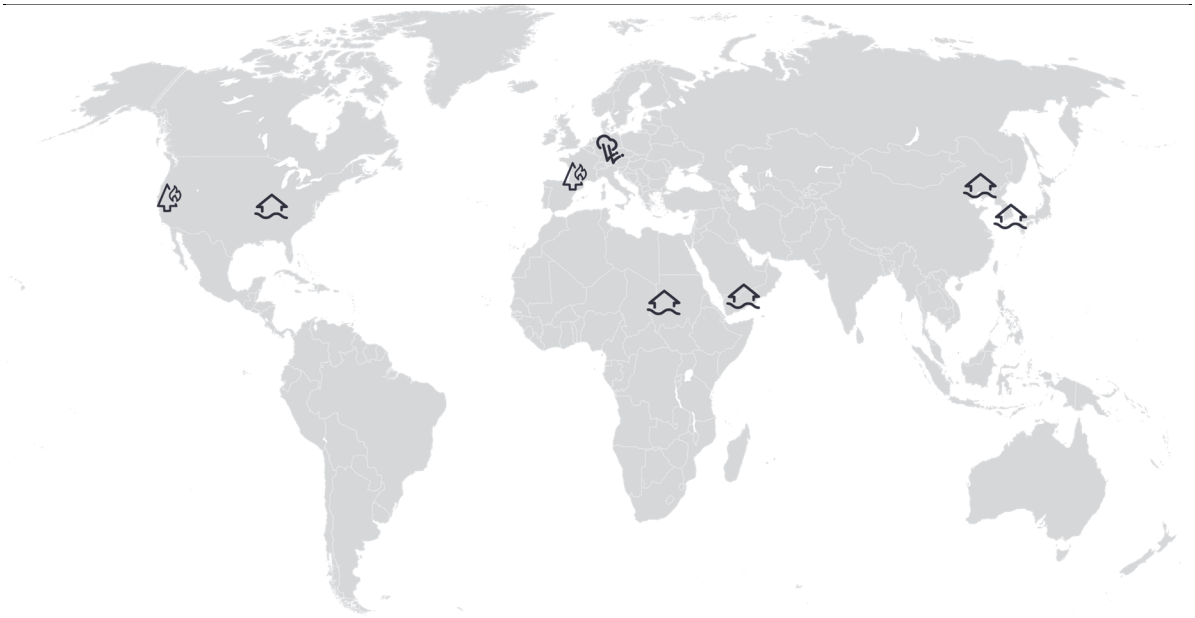
Weekly Cat Report

August 12, 2022

Executive Summary



Event	Affected Region(s)	Fatalities	Economic Loss ($)	Page
Flooding	South Korea	12+	100s of millions	3
Flooding	China & Japan	0	Millions	6
Severe Convective Storm	Western & Central Europe	1	Millions	7
Flooding	Yemen	16+	Unknown	7
Wildfire	United States	4+	Millions	7
Flooding	United States	0	Millions	7
Flooding	Sudan	11+	Unknown	8
Wildfire	France	0	Millions	8

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.

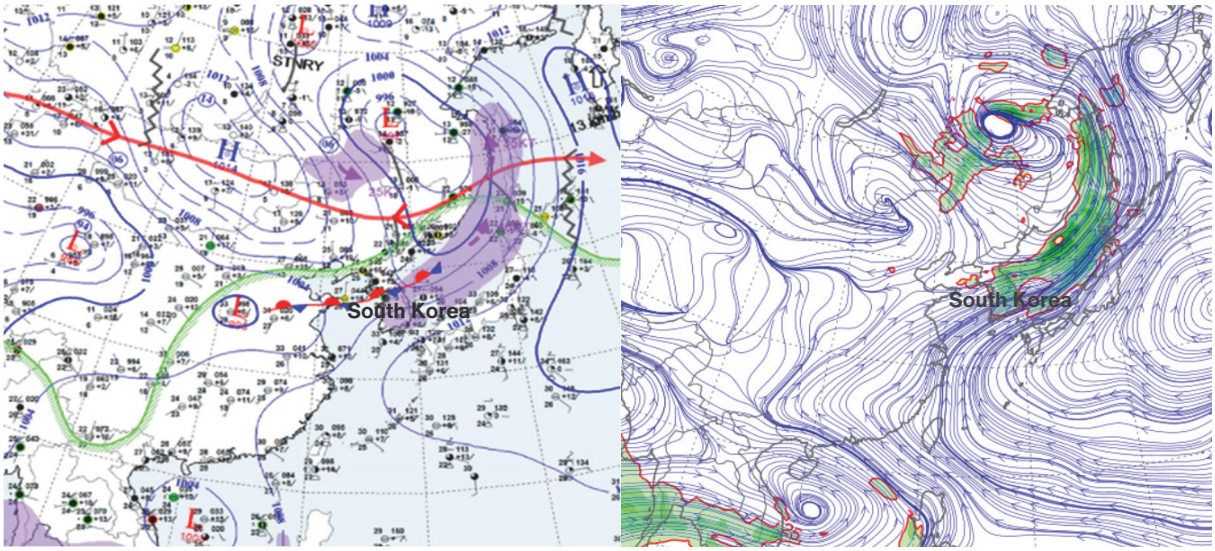
Along with this report, we continue to welcome users to access current and historical natural catastrophe data and event analysis on Impact Forecasting's Catastrophe Insight website: http://catastropheinsight.aon.com

South Korea: Flooding

Overview

A stalled frontal system along the boundary between North and South Korea resulted in record-breaking rainfall in Seoul and parts of the Korean Peninsula on August 7-9. Widespread flash-flooding inundated the capital and led to at least 12 fatalities. As of August 11, the insurance industry had received nearly 9,200 vehicle claims. Initial assessments suggested that as many as 3,800 private facilities had been inundated. Both economic and insured losses were expected to reach into the hundreds of millions (USD).

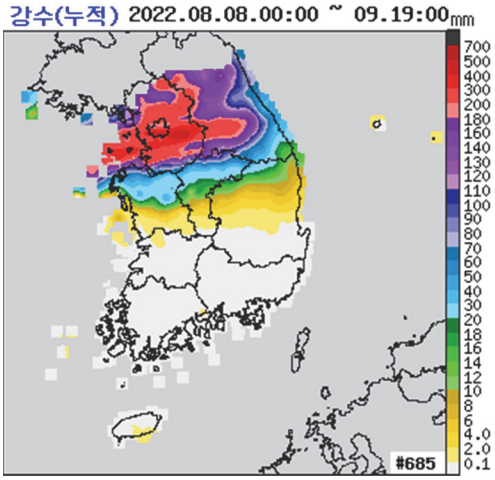
Meteorological Recap

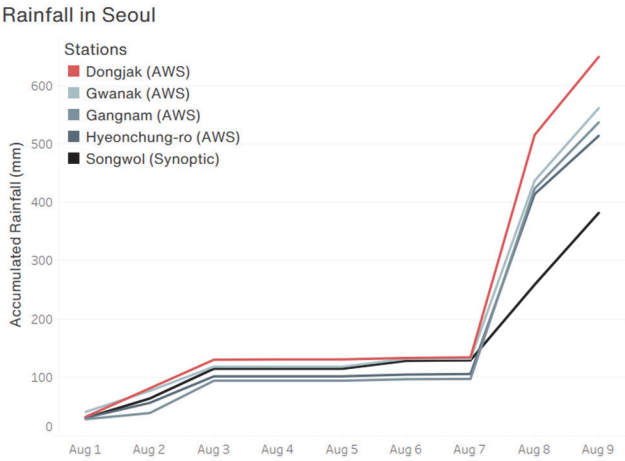


Mean Sea Level Pressure and 850 hPa Streamline Charts at 00 UTC on August 8
Source: KMA

Exceptional rainfall rates across the Korean Peninsula were aided by abundant moisture pooling along a nearly stationary frontal boundary between contrasting cold, dry air across Russia and warm, moist air over China. Alternate blocks of high and low pressure over Russia pushed northwesterly winds towards the frontal boundary. The Okhotsk Sea high pressure further blocked the low from heading east, which allowed training or repeated thunderstorms and torrential downpours to occur across North and South Korea between August 7-9.

Incessant record-breaking rainfall hit Seoul, South Korea's capital. Seoul and surrounding areas of the Gyeonggi Province experienced maximum hourly rainfall rates of at least 100 mm (3.9 in) on August 8-9. Data from the Korea Meteorological Administration (KMA) indicated the city received an accumulated precipitation total of 496.5 mm (19.5 in) during the 48-hour period ending August 9. Nearby, a weather station in the Dongjak District recorded 381.5 mm (15.2 in) of rain in a 24-hour period on August 8, preliminarily the highest total since reliable records began in 1907. The same station reported its peak one-hour rainfall at 141.5 mm (5.6 in).





Accumulated rainfall for Korea and Seoul
Source: KMA

Precipitation was heaviest in the northwest of South Korea, affecting Seoul, Incheon, Gyeonggi, and western Gangwon. The graph on the above right showed select rainfall stations in Seoul. Southern Seoul generally had the highest rainfall. The automatic weather station in Dongjak is at the current site of the KMA. While the reference station since 1907 was less than 10 km (6.2 mi) away in Songwol, KMA had unofficially acknowledged August 8 as the day of heaviest rainfall in Seoul to highlight the severity of the event. The torrential downpours occurred mainly between 8 and 9 PM local time on August 8.

The table below shows the heaviest precipitation observed at major points in other provinces from August 8 at 12 AM to August 11 at 12 PM local time. The synoptic station in Yangpyeong had its fourth highest daily rainfall and third highest one-hour rainfall since 1972. The Hongcheon River in Gangwon crested at its highest level reaching 5.99 m (19.7 ft) early on August 10.

Station	City/County	Province	Rainfall (mm)	Rainfall (in)
Yongmunsan	Yangpyeong	Gyeonggi	641	25.2
Sanbuk-myeon	Yeoju	Gyeonggi	617	24.3
Gwangju	Gwangju	Gyeonggi	605	23.8
KMA	Seoul	Seoul	577	22.7
Cheongil-myeon	Hoengseong	Gangwon	495	19.5
Jo-dong	Hongcheon	Gangwon	481	18.9
Baegun-myeon	Jecheon	Chungbuk	328	12.9
Yeonsu	Incheon	Incheon	308	12.1

August is typically the wettest month for Seoul. Pressure patterns that form stagnant fronts at this time of year are common. However, the extremity of the precipitation between August 7-9 was potentially influenced by a warmer climate, which can hold additional moisture.

The Korea Meteorological Administration (KMA) lifted warnings for the Greater Seoul Area and Incheon early on August 10 as the rain belt shifted south.

Event Details

According to the Ministry of the Interior and Safety (MoIS), at least 12 people died, 7 others remained missing and 18 people were injured as of August 10. Majority of the deaths were from Seoul, including three people who drowned after getting trapped in the basement of their apartment. The Ministry upgraded the crisis alert level from "warning" to "serious" in the early hours of August 9. Thousands of residents were evacuated as more than 3,800 houses and shops were affected by flood water. At least 3,400 of the property damages occurred in Seoul alone. Torrential rain caused 1,400 people to be displaced across Seoul, Gyeonggi, and Incheon provinces.

The local insurance industry reported at least 9,200 cases of flooded vehicles. Rainwater submerged subway stations and tracks, with the worst accumulation on routes south of the Han River. This affected Subway Line 2, Seoul's most heavily used line. A ceiling at the Isu Station on Subway Line 7 collapsed. Major roads in the Seoul Metropolitan Area were blocked since the morning of August 9. Gangnam, the capital's affluent residential district, was heavily flooded with 380 mm (15.0 in) rainfall between August 8-9. Stores in Shinsegae Central City, Gangnam, were underwater and had to be closed on August 9.

Flooding along the Han River
Source: Seoul Metropolitan Government

Multiple malls, hospitals, libraries, and convenience store chains also reported perforation and blackouts. Electricity disruption hit no fewer than 17,000 users. The Ministry of Education and Cultural Heritage Administration additionally reported damage to at least 120 schools and 40 heritage sites. The deluge hit hard on residential, auto, and commercial properties, but did not deal significant damages to manufacturing or agricultural lines (1362 acres / 551 ha damaged).

Rainstorms further impacted North Korea, where a heavy rain alert was issued across its southern region. State media footages revealed the Taedong River spilling onto the riverside pathways in Pyongyang. However, with the rain belt shifting south by August 10, damages were not as significant as South Korea.

Financial Loss

Preliminary estimates from the General Insurance Association of Korea noted that nearly 9,200 vehicle insurance claims had already been filed. The estimated cost was ₩127.3 billion ($97.8 million). Given additional expected claims to residential and commercial property, the insured loss will well exceed $100 million. When combining the uninsured or underinsured damage to property and infrastructure, the overall economic cost was likely to reach into the hundreds of millions (USD).

China and Japan: Flooding

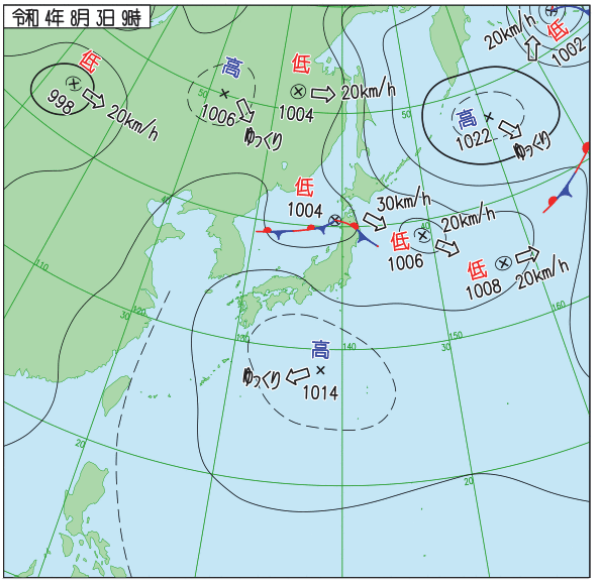
Overview

Incessant rain from a stalled front and low-pressure system caused flooding in northeast China and Japan on August 1-4. A swollen river in Liaoning broke its dike on August 1, and at least 3,700 houses were inundated or damaged in Japan alone. Renewed heavy rains prompted China's State Flood Control and Drought Relief Headquarters to activate a level IV flood control response on August 6.

Meteorological Recap

A stalled frontal boundary stretching from Jilin to northern Japan since August 1 brought days of heavy rain to the region. A Siberian high pressure pushing in from the northwest together with a blocking high south of Japan further concentrated moisture along the nearly stationary boundary. A cyclonic wind pattern wrapping into a low off the east coast of Sendai on August 3, aided in very heavy rainfalls in the Tohoku and Hokuriku regions. Sekikawa recorded at least 560 mm (22 in) in a 24-hour period. The front dissipated after crossing the Sea of Japan.

A new stationary front began to form late on August 6 over northeast China and South Korea, with the trough intensifying by August 8. China's State Flood Control and Drought Relief Headquarters activated a level IV flood control response on August 6.



Mean Sea Level Pressure Charts at 09Z of August 3
Source: JMA

Event Details

As many as 6,000 people in **Liaoning** were evacuated after the Raoyang River in Liaoning burst its dike on August 1. The breach was remedied on August 6. However, water levels remained high with the main Liao River exceeding its alert level for 42 days. Several lines on the **Beijing** Suburban Railway were suspended on August 7. Rainfall in excess of 100 mm stretched from Yantai in **Shandong** to Xingtai in **Hebei** on August 8.

Forty-four (44) rivers overflowed in eight prefectures across **Japan**, and a dozen landslides were recorded. The highest disaster alert level was issued to 43,000 residents in Niigata and Ishikawa prefectures, and level 4 evacuation orders were additionally issued to 575,000 people in six prefectures. According to Japan's Fire and Disaster Management Agency (FDMA), eight people were injured and one person remained missing. At least 3,700 houses were inundated or damaged.

Natural Catastrophes: In Brief

Severe Convective Storm (Western & Central Europe)

A proceeding frontal system associated with low Imke affected several countries in Western and Central Europe on August 4-6. The primary hazards associated with storms were intense rainfall, strong wind gusts and hail. Damage on property and infrastructure due to fallen trees were reported, particularly in Lower Saxony, northwest Germany. Heavy rainfall resulted in flash flooding and debris flows across multiple localities in Austria, particularly in the states of Tirol and Salzburg, where homes and vehicles were flooded and roads were closed, which left dozens of people stranded in hotels and huts. Fallen power pylons blocked one of the main highways in the Czech Republic, which resulted in material damage of nearly $1 million. Approximately 15,000 customers were left without power. At least four injuries, one fatality and notable material damages caused by the severe weather were reported in Italy, particularly in the Piemonte and Liguria regions. Total economic losses were anticipated to be in the millions (EUR).

Flooding (Yemen)

After several notable bouts of flash flooding that occurred in Yemen throughout July, another episode struck the country in early August. Among the worst affected were the governorates of Hajjah, Jouf and Ibb. According to officials and local media reports, no fewer than 16 people lost their lives.

Wildfire (United States)

The McKinney Fire burning in Northern California's Klamath National Forest had resulted in at least four fatalities and seven injuries since it was first discovered on July 29. Amid periods of above average warmth and ongoing drought, the fire had since expanded to no less than 60,389 acres (24,439 ha) by August 10 while destroying 185 structures and damaging 11 others. The McKinney fire is the largest in California so far this year. Slow moving thunderstorms in the region on August 2 aided in efforts to contain the fire spread, but concurrently resulted in flash flooding which generated mud and debris flows that washed out roadways and trapped vehicles.

Flooding (United States)

A continued active period of the Southwest Monsoon combined with a slow-moving cold front and additional moisture from the Gulf of Mexico resulted in localized flooding events across the United States over the past week. In California, flash-flooding ensued after 1.47 in (37 mm) of rain fell on arid land near Death Valley National Park on August 5. The flooding washed out roadways, stranded visitors, and buried dozens of vehicles. Further instances of flash-flooding have since been reported in Arizona, Colorado, Illinois, Missouri, and the Appalachians – particularly where heavy rains fell on already saturated soils. On August 10, flash-flooding disrupted transportation and prompted water rescues across Washington D.C. and surrounding areas.

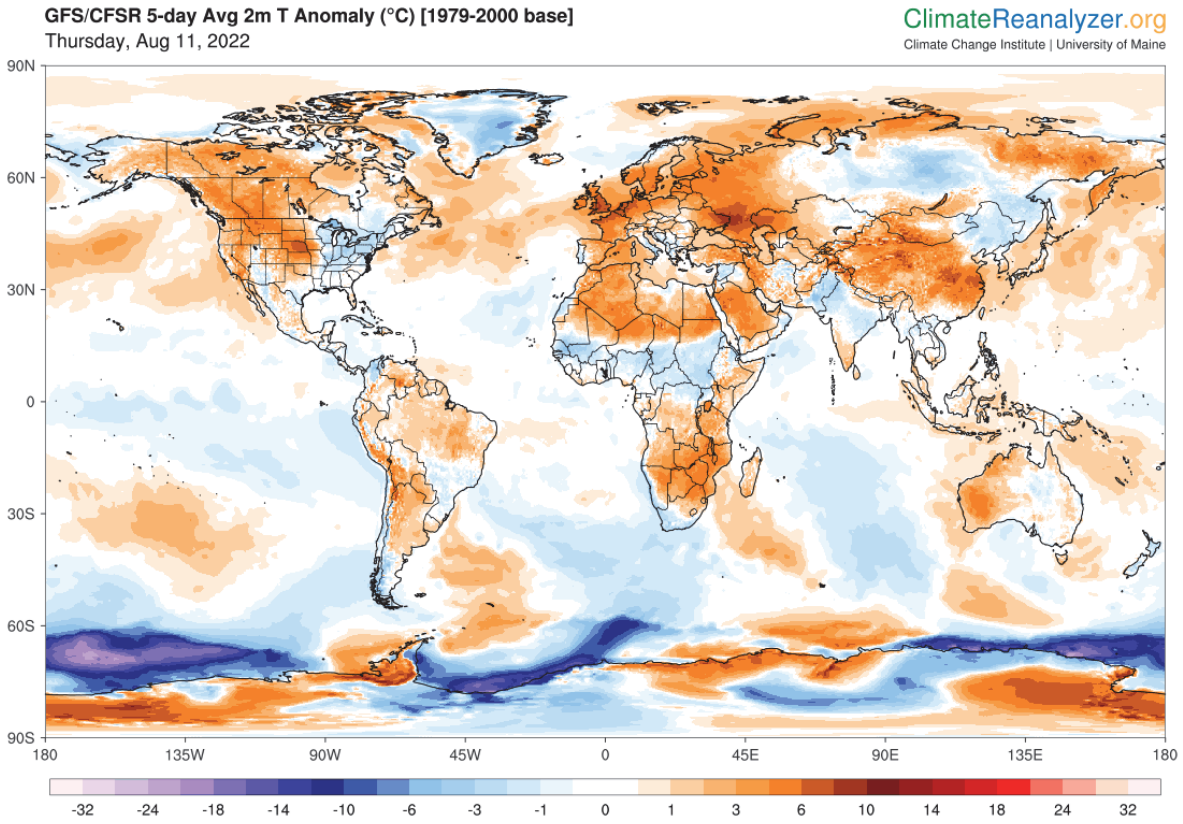
Flooding (Sudan)

An active stretch of the rainy season in Sudan affected nearly 30,000 people in Central Darfur since the beginning of August. The UN Office for the Coordination of Humanitarian Affairs (OCHA) reported flooding or damage in at least 38 localities across the country. No fewer than 25 flooding related fatalities have been reported since mid-July, with at least 11 occurring in August. As of this writing, 5,892 houses were destroyed since the beginning of the rainy season, a majority in Central Darfur. Another 12,000 structures were damaged, including several schools and health facilities. Further impacts to crops and livestock were incurred. The peak rainy season in Sudan typically occurs in August and September.

Wildfire (France)

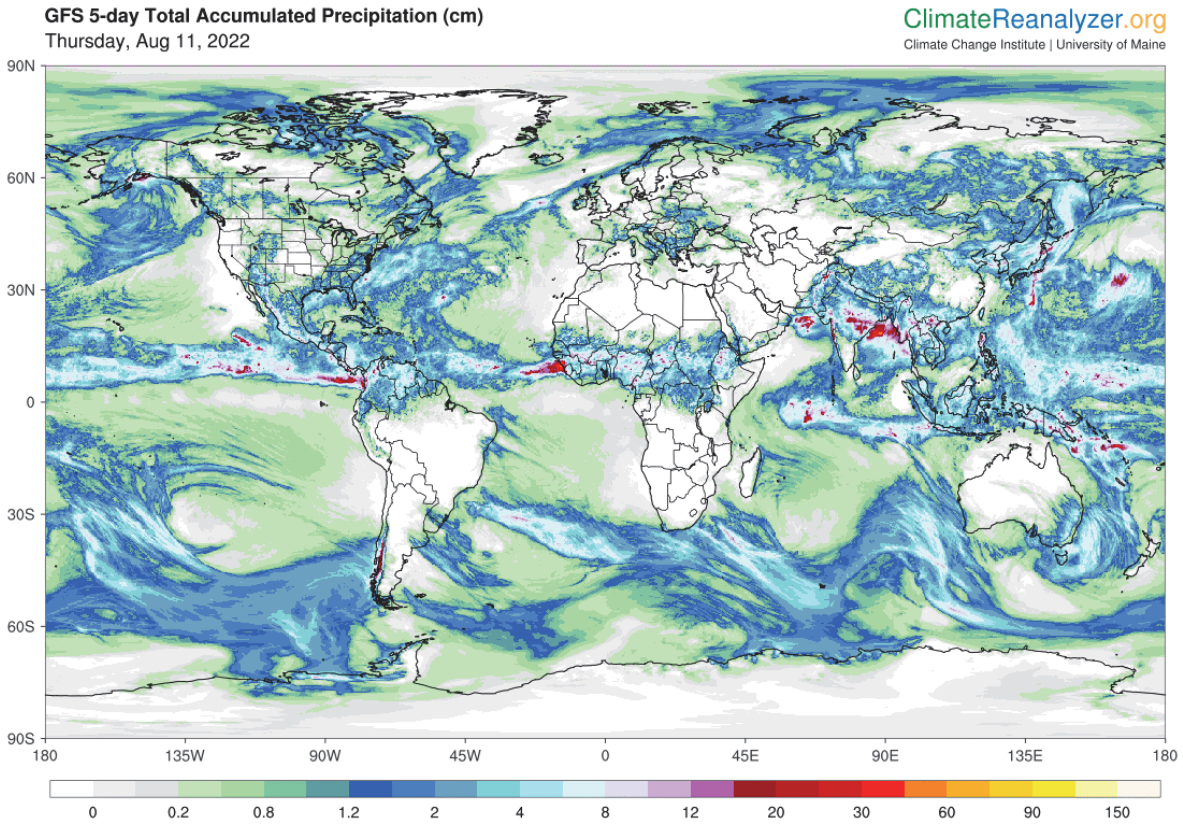
Successive heatwaves and ongoing severe drought conditions further aided in enhanced wildfire activity across southern France in recent days. As of August 11, a wildfire in France's wine making Gironde Region, south-east of Bordeaux, had affected at least 6,800 ha (16,800 acres). As of this writing, 10,000 residents were under evacuation orders, and multiple structures were destroyed. No fewer than 57,000 ha (140,850 acres) have burned across France so far in 2022, nearly six times the annual 2006-2021 average.

Global Temperature Anomaly Forecast



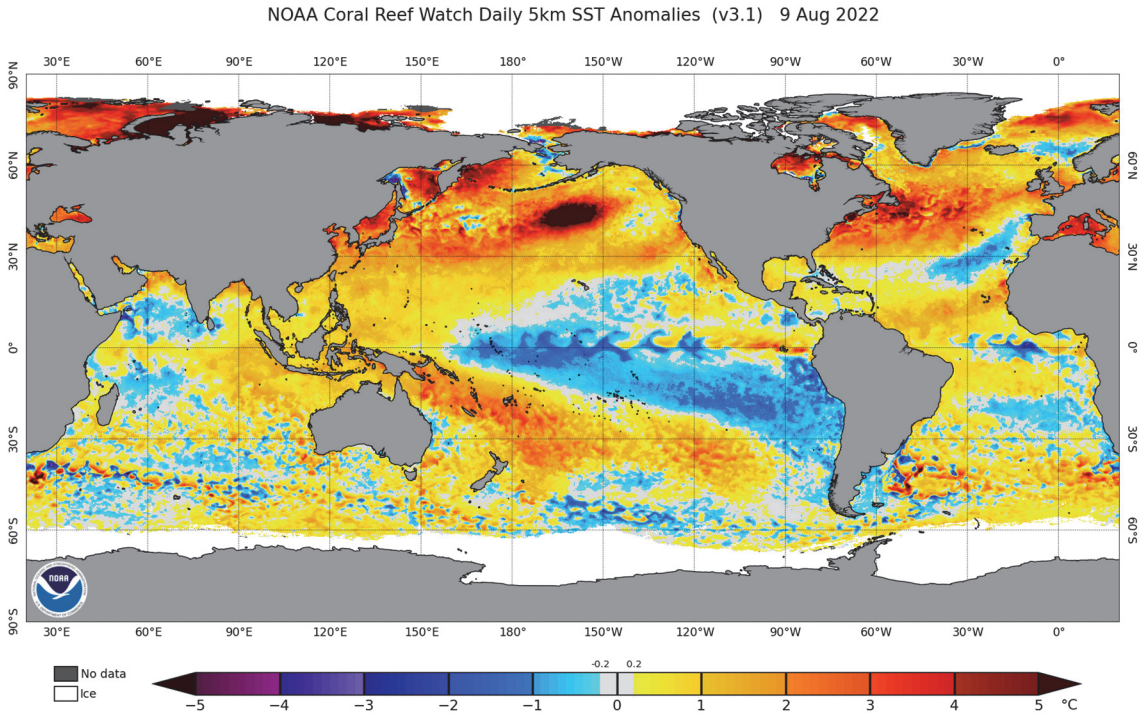
Source: Climate Reanalyzer, Climate Change Institute, University of Maine, USA

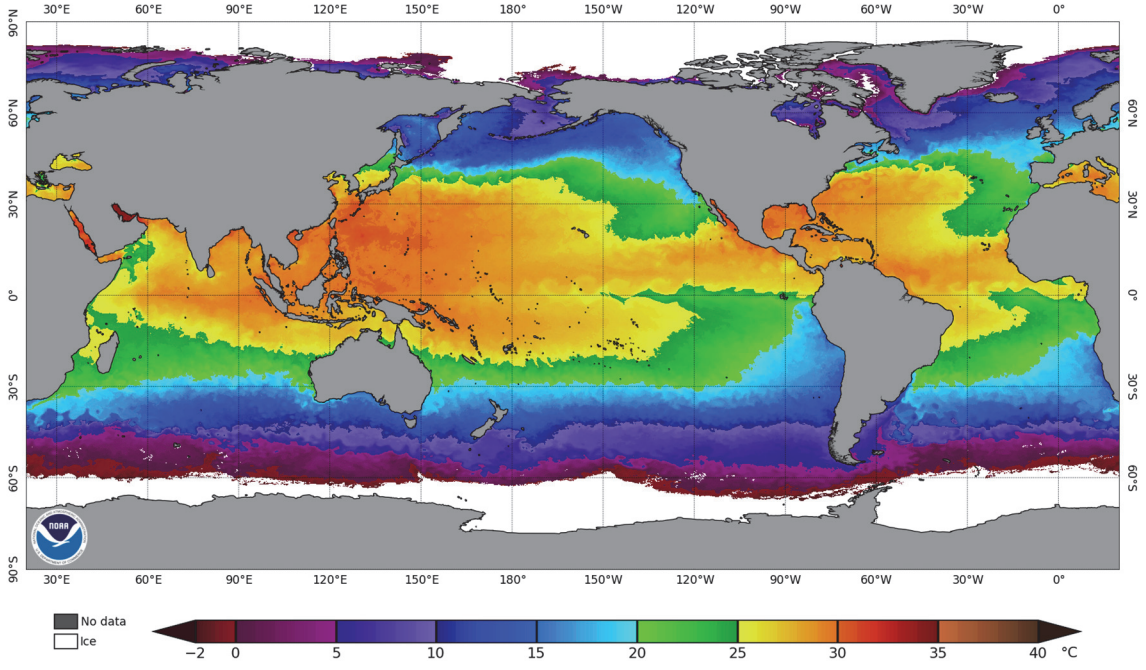
Global Precipitation Anomaly Forecast



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

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

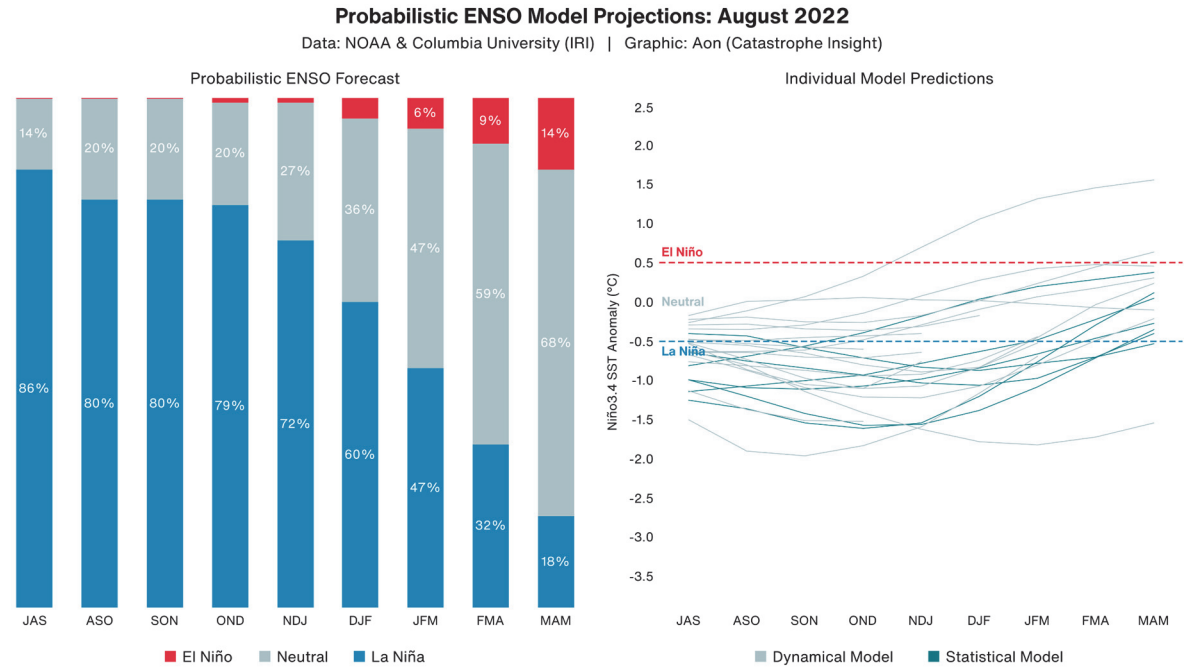




El Niño-Southern Oscillation (ENSO)

Overview

La Niña conditions are likely to continue for the next several months. NOAA cites an 86 percent chance of La Niña conditions persisting through the summer and then gradually declining to 60 percent by the time the boreal (northern hemisphere) winter months arrive in December, January, and February.



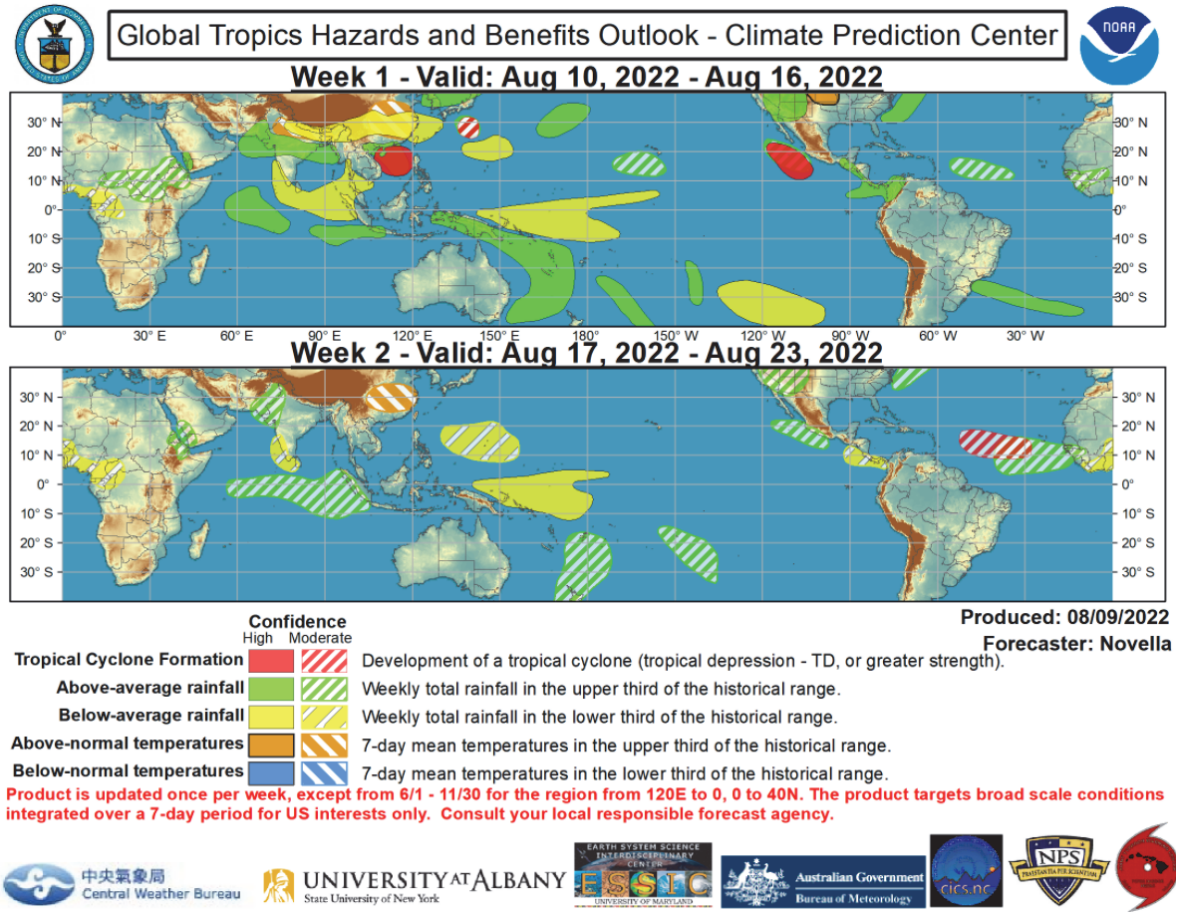
El Niño: *Warm phase of an ENSO cycle. Sea surface temperatures of +0.5°C occur across the east-central equatorial Pacific.*

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.*

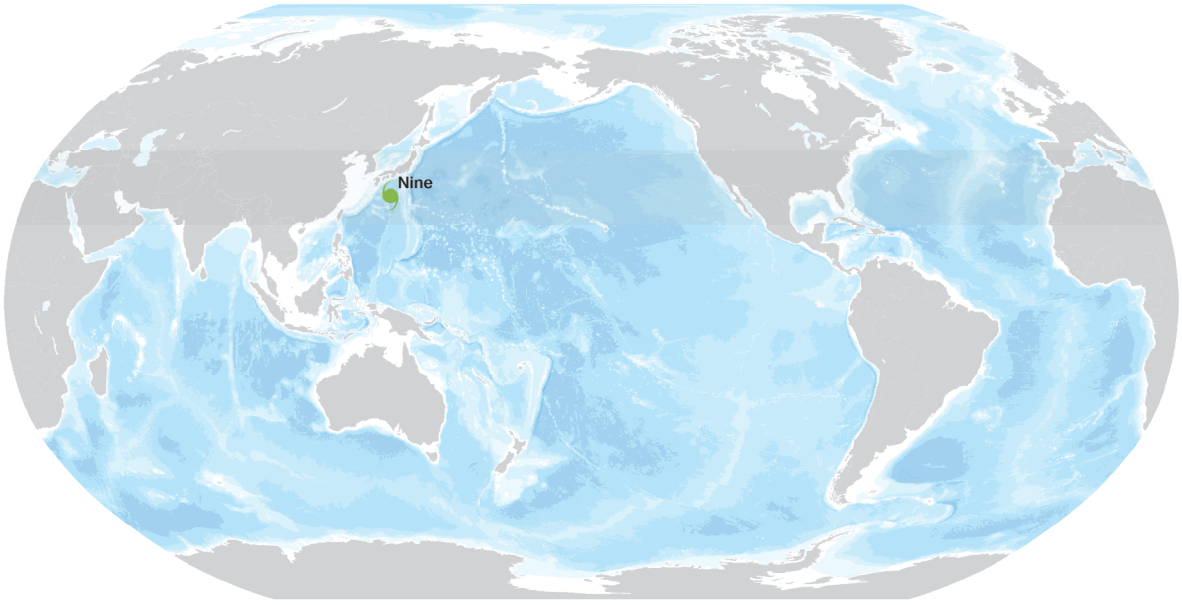
El Niño (La Niña) is a phenomenon in the equatorial Pacific Ocean characterized by a five consecutive 3-month running mean of sea surface temperature (SST) anomalies in the Niño 3.4 region that is above the threshold of +0.5°C (-0.5°C). This is known as the Oceanic Niño Index (ONI).

Global Tropics Outlook



Source: Climate Prediction Center (NOAA)

Current Tropical Cyclone Activity



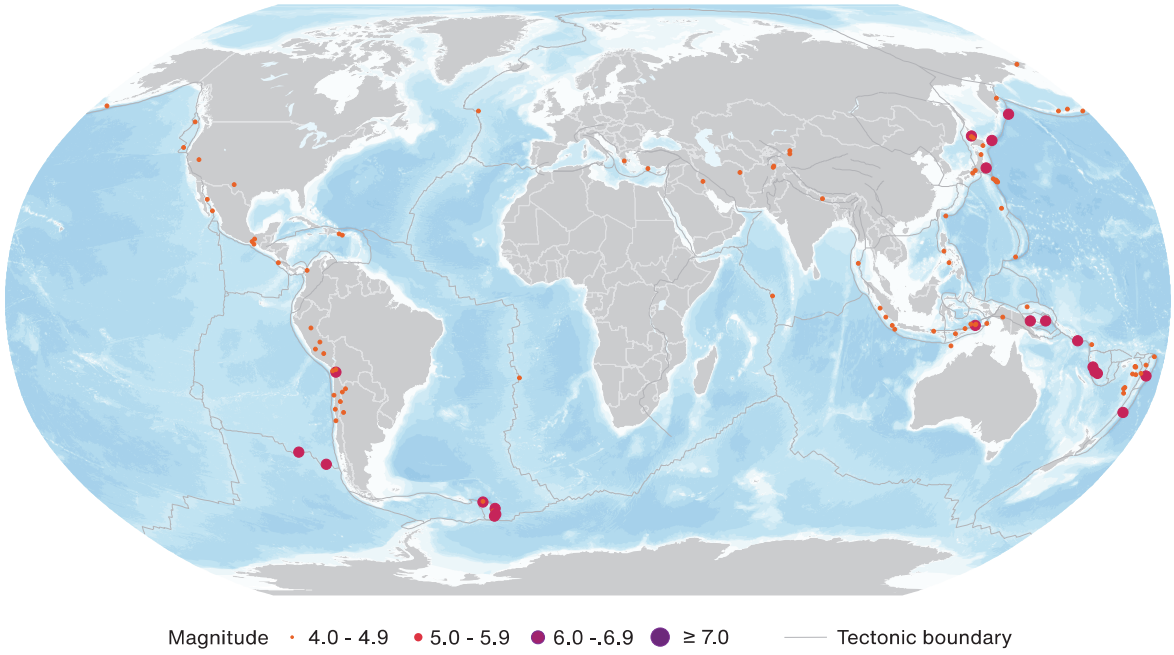
Tropical Depression Tropical Storm Category 1 Category 2 Category 3 Category 4 Category 5

Storm Name	Location	Winds	Location from Nearest Land Area
TS Nine	28.9N, 136.0E	40 mph	510 mi (825 km) SSW from Yokosuka, Japan

* TD: Tropical Depression, TS: Tropical Storm, HU: Hurricane, TY: Typhoon, CY: Cyclone; PTC: Potential Tropical 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)

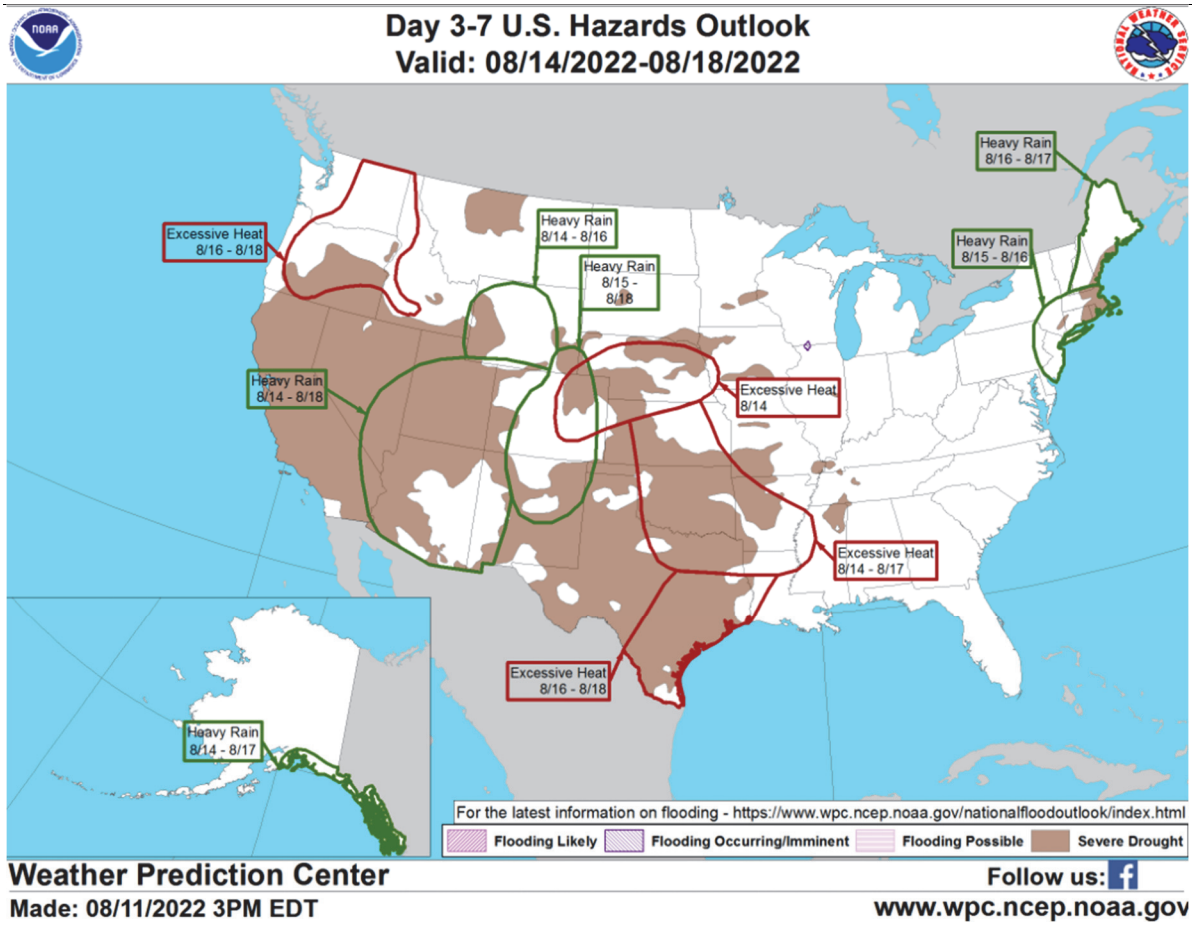
Global Earthquake Activity (≥M4.0): August 5 - 11



Date (UTC)	Location	Magnitude	Epicenter

Source: United States Geological Survey

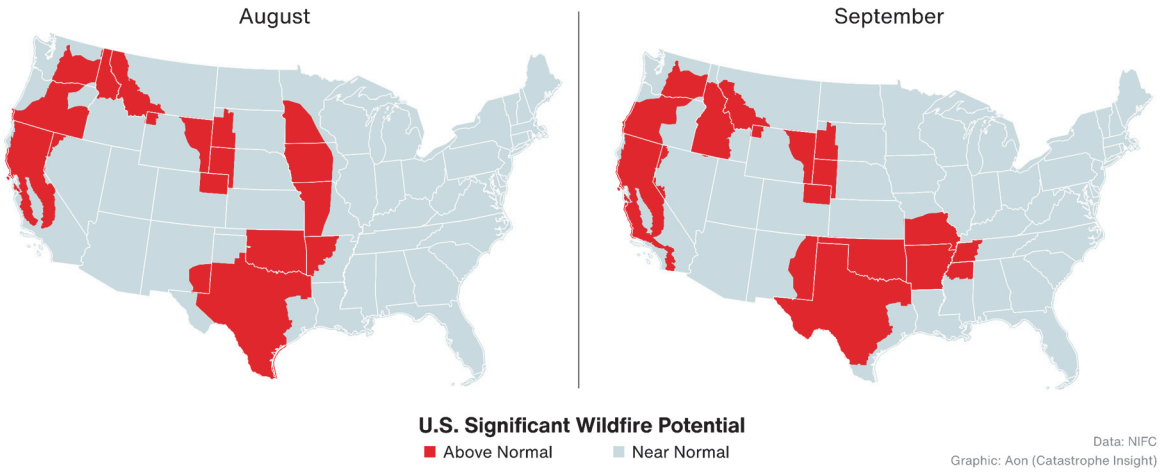
U.S. Hazard Outlook



- Monsoonal moisture will continue to stream northward between August 14-16, resulting in the continued threat for heavy rainfall across the Southwest, Great Basin, and Northern Rockies. Additional heavy rainfall, associated with a cold front, will impact the Central Rockies between August 15-16.
- A northward shifting upper-level ridge across the central United States will allow excessive heat to build in the Plains between August 14-17. Concurrently, Gulf Moisture will continue to promote high heat indices in the Southern Plains and western Gulf Coast through August 18.
- A coastal low-pressure system is likely to bring heavy rainfall to portions of the Mid-Atlantic and Northeast between August 15-17.

Source: Weather Prediction Center (NOAA)

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



Annual YTD Wildfire Comparison: August 11

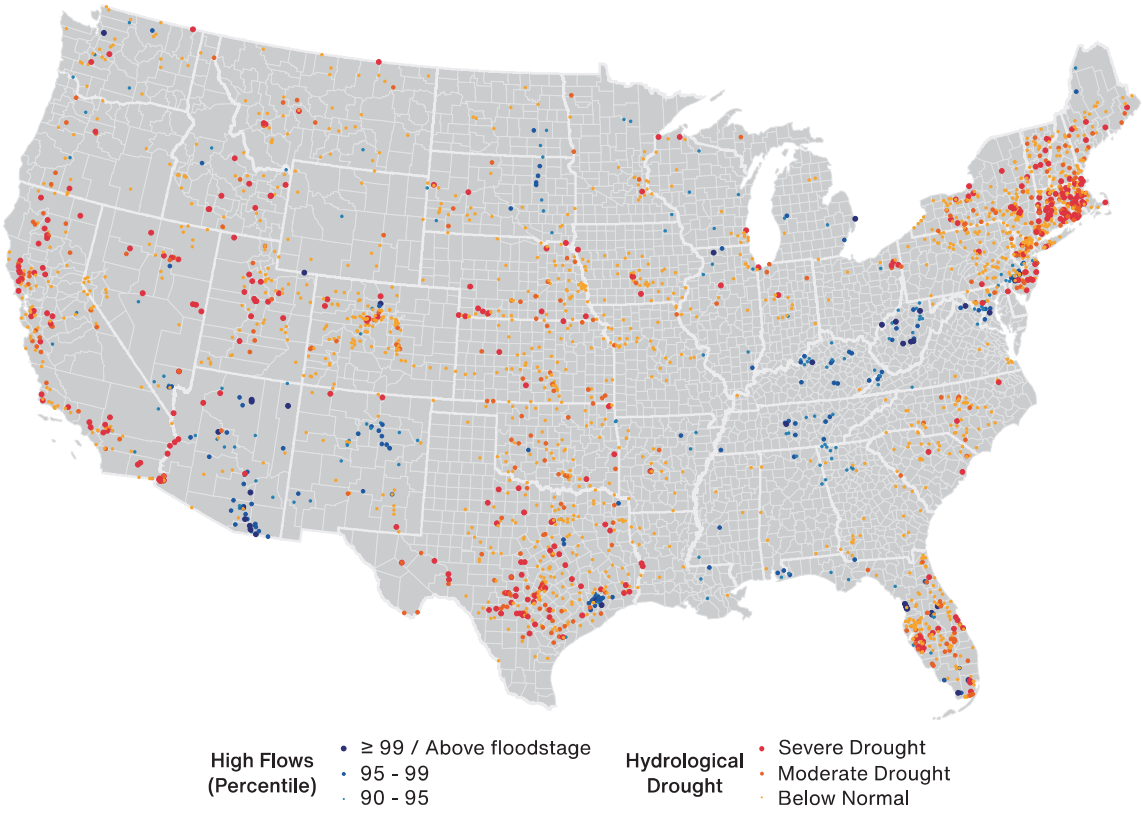
Year	Number of Fires	Acres Burned	Acres Burned Per Fire
2018	40,079	5,661,659	141.26
2019	29,119	3,617,356	124.23
2020	34,693	2,312,885	66.67
2021	39,795	3,821,173	96.02
2022	40,936	5,897,114	144.06
10-Year Average (2012-2021)	**36,282**	**4,132,076**	**113.89**

Top 5 Most Acres Burned by State: August 11

State	Number of Fires	Acres Burned	Acres Burned Per Fire
Alaska	551	3,087,526	5,603.50
New Mexico	698	861,393	1,234.09
Texas	5,616	558,563	99.46
Oklahoma	1,772	305,625	172.47
Florida	2,181	141,365	64.82

Source: National Interagency Fire Center

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.

Top 5 Rivers / Creeks: Highest Percentile for Water Height

Location	Current Stage (ft)	Percentile
Tygart Valley River at Belington, West Virginia	7.35	99.14
Black River at Neillsville, Wisconsin	7.00	99.10
Pecatonica River at Freeport, Illinois	14.86	99.07
Tualatin River at West Linn, Oregon	2.97	98.92
Elkhart River at Goshen, Indiana	3.48	98.90

Source: United States Geological Survey

Source Information

South Korea: Flooding
Korea Meteorological Administration (KMA)
South Korea – 9 Dead, 6 Missing After Record Rain and Floods*, Floodlist*
South Korea flood: record rain kills at least 7 in Seoul with more falls expected, *The Guardian*
N. Korea issues heavy rain alert for southern regions, *The Korea Herald*
Ministry of the Interior and Safety
General Insurance Association of Korea

China and Japan: Flooding
China Meteorological Administration
Japan Meteorological Agency
Japan Fire and Disaster Management Agency (FDMA)
China warns of possible flooding in major river basins, *Xinhua*

Natural Catastrophes: In Brief
Severe weather in the district of Rotenburg: short but violent*, Kreiszeitung*
Thunderstorms with mudflows in North and South Tyrol: Cars swept away, houses flooded*, Tiroler Tageszeitung*
Traffic on the D1 highway has already been restored after the wires fell at the 15th kilometer, *Ceske Noviny*
The California Department of Forestry and Fire Protection (CAL-FIRE)
U.S. National Weather Service
Dozens of homes destroyed, thousands evacuated as wildfires rage in southwestern France*, France24*
Floods and Heavy Rain Leave 25 Dead, 5,800 Homes Destroyed, *Floodlist*

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