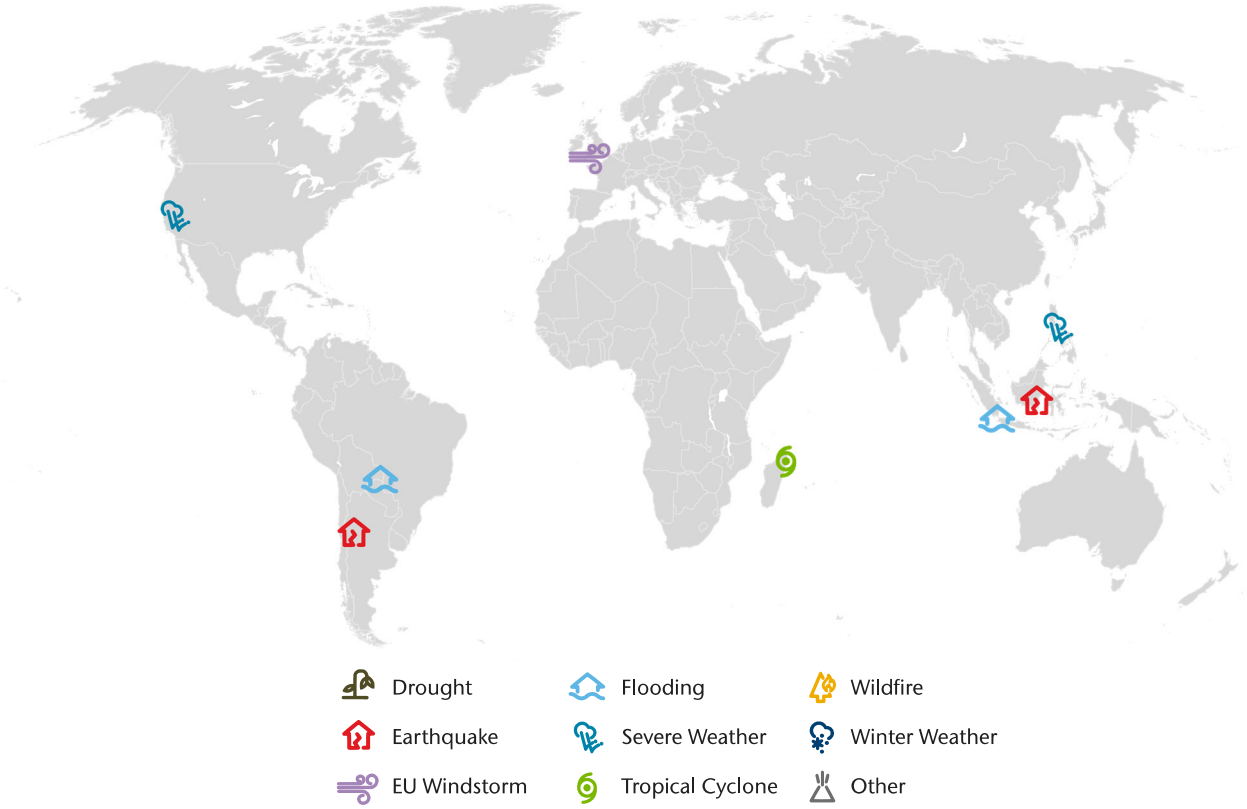
Weekly Cat Report

January 22, 2021

This Week's Natural Disaster Events



Event	Impacted Areas	Fatalities	Damaged Structures and/or Filed Claims	Preliminary Economic Loss (USD)*	Page
Earthquake	Indonesia	91+	2,000+	Millions	3
Earthquake	Argentina	0	Thousands	Millions	5
Flooding	Bolivia, Paraguay	1+	Hundreds	Unknown	5
Severe Weather	United States	0	Thousands	10s of millions	5
Severe Weather	Philippines	2+	2,500+	14+ million	5
Flooding	Indonesia	21+	26,000+	Millions	6
TS Eloise	Madagascar	1+	Hundreds	Unknown	6
European Windstorm	Western Europe	0	Thousands	10s of millions	6

**Please note that these estimates are preliminary and subject to change. In some instances, initial estimates may be significantly adjusted as losses develop over time. This data is provided as an initial view of the potential financial impact from a recently completed or ongoing event based on early available assessments.*

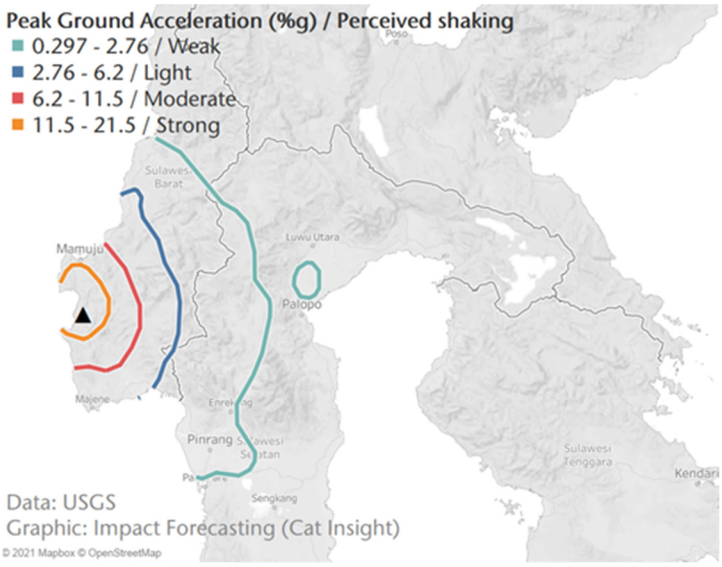
Along with this report, we continue to welcome users to access current and historical natural catastrophe data and event analysis on Impact Forecasting's Catastrophe Insight website: http://catastropheinsight.aon.com

Strong magnitude-6.2 earthquake hits Indonesia

A strong magnitude-6.2 (USGS) earthquake struck Indonesia's Majene Regency on January 14. The tremor was shallow and was followed by dozens of smaller magnitude aftershocks. Government officials confirmed that at least 91 people died and more than 1,175 others were injured. Notable structural damage was reported from Majene and Mamuju regencies. Preliminary reports suggest that the economic losses are likely to minimally reach well into the tens of millions (USD).

Seismological Recap

Below is the tectonic summary of event provided by the United State Geological Survey (USGS):



"The January 14, 2021, M6.2 earthquake near Mamuju, Indonesia occurred as a result of reverse faulting at shallow depths on or near the boundary between the Sunda plate and Banda Sea microplate. Focal mechanism solutions for the earthquake indicate rupture occurred on either a shallowly dipping oblique reverse strike-slip fault striking towards the northwest or on a steeply dipping reverse fault striking towards the south, both of which indicate roughly east-west oriented compression. Eastern Indonesia is characterized by complex tectonics in which motions of numerous small microplates are accommodating large-scale convergence between the Australia, Sunda, Pacific, and Philippine Sea plates. At the location of the January 14 earthquake, the Sunda plate moves east with respect to the Banda Sea microplate at a velocity of about 21 mm/year.

Shallow earthquakes of this size can often have a deadly impact on nearby communities. Historically, the island of Sulawesi in Indonesia where the January 14 earthquake occurred has hosted 119 earthquakes of M6.0 or greater since 1900. The most recent prior significant earthquake was a M7.5 strike-slip earthquake and associated tsunami in September 2018 that occurred ~300 km north of the January 14 event and led to severe impacts in the city of Palu and surrounding regions. The earthquake in 2018 contributed to approximately 4000 fatalities. The largest documented earthquake on the island of Sulawesi was a M7.9 earthquake in January 1996. The 1996 earthquake – a shallow thrust faulting earthquake likely to have occurred on the regional subduction zone system at depth beneath the shallow crust - resulted in approximately 10 fatalities, over 60 injuries, and significant building damage in the local region. The January 14 M6.2 earthquake was preceded by a M5.7 earthquake 12 hours prior in the same location with a similar reverse faulting focal mechanism."

Event Details

Impacts from the M-6.2 Sulawesi earthquake
Source: BNPB, Indonesia

A strong earthquake struck Indonesia's Sulawesi Island on January 15 at 02:28 AM local time (on January 14 at 18:28 UTC). The tremor occurred along the Mamuju-Majene thrust fault and registered a magnitude of 6.2 (USGS) on the moment magnitude scale. Its epicenter was located approximately 6 kilometers (3.73 miles) northeast of Majene-Sulbar in a shallow depth of roughly 18 kilometers (11 miles). The main earthquake event was preceded by a magnitude-5.7 (USGS) foreshock, which occurred approximately 4 kilometers (2.5 miles) northwest of the mainshock location on the previous day. This foreshock triggered multiple landslides in Majene, resulting in damage and casualties. The quake was followed by dozens of aftershocks including a magnitude 5.7 aftershock which occurred near Majene on January 16, according to the Indonesian Meteorology, Climatology and Geophysics Agency (BMKG). Strong tremors often occur in Indonesia, as the country is located along the earthquake prone 'Circum-Pacific Belt' – also known as the 'Ring of Fire'.

Strong shaking was felt for approximately 5 to 7 seconds across the Majene, Mamuju, and Polewali Mandar districts. The tremor prompted massive landslides in areas already affected due to prolonged flooding, resulting in blocking several highways and rural roads. Power supply and telecommunication in some isolated areas were interrupted, mainly due to damaged electrical infrastructure and utility poles.

According to the Indonesian Disaster Management Authority (BNPB), at least 91 people were killed and more than 1,175 others were injured. Most of the casualties occurred in Mamuju district. Approximately 40,000 residents were affected, of which more than 20,000 people were evacuated by local disaster officials and rescue workers. Rescue and relief operations were hampered as prevailing emergency conditions due to COVID-19 and prolonged flooding triggered by an active spell of seasonal rains.

Initial assessments noted that 1,900 houses were damaged in West Sulawesi Province, most of them were in the Majene and Mamuju districts, according to the BNPB. Additional damage occurred in the Majene district where more than 300 buildings along with dozens of other structures, including government offices, schools, and places of worship were damaged to varying degrees. The local disaster management office highlighted that nearly every structure near the epicenter had incurred some level of damage.

Financial Loss

The damage and economic loss estimates remained ongoing as of this writing; however, preliminary damage assessment reports suggest that the total economic loss might reach into the tens of millions (USD). According to the USGS' exposure-based PAGER methodology, total economic losses were anticipated to be in the range of 10-100 million (USD) with the highest probability of 43 percent.

Natural Catastrophes: In Brief

Earthquake (Argentina)
A strong magnitude 6.4 (M6.4) earthquake struck the San Juan Province in west-central Argentina on January 18. According to the United States Geological Survey (USGS), the epicenter was located 29 kilometers (18 miles) west-southwest of Pocito at a depth of 20 kilometers (12 miles). Shaking was felt widely in neighboring provinces and cities, including Santiago (the capital city of Chile). The tremor generated structural damage to multiple homes – particularly precarious adobe structures - in addition to material losses and localized power outages. Significant roadway cracking resulted in transportation interruptions along Route 40. At least five people were injured. Several large aftershocks ranging in magnitude from 4.8 to 5.3 were measured. Total economic losses were expected in the millions (USD).

Flooding (Bolivia and Paraguay)
Heavy rainfall and thunderstorms generated widespread flooding across regions of Bolivia and Paraguay between January 16-20. Civil Defense authorities indicated 15,000 people were affected by the floods in Bolivia, and 5,000 in Paraguay. The greatest impacts in Bolivia were reported in the Departments of Tarija, Cochabamba, Beni, and La Paz. In the La Paz Department, flooding was enhanced as the Mapiri and Tipuani Rivers overflowed their banks. In Cochabamba, no less than 34 containment dams along the Taquiña River were damaged or destroyed. Government officials noted blocked roadways, collapsed houses, landslides, toppled trees, and impacts to cropland and livestock. One death was confirmed in Cochabamba.

Severe Weather (United States)
An unseasonably strong high wind event impacted central and southern California between January 17-20. Wind gusts across the Sacramento Valley, Bay Area, and Greater Los Angeles reached 60 to 70 mph (95 to 115 kph), with maximum gusts at higher elevations topping 90 mph (145 kph). The severe winds, coupled with abnormally warm temperatures and prolonged drought conditions aided in the ignition of several small wildfires in southern California. The offshore winds were enhanced by a strong pressure gradient generated between an area of low pressure off the California coast and a surface high pressure system spanning the Rocky Mountains. No less than 260,000 customers were affected by power outages resulting from the combination of high winds and public safety shutoffs. Numerous instances of toppled trees and downed power lines were reported, along with damage to vehicles and structures. Downed trees and damaged facilities prompted the closure of Yosemite National Park. The Santa Rosa Fire Department reported multiple calls involving wind-related property damage, a majority on the east side of town. Total economic and insured losses were expected to reach well into the millions (USD).

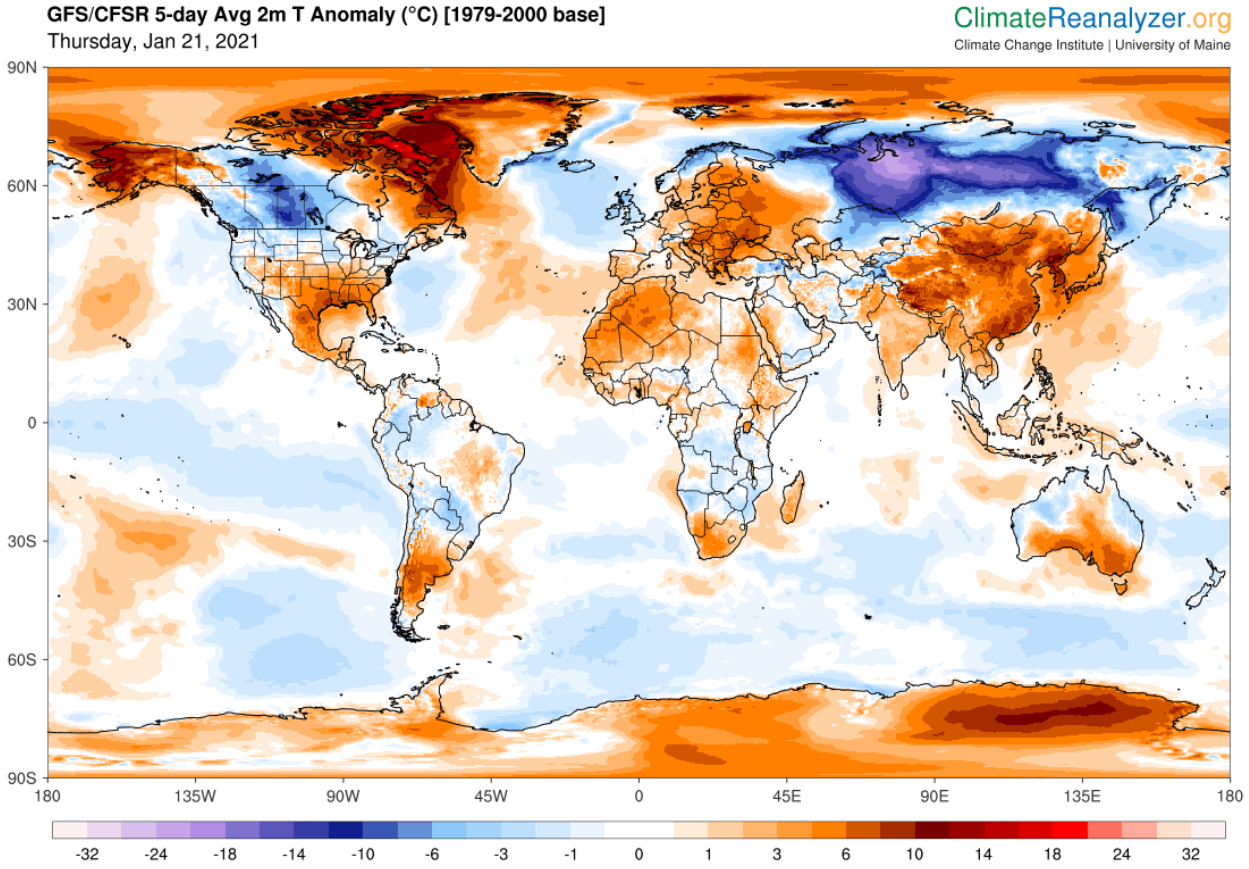
Severe Weather (Philippines)
The tail-end of a frontal system affected Visayas and Luzon Islands of Philippines archipelago from January 8-21. According to the Philippines' National Disaster Risk Reduction and Management Council (NDRRMC), two people were noted as dead or missing, three others were critically injured, while approximately 61,000 people were directly affected during the event. Owing to the disastrous impacts brought by the system, five cities in the western Visayas were declared under the state of calamity. As many as 2,500 residential houses, 20 road sections, and 18 bridges were damaged to various degrees. Further losses were inflicted on the local infrastructure and in the agriculture sector. Total combined economic losses were estimated at upwards of PHP670 million (USD14 million); damage to private property is not included in this figure.

Flooding (Indonesia)
Heavy precipitation continued to affect the Indonesian Provinces of South Kalimantan, South Sulawesi, and North Maluku between January 15-21. According to the Indonesian National Board for Disaster Management (BNPB), as of January 18, at least 21 people were killed and dozens of others were injured in rain-related incidents. As many as 26,000 residential houses were either damaged or destroyed; most of them were in South Kalimantan Province.

Tropical Storm Eloise (Madagascar)
Tropical Storm Eloise made landfall in the Madagascar's Antalaha district on January 19. The storm brought heavy rainfall and strong winds in the districts of Antalaha, Maroantsetra, Vavatenina and Toamasina located along the northeastern parts of Madagascar. According to the media reports, one person was killed, and hundreds of houses were damaged or destroyed in storm-related incidents. The full scope of the damage was not known as the damage assessment remained ongoing as of this writing. Eloise would later track through the Mozambique Channel and bring heavy rainfall and damaging winds in South African countries of Mozambique and Zimbabwe.

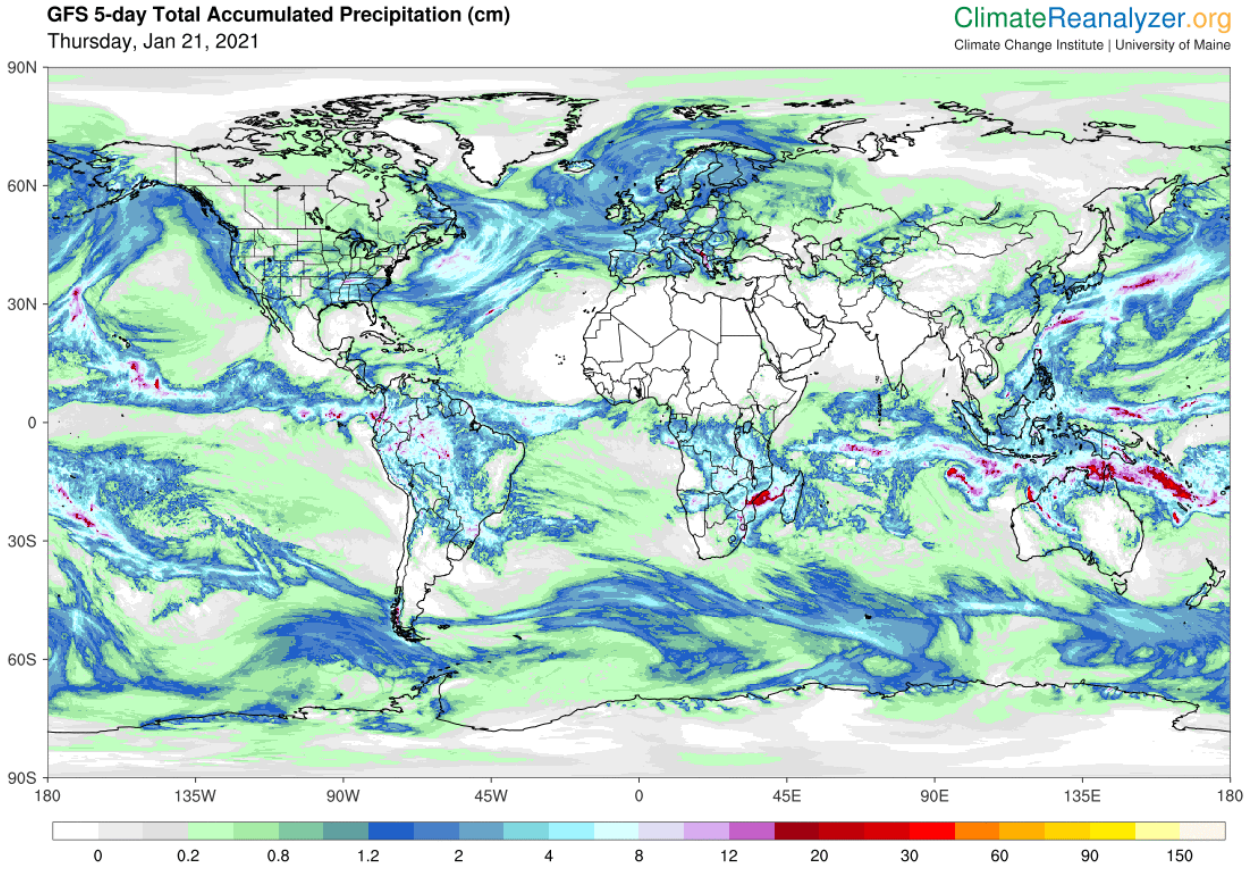
Windstorms Gaetan, Christoph & Hortense (Europe)
A very active cyclonic pattern affected several countries of Western Europe on January 20-22, as three named extratropical storms brought strong winds and heavy rain. Storm Gaetan was named by the Spanish Meteorological Agency AEMET and mostly affected northern Spain on January 20, storm Christoph (named by the UK Met Office) brought heavy rain to parts of Northern England and Wales, causing widespread flooding on January 20-21; more than 2,000 homes were evacuated in the Manchester area alone. Additional wind-related impacts were felt in Benelux, northern France and northwestern Germany. Finally, storm Hortense impacted northern Spain and southwestern France on January 21-22 with strong gusts.

Global Temperature Anomaly Forecast



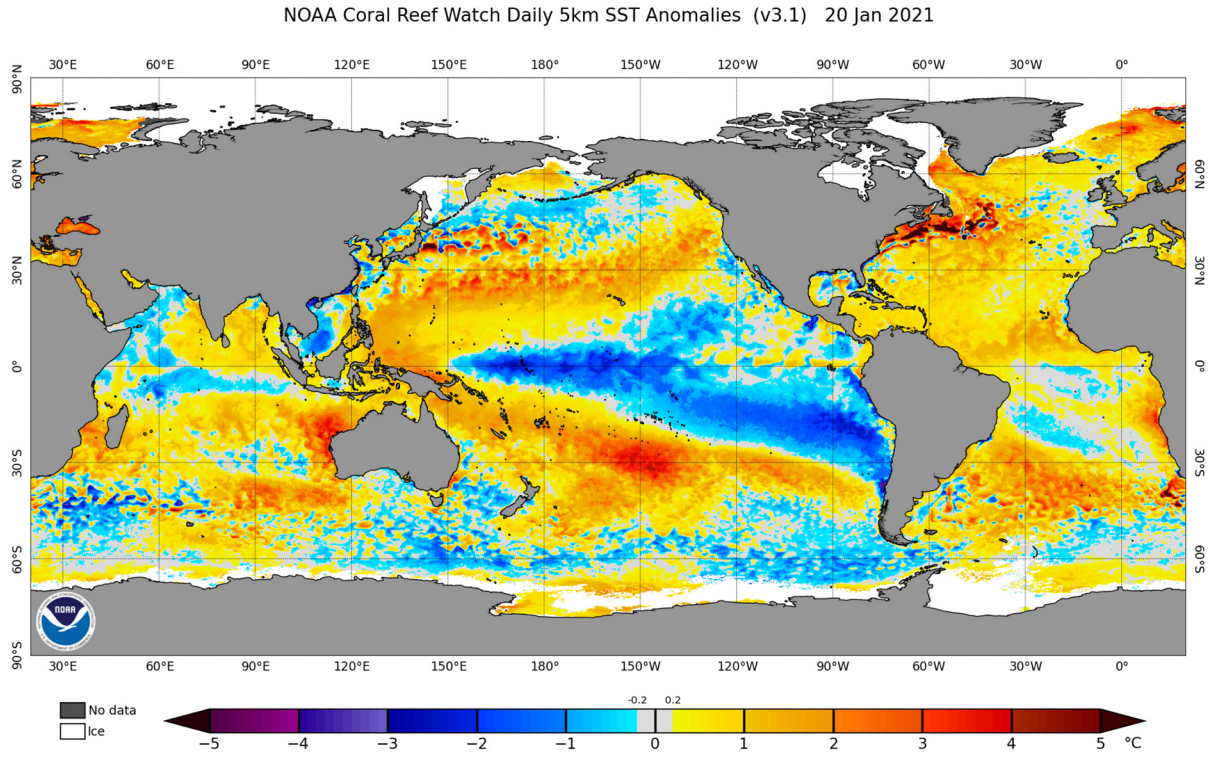
Source: Climate Reanalyzer, Climate Change Institute, University of Maine, USA

Global Precipitation Forecast



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

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



The SST anomalies are produced by subtracting the long-term mean SST (for that location in that time of year) from the current value. This product with a spatial resolution of 0.5 degree (50 kilometers) is based on NOAA/NESDIS operational daily global 5 kilometer Geo-polar Blended Night-only SST Analysis. The analysis uses satellite data produced by AVHRR radiometer.

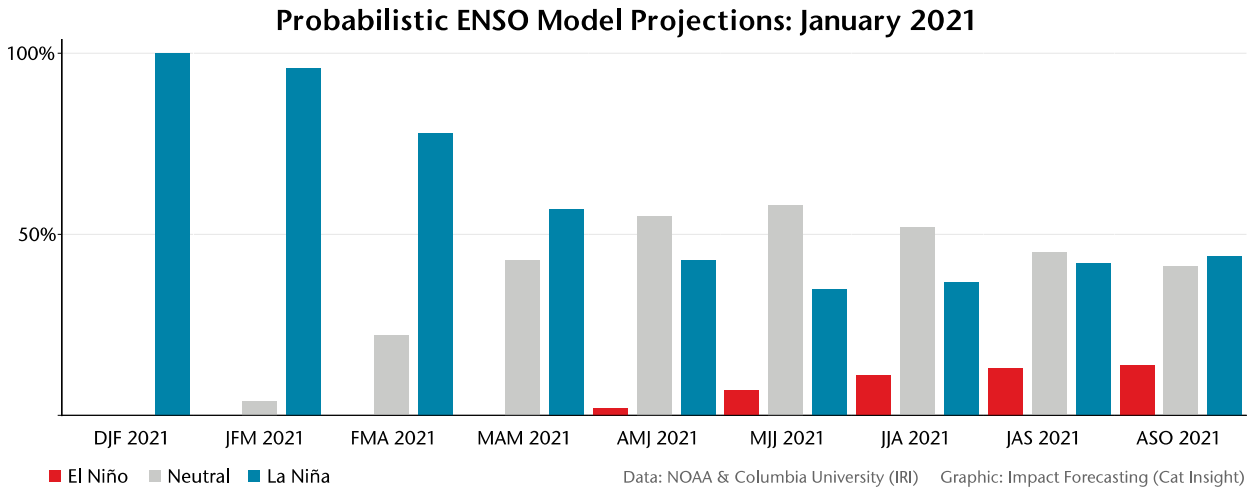
Select Current Global SSTs and Anomalies

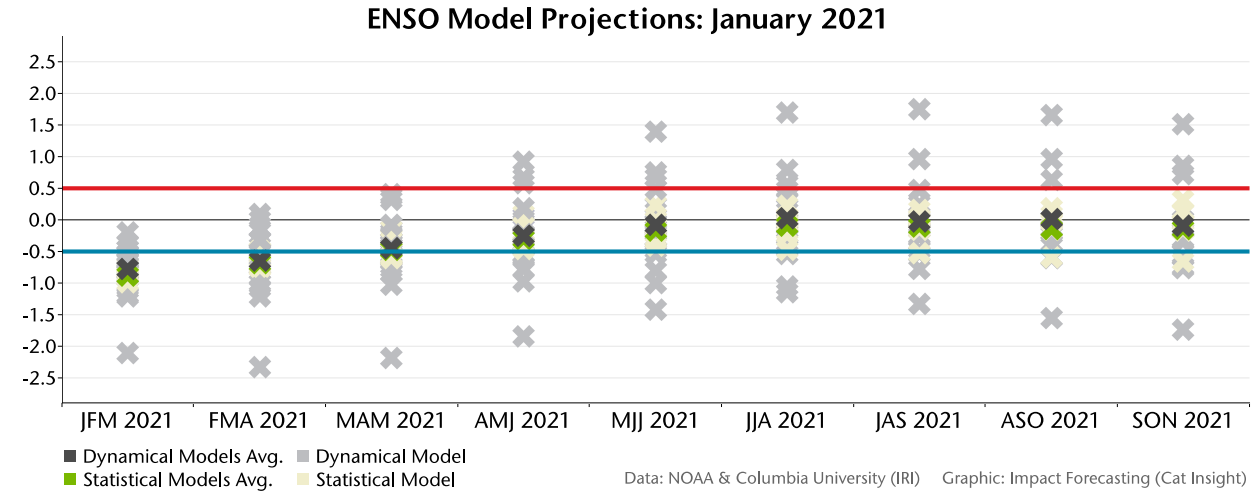
Location of Buoy	Temp (°C)	Departure from Last Year (°C)
Eastern Pacific Ocean (1,020 miles SW of San Salvador, El Salvador)	24.5	-0.5
Niño3.4 region (2°N latitude, 155°W longitude)	23.9	-1.7
Western Pacific Ocean (700 miles NNW of Honiara, Solomon Islands)	29.0	-1.0

Sources: ESRL, NOAA, NEIS, National Data Buoy Center

El Niño-Southern Oscillation (ENSO)

La Niña conditions are currently present, though NOAA has officially issued a **La Niña Advisory**. NOAA notes a 95 percent chance that La Niña conditions will persist through boreal (Northern Hemisphere) winter of 2020 / 2021, and a 55 percent chance that these conditions will linger into the spring months.





El Niño *refers to the above-average sea-surface temperatures (+0.5°C) that periodically develop across the east-central equatorial Pacific. It represents the warm phase of the ENSO cycle.*

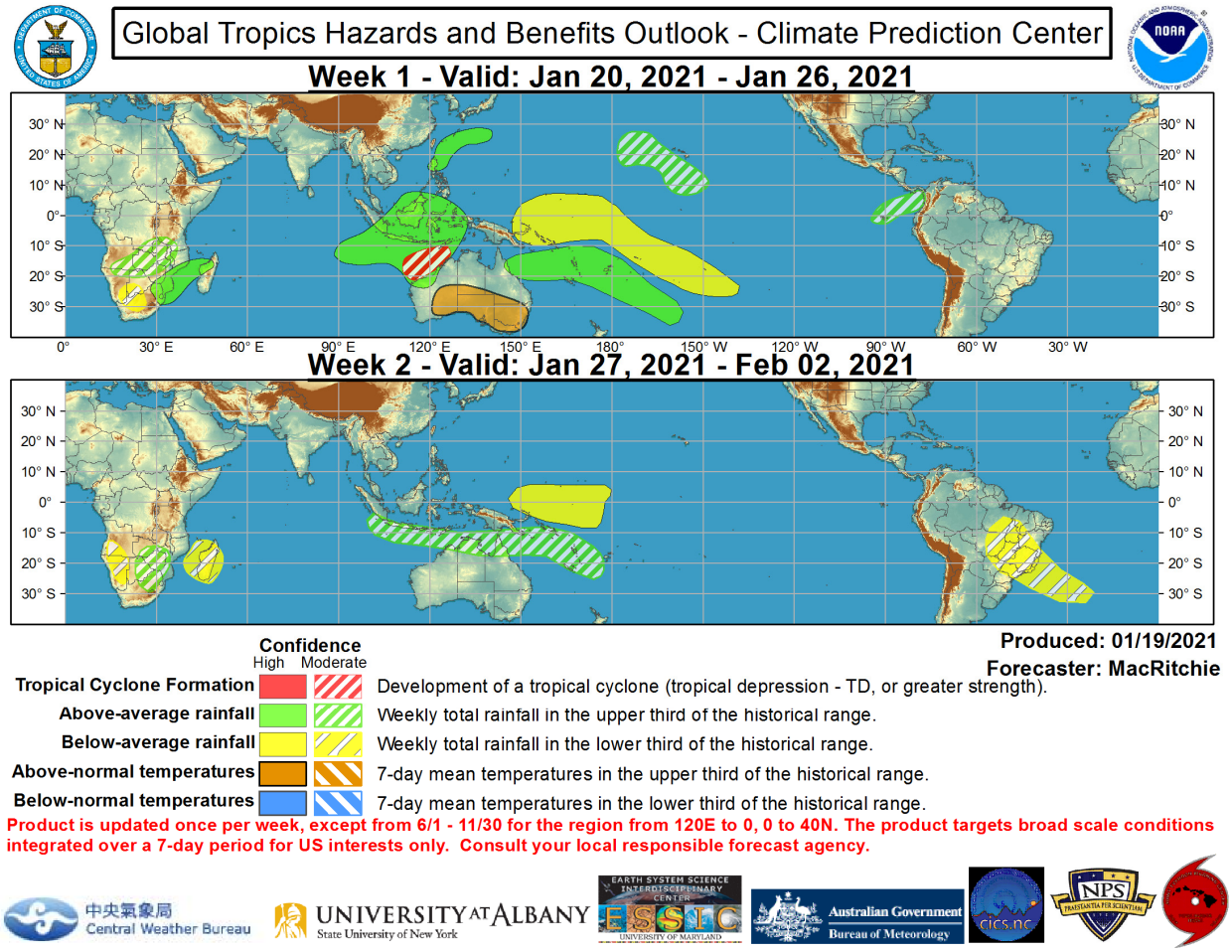
La Niña *refers to the periodic cooling of sea-surface temperatures (-0.5°C) across the east-central equatorial Pacific. It represents the cold phase of the ENSO cycle.*

El Niño and La Niña episodes typically last nine to 12 months, but some prolonged events may last for years. While their frequency can be quite irregular, El Niño and La Niña events occur on average every two to seven years. Typically, El Niño occurs more frequently than La Niña.

ENSO-neutral *refers to those periods when neither El Niño nor La Niña conditions are present. These periods often coincide with the transition between El Niño and La Niña events. During ENSO-neutral periods the ocean temperatures, tropical rainfall patterns, and atmospheric winds over the equatorial Pacific Ocean are near the long-term average.*

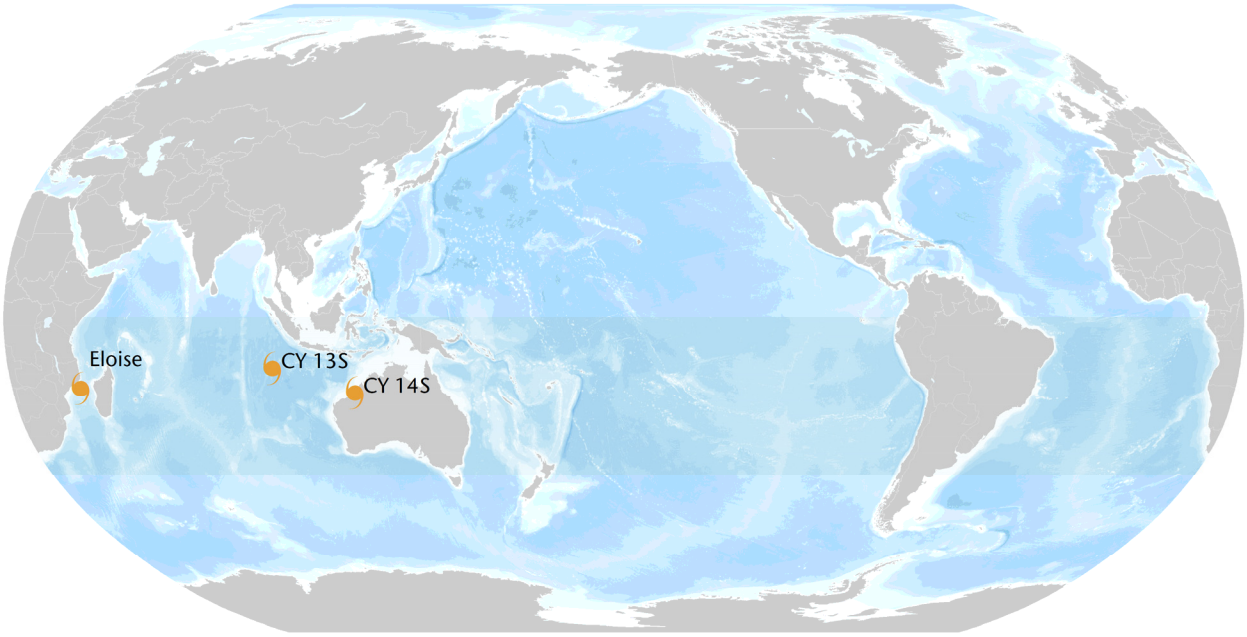
El Niño (La Niña) is a phenomenon in the equatorial Pacific Ocean characterized by a five consecutive 3-month running mean of sea surface temperature (SST) anomalies in the Niño 3.4 region that is above the threshold of +0.5°C (-0.5°C). This is known as the Oceanic Niño Index (ONI).

Global Tropics Outlook



Source: Climate Prediction Center

Current Tropical Systems



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

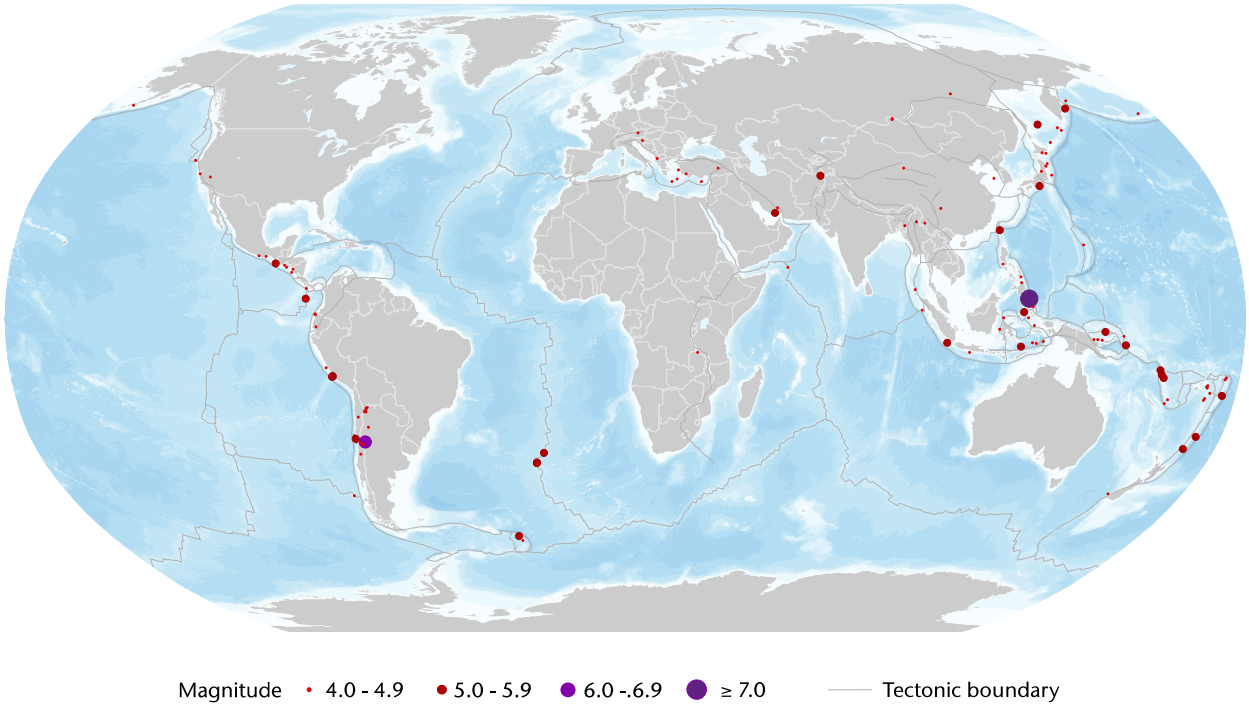
Location and Intensity Information

Name*	Location	Winds	Storm Reference from Land	Motion**
CY Eloise	18.0°S, 40.1°E	40 mph	305 miles (490 kilometers) N of Europa Island	WSW at 15 mph
CY 13S	12.8°S, 97.3°E	40 mph	1,285 miles (2,065 kilometers) WNW of Learmonth, Australia	SSW at 3 mph
CY 14S	19.1°S, 120.6°E	50 mph	135 miles (215 kilometers) WSW of Broome, Australia	SSE at 12 mph

* TD = Tropical Depression, TS = Tropical Storm, HU = Hurricane, TY = Typhoon, STY = Super Typhoon, CY = Cyclone
** N = North, S = South, E = East, W = West, NW = Northwest, NE = Northeast, SE = Southeast, SW = Southwest

Sources: National Hurricane Center, Joint Typhoon Warning Center, Central Pacific Hurricane Center

Global Earthquake Activity (≥M4.0): January 15 – 21

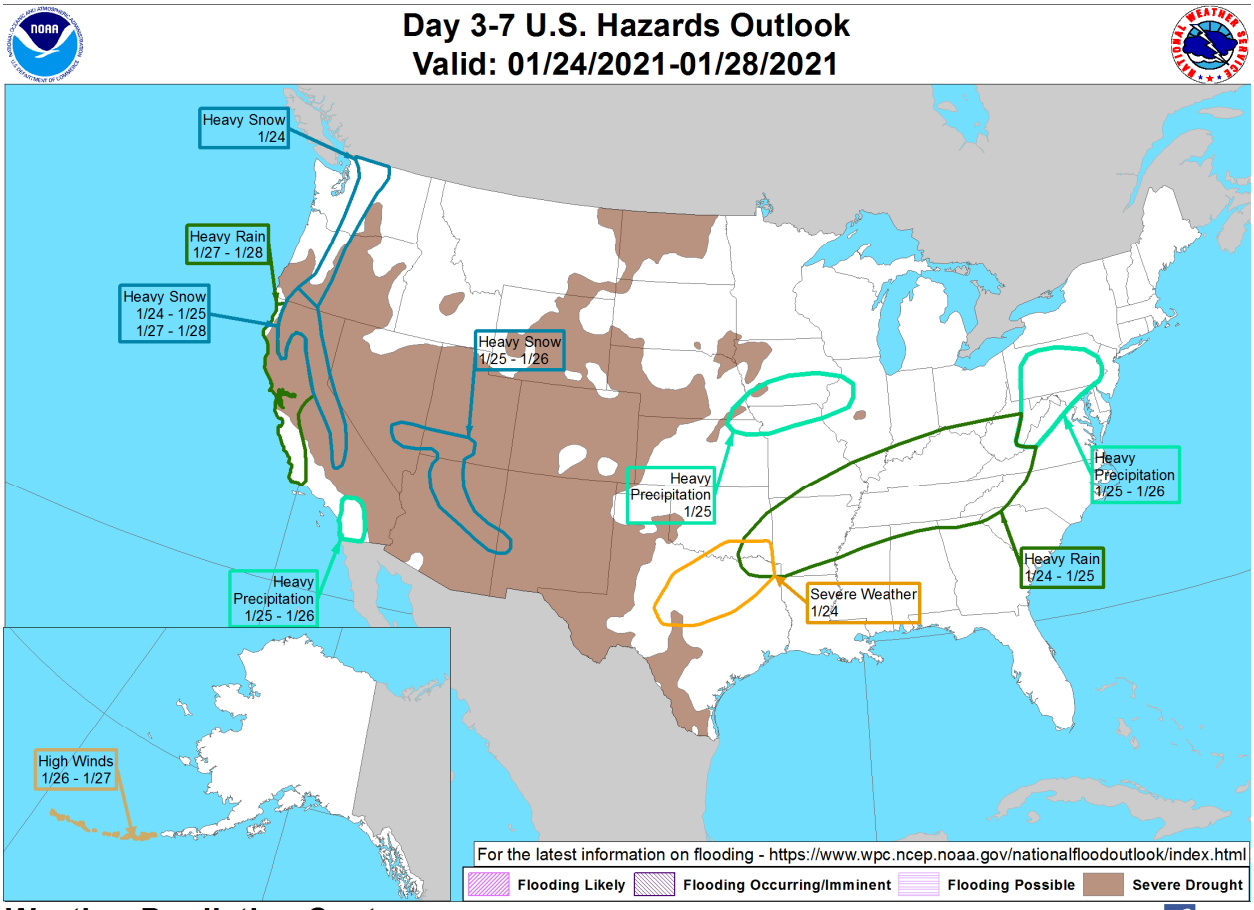


Significant EQ Location and Magnitude (≥M6.0) Information

Date (UTC)	Location	Magnitude	Depth	Epicenter
01/19/2021	31.82°S, 68.82°W	6.4	20 km	27 kilometers (17 miles) SW of Pocito, Argentina
01/21/2021	5.01°N, 127.52°E	7.0	96 km	21 kilometers (13 miles) SE of Pondaguitan, Philippines

Source: United States Geological Survey

U.S. Weather Threat Outlook



Potential Threats

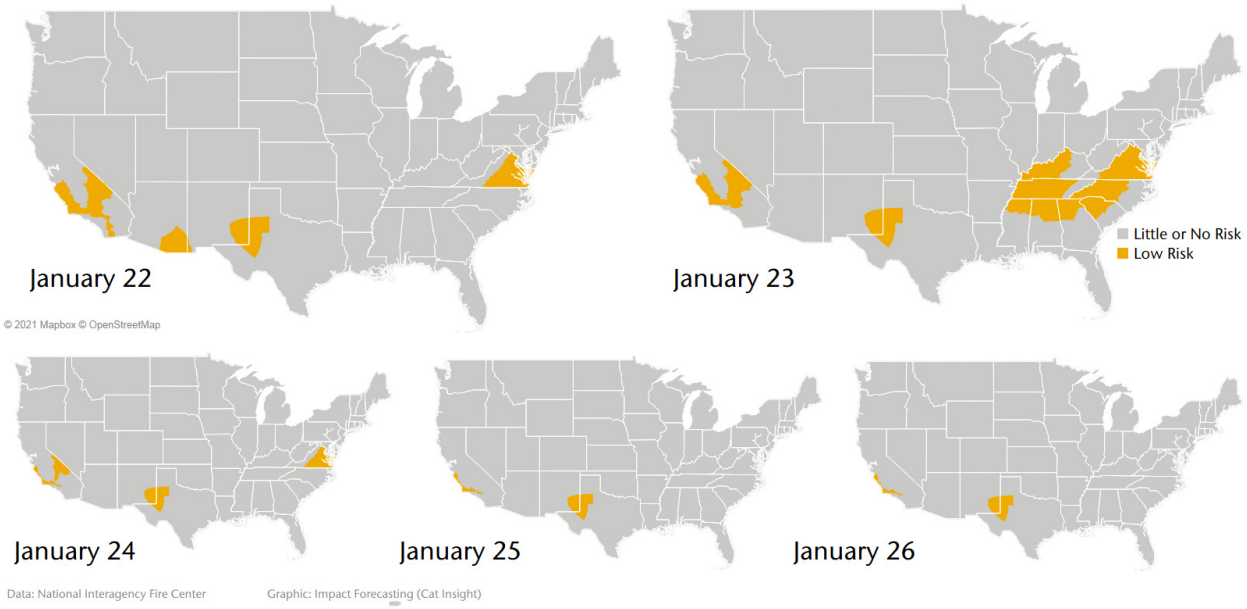
- An intensifying low-pressure system will eject from the Southwest toward the Central United States generating heavy rainfall and isolated severe weather across the Southern Plains and Tennessee and Ohio Valleys between January 24-25. Further north, heavy mixed precipitation and snowfall are expected in regions of the Midwest and Mid-Atlantic through January 26.

- A highly amplified upper level trough will enhance heavy snowfall spanning the Cascades and Sierra Nevada between January 24-25, with heavy precipitation reaching southern California and the Southwest through January 26.

- An anticipated ‘Atmospheric River’ event has the potential to produce heavy rainfall across coastal California, with notable snowfall accumulations in the Sierra Nevada between January 27-28.

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

The National Interagency Fire Center has highlighted a limited volume of potential fire risk across much of the country during the next week. The arrival of more seasonal precipitation and temperatures should minimize any significant fire chance for the rest of the winter months, though continued drought conditions in the Desert Southwest will keep a lingering threat.



Annual YTD Wildfire Comparison: January 15*

Year	Number of Fires	Acres Burned	Acres Burned Per Fire
2017	483	9,124	18.89
2018	1,008	7,155	7.10
2019	218	2,310	10.60
2020	567	12,954	22.85
2021	373	6,251	16.76
10-Year Average (2011-2020)	482	9234	19.16

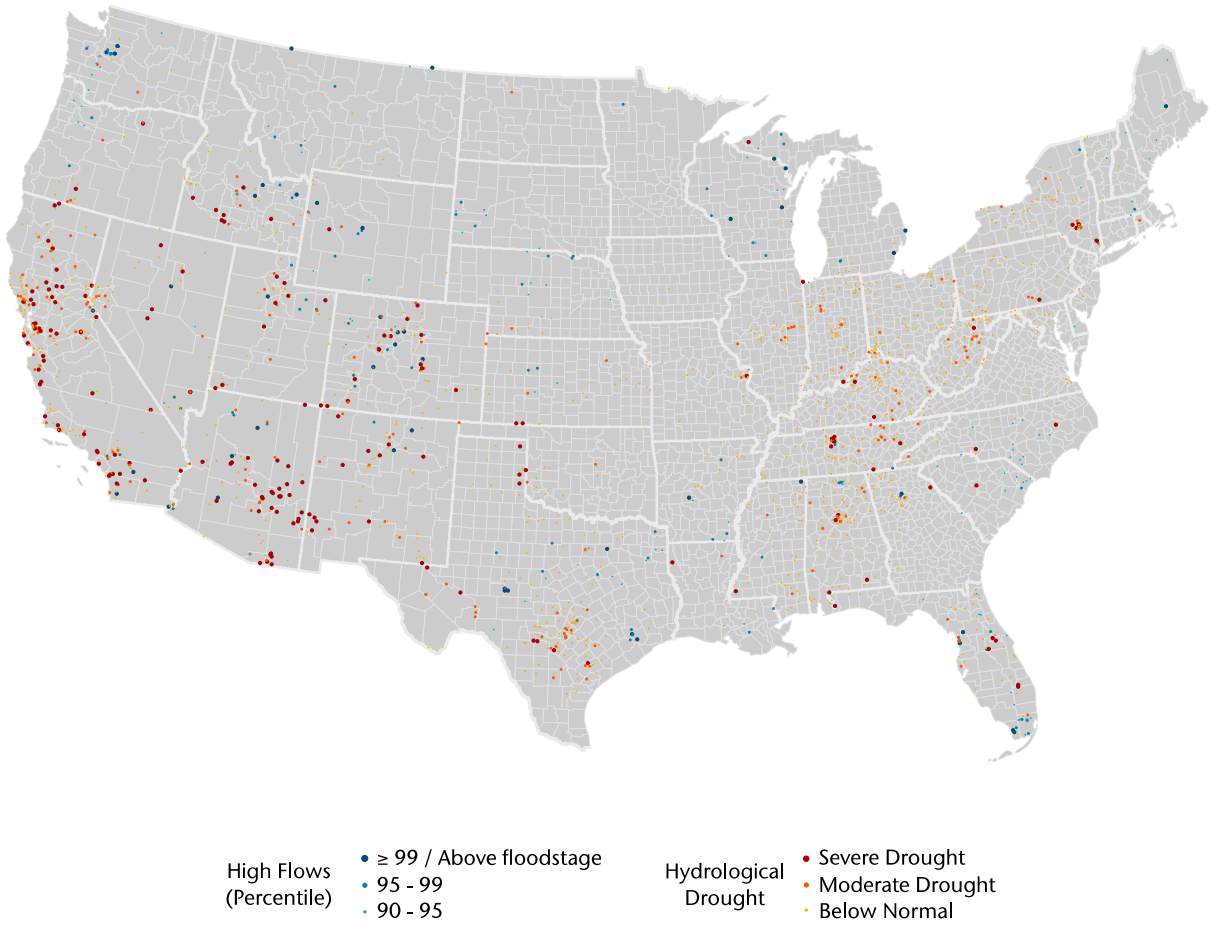
*Most recent available data via NIFC
Source: National Interagency Fire Center

Top 5 Most Acres Burned by State: January 21

State	Number of Fires	Acres Burned	Acres Burned Per Fire
Montana	12	6,049	504.08
Texas	154	3,957	25.69
California	291	2,023	6.95
Colorado	5	1,430	286.00
Arizona	37	1,379	37.28

Source: National Interagency Fire Center

Current U.S. Streamflow Status



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.

Top 5 Rivers Currently Nearing or Exceeding Flood Stage

Location	Current Stage (ft)	Flood Percentile
Red Lake River at Crookston, Minnesota	7.10	99.16
Weber River near Oakley, Utah	6.01	99.15
Oconto River near Gillett, Wisconsin	3.00	99.09
Dolores River at Dolores, Colorado	3.43	99.09
Chippewa River near Bruce, Wisconsin	3.81	99.07

Source: United States Geological Survey

Source Information

Strong, magnitude-6.2 earthquake strikes Indonesia

United States Geological Survey (USGS)
Indonesian Disaster Management Authority (BNPB)
Indonesian Meteorology, Climatology and Geophysics Agency (BMKG)
Regional Disaster Management Agency (BPBD) of Majene
Indonesia earthquake: 10,000 people flee, buildings 'flattened' in Sulawesi island, South China Morning Post
Death Toll from Indonesia Earthquake Rises to at Least 84, Voice of America
Sebanyak 185 Bencana Terjadi Hingga Minggu Keempat Januari 2021, BNPB

Natural Catastrophes: In Brief

Magnitude-6.4 quake strikes San Juan and other provinces, Buenos Aires Times
Earthquake in San Juan: it was the largest earthquake of the last four decades, Clarin
Earthquake in San Juan: Media Agua, the epicenter of the strong earthquake that shook the province, La Nacion
Cochabamba: 34 containment dams of the Taquiña River will be repaired, Periodico Bolivia
The number of families affected by floods rises to 15 thousand, Los Tiempos
U.S. National Weather Service
Poweroutage.US
National Disaster Risk Reduction and Management Council (NDRRMC)
Los Angeles, San Francisco brace for damaging winds, rare January fire threat, The Washington Post
Wind Storm Causes Widespread Damage, Power Outages, CBS 5 SF Bay Area
Tropical storm Eloise enters Mozambique Channel, IOL

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