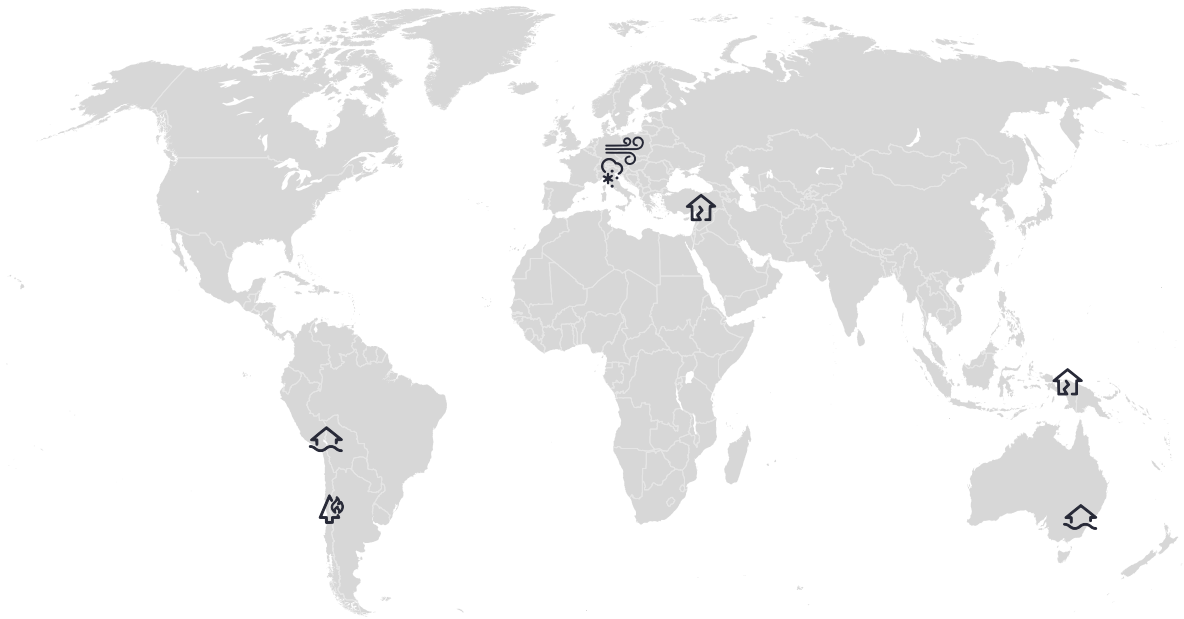


# **Weekly Cat Report**

February 10, 2023



## Executive Summary



Event	Affected Region(s)	Fatalities	Economic Loss (\$)	Page
<b>Earthquake</b>	Turkey, Syria	21,000+	Billions	3
<b>Wildfires &amp; Heatwave</b>	Chile	24+	100s of millions	8
<b>Flooding</b>	Peru, Bolivia	38+	Unknown	10
<b>Winter Weather</b>	Austria, Italy, Switzerland	11+	Negligible	10
<b>Windstorm Pit</b>	Central Europe	0	10s of millions	10
<b>Flooding</b>	Australia	0	Millions	10
<b>Earthquake</b>	Indonesia	4	Negligible	10

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>

On January 25, we released the 2023 Weather, Climate and Catastrophe Insight Report. The document can be accessed at: <https://www.aon.com/weather-climate-catastrophe/index.aspx>

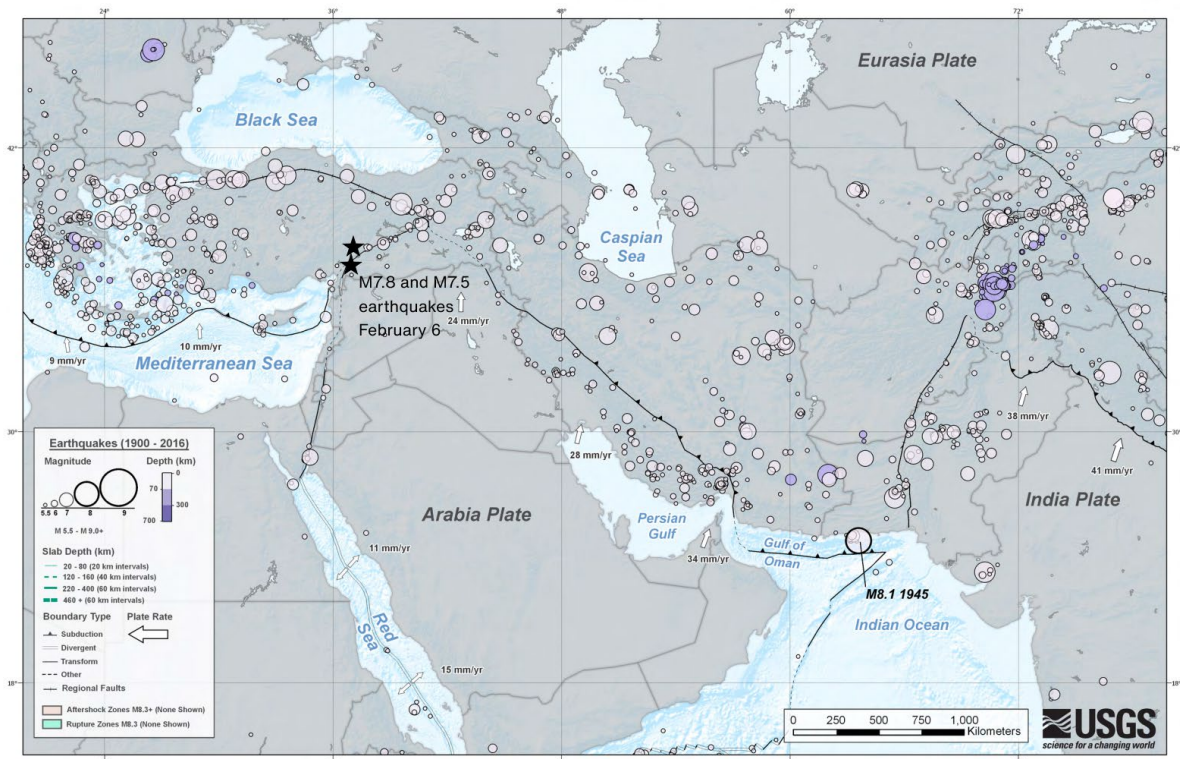
# Turkey and Syria: Earthquake

## Overview

Starting in the early morning hours on February 6, a series of strong earthquakes occurred in southern Turkey and shook the Turkish-Syrian border region, resulting in thousands of fatalities and tens of thousands of injuries, causing notable material damage in both countries, and affecting millions of people across the region. Based on the initial estimates, total economic losses were anticipated to reach well into the billions (USD). As of February 10, the number of fatalities stood at 21,000.

## Seismological Recap

The Earthquakes resulted from strike-slip faulting at shallow depth of 5 to 20 km (up to 12.4 mi). The location was in the vicinity of the triple-junction between the Anatolia, Arabia, and Africa plates, a region of generally high levels of seismicity and earthquake activity. The mechanism and location of the earthquakes are consistent with that happened in the past either the East Anatolian fault zone or the Dead Sea transform fault zone.



## The main shock – magnitude 7.8 earthquake

The first notable earthquake struck at 1:17 (UTC) in Kahramanmaraş province, about 26 km (16 mi) east of Nurdagi and about 34 km (21 mi) northwest of the city of Gaziantep. The event had an estimated depth of 17.9 km (11 mi) with a **magnitude of 7.8** and intensities up to level IX (violent) on Modified Mercalli Intensity (MMI) scale.

According to the United States Geological Survey (USGS), “the magnitude-7.8 earthquake resulted from strike-slip faulting at shallow depth. The event ruptured either a near-vertical left-lateral fault striking northeast-southwest, or a right-lateral fault striking southeast-northwest. The preliminary location of the earthquake places it within the vicinity of a triple-junction between the Anatolia, Arabia, and Africa plates. The mechanism and location of the earthquake are consistent with the earthquake having occurred on either the East Anatolia fault zone or the Dead Sea transform fault zone. The East Anatolia fault accommodates the westward extrusion of Turkey into the Aegean Sea, while the Dead Sea Transform accommodates the northward motion of the Arabia peninsula relative to the Africa and Eurasia plates.”

### Aftershocks

The first strong aftershock struck eleven minutes later (1:28 UTC) about 10 km (6.2 mi) southeast of the main epicentre at a depth of about 15 km (9.3 mi), with a **magnitude of 6.7**.

A subsequent significant earthquake occurred approximately nine hours later, at 10:24 (UTC) roughly 100 km (62 mi) north of the previous two events at a depth of about 10 km (6.2 mi) and with a high **magnitude of 7.5**.

Based on USGS’s report, “the event ruptured either a near-vertical left-lateral fault striking east-west, or a right-lateral fault striking north-south. The preliminary location of the magnitude 7.5 earthquake places it within the vicinity of a triple-junction between the Anatolia, Arabia, and Africa plates. The location and mechanism of the earthquake, along with aftershocks that have occurred since the M7.8 earthquake nine hours earlier, are consistent with the February 6 earthquake sequence having occurred within the broad East Anatolia fault zone, though not necessarily all on the same fault strands. The East Anatolia fault zone accommodates the westward extrusion of Turkey into the Aegean Sea.”

### Turkey & Syria Earthquakes

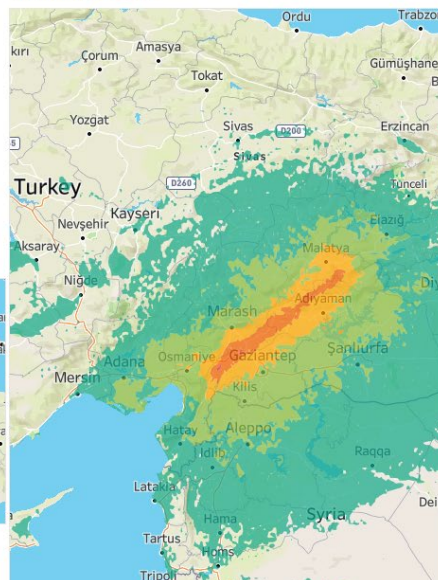
Modified Mercalli Intensity / Perceived Shaking

- V / Moderate
- VI / Strong
- VII / Very Strong
- VIII / Severe
- IX / Violent

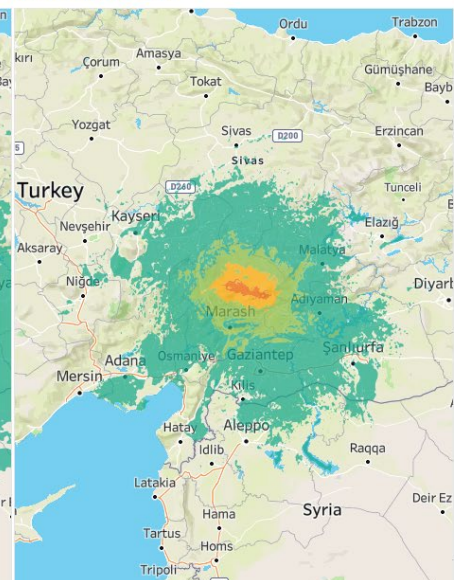


Data: USGS  
Graphic: Catastrophe Insight, Aon

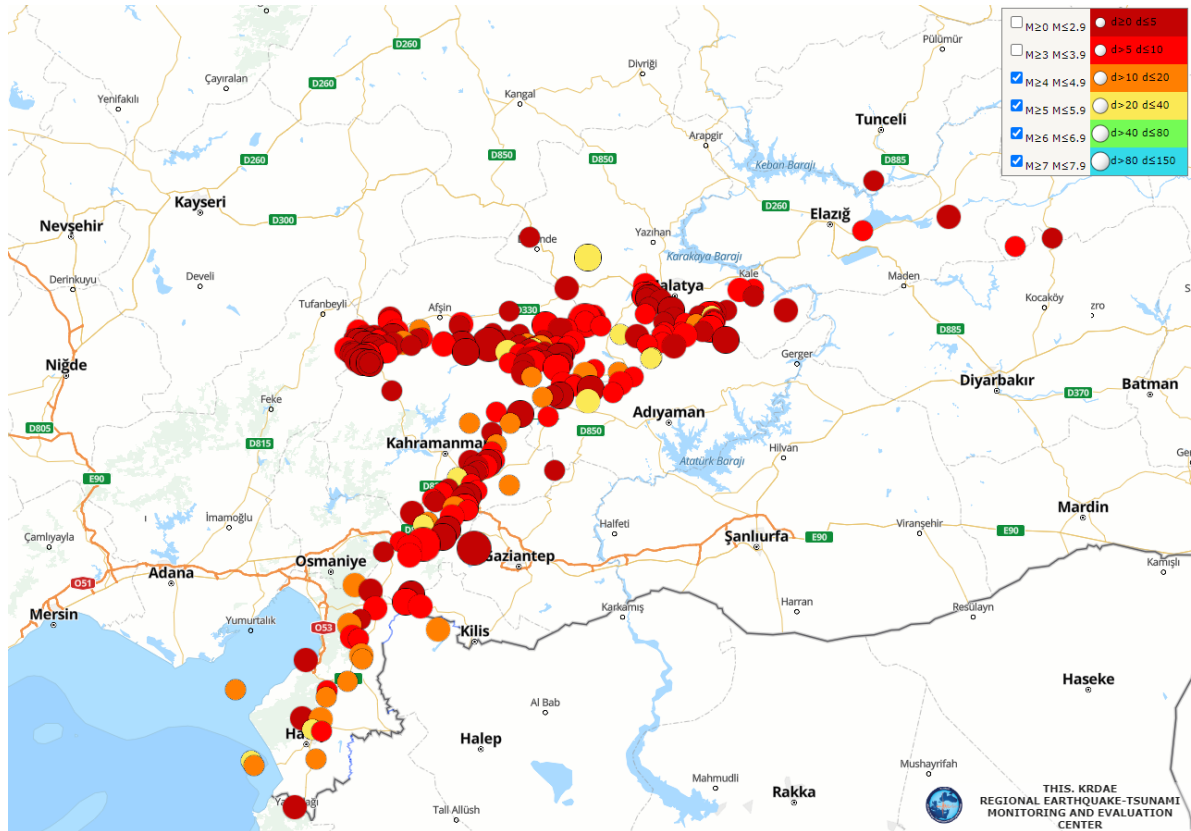
### M7.8, 1:17 UTC



### M7.5, 10:24 UTC



Numerous smaller but significant aftershocks with magnitude lower than 6 were recorded across the tectonic region throughout the day and can be expected to continue for the following days and weeks. In total, there have been hundreds of earthquakes of various intensity. The map below, provided by the Kandili Observatory and Earthquake Research Institute (KRDAE), shows all +M4.0 earthquakes that occurred in the region between February 1-8. Tremors from the strongest earthquakes were detected elsewhere, even more than 5,500 km (3,400 mi) away from the main epicentre.



## Historical Context

The events took place in the area of the East Anatolian Fault and the Dead Sea Transform Fault Zones, a region of generally high levels of seismicity and earthquake activity. Both, southern Turkey and northern Syria have expected significant earthquakes in the past. The strongest earthquake (based on magnitude level) to hit the region in the past 50 years was a M6.7 earthquake on January 24, 2020, claiming at least 41 fatalities, no fewer than 1,600 injured people, and thousands of damaged buildings, causing an estimated economic loss of 340 million (USD 2023). Stronger earthquakes usually occur in the areas of different fault zones across Turkey. In Syria, Aleppo city was devastated several times historically by large earthquakes, notably in 1822, claiming estimated 20,000-60,000 deaths.

Given the even more violent nature of the latest events, they are expected to pose the deadliest and the costliest events to hit the region of south Turkey in the modern era. Table below highlights five costliest and deadliest earthquake events that occurred in Turkey since 1950.

Date	Location	Magnitude	Economic Loss (2023 \$ billion)
August 17, 1999	Izmit	7.6	28.4
October 23, 2011	Van	7.1	2.0
November 12, 1999	Duzce	7.2	1.8
March 3, 1992	Erzincan	6.9	1.6
June 27, 1998	Adana	6.3	1.0

Date	Location	Magnitude	Fatalities
August 17, 1999	Izmit	7.6	19,100
November 24, 1976	Çaldıran	7.3	5,300
August 19, 1966	Varto	6.8	2,500
September 6, 1975	Lice	6.7	2,400
October 30, 1983	Erzurum	6.9	1,300

## Event Details

The situation related to the latest events remains very dynamic, death toll estimates and material damage assessments in the affected area are still evolving. Current reports indicate over 21,000 fatalities and no fewer than 80,000 injured people.

According to the latest report of the Turkish Disaster and Emergency Management Presidency (AFAD) released on February 10, more than 17,000 people died and no fewer than 73,000 others were injured across the provinces of Kahramanmaraş, Gaziantep, Sanliurfa, Diyarbakir, Adana, Adiyaman, Osmaniye, Hatay, Kilis and Malatya in **Turkey**. Other statements from officials already placed the death toll above 18,000; yet it is likely that the eventual toll will increase further. More than 6,000 building collapsed and thousands more were damaged in those ten provinces. Local support teams together with international search and rescue teams include about 120,000 persons who are working in the area.



Earthquake damage in cities of Gaziantep (left) and Diyarbakir (right)

Source: ASAD

In **Syria**, the situation is similarly disastrous, with collapsed buildings across the region and including the cities of Aleppo, Harim, Atmeh, Latakia and Hama that were probably the most affected by earthquake. As of February 10, the Syrian Ministry of Health and Syrian Arab News Agency (SANA) reported no fewer than 3,800 fatalities and more than 7,200 injured people.

According to the USGS's reports, table below summarises number of people exposed to different intensity of shaking that was triggered by two strongest earthquake tremors. On February 6, the World Health Organisation warned that a total death toll can possibly reach as high as 20,000 casualties due to continuing aftershocks and subfreezing conditions, this statement became reality on February 10.

Earthquake	Modified Mercalli Intensity	Perceived Shaking	Affected Population (thousands)
<b>Magnitude-7.8, 1:17 UTC</b>	IV	Light	235,000
	V	Moderate	22,000
	VI	Strong	12,000
	VII	Very strong	5,000
	VII	Severe	540
	XI	Violent	70
<b>Magnitude-7.5, 10:24 UTC</b>	IV	Light	61,000
	V	Moderate	17,000
	VI	Strong	3,000
	VII	Very strong	350
	VII	Severe	100

### Financial Loss

As of this writing, it is still too early to estimate the total economic and insurance impact of this significant event. However, based on the widespread scope of extreme damage on property and infrastructure, it was initially anticipated that total economic losses will reach into the billions of USD. Relatively high portion is going to be covered by insurance. As the Natural Catastrophe Insurance Pool (DASK) noted, the take-up rate of the compulsory earthquake insurance scheme is approximately 52 percent in the Malatya Province, 45 percent in Adiyaman and 65 percent in Gaziantep. On February 10, the World Bank announced to provide \$1.78 billion to Turkey for recovery after earthquake.

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## Chile: Wildfires & Heatwave

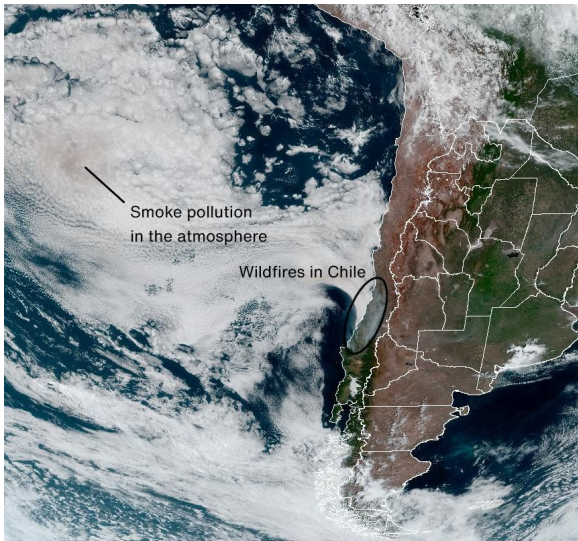
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### Overview

*Prolonged extreme heat enhanced wildfire conditions and new fires were ignited across central and southern Chile since the first week of February. As of February 10, wildfires claimed at least 24 lives and injured nearly 1,000 people across the region. Notable structural damages and agricultural losses on hundreds of thousands of hectares were incurred.*

### Meteorological Recap

Chilean weather since mid-January was dominated by several intense heatwaves. Record-setting extreme temperature engulfed a broad area of South America continent, affecting particularly Chile and Argentina. Many areas experienced extreme maximum temperatures, exceeding 40°C (104.4°C) for several consecutive days. As a result, Chile has seen a significant increase in the number of total wildfires and the spatial extent burned thus far in 2023. There has been also a related spike in emissions into the atmosphere, with a large smoke plume being transported out across the Pacific Ocean. The Copernicus Atmosphere Monitoring Services estimate that fires have released 4 million tonnes of carbon into the atmosphere so far.



**Wildfires and smoke pollution from the satellite on Feb 6**  
Source: NASA, GOES-16 RGB



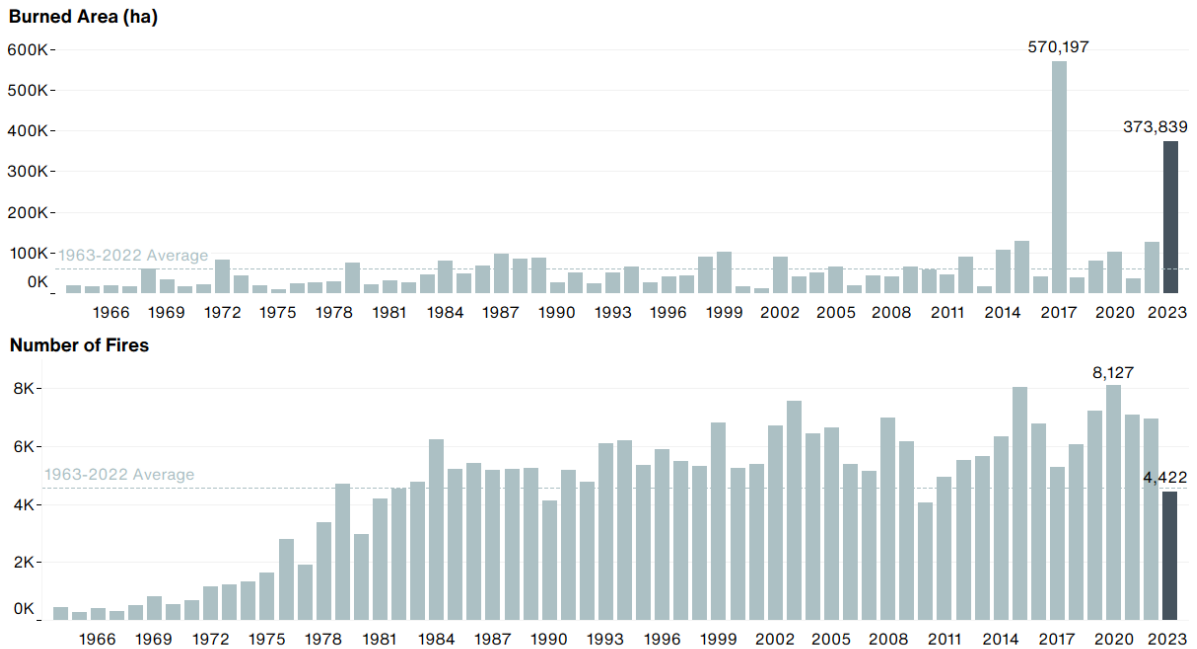
**Airborne image of wildfires in Biobío region**  
Source: CONAF

### Event Details

Hundreds of wildfires continue to blaze central and southern Chile, forcing local government to declare a state of emergency in regions of **Biobío**, **Ñuble** and **Araucanía**, the most affected areas. Maule, Los Ríos, Los Lagos, Aysén, O'Higgins, Valparaíso and Santiago Metropolitan have been also badly hit by severe wildfires. As of February 10, at least 24 people died and almost 1,000 others were injured. According to the National System for Disaster Prevention (SENAPRED) and the National Forestry



Corporation (CONAF), wildfires have already destroyed more than 1,100 houses and burnt an area of approximately **373,000 ha** (922,000 acres) across the country. The current wildfire now places second (see Graph below with number as of February 10) for most hectares burned since 1963, behind 2017 with more 570,000 ha (1,400,000 acres) burned, and significantly exceeding 1963-2022 average of 59,600 ha (147,000 acres) of burned area. According to authorities, more than 6,000 Chilean firefighters together with international fire brigades battle with severe wildfires.



Data: CONAF. Graphic: Catastrophe Insight, Aon

Further notable impact can result from the prolonged extreme heat. The heatwave itself is not likely to cause significant material damage on its own, yet the impact on public health and the excess death rate can be considerable, usually in hundreds or thousands of heat-related fatalities.

### Financial Loss

The extreme heat and widespread wildfires will likely result in complex economic consequences and a notable financial impact. Full scale of the damage on property, but also on forestry and agriculture, has yet to be determined. The full scope of impacts is likely to be realized in the coming weeks / months. In 2017, severe wildfires were estimated to cause total economic losses close to \$1 billion.

## Natural Catastrophes: In Brief

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### **Flooding (Peru, Bolivia)**

Since February 5, heavy rainfall triggered deadly mudslides and flooding in eight provinces in southern Peru, particularly in Arequipa and Lima Departments. According to local authorities (INDECI), more than 400 houses have been damaged across the region. Deadly mudslide in Secocha city left at least 36 people dead, two persons remain missing, and no fewer than 20 people sustained injuries. Additional flood-related damage to dozens of buildings and wide areas of crops was incurred in neighbouring Bolivia, particularly in La Paz, Beni and Santa Cruz departments. Flooding has affected thousands of people and killed at least two people there.

### **Winter Weather (Austria, Italy, Switzerland)**

Heavy snowfall and strong winds resulted in increased avalanche danger in much of the Alpine region over the weekend of February 4-5. According to the authorities and rescuers, avalanches killed at least 11 people in Austria (8), Italy (1), and Switzerland (2).

### **Windstorm Pit (Central Europe)**

An active cyclonic pattern continued to affect parts of Central Europe, notably on February 3-4 when a low-pressure area Pit (named by FU Berlin) brought strong winds of up to 100 kph (62 mph) and rare thunderstorm activity to parts of Germany, Poland, the Czech Republic, Slovakia and Hungary. Further hazards included heavy snowfall and ice accumulation. Moderate, yet widespread material damage was incurred as more than 100,000 power outages were reported in the Czech Republic. In western Hungary, insurers reported 13,000 filed claims already on February 7, with home insurance payouts totalling HUF1.8 billion (\$5 million); losses were anticipated to eventually reach several billion HUF.

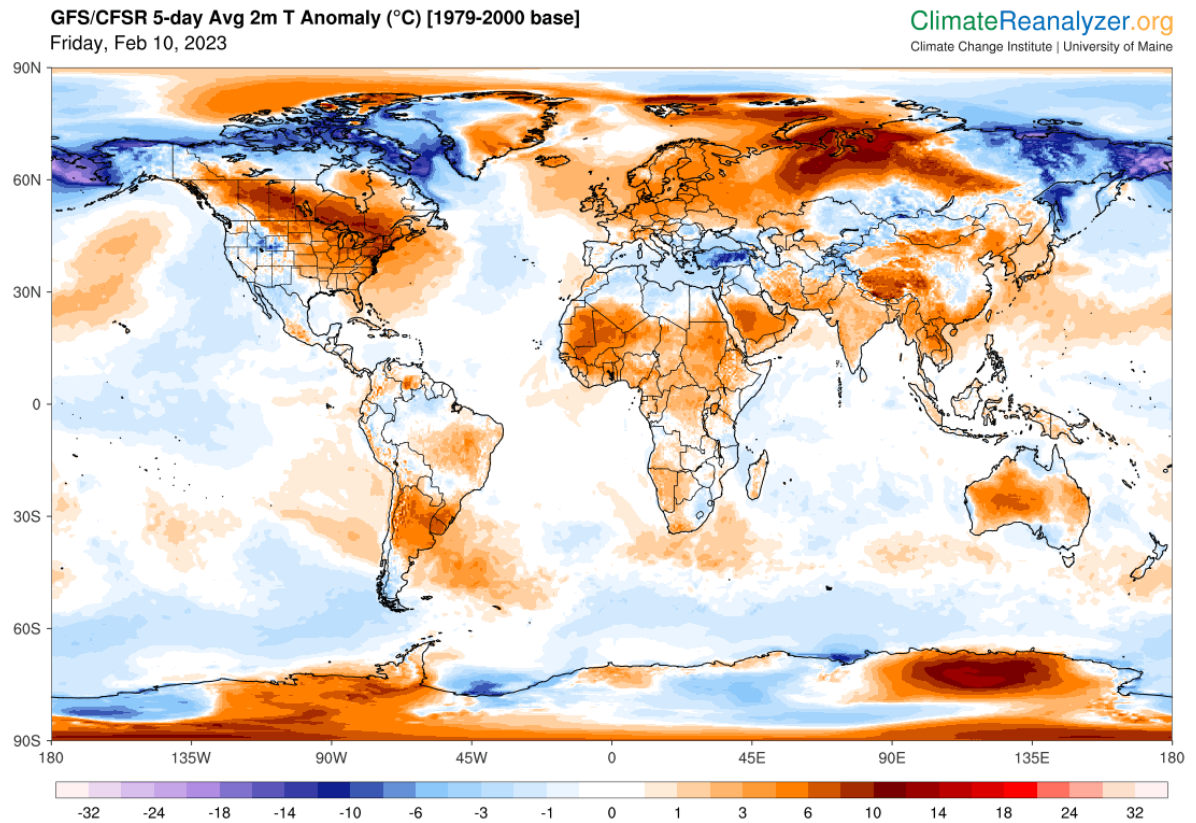
### **Flooding (Australia)**

Heavy rainfall on February 8-9 hit parts of New South Wales as more than 300 mm (11.8 in) of accumulated precipitation was observed on some locations. As a result, flooding affected communities across the coastal areas, including Illawarra and Greater Sydney region. The State Emergency Services responded to at least 600 calls for assistance.

### **Earthquake (Indonesia)**

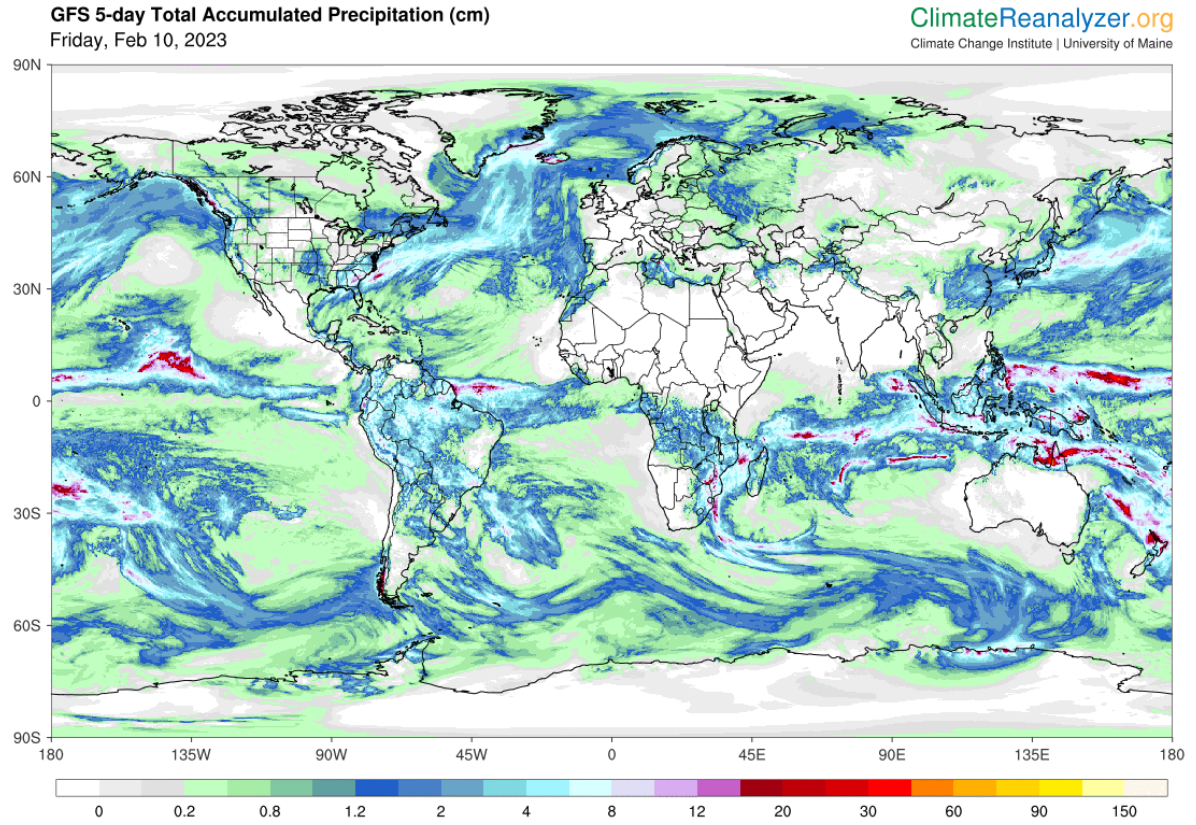
At least four people were killed and several buildings suffered damage after shallow, 5.2-magnitude earthquake that struck near Jayapura city in Papua province, eastern Indonesia, on February 9. According to local geophysical agency (BMKG), there have been more than 1,000 quakes around Jayapura city since the beginning of the year, with about 132 felt by its residents.

## Global Temperature Anomaly Forecast



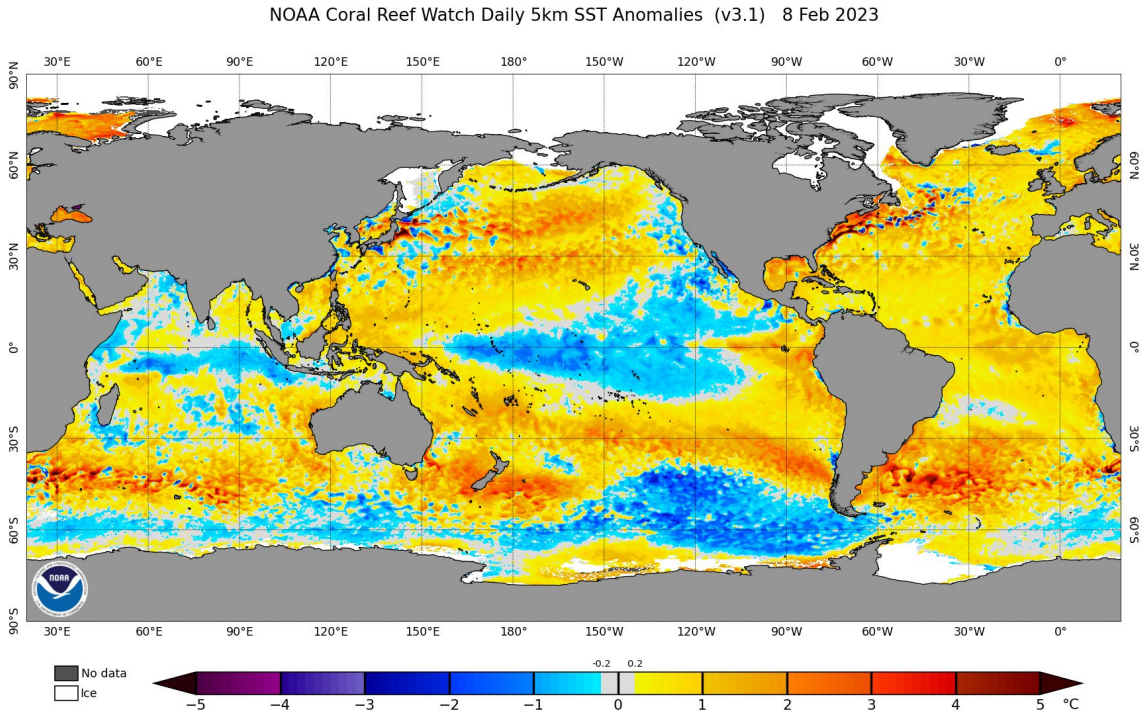
Source: Climate Reanalyzer, Climate Change Institute, University of Maine, USA

## Global Precipitation Forecast



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

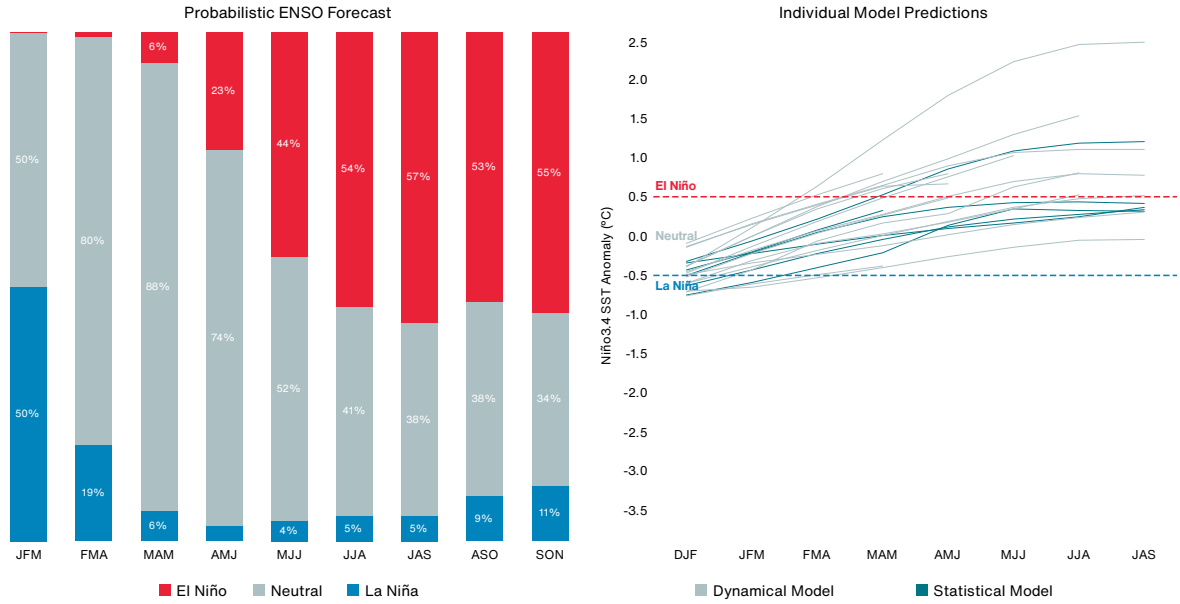
## Weekly Sea Surface Temperature (SST) Maps (°C)



# El Niño-Southern Oscillation (ENSO)

## Probabilistic ENSO Model Projections: Mid-December 2022

Data: NOAA & Columbia University (IRI) | Graphic: Aon (Catastrophe Insight)



**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).

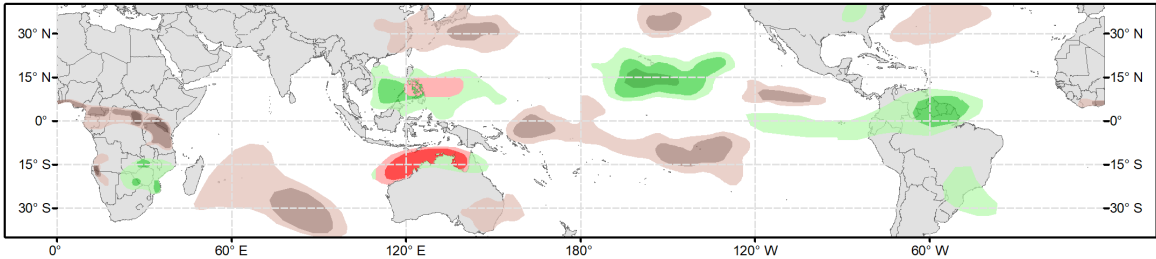
## Global Tropics Outlook



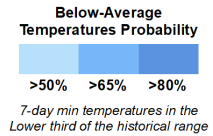
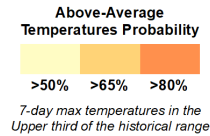
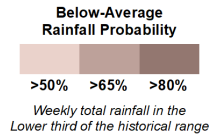
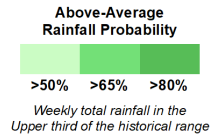
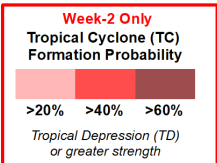
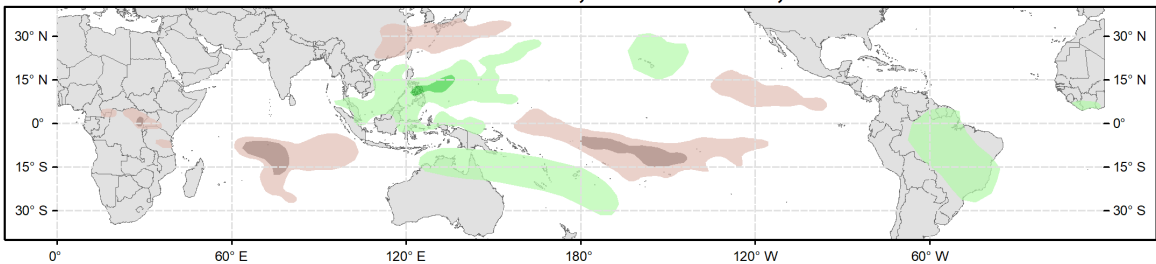
### Global Tropics Hazards Outlook Climate Prediction Center



**Week 2 - Valid: Feb 15, 2023 - Feb 21, 2023**



**Week 3 - Valid: Feb 22, 2023 - Feb 28, 2023**

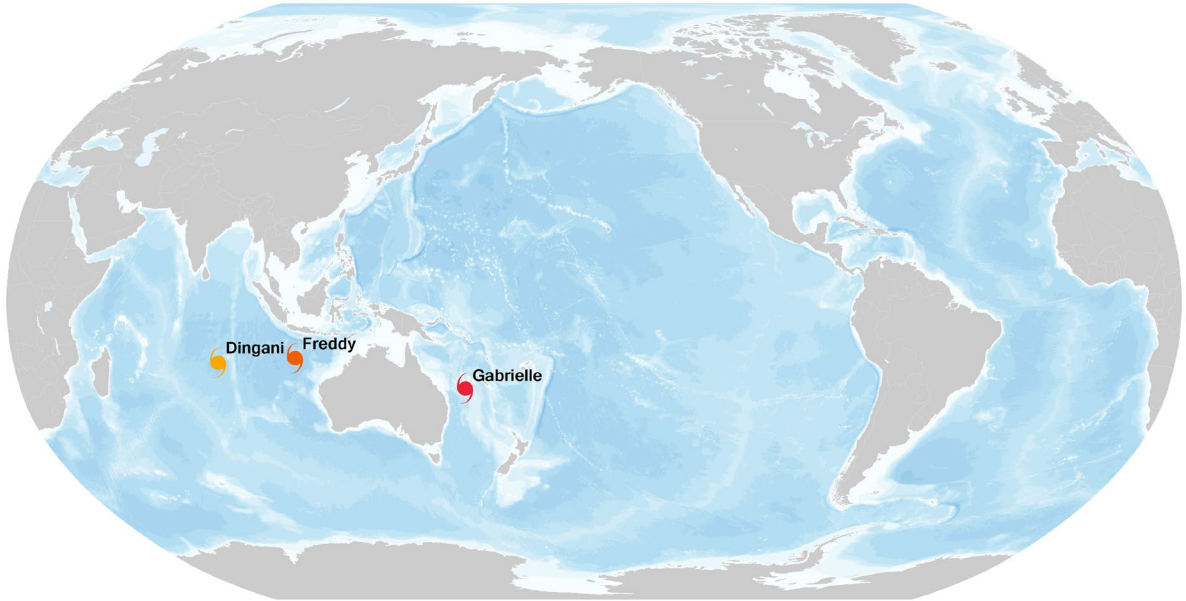


**Issued: 02/07/2023**  
**Forecaster: Collow**

**This product is updated once per week and targets broad scale conditions integrated over a 7-day period for US interests only. Consult your local responsible forecast agency.**

Source: Climate Prediction Center (NOAA)

## Current Tropical Cyclone Activity



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

Storm Name	Location	Winds	Location from Nearest Land Area
CY Dingani	16.3S, 83.6E	50	1530 mi (2465 km) SW from Bengkulu, Indonesia
CY Gabrielle	23.3S, 159.6E	105	440 mi (710 km) W from Noumea, French Republic
CY Freddy	15.1S, 107.5E	80	540 mi (870 km) S from Yogyakarta, Indonesia

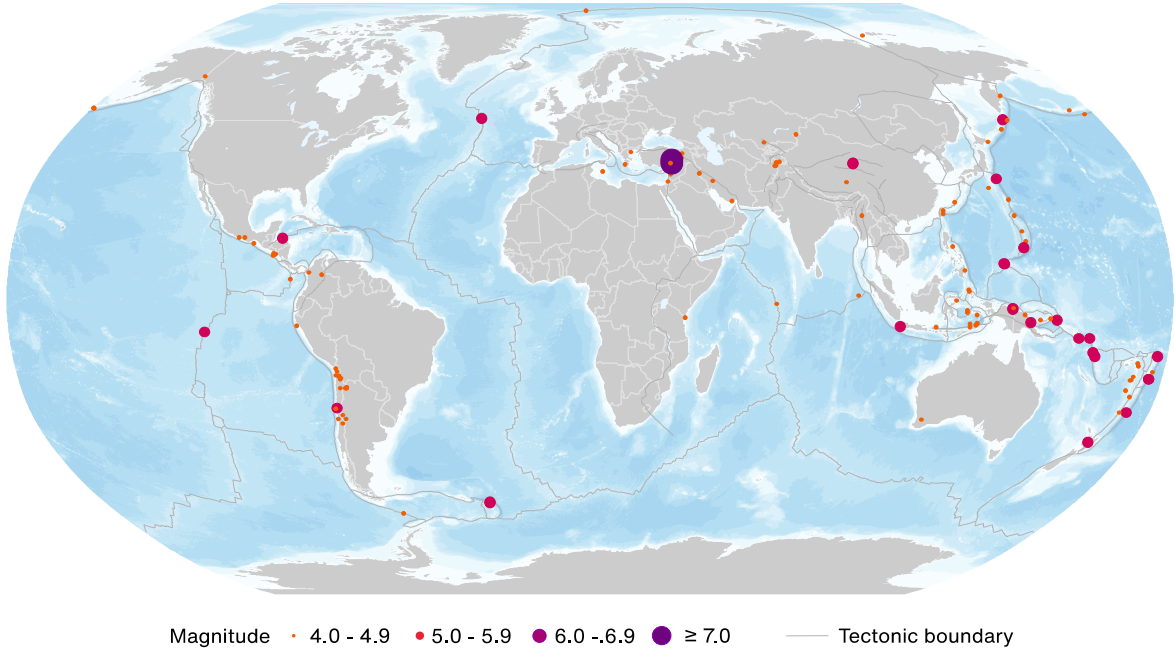
\* TD: Tropical Depression, TS: Tropical Storm, HU: Hurricane, TY: Typhoon, CY: Cyclone

\*\* 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)



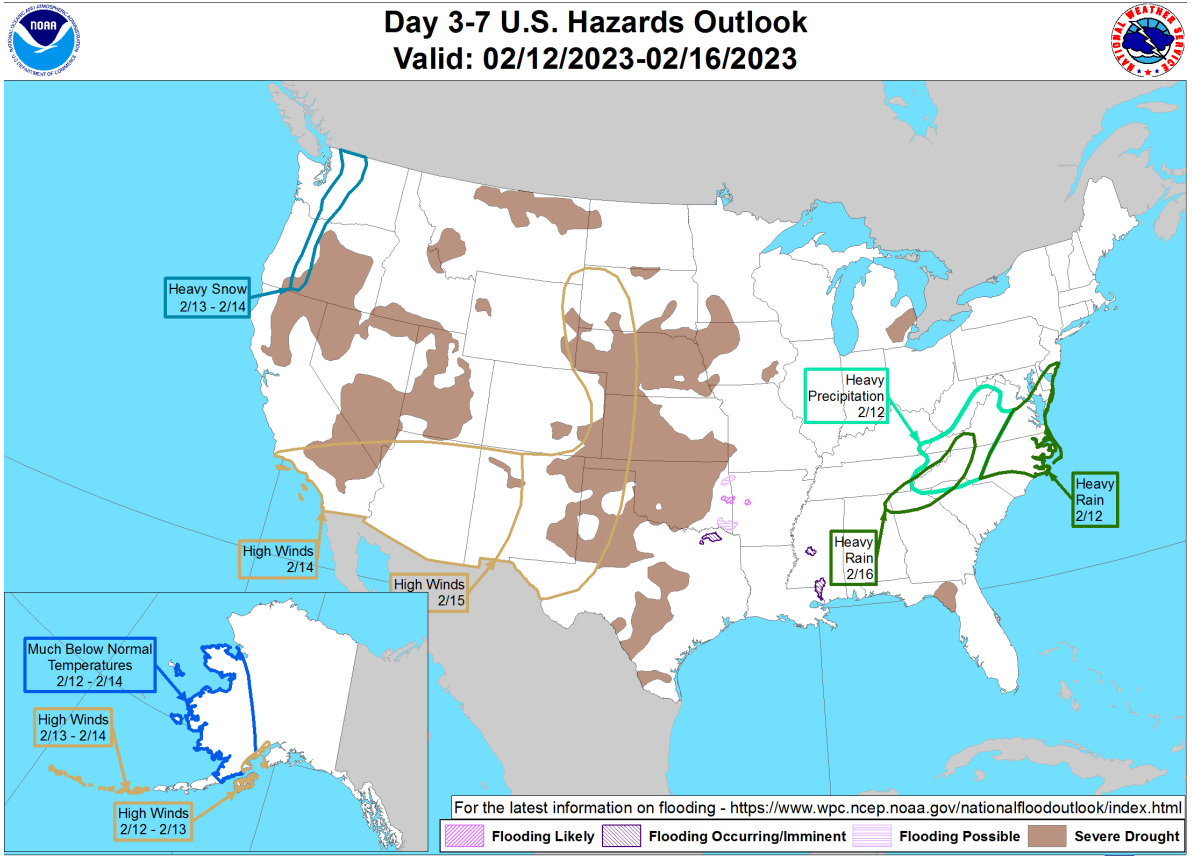
## Global Earthquake Activity ( $\geq M4.0$ ): Feb 3-Feb 9



Date (UTC)	Location	Magnitude	Epicenter
2/6/2023	37.17N, 37.04E	7.8	27 km (17 mi) E of Nurdağı, Turkey
2/6/2023	37.13N, 36.94E	6.7	18 km (11 mi) ESE of Nurdağı, Turkey
2/6/2023	38.02N, 37.20E	7.5	4 km (2 mi) SSE of Ekinözü, Turkey
2/6/2023	38.03N, 37.96E	6	Central Turkey
2/6/2023	38.06N, 36.54E	6	5 km (3 mi) NE of Göksun, Turkey

Source: United States Geological Survey

## U.S. Hazard Outlook



**Weather Prediction Center**

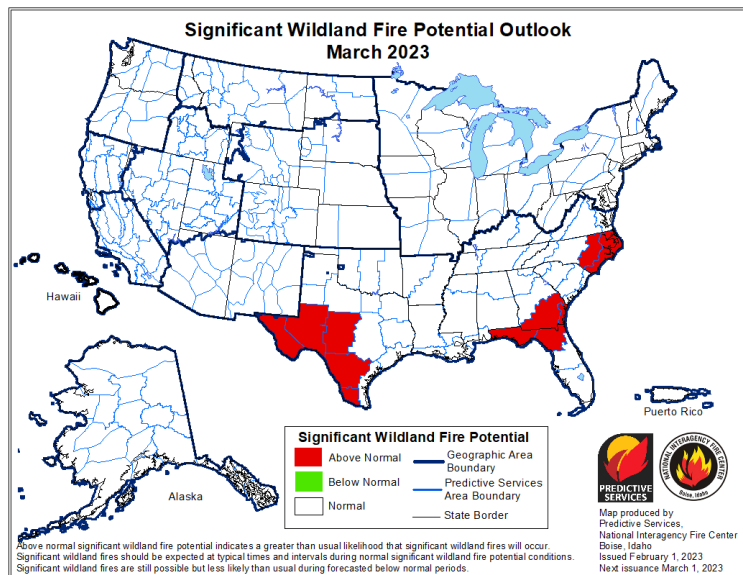
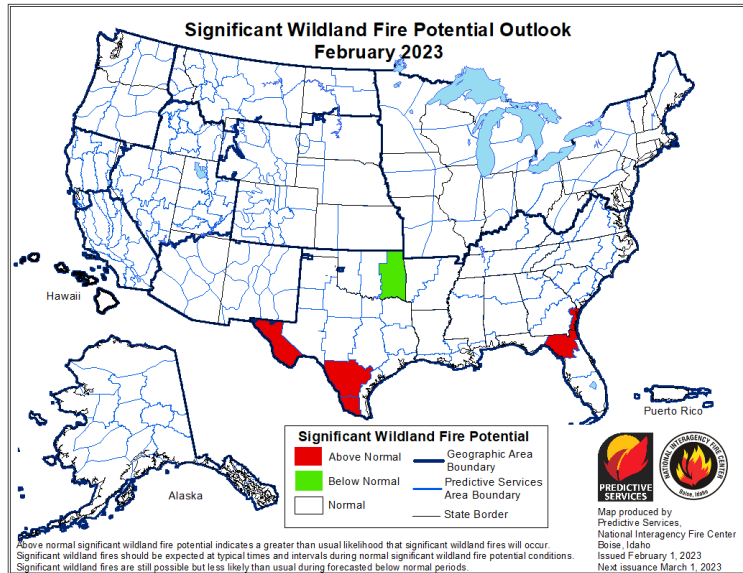
Made: 02/09/2023 3PM EST

Source: Climate Prediction Center (NOAA)

Follow us: 

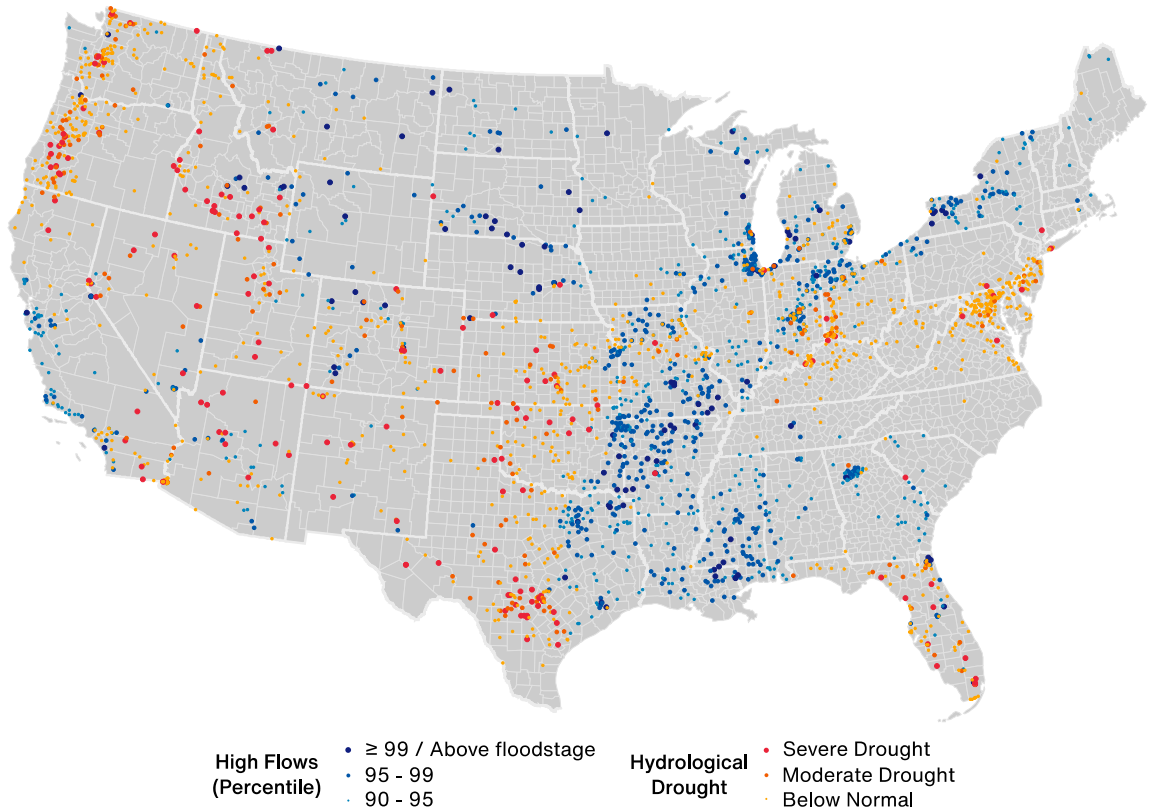
[www.wpc.ncep.noaa.gov](http://www.wpc.ncep.noaa.gov)

## 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 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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### **Turkey and Syria: Earthquakes**

The United States Geological Survey (USGS)

The Turkish Disaster and Emergency Management Presidency (AFAD)

The Syrian Arab News Agency (SANA)

Kandili Observatory and Earthquake Research Institute (KRDAE)

The Natural Catastrophe Insurance Pool (DASK)

### **Chile: Wildfires & Heatwave**

The National System for Disaster Prevention (SENAPRED)

The National Forestry Corporation (CONAF)

As wildfires ravage Chile, CAMS monitors the situation, *The Copernicus Atmosphere Monitoring Service*

Wildfires burning in Chile are among the deadliest in country's record, *New Scientist*

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

National Institute of Civil Defense in Peru (INDECI)

Avalanches in Alps Kill at Least 11, as Weather Hampers Rescues, *The New York Times*

Floods Affect Thousands in La Paz, Beni and Santa Cruz Departments, *FloodList*

Indonesia's Meteorology, Climatology, and Geophysical Agency (BMKG)

## Contacts

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Aon plc (NYSE:AON) is a leading global professional services firm providing a broad range of risk, retirement and health solutions. Our 50,000 colleagues in 120 countries empower results for clients by using proprietary data and analytics to deliver insights that reduce volatility and improve performance.

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