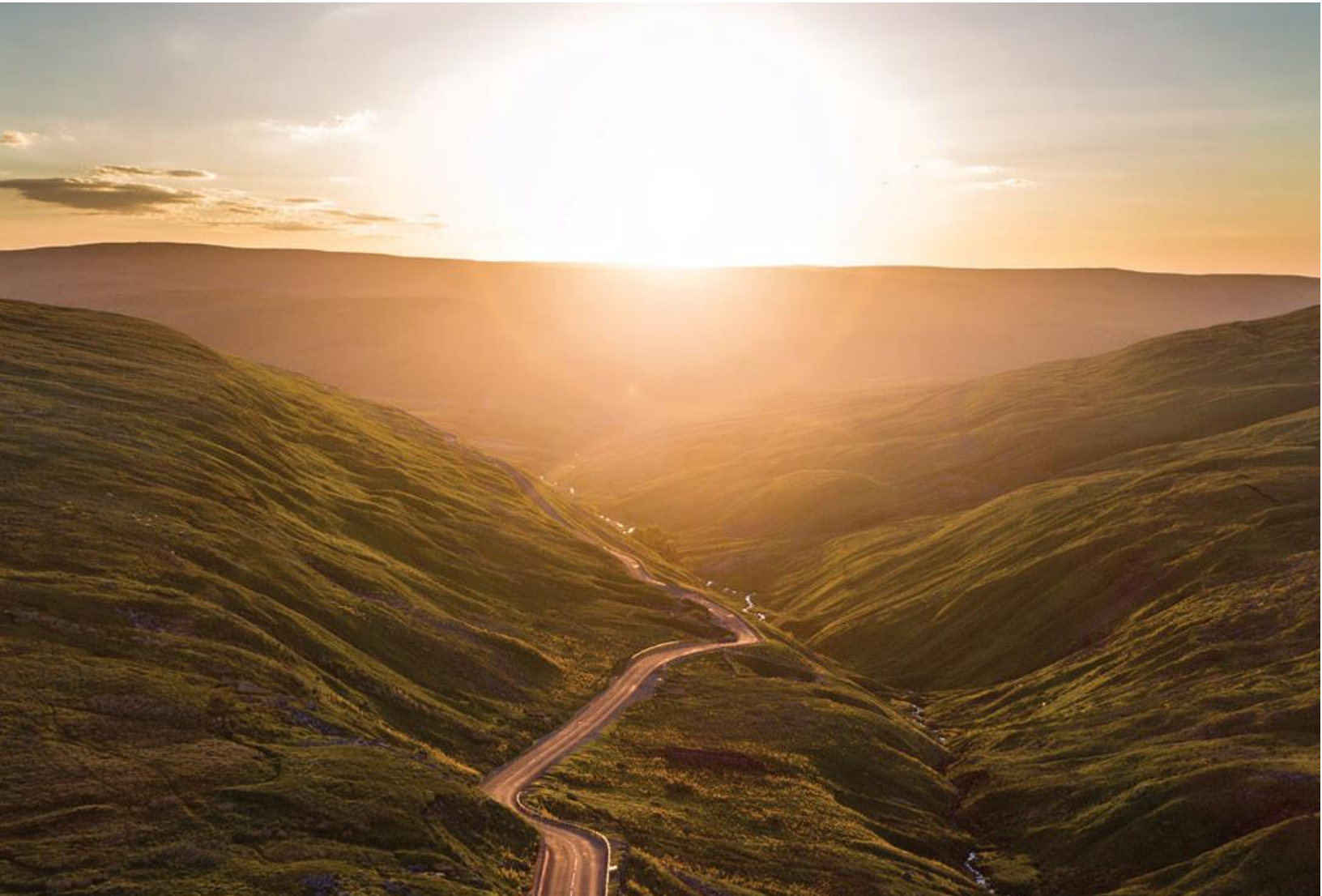
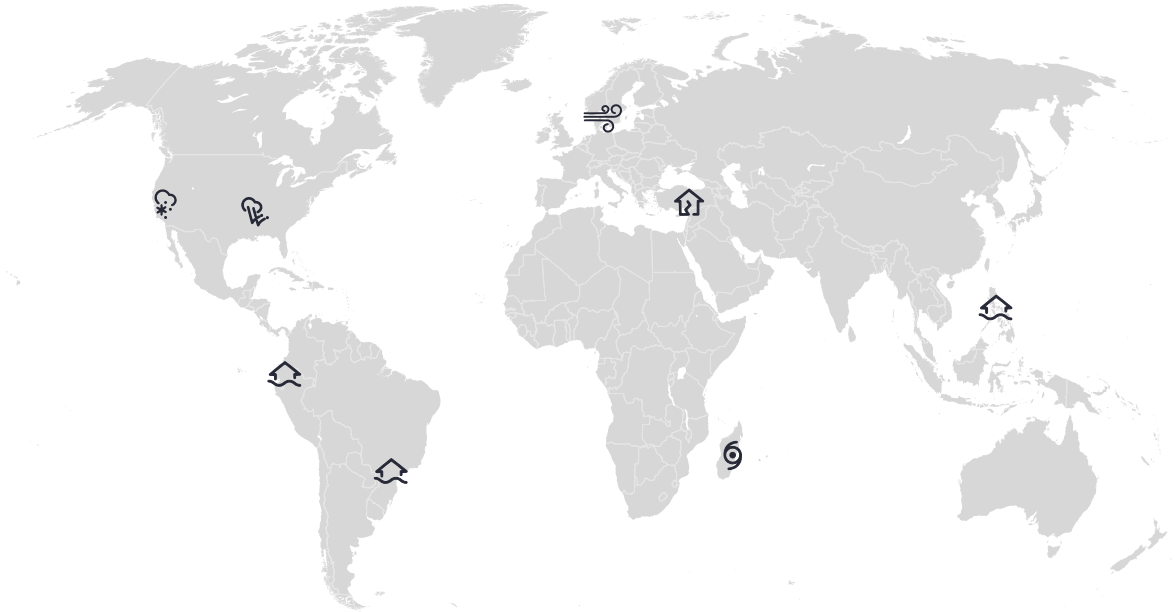


Weekly Cat Report

February 24, 2023



Executive Summary



Event	Affected Region(s)	Fatalities	Economic Loss (\$)	Page
Cyclone Freddy	South-eastern Africa	6+	100s of millions	3
Earthquake	Turkey, Syria	13+	10s of millions	5
Windstorms Otto & Willy	Western & Northern Europe	0	10s of millions	6
Flooding & Landslides	Brazil, Paraguay	50+	Unknown	7
Flooding & Landslides	Ecuador	6+	Unknown	7
Severe Convective Storm	United States	2+	Millions	7
Winter Weather	United States	0	10s of millions	7
Flooding	Philippines	2+	10+ million	7

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>

Madagascar & Mozambique: Cyclone Freddy

Overview

Cyclone Freddy, a Category 5-equivalent storm at peak intensity, affected thousands of people in south-eastern Africa, particularly in Madagascar. As of February 23, at least six people were killed, thousands of homes were flooded or damaged. Total economic losses can potentially reach into the tens of millions USD.

Meteorological Recap

Freddy developed as a disturbance embedded within the monsoon trough on February 5, approximately 770 km (480 mi) northwest of Western Australia coast. On February 6, the tropical low intensified into a Category 1-equivalent tropical cyclone (on the Saffir-Simpson scale) and was named **Freddy**. The storm further intensified on its way westward from the Australian region cyclone basin into eastern Indian Ocean. Westward path through the entire Indian Ocean was observed in the last 23 years, cyclones Hudah and Leone were the last ones to traverse the ocean in 2000.

On February 14, storm Freddy crossed 90°E into the South-west Indian Ocean basin and was classified as a tropical cyclone by Météo-France. The agency later upgraded the storm's status into **very intense tropical cyclone**, according to estimated 10-minutes winds of 220 kph (140 mph). During peak intensity, the Joint Typhoon Warning Center (JTWC) estimated 1-minute sustained winds of 270 kph (165 mph), equivalent to Category 5. On February 20, Freddy passed approximately 200 km (120 mi) north of Mauritius and Réunion, bringing localized heavy daily rainfall up to 180 mm (7.1 in), storm surge and strong wind gusts of 160 kph (100 mph).

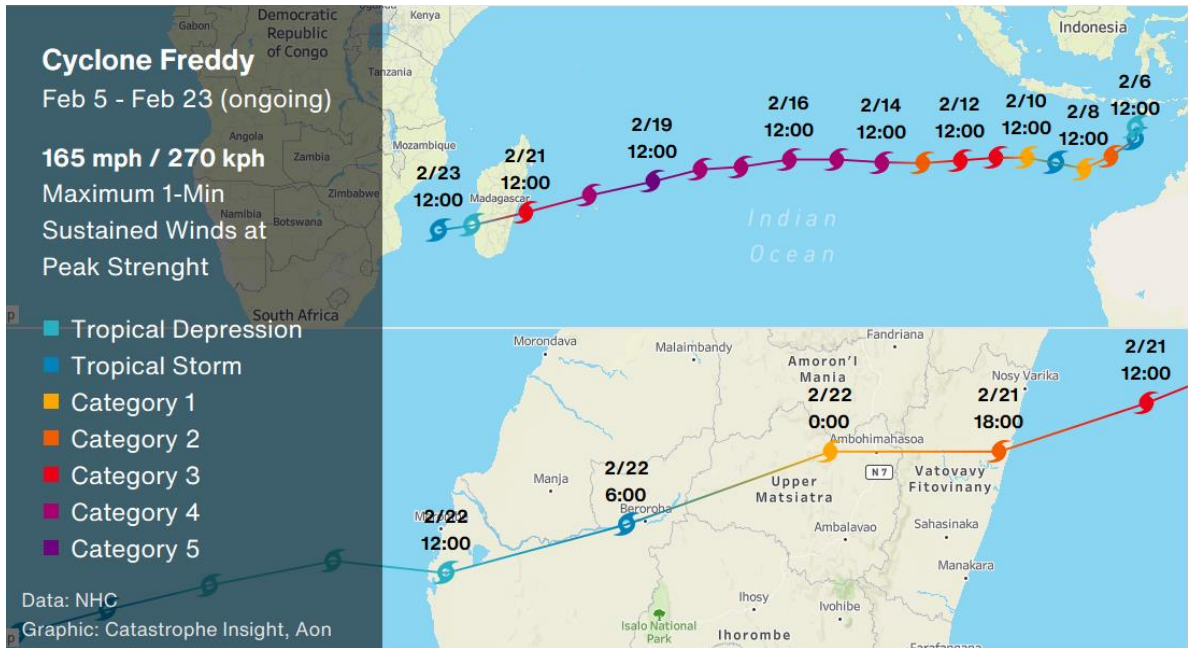


Eye of cyclone Freddy captured by the ISS on February 17

Source: WMO

On February 21 at 7:00 p.m. (local time), Freddy made its first landfall near Mananjary city, eastern Madagascar, as a Category 3-storm with maximum sustained winds estimated at 185 kph (115 mph). System weakened into a tropical depression while moving westward over Madagascar on February 22.

As of February 23, storm was located over Mozambique channel, re-strengthening over warm waters and approaching Mozambique with expected second landfall in northern Inhambane Province, southern Mozambique, on February 24.



Event Details

Madagascar was the first notably impacted by cyclone Freddy. According to the reports of National Office of Risks and Disasters (BNGRC) on February 23, at least seven people were killed, more than 22,000 others were displaced due to the storm, particularly in regions of Vatoavavy, Fitovinany, Atsimo Atsinanana and Amoron'i Mania. Heavy rainfall triggered flash flooding that inundated more than 13,000 houses, with nearly 10,000 homes damaged and 1,200 completely destroyed.

Relatively minor impact was reported in **Mauritius**, where one person was killed, and in **Réunion**, where nearly 25,000 customers were left without power and several roads were closed due to landslides.

Financial Loss

As the event remains ongoing and is expected to incur additional damage in Mozambique, it is too early to assess total economic losses. Based on initial damage assessments in Madagascar, event has potential to result in notable economic loss.

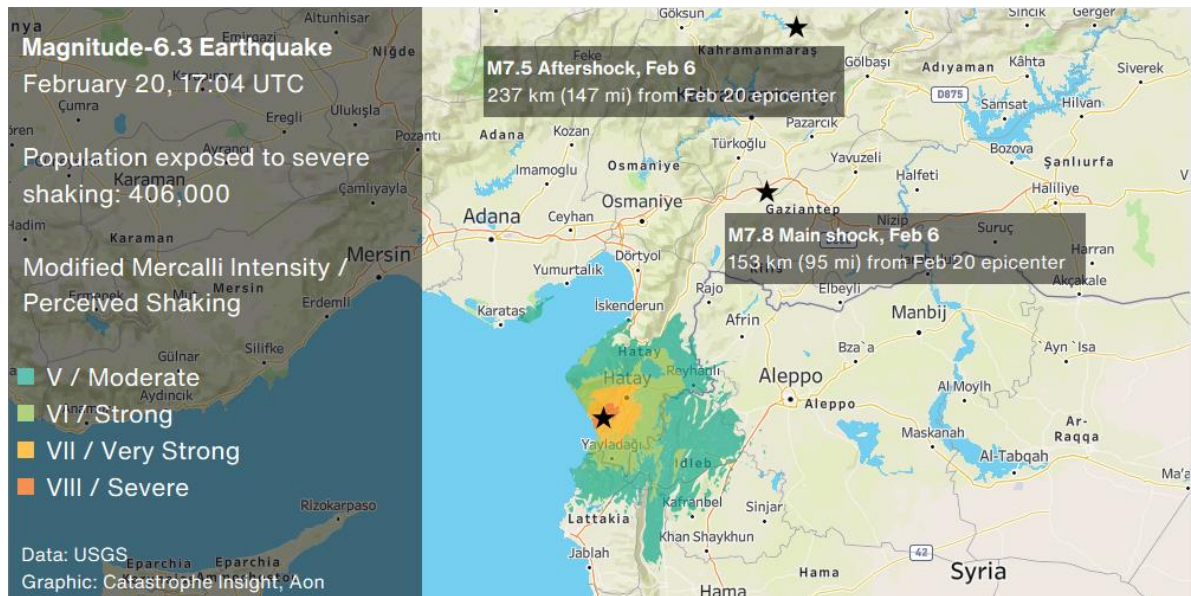
Turkey and Syria: Earthquake

Overview

Another strong, magnitude-6.3 earthquake impacted the Hatay province in southern Turkey, with the epicenter located southwest of the city of Antakya, which was already heavily damaged in previous tremors. Continuing damage assessments in Turkey and Syria revealed the scale of devastation from the entire sequence in both countries; as of February 24, the current estimates death toll stand at 49,000. Nearly 200,000 buildings were damaged or destroyed in Turkey alone.

Event Details

Following the M7.8 and M7.5 earthquakes and relentless aftershock activity, another strong, magnitude-6.3 earthquake occurred in the Hatay Province, southern Turkey, at 17:04 UTC on February 20. More than 90 aftershocks were reported, the strongest had a magnitude of 5.8. As of February 23, at least 13 people were killed – eight in Turkey, five in Syria, and more than 1,000 others were injured in both countries, according to local authorities. USGS's PAGER estimated up to 406,000 people were exposed to severe shaking. The earthquake had a high potential to cause additional extensive damage and leave notable number of fatalities and worsening the catastrophic humanitarian situation in the region.



Europe: Windstorms Otto and Willy

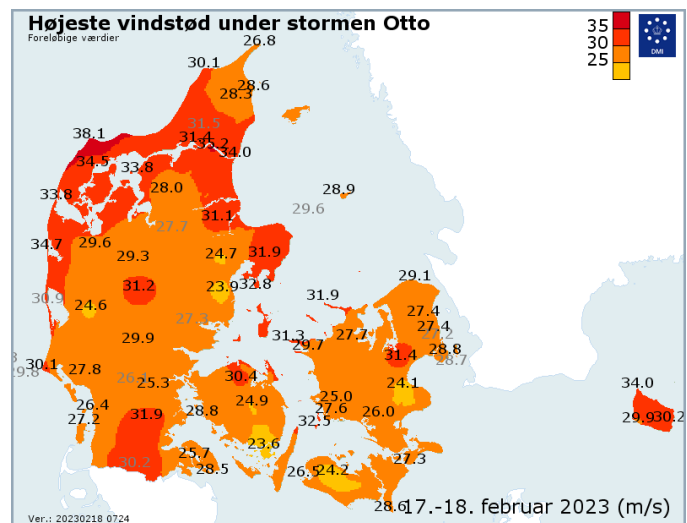
Overview

Parts of Western, Northern and Central Europe were affected by strong winds, as a storm, named Otto by the Danish Meteorological Institute, traversed from northern UK towards Scandinavia on February 17-18. Moderate damage occurred, with notable effects in Denmark and Sweden, yet the overall impact was expected to be lower than damage observed after storm Malik last year and potentially reach into the tens of millions EUR. Additional strong winds were caused by another low-pressure system named Willy.

Meteorological Recap

While Scotland and northern England were first to be affected by Otto, it was named by the Danish Weather Service (DMI) as forecasting models suggested a more notable impact in the country. Compared to Windstorm Malik, Otto's impact was lower as its highest winds affected a smaller portion of the country. According to DMI's classification, Malik was a Class 2 national storm, while Otto was only assigned Class 2 regional status. The strongest gusts were recorded at exposed locations, peaking at Hanstholm with 38.1 m/s (85 mph).

Otto continued to affect southern Sweden during the night to February 18, with gusts peaking at Hanö in Blekinge with 34.1 m/s (76 mph). Swedish meteorological agency (SMHI) estimated the return period of wind gusts in the southernmost regions locally between 2 and 5 years. The storm's wind field extended further southwest, with notable effects experienced in north-western Poland.



Wind gusts from Windstorm Otto

Source: DMI

Event Details

In the **United Kingdom**, the impact was relatively minor, with damage and disruption noted particularly in Aberdeenshire. Moderate wind-related damage occurred across **Denmark** and southern **Sweden**, yet the overall impact was expected to be much lower than the damage experienced following Windstorm Malik in January 2022. Major insurance companies initially reported several thousands of claims following Otto's passage. Notable effects were reported from north-western **Poland**, where more than 200,000 power outages occurred and fire brigades intervened more than 4,000 times, while three people were injured and at least dozens of homes damaged.

Natural Catastrophes: In Brief

Flooding & Landslides (Brazil, Paraguay)

Severe flash flooding and landslides left at least 50 people dead and displaced thousands of others after heavy rainfall hit southeastern Brazil on February 18-19. According to authorities, majority of fatalities were reported from the state of São Paulo, which was the most affected, along with tens of collapsed houses, destroyed infrastructure and dozens of missing people. Dozens of people were injured. Some localities saw more than 600 mm (23.6 in) of rain just in 24-hour period. Additional material damage on dozens of buildings, roads and bridges related to flooding was incurred in neighboring Paraguay.

Flooding & Landslides (Ecuador)

Torrential rain triggered flooding and landslides in Ecuador between February 18-21. Provinces of Chimborazo, Esmeraldas, Los Ríos, Loja, Manabí, El Oro and Guayas were particularly affected. According to the disaster authorities, at least six people died due to flood events.

Severe Convective Storm (United States)

Thunderstorms accompanied by several EF1-rated tornadoes and heavy rainfall affected several southern states of the United States on February 15-17, triggering flooding and resulting in casualties and material damage particularly in West Virginia, Tennessee, Alabama and Kentucky. Material damage to property and infrastructure was reported from across the affected area. At least two people were killed in flood-related accidents.

Winter Weather (United States)

Blizzard conditions with heavy snowfall and strong winds have affected parts of California and U.S. Southwest since February 21, prompting the first blizzard warning in the montane regions of Los Angeles, Ventura and Santa Barbara counties in 33 years. Approximately 850,000 customers were left without power across the country as wintry conditions extended across the Midwest.

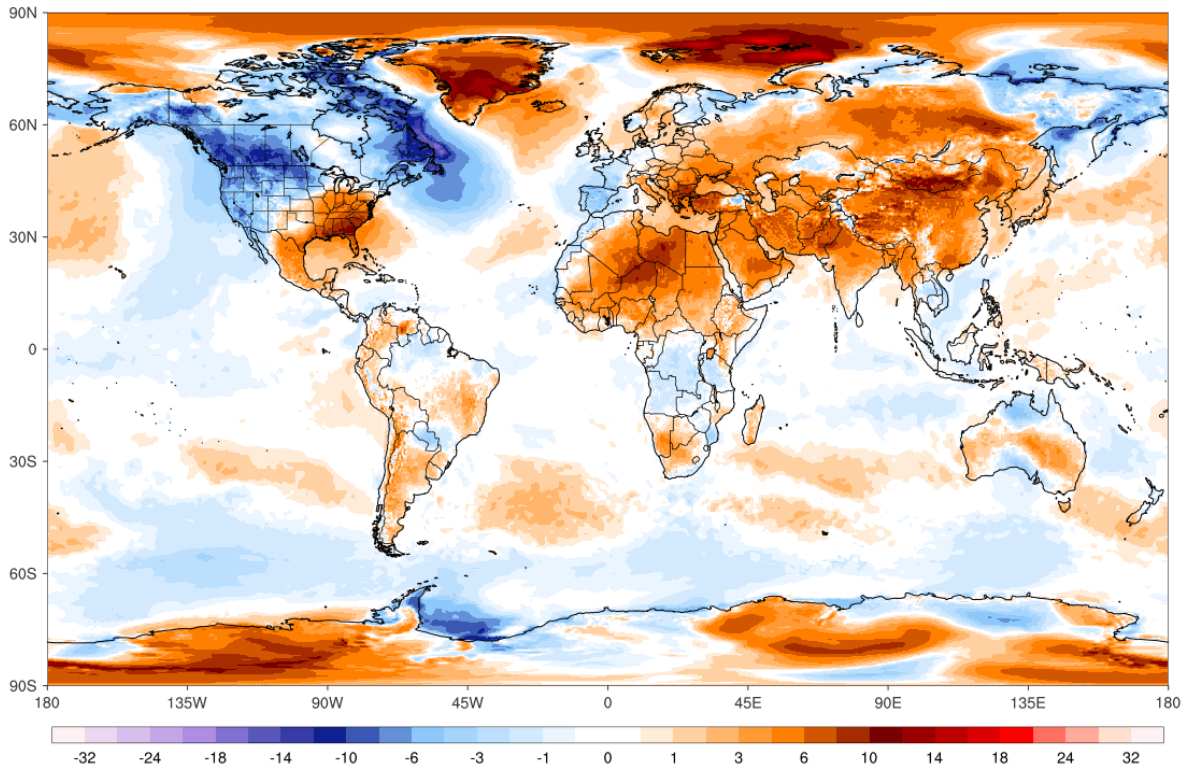
Flooding (Philippines)

Heavy rainfall related to a low pressure has resulted in damage and disruption in multiple regions of the Philippines since February 13. As of February 24, authorities reported 2 fatalities, nearly 7,000 displaced and 215,000 people affected in total. Initial estimates of loss on infrastructure and agriculture alone were in excess of \$5 million.

Global Temperature Anomaly Forecast

GFS/CFSR 5-day Avg 2m T Anomaly (°C) [1979-2000 base]
Friday, Feb 24, 2023

ClimateReanalyzer.org
Climate Change Institute | University of Maine

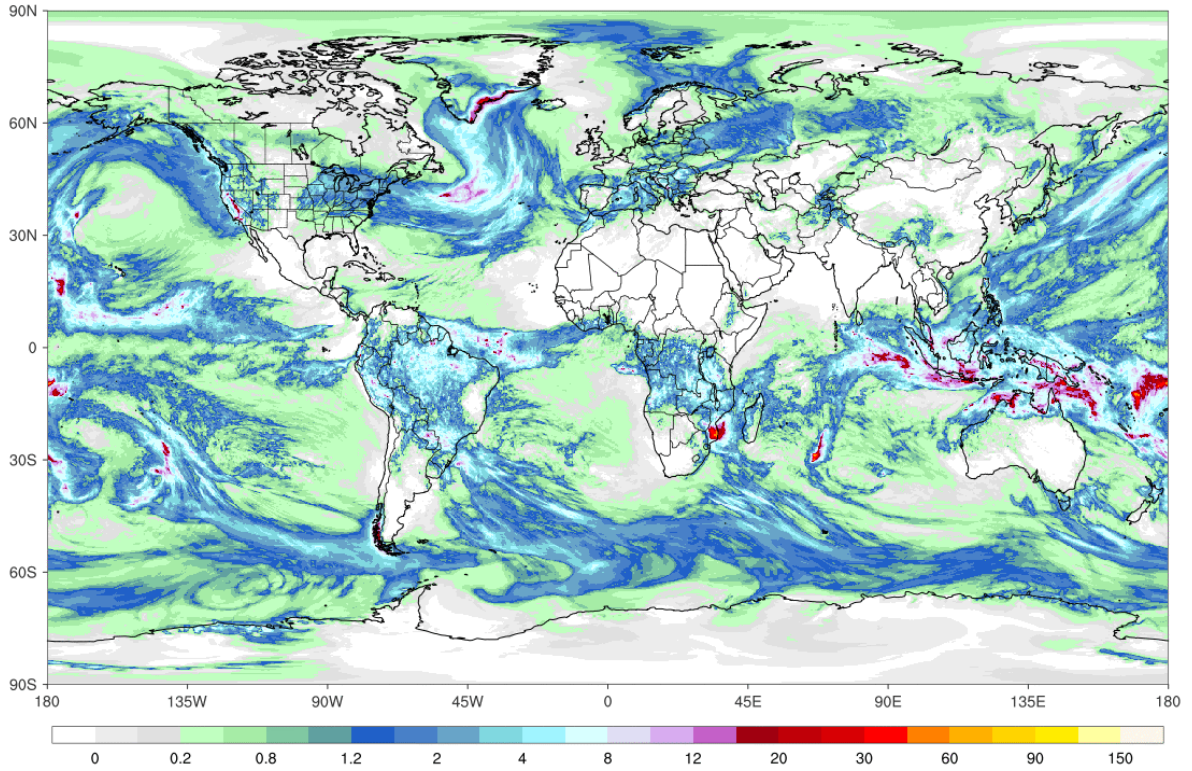


Source: Climate Reanalyzer, Climate Change Institute, University of Maine, USA

Global Precipitation Forecast

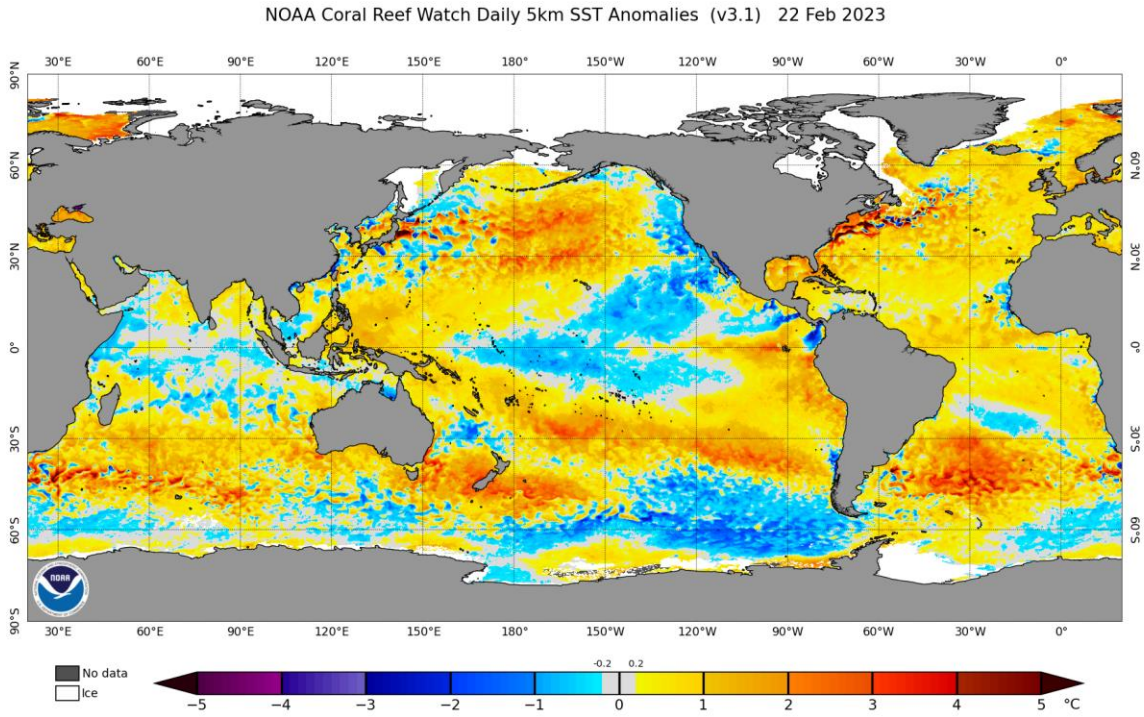
GFS 5-day Total Accumulated Precipitation (cm)
Friday, Feb 24, 2023

ClimateReanalyzer.org
Climate Change Institute | University of Maine



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

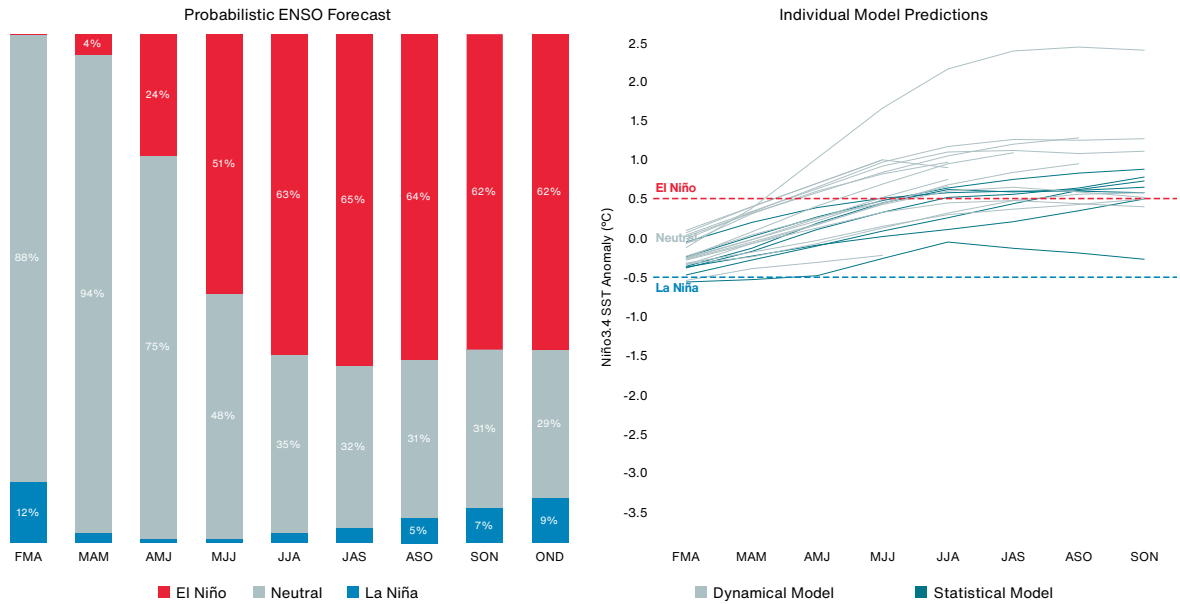
Weekly Sea Surface Temperature (SST) Maps (°C)



El Niño-Southern Oscillation (ENSO)

Probabilistic ENSO Model Projections: February 2023

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



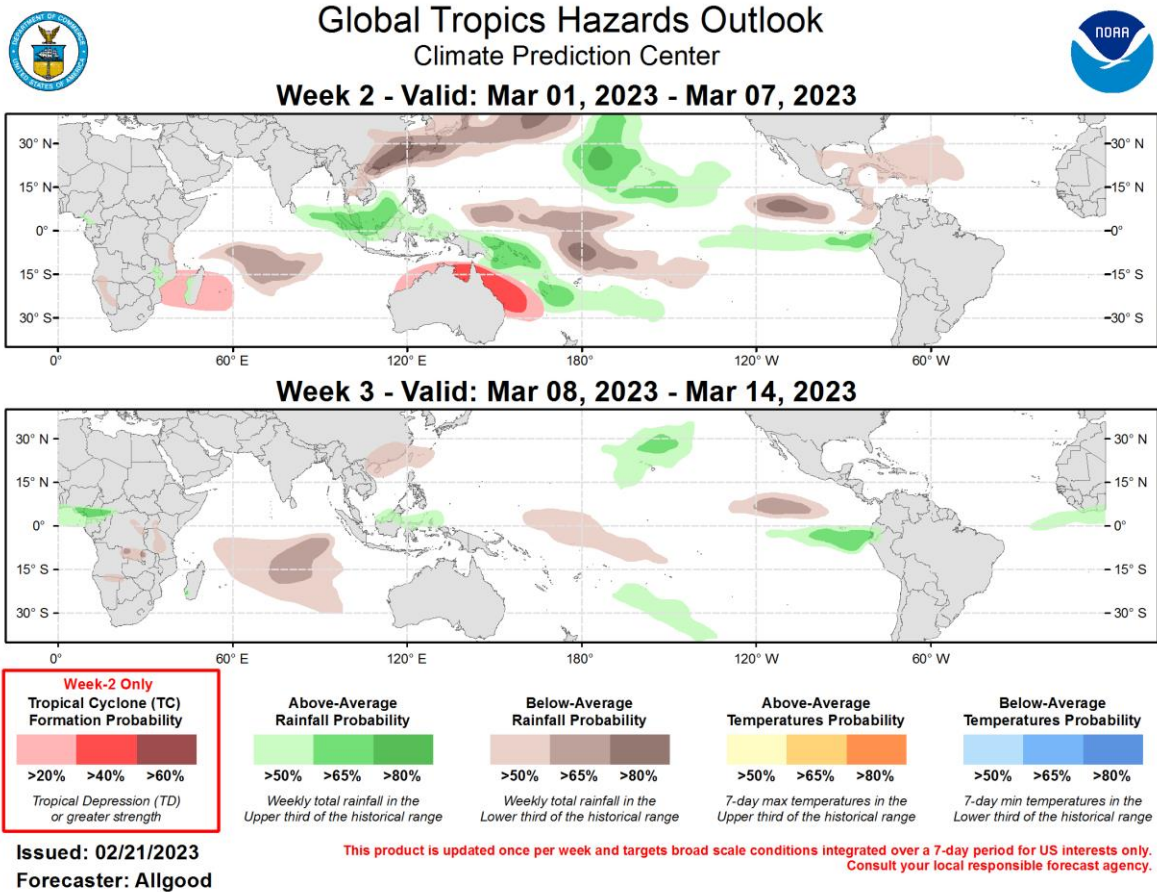
El Niño: Warm phase of an ENSO cycle. Sea surface temperatures of +0.5°C occur across the east-central equatorial Pacific.

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.

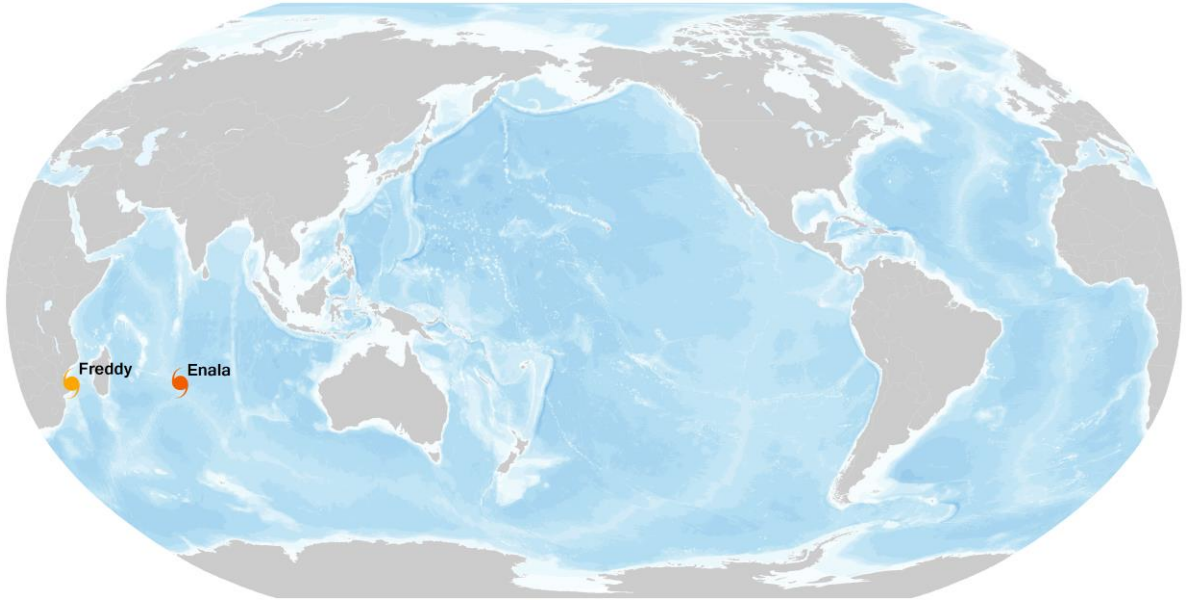
El Niño (La Niña) is a phenomenon in the equatorial Pacific Ocean characterized by a five consecutive 3-month running mean of sea surface temperature (SST) anomalies in the Niño 3.4 region that is above the threshold of +0.5°C (-0.5°C). This is known as the Oceanic Niño Index (ONI).

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

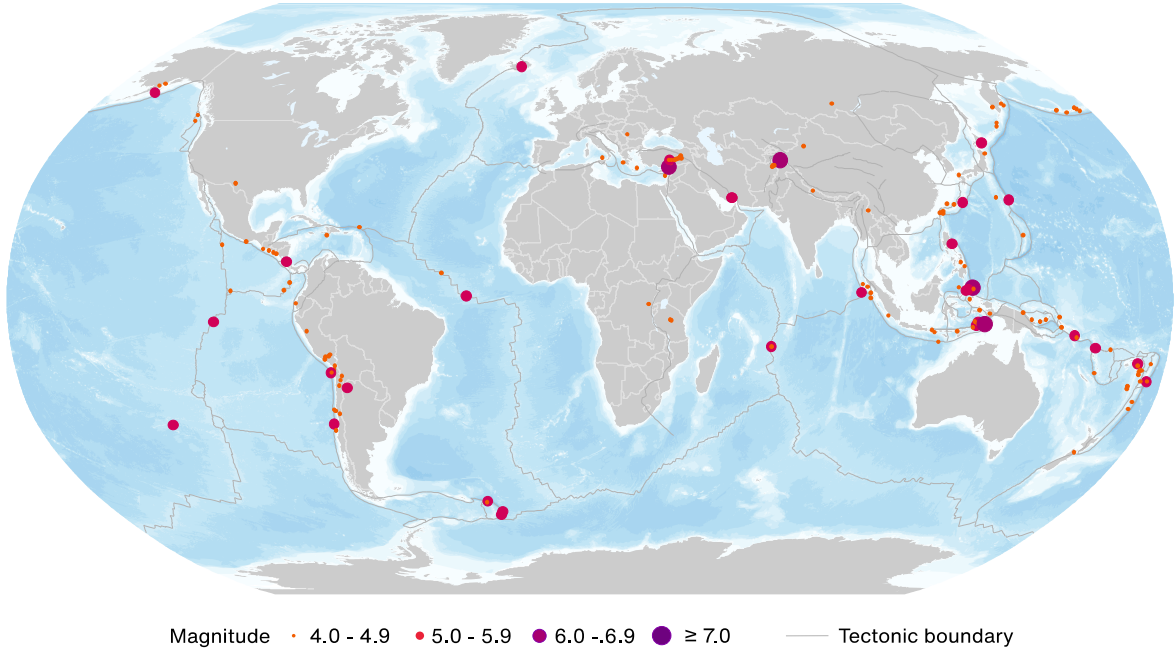
Storm Name	Location	Winds	Location from Nearest Land Area
CY Enala	22.1S, 70.5E	80	850 mi (1,365 km) E from Port Louis, Mauritius
CY Freddy	22.2S, 36.5E	70	135 mi (215 km) NE from Maxixe, Mozambique

* 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)

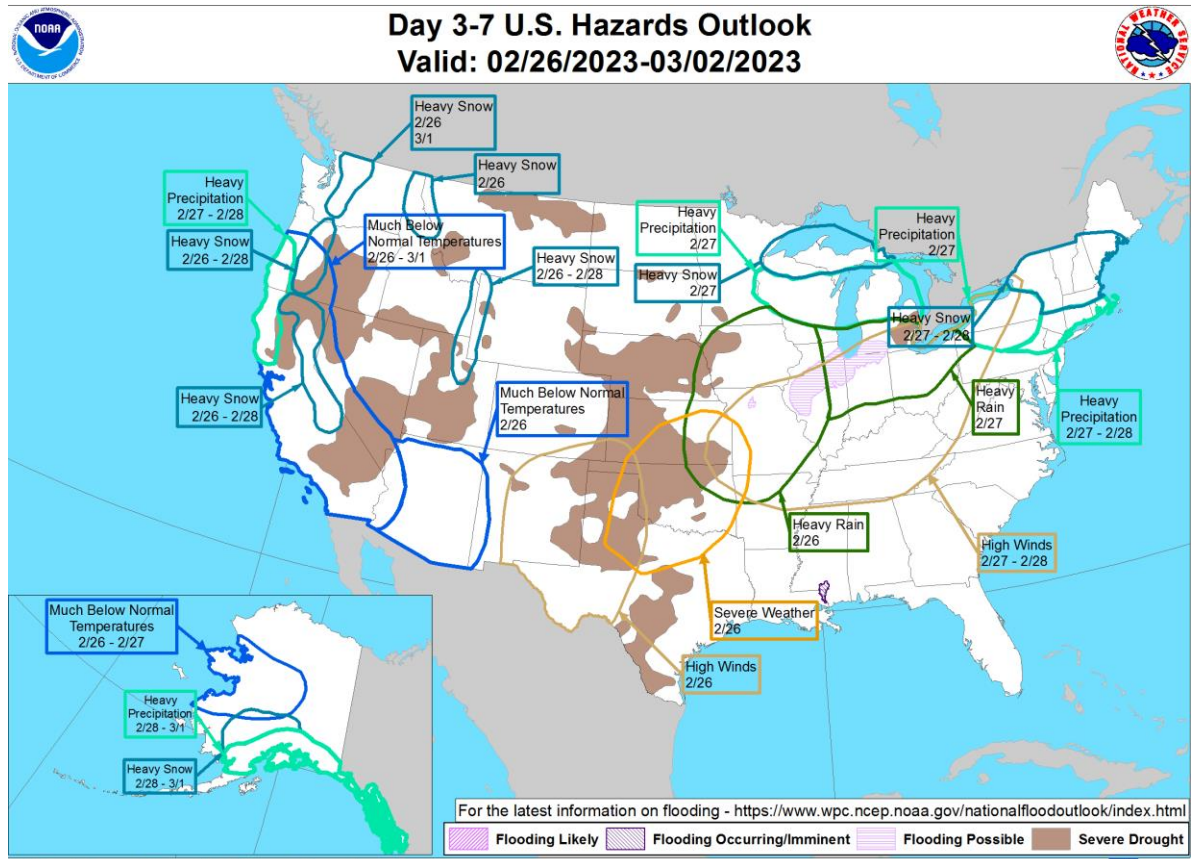
Global Earthquake Activity ($\geq M4.0$): Feb 17-23



Date (UTC)	Location	Magnitude	Epicenter
2/17/2023	6.60S, 132.08E	6.1	13 km (8 mi) SW of Tual, Indonesia
2/20/2023	36.11N, 36.02E	6.3	3 km (2 mi) SSW of Uzunbag, Turkey
2/23/2023	38.07N, 73.21E	6.8	67 km (42 mi) W of Murghob, Tajikistan
2/23/2023	3.32N, 128.15E	6.3	17 km (11 mi) N of Tobelo, Indonesia

Source: United States Geological Survey

U.S. Hazard Outlook



Weather Prediction Center

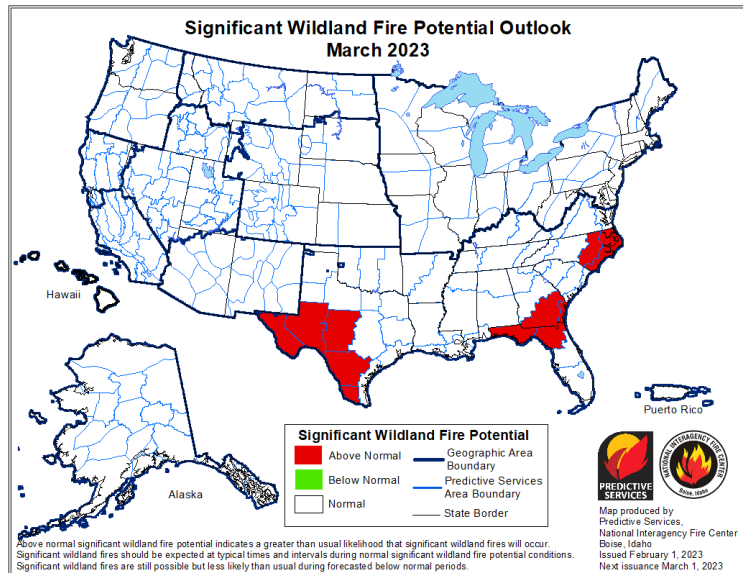
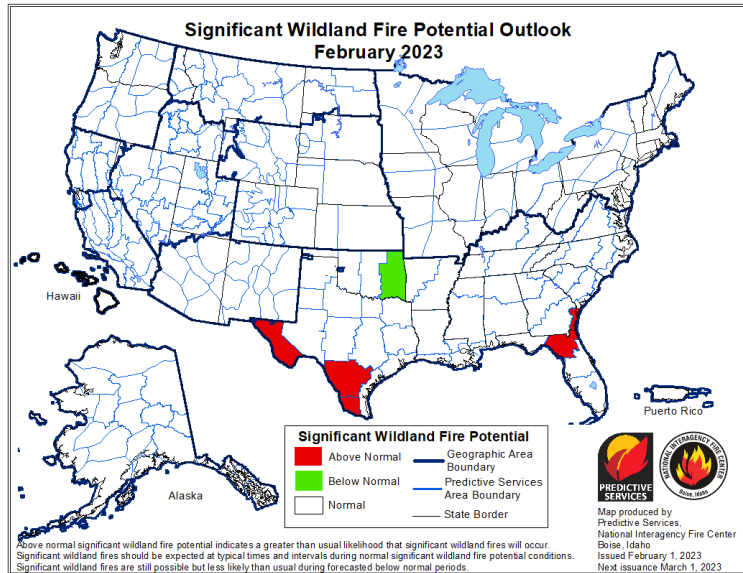
Made: 02/23/2023 3PM EST

Source: Climate Prediction Center (NOAA)

Follow us:

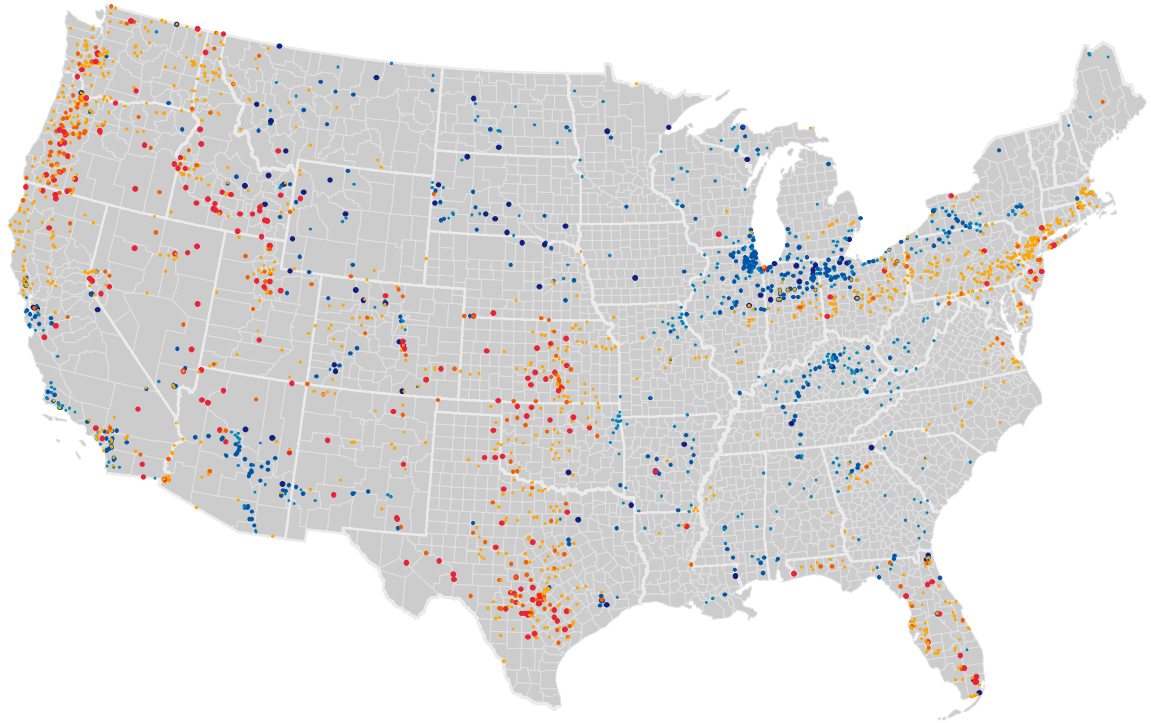
www.wpc.ncep.noaa.gov

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



Source: NIFC

U.S. Current Riverine Flood Risk



- | | | | |
|----------------------------|---------------------------|-------------------------|--------------------|
| High Flows
(Percentile) | • ≥ 99 / Above floodstage | Hydrological
Drought | • Severe Drought |
| | • 95 - 99 | | • Moderate Drought |
| | • 90 - 95 | | • Below Normal |

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 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

South-eastern Africa: Cyclone Freddy

Météo-France

Madagascar's National Office of Risks and Disasters (BNGRC)

Death toll from cyclone Freddy in Madagascar rises to 4, *Reuters*

Turkey and Syria: Earthquake

AFAD

USGS

Europe: Windstorms Otto and Willy

Met Office

DMI

SMHI

Natural Catastrophes: In Brief

Brazil: flooding and landslides kill dozens in São Paulo state, *The Guardian*

Emergency Response Coordination Centre (ERCC)

Floodlist

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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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