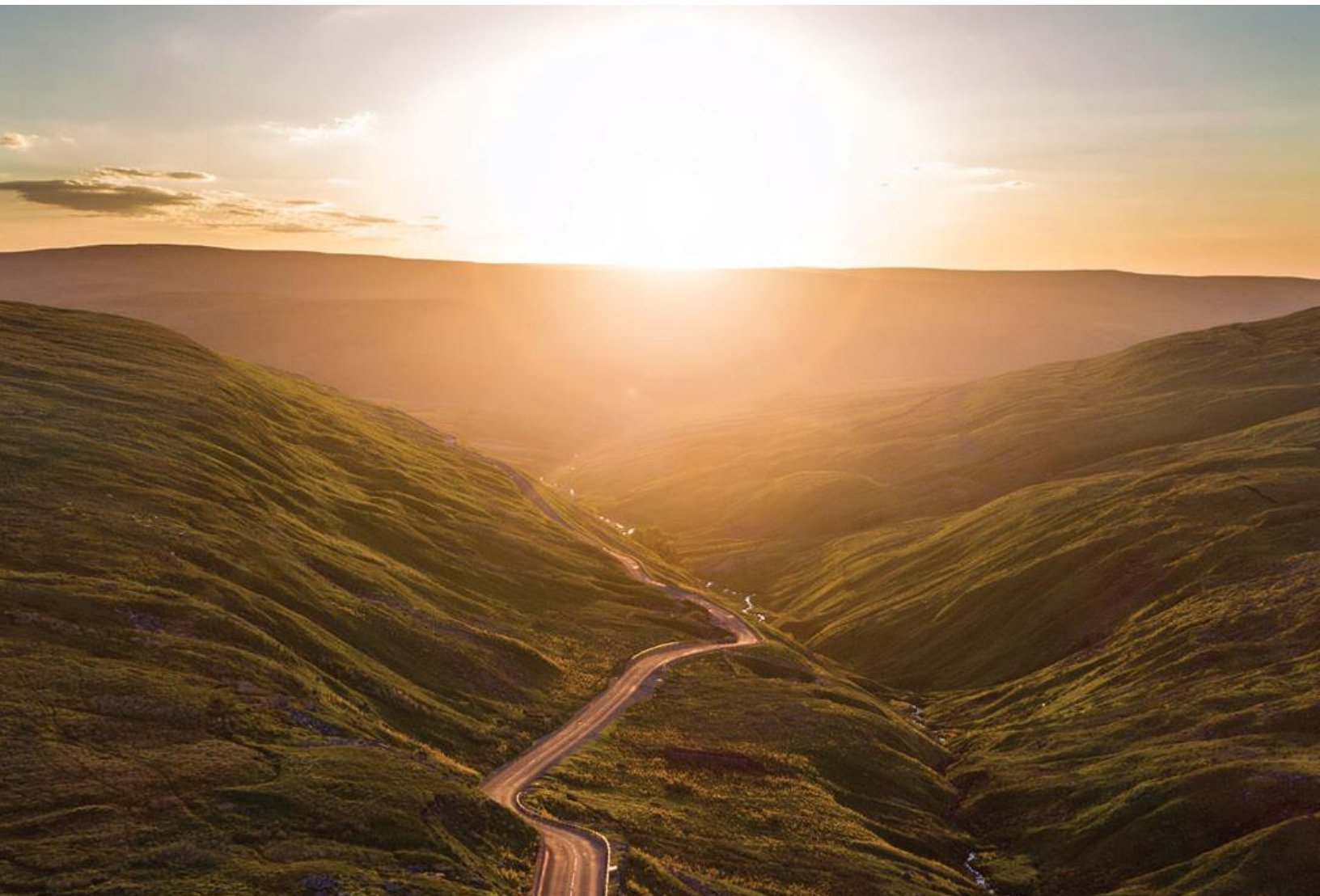
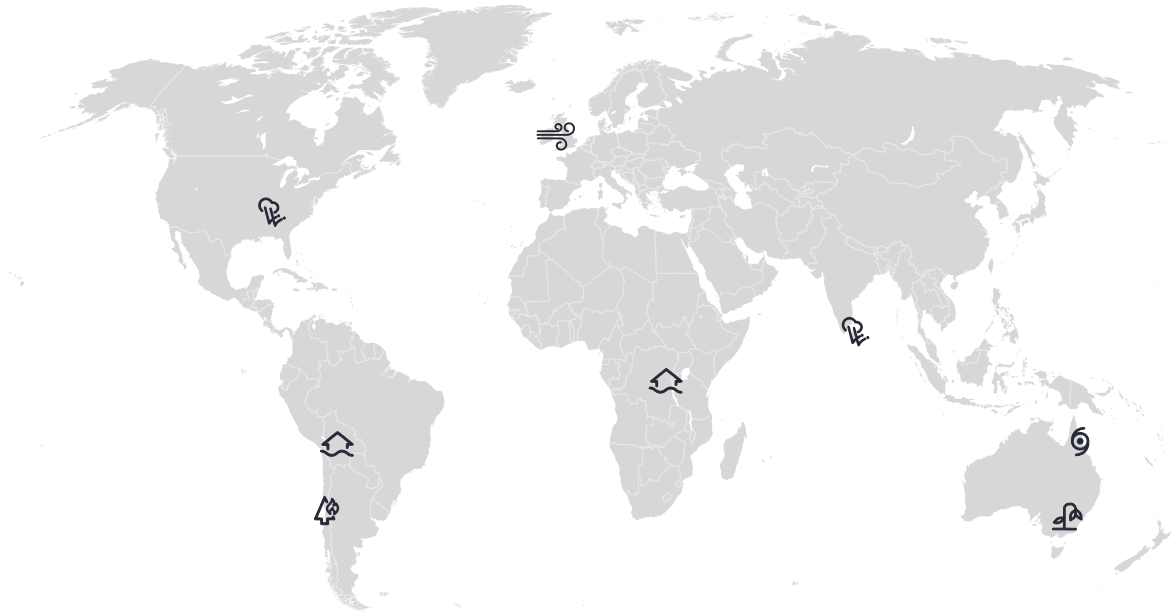


# **Weekly Cat Report**

December 15, 2023



## Executive Summary



Event	Affected Region(s)	Fatalities	Economic Loss (\$)	Page
<b>SCS &amp; Winter Weather</b>	United States	6	100s of millions	3
<b>Cyclone Jasper</b>	Australia	0	Millions	6
<b>Heatwave</b>	Australia	N/A	N/A	8
<b>Flooding</b>	Bolivia	14	Unknown	9
<b>Flooding &amp; Landslide</b>	DRC	15	Unknown	9
<b>SCS &amp; Flooding</b>	Sri Lanka	1	Unknown	9
<b>Wildfire</b>	Chile	0	Unknown	9
<b>Windstorms Elin &amp; Fergus</b>	Western Europe	0	10s of millions	9

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.

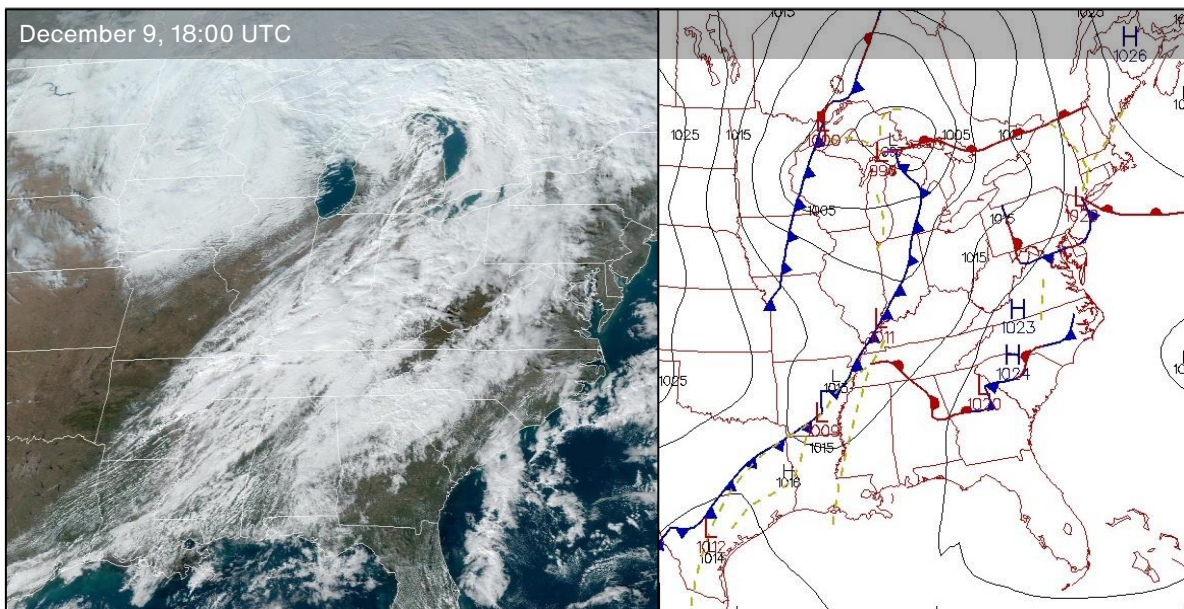
Along with this report, we continue to welcome users to access current and historical natural catastrophe data and event analysis on Impact Forecasting's Catastrophe Insight website: <http://catastropheinsight.aon.com>

## United States: SCS & Winter Weather

### Overview

An intense midlatitude cyclone impacted much of the eastern United States on December 9-11. Severe and winter weather hazards caused widespread damage and power outages from Louisiana to Connecticut. Notably, several towns in northern Tennessee were devastated by multiple, powerful tornadoes, leading to 6 deaths, 91 injuries, and significant infrastructure and property damage. Total economic and insured losses will reach at least into the 100s of millions USD, potentially higher.

### Meteorological Recap



### December 9

Ahead of a deep, upper-level trough, a strong midlatitude cyclone trekked across the northern United States on December 9. Along the cyclone's cold front, abundant moisture and favorable wind shear helped trigger widespread severe thunderstorms from the afternoon into the overnight hours. Storms packed with 60 mph (95 kph) wind gusts and hailstones up to 4 inches (10 cm) in diameter particularly impacted states within the lower Mississippi and Tennessee Valleys. According to the SPC, there were over 100 reports of severe winds and large hail.

Notably, these storms also produced 16 tornadoes in total, according to NWS damage surveys. The strongest tornado observed was rated EF-3 with an estimated peak wind speed of 150 mph (240 kph). While on the ground for nearly 43 miles (70 km), this powerful twister tore directly through the town of **Clarksville**, Tennessee into southern Kentucky. Another powerful twister, rated EF-2 with wind speeds of 130 mph (210 kph), moved nearly 30 miles (50 km) directly through the towns of **Hendersonville**, **Madison**, and **Gallatin** just north of Nashville. Other locations such as Springfield, Tennessee and the Birmingham, Alabama metro area were also directly hit by strong tornadoes.

## December 10-11

The previously mentioned cold front continued eastward on December 10-11 and helped produce some limited severe weather, including a brief EF-1 tornado in the Raleigh metro area. However, many Atlantic coastal states experienced more impacts from strong wind gusts up to 55 mph (90 kph) and heavy mixed precipitation. Parts of Massachusetts, Connecticut, and New York received over 5 inches (125 mm) of rain while areas further north and west locally received more than 9 inches (230 mm) of snow, according to the NWS.

Location, State	Highest Rainfall Storm Totals (in/mm)
Durham, CT	5.30 / 134.6
Moosup, CT	5.15 / 130.8
Milford, CT	5.13 / 130.3
Fort Salonga, NY	5.05 / 128.3
Wauregan, CT	5.00 / 127.0
Wallingford, CT	4.91 / 124.7

## Event Details



Tornado damage in Clarksville, Tennessee

Source: NOAA DAT

## Southeast

While several communities throughout the southeast were heavily impacted during the severe weather outbreak on December 9, the devastation seen from the **Clarksville** and **Madison-Hendersonville-Gallatin** tornadoes was extraordinary. As of December 13, the major EF-3 tornado in **Clarksville** has killed three people and injured 62 more. In a preliminary damage assessment, the Montgomery County Emergency Management Agency determined that 81 commercial and 2,211 residential properties were affected by the tornado. This includes 785 residences that either sustained major damage or were completely destroyed. In the **Madison-Hendersonville-Gallatin** area, the deadly EF-2 tornado has killed 3 people and injured 21 others, as of December 13. According to officials in Nashville and Sumner County, at least 650 structures were affected, with 174 of them either fully collapsing or sustaining major damage.

Additional tornado damage was seen in Cumberland Furnace and Springfield in northern Tennessee, and in the Birmingham, Alabama metro area. Numerous properties sustained minor to moderate damage, and 8 more people were injured. In total, at least 86,000 people lost power at the height of the severe weather outbreak.

## *Northeast and Mid-Atlantic*

Despite strong winds and heavy rain and snow, overall damage in the Mid-Atlantic and Northeast was minor. Thousands of customers throughout the area lost power, and many roads were closed due to downed trees and powerlines. Connecticut was the most affected as some localized flooding triggered a few evacuations and school closures, primarily near the towns of Norwich and North Branford.

## **Financial Loss**

Since several communities were directly hit by strong tornadoes, especially Clarksville and areas north of Nashville, the full extent of property and infrastructure damage is expected to be very significant. As such, total economic and insured losses will reach into the 100s of millions USD, possibly higher.

## Australia: Cyclone Jasper

### Overview

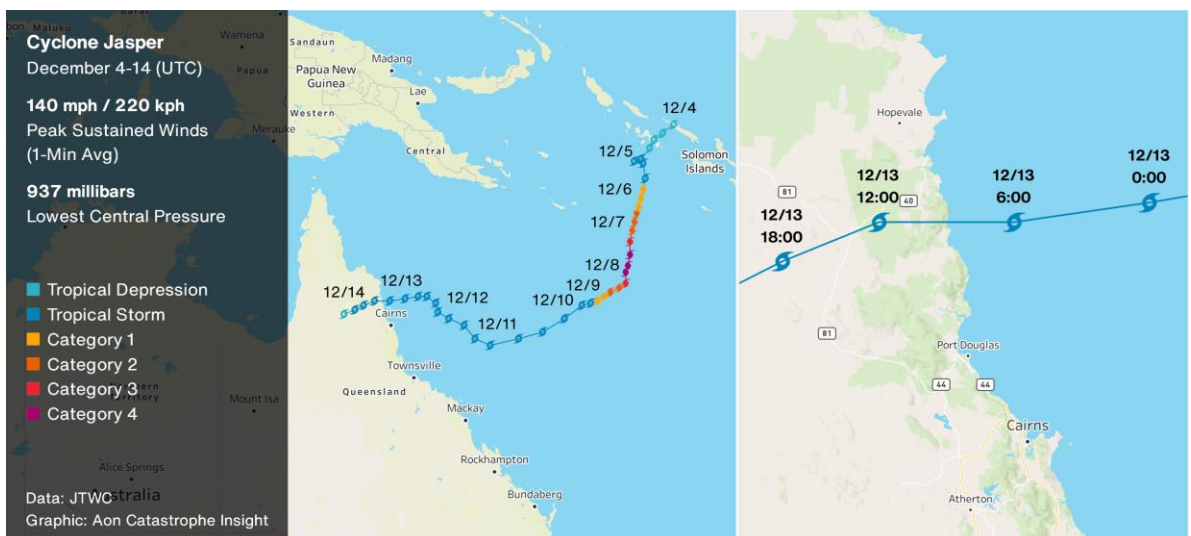
*Cyclone Jasper, the first named storm of the 2023/2024 Australian cyclone season, made landfall in northeast Australia on December 13. Strong wind gusts and heavy rainfall particularly affected parts of northern Queensland. Total economic losses are expected to be relatively low as the storm impacted a sparsely populated region.*

### Meteorological Recap

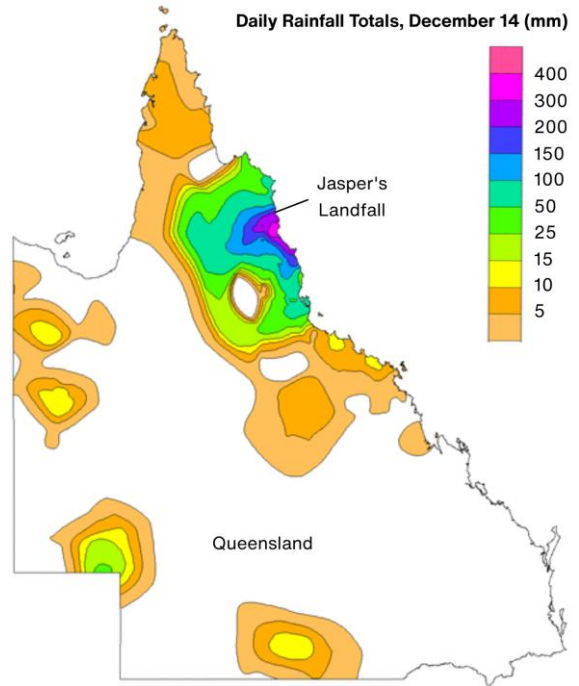
The system originated as a low-pressure area over the South Pacific Ocean and was initially recognized by the Australian and Fiji Meteorological Services (BoM, FMS) on December 2. The storm gradually strengthened within a favorable environment, reached a tropical storm intensity, and was named **Jasper** by BoM on December 5. Jasper further intensified and topped out at one-minute sustained winds of **140 mph (220 kph)**, an equivalent to a Category 4 hurricane (on the Saffir-Simpson scale), according to the Joint Typhoon Warning Center (JTWC). Thereafter, the system started to weaken while tracking southwest towards the Australian coast. A Tropical Cyclone Watch was issued for areas between Cape Melville to Townsville, including the towns of Cairns and Cooktown, on December 10.



**Cyclone Jasper approaching Queensland's coast**  
Source: NASA Worldview



Location	24-hour Rainfall Total (mm/in)
<b>Yandill</b>	<b>624 / 24.6</b>
Diwan	500 / 19.7
Whyanbeel Creek	463 / 18.2
Kuranda	457 / 18.0
Port Douglas	286 / 11.3
Cairns	179 / 7.0



On the morning of December 13 (UTC), Jasper made landfall north of the town of Cairns as a tropical storm (based on the Saffir-Simpson scale) with maximum sustained winds of 65 mph (105 kph). According to the Australian Tropical Cyclone Intensity Scale, Jasper was classified as a Category 2 storm upon landfall.

The storm generated very heavy, localized rainfall over parts of northern Queensland on December 14.

The Table above highlights some of the highest 24-hour rainfall totals, according to the BoM. Yandill recorded an astonishing **624 mm (24.6 inches)** of rain, which is the second-highest December daily rain total on record for all of Australia. Furthermore, much of this rainfall fell in just 3 hours, leading to some extreme 3-hour rain rates at Whyanbeel Creek (148 mm / 5.8 inches) and Yandill (160 mm / 6.3 inches).

### Event Details

The cities of Cairns, Port Douglas, and Cooktown were among the most affected by the storm. Jasper prompted evacuations of about 100 people, and dozens of others were rescued. Flights in the affected area were canceled, local transportation was heavily disrupted, and nearly 40,000 customers lost power as the storm passed.

### Financial Loss

Material damage to properties, vehicles, and infrastructure is expected to be relatively low as the storm hit a sparsely populated area. Total economic losses may reach into the millions of AUS.

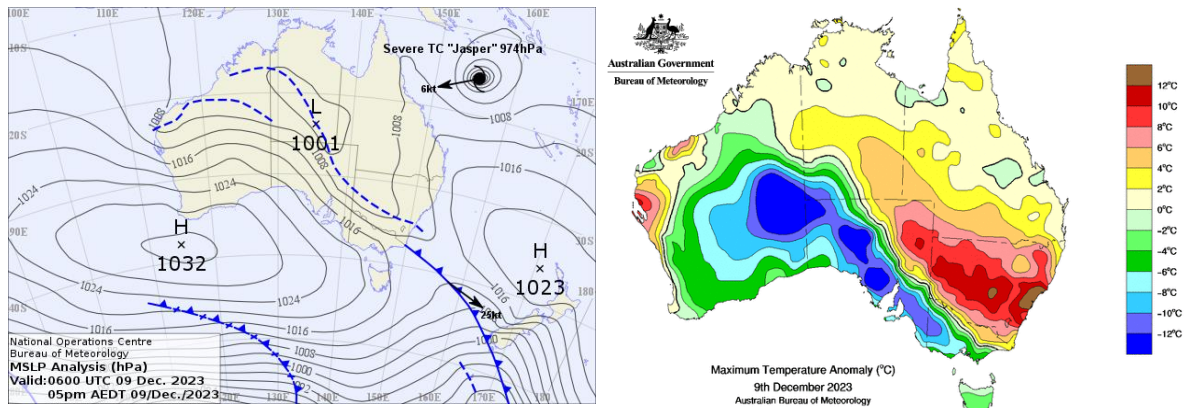
## Australia: Heatwave

### Overview

Nearly half of Australia experienced a severe heatwave between December 6-10. After a brief cooldown period, extreme temperatures are expected to continue through December 16, according to forecasts from the Australian Bureau of Meteorology (BoM).

### Meteorological Recap

Possibly exacerbated by the current El Niño phenomenon, the ongoing heatwave over eastern Australia is a result of an eastward-extending ridge of high-pressure situated at 30–40° S. Since December 9, the center of the anticyclone has continued to move further inland while pushing an adjacent area of low-pressure area eastward. Due to slow air movement between the two pressure systems, the surrounding air has warmed faster than local authorities expected.



Synoptic map (left) and maximum temperature anomaly compared to 1991-2020 mean (right), December 9  
Source: BoM

### Event Details

The low-intensity heatwave has spread from Broome in Western Australia into parts of the Northern Territory, South Australia, Queensland, New South Wales, and Victoria. The most severe heat was concentrated over most of New South Wales, inland parts of South Australia, and southern Queensland, where temperatures exceeded **40 °C** (see table). The elevated temperatures have caused localized fires in some places, prompting authorities to issue fire danger warnings while the current situation remains under control.

Location, State	Max Temperature, Dec 9 (°C/°F)
Moomba Airport, SA	44.0 / 111.2
Birdsville Airport, QLD	43.8 / 110.8
Wanaaring, NSW	43.1 / 109.6
Rabbit Flat, NT	41.5 / 106.7
Sydney, NSW	40.0 / 104.0
Brisbane, QLD	38.4 / 101.1

Source: BoM



## Natural Catastrophes: In Brief

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### **Flooding (Bolivia)**

Since December 10, severe flooding has affected much of Bolivia, especially the Potosi, Chuquisaca, and La Paz departments. Heavy rainfall has caused the Coroico, Mapiri, and Tipuani Rivers to overflow, leading to infrastructural damage and destroying over 1,000 hectares (2,470 acres) of crops. According to the latest reports, 14 people have been killed, and at least 1,780 families have been affected.

### **Flooding & Landslide (Democratic Republic of the Congo)**

Torrential rains triggered deadly flooding and landslides across South Kivu province in the eastern DRC on December 10-11. Extensive damage to dozens of homes and local infrastructure, along with 15 deaths, was reported near Bukavu City. Damage assessments are ongoing within the affected area.

### **SCS & Flooding (Sri Lanka)**

Sri Lanka has seen material losses and casualties due to severe weather and heavy rainfall since the beginning of December. According to the disaster authorities (NDRSC), one person died in the Kurunegala District in a lightning incident, and three others were injured due to flooding in Kilinochchi District. In total, more than 2,000 people have been affected and 243 houses have been damaged.

### **Wildfire (Chile)**

Several wildfires have burnt more than 2,800 hectares (6,900 acres) in central Chile since December 6. The Santiago Metropolitan area and the regions of Valparaiso and O'Higgins have been among the worst affected by the fires. As of December 11, local disaster authorities (SENAPRED) reported at least seven injured people and 20 damaged houses. Hundreds of people have also been evacuated.

### **Windstorms Elin & Fergus (Western Europe)**

Strong winds and heavy rainfall associated with two successive lows, internationally named Elin and Fergus (Vanja and Walter by FU Berlin), resulted in relatively minor material damage across Western Europe on December 9-10. Many exposed locations within Ireland, where an orange wind warning was issued, were particularly affected by strong winds. In Leitrim, several buildings and vehicles were damaged by a tornado.

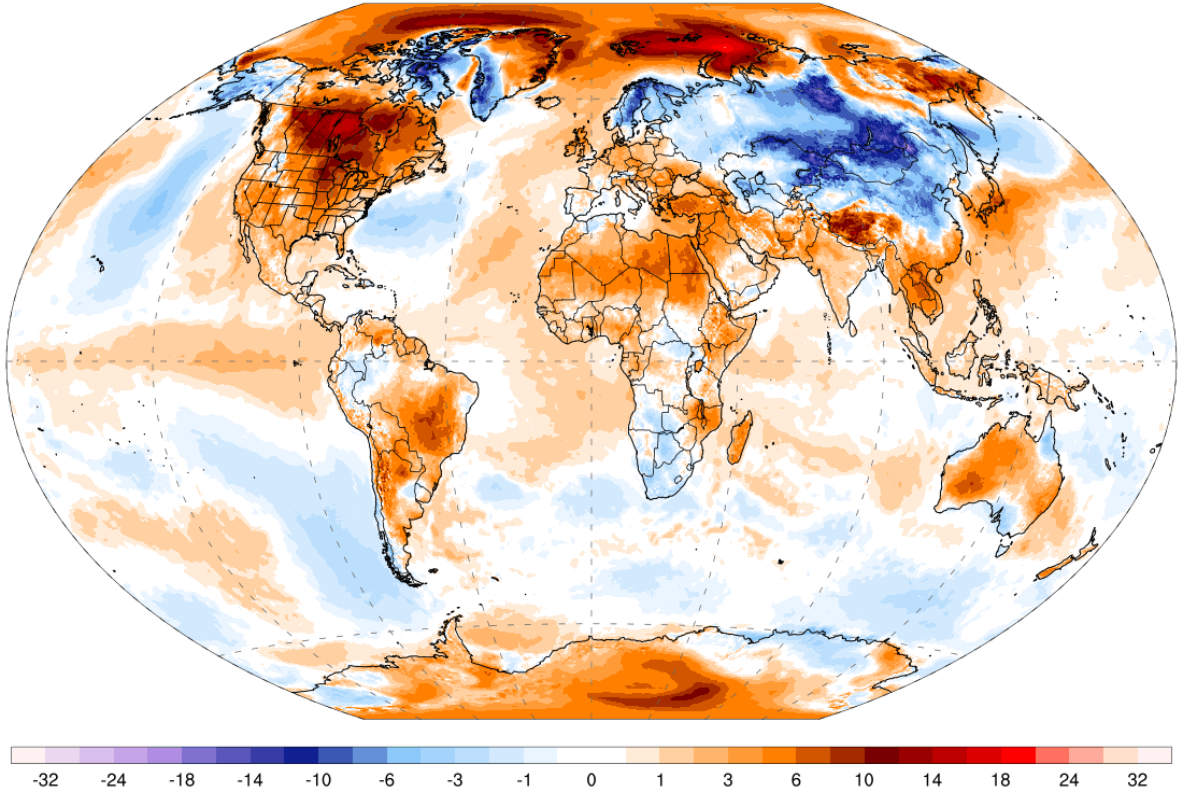
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## Global Temperature Anomaly Forecast

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GFS 2m T Anomaly (°C) [CFSR 1979-2000 baseline]  
Days 1-3 Avg | Thu, Dec 14, 2023

ClimateReanalyzer.org  
Climate Change Institute | University of Maine



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

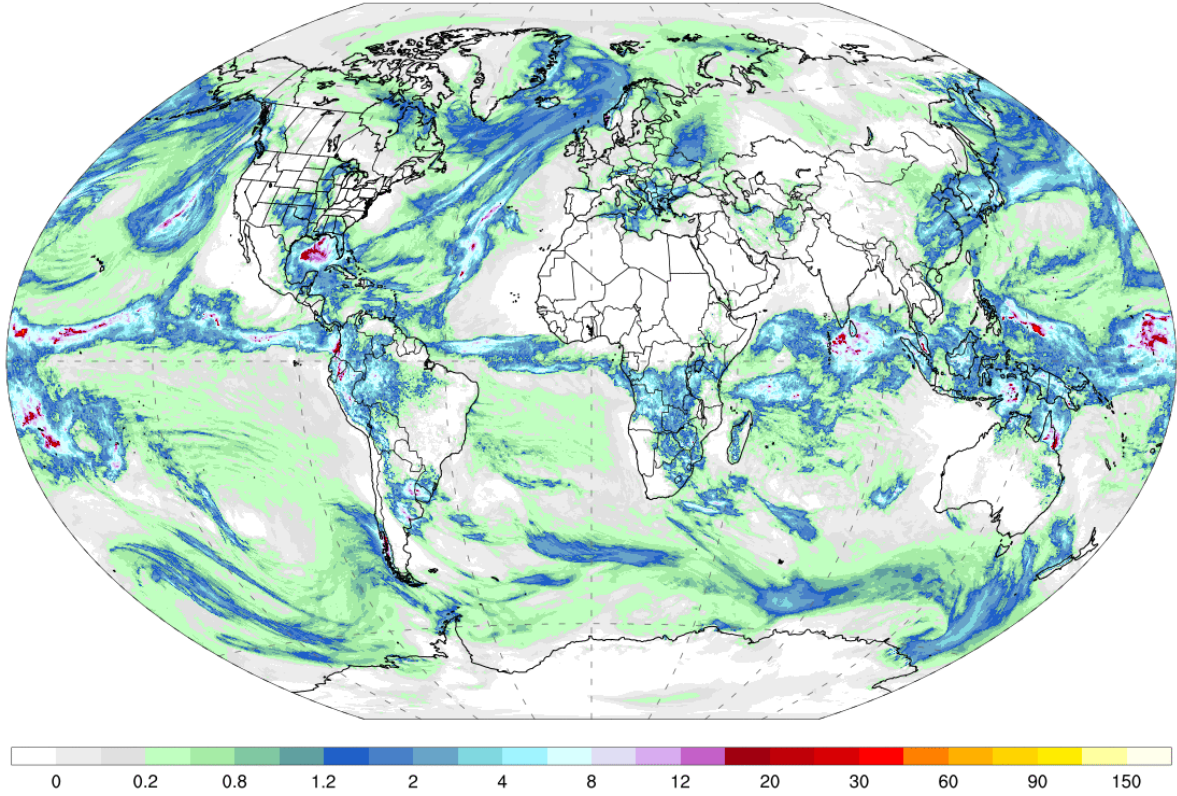
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## Global Precipitation Forecast

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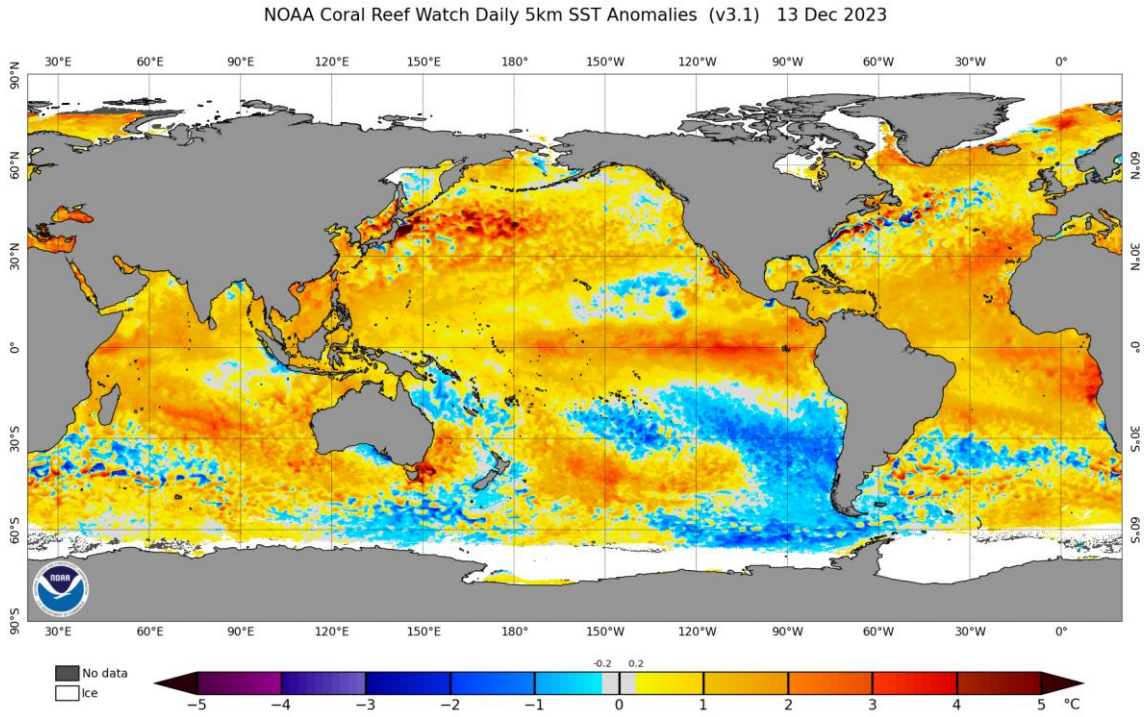
GFS Accumulated Precipitation (cm)  
Days 1-3 Total | Thu, Dec 14, 2023

ClimateReanalyzer.org  
Climate Change Institute | University of Maine

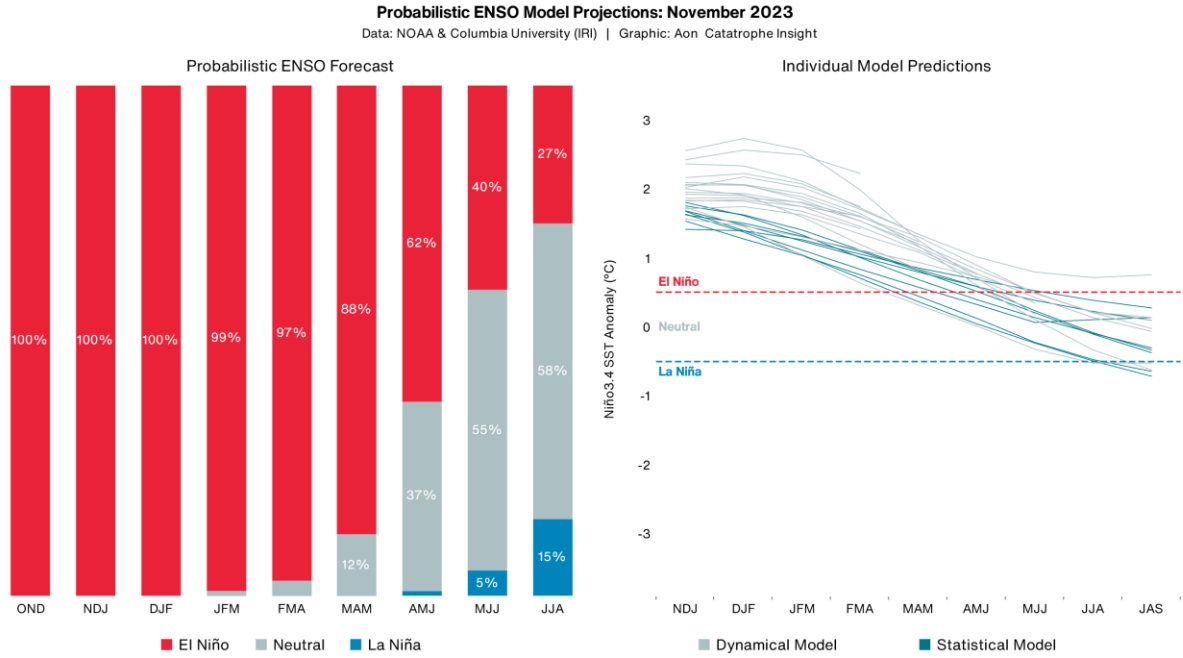


Source: Climate Reanalyzer, Climate Change Institute, University of Maine, USA

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



## El Niño-Southern Oscillation (ENSO)



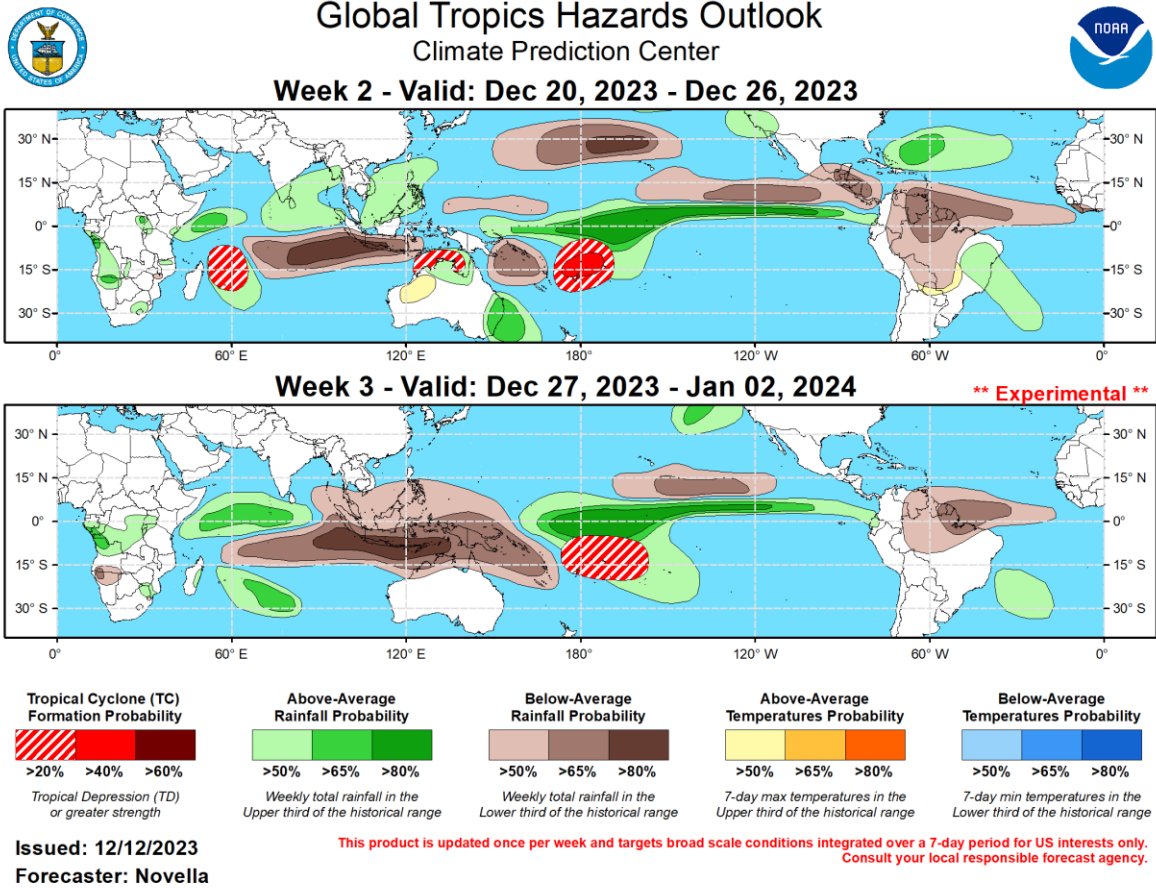
**El Niño:** Warm phase of an ENSO cycle. Sea surface temperatures of +0.5°C occur across the east-central equatorial Pacific.

**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.

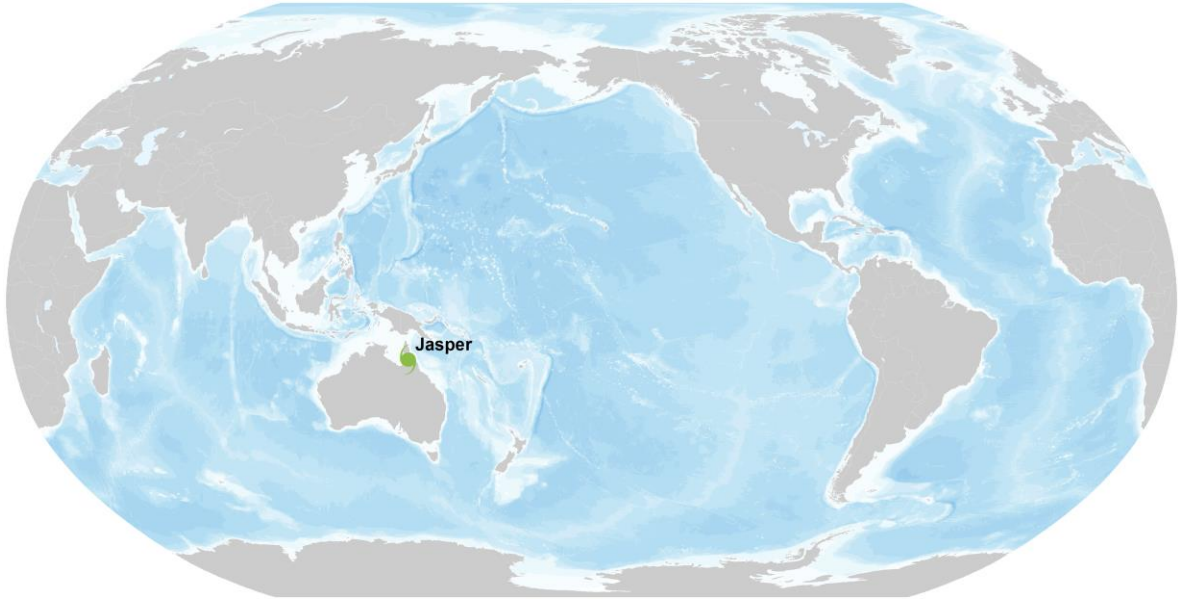
*El Niño (La Niña) is a phenomenon in the equatorial Pacific Ocean characterized by a five consecutive 3-month running mean of sea surface temperature (SST) anomalies in the Niño 3.4 region that is above the threshold of +0.5°C (-0.5°C). This is known as the Oceanic Niño Index (ONI).*

## 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

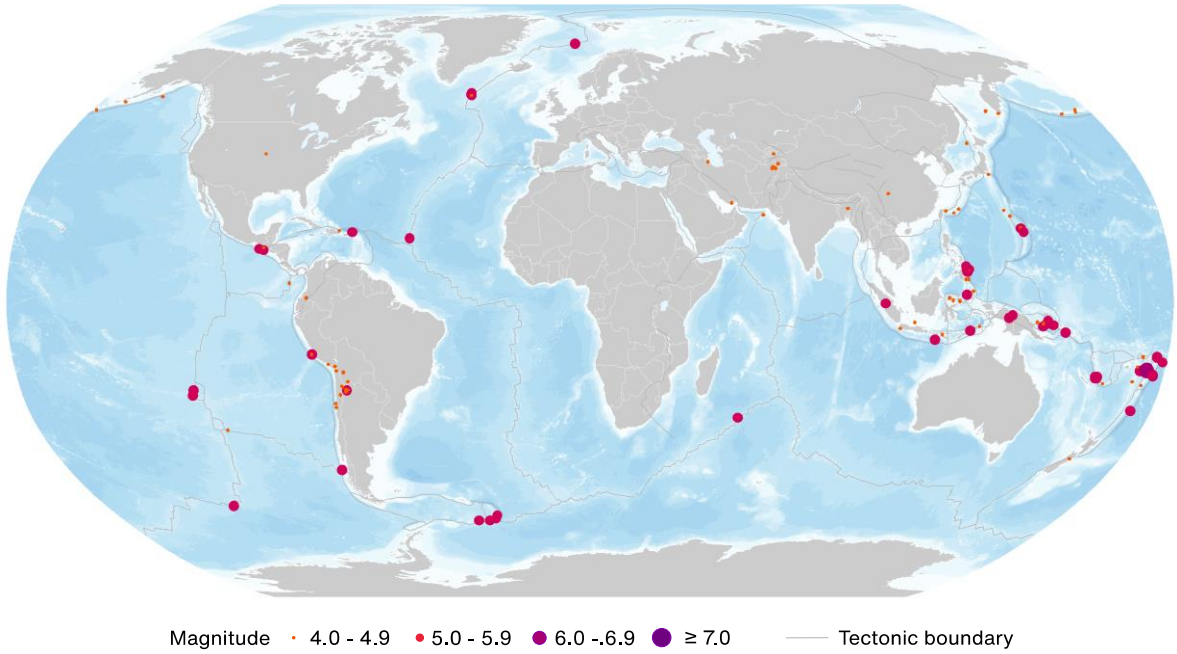
Name	Location	Winds	Center
CY Jasper	15.9S, 143.0E	35	465 miles (750 km) S from Daru, Papua New Guinea

\* 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 ( $\geq M4.0$ ): December 8-14

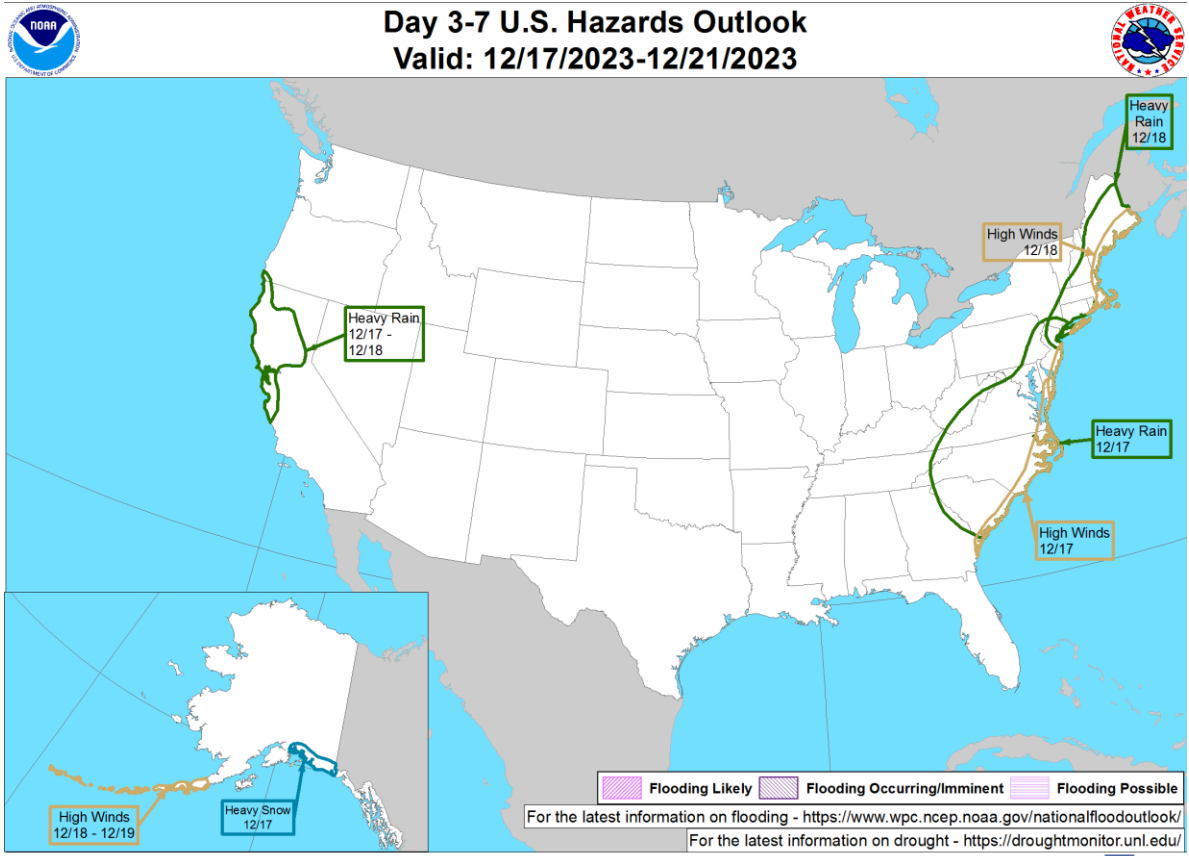


Date (UTC)	Location	Mag	Epicenter
12/11/2023	18.68S, 175.48W	6.1	15 km (9 miles) W of Neiafu, Tonga

Source: United States Geological Survey



## U.S. Hazard Outlook

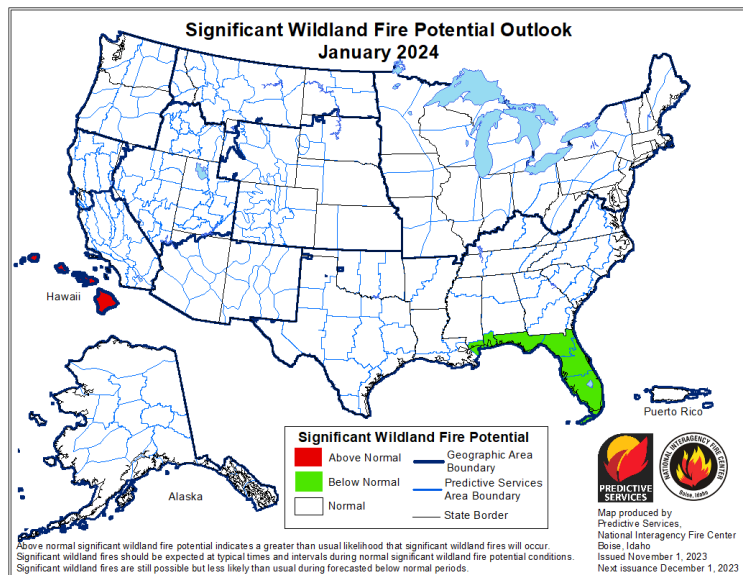
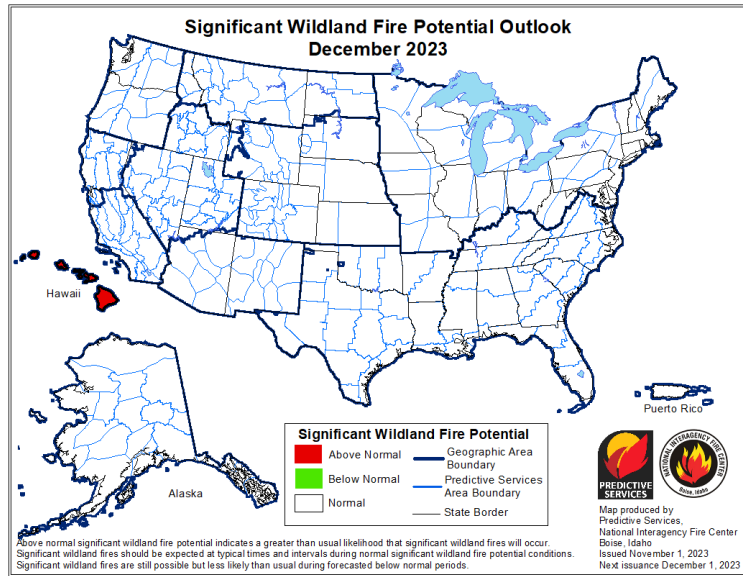


**Weather Prediction Center**  
Made: 12/14/2023 02:37 PM EST

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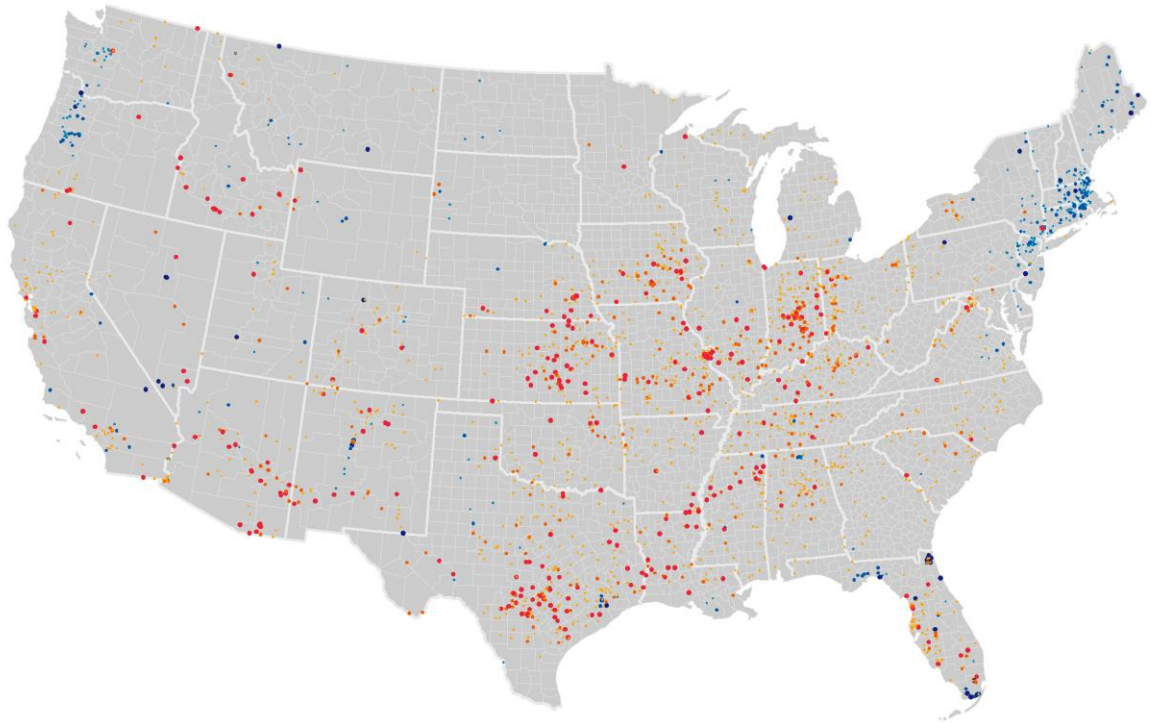
Source: Climate Prediction Center (NOAA)

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



Source: NIFC

## U.S. Current Riverine Flood Risk



- |                                |                                |                             |                    |
|--------------------------------|--------------------------------|-----------------------------|--------------------|
| <b>High Flows (Percentile)</b> | • $\geq 99$ / Above floodstage | <b>Hydrological Drought</b> | • Severe Drought   |
|                                | • 95 - 99                      |                             | • Moderate Drought |
|                                | • 90 - 95                      |                             | • Below Normal     |

*A  $\geq 99^{\text{th}}$  percentile indicates that estimated streamflow is greater than the 99<sup>th</sup> 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 5<sup>th</sup> percentile for this day of the year. Moderate drought indicates that estimated 7-day streamflow is between the 6<sup>th</sup> and 9<sup>th</sup> percentile for this day of the year and 'below normal' state is between 10<sup>th</sup> and 24<sup>th</sup> percentile.*

Source: United States Geological Survey

## Source Information

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### **United States: SCS & Winter Weather**

Storm Prediction Center (SPC)

National Weather Service (NWS)

Plymouth State University

Montgomery County Emergency Management Agency

Sumner County Emergency Management Agency

Nashville Office of Emergency Management

Tornadoes unleash deadly terror in Tennessee with children among those killed in severe storms, *Fox Weather*

Snowfall, rain, gusty winds hit Northeast as Tennessee recovers from deadly tornadoes, *ABC News*

### **Australia: Cyclone Jasper**

Australian Bureau of Meteorology (BoM)

JTWC

### **Australia: Heatwave**

Australian Bureau of Meteorology (BoM)

### **Natural Catastrophes: In Brief**

SENAPRED

NDRSC

DRC: Disruptions due to landslides and flooding ongoing in Bukavu, South Kivu Province, *Crisis24*

Met Éireann

Storms Elin and Fergus batter UK as Met Office issues four days of heavy rain warnings, *The Independent*

ESWD

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