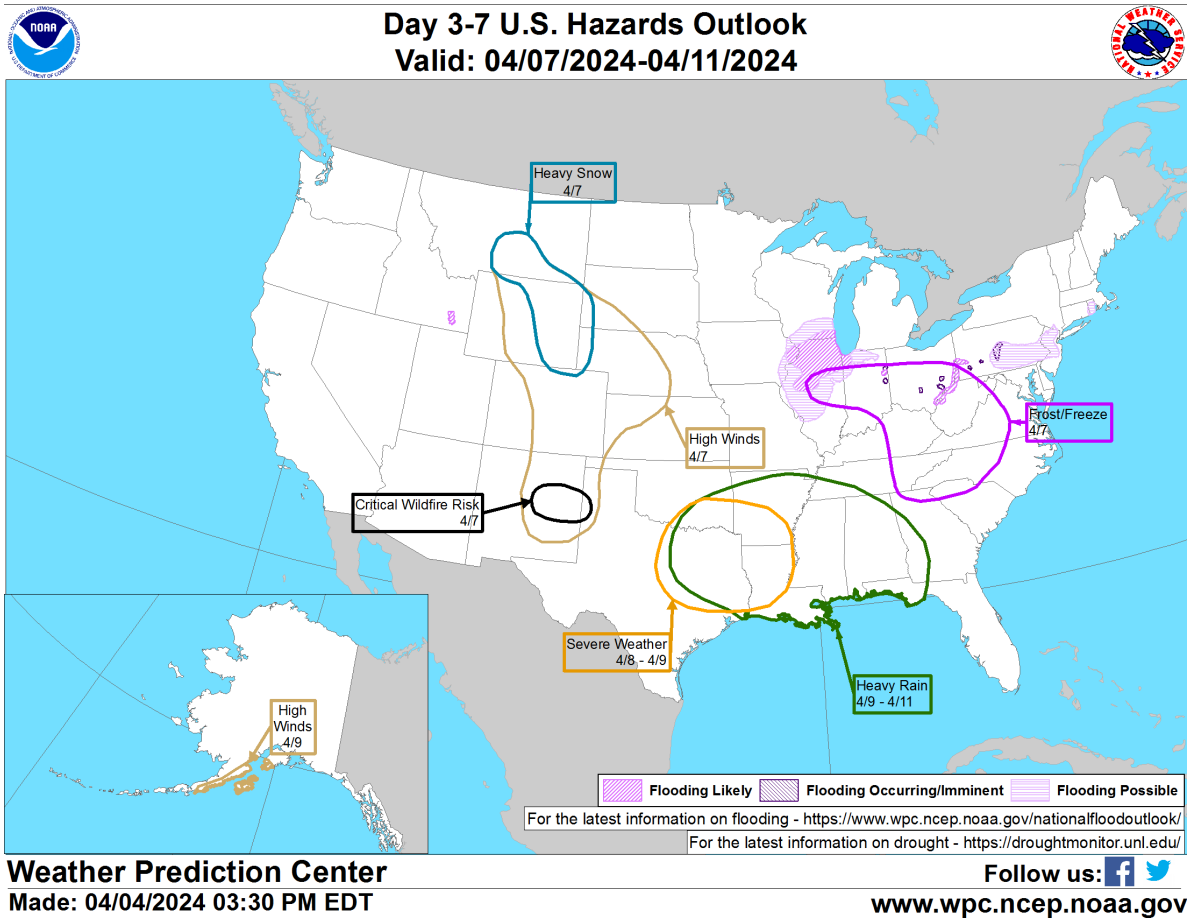
Global Earthquake Activity (≥M4.0): March 29 - April 4



Date (UTC)	Location	Magnitude	Epicenter
4/2/2024	15.82N, 146.87E	6.2	13 km (8 miles) ENE of Saipan, Northern Mariana Islands
4/2/2024	23.82N, 121.56E	7.4	18 km (11 miles) SSW of Hualien City, Taiwan
4/3/2024	24.06N, 121.67E	6.4	11 km (7 miles) NE of Hualien City, Taiwan
4/4/2024	37.72N, 141.92E	6.1	83 km (52 miles) E of Minami, Japan

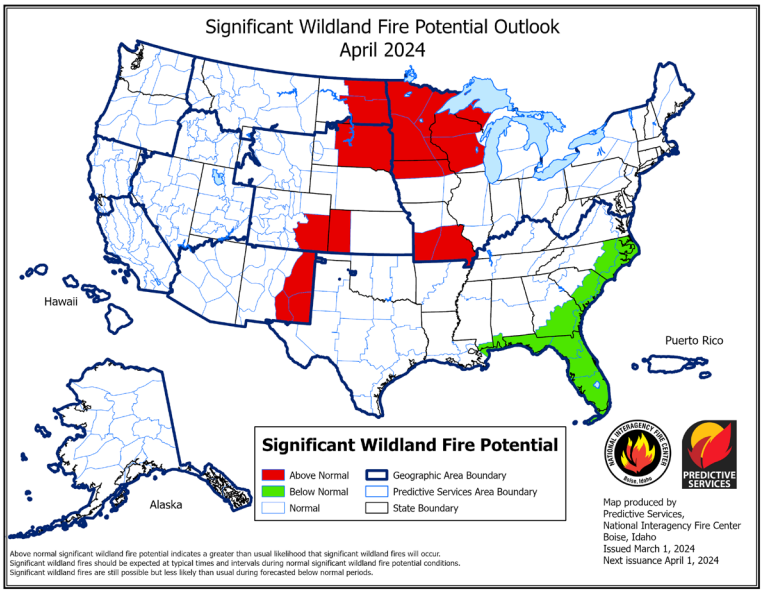
Source: United States Geological Survey

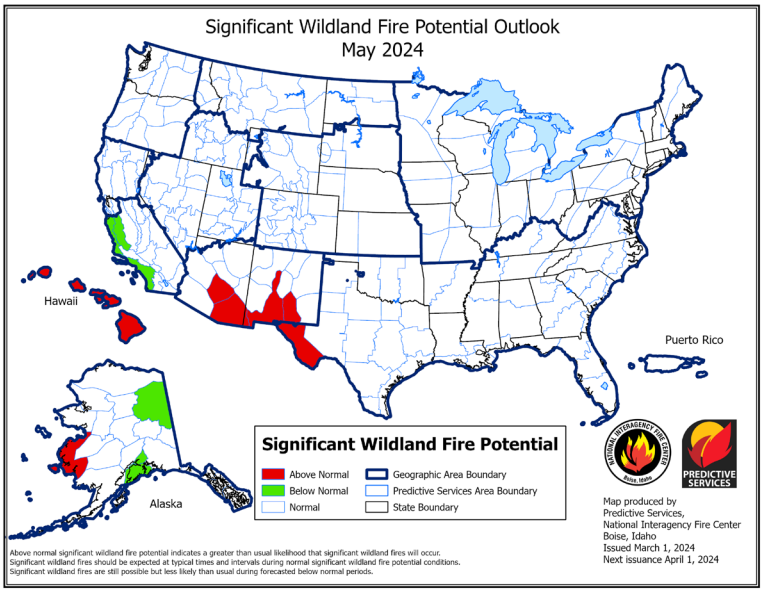
U.S. Hazard Outlook



Source: Climate Prediction Center (NOAA)

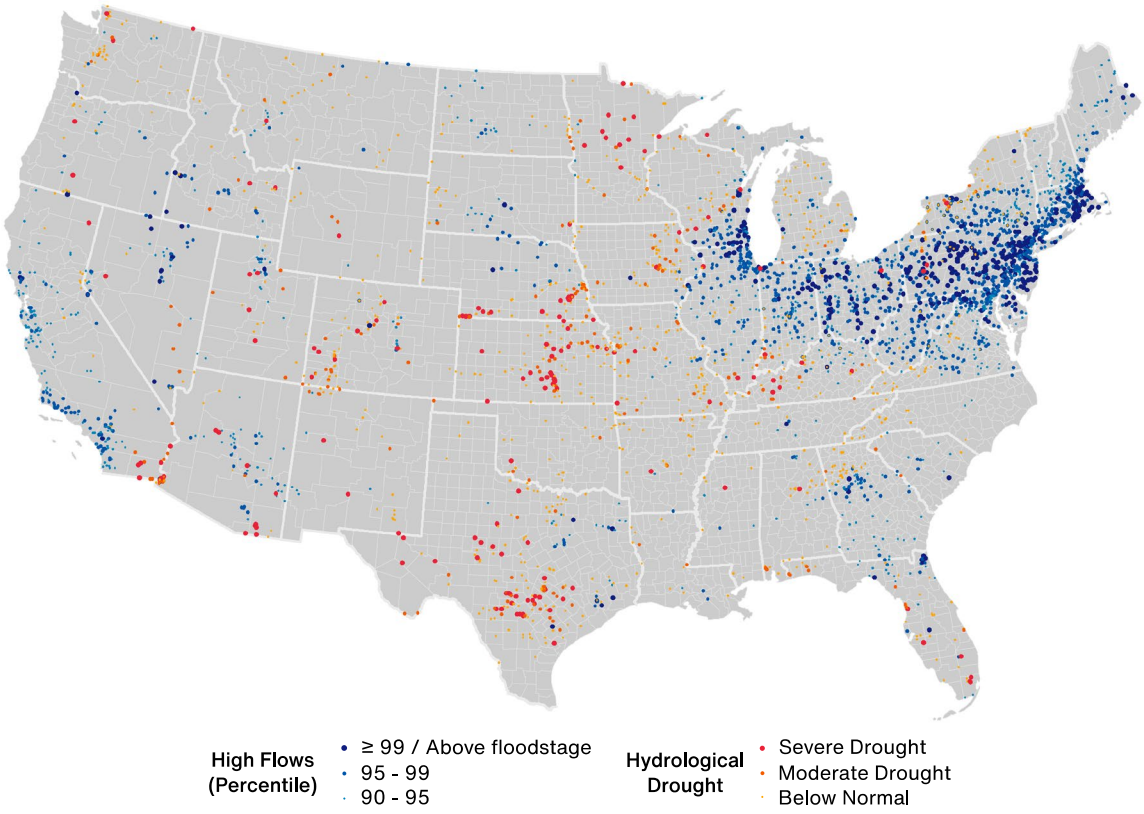
U.S. Wildfire: Significant Fire Risk Outlook & Activity





Source: NIFC

U.S. Current Riverine Flood Risk



A ≥99th 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 steam 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

Taiwan: Earthquake

U.S. Geological Survey (USGS)
Taiwan's National Fire Agency (NFA)
The Japan Meteorological Agency (JMA)
7.4 magnitude quake hits Taiwan, strongest in 25 years, *CNN*
Taiwan Residential Earthquake Insurance Fund (TREIF)

United States: Severe Convective Storm, Flooding, Winter Weather

National Weather Service (NWS)
Storm Prediction Center (SPC)
NOAA Damage Assessment Toolkit (DAT)
Atmospheric river storm that drenched Los Angeles, San Diego over Easter weekend winds down, *Fox Weather*
Deadly severe weather roars through several states, spawning potential tornadoes, *AP News*
Deadly Severe Weather Outbreak Leaves Damage In More Than A Dozen States, *The Weather Channel*
As rivers recede, the full scope of flooding in the Pittsburgh region is becoming clearer, *Pittsburgh Post-Gazette*
April nor'easter with heavy, wet snow pounds Northeast, knocks out power to hundreds of thousands, *Ap News*

Europe: Flooding & Windstorm

European Severe Weather Database
Vigicrues
Météo France

Natural Catastrophes: In Brief

UN OCHA
Pan American Health Organization (PAHO)
Cyclone Wreaks Havoc In West Bengal's Jalpaiguri; Five Dead, Over 500 Injured, *News 24*
Government Under Fire As Kazakh Regions Go Under Water, *Radio Free Europe Radio Library*
The number of cities in emergency situation due to rains in MA rises to 13, *Imirante*
Wind storm kills 1, destroys over 100 houses in Nasarawa, *Daily Post*

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