Weekly Cat Report

November 20, 2020

This Week's Natural Disaster Events

	Drought		Flooding		Wildfire
	Earthquake		Severe Weather		Winter Weather
	EU Windstorm		Tropical Cyclone		Other
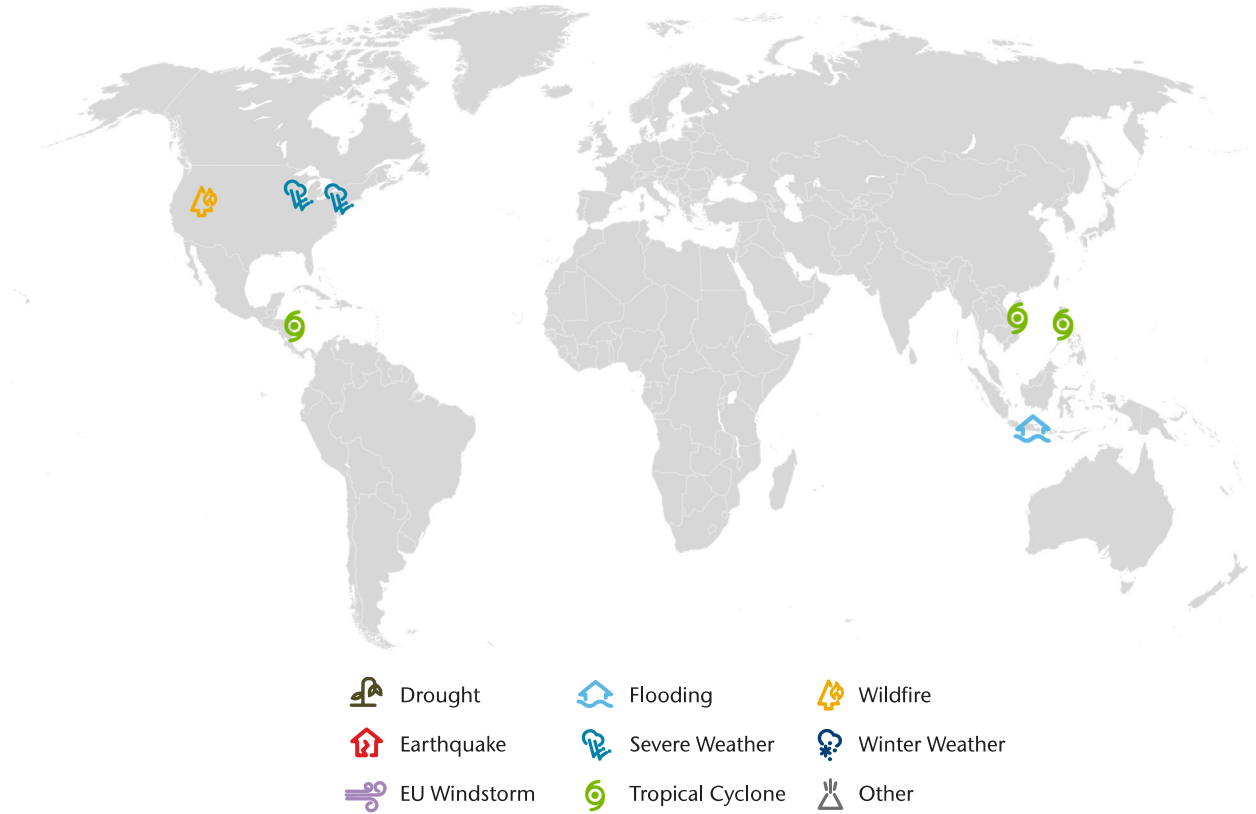
| Event	Impacted Areas	Fatalities	Damaged Structures and/or Filed Claims	Preliminary Economic Loss (USD)*	Page
Hurricane Iota	Central America	44+	10s of Thousands	100+ million	3
Severe Weather	United States, Canada	1	Thousands	100+ million	9
Typhoon Vamco	Philippines, Vietnam	74+	74,000+	1+ billion	12
Flooding	Indonesia	5+	Hundreds	Unknown	17
Wildfire	Nevada	0	29+	Millions	17

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

Iota compounds catastrophic impacts in Central America

Hurricane Iota exhibited rapid intensification in the Caribbean Sea between November 15-16, strengthening 70 mph (110 kph) in a 24-hour period, while becoming the first Category 5 hurricane of the 2020 Atlantic season. Iota's maximum sustained winds peaked at 160 mph (260 kph) during the morning of November 16. The hurricane made landfall along the northeastern coast of Nicaragua at 10:40 PM EST on November 16 (3:40 UTC November 17) as a powerful Category 4 hurricane, with maximum sustained winds of 155 mph (250 kph). The landfall location of Iota was remarkably just 15 miles (25 kilometers) south of where Category 4 Hurricane Eta made landfall on November 3. Despite coming ashore in a sparsely populated region of the Nicaraguan coast, Iota produced dangerous storm surges, strong winds, and incessant rainfall across regions of Central America. Catastrophic impacts were experienced in portions of Colombia, Nicaragua, and Honduras. Damage was compounded as many localities were still recovering from the impacts of Hurricane Eta. Total economic losses were anticipated to reach into the hundreds of millions (USD).

Meteorological Recap
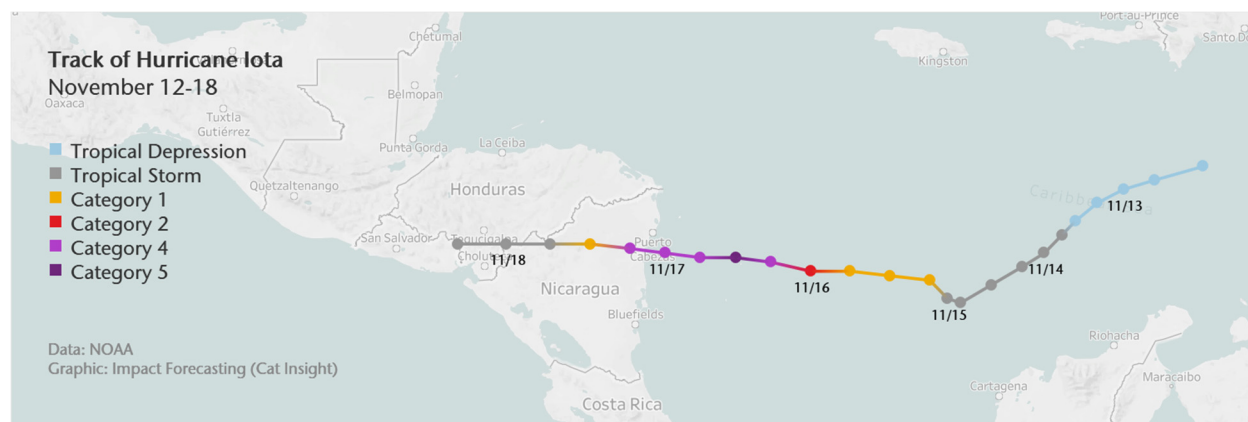
The National Hurricane Center (NHC) began monitoring for the development of a tropical wave in the Caribbean Sea on November 8. The wave subsequently moved into the eastern Caribbean by November 10, producing a disorganized area of shower and thunderstorm activity. Environmental conditions were conducive for tropical development as the disturbance slowly propagated westward towards the central Caribbean between November 10-12.
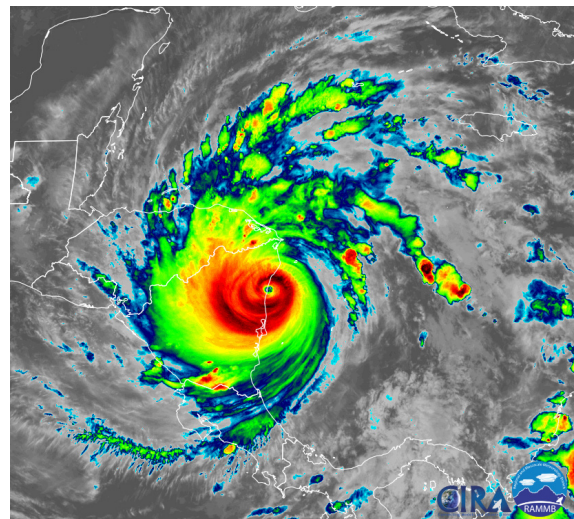
Tropical Depression Thirty-One was officially designated at 10:00 AM EST (15:00 UTC) on November 13, located 300 miles (500 kilometers) south-southeast of Kingston, Jamaica. Several hours later, the depression strengthened into Tropical Storm Iota, with maximum sustained winds of 40 mph (65 kph) initially moving west-southwest at 3 mph (6 kph). Iota became the record 30th named storm of the 2020 Atlantic Hurricane Season, and the third Atlantic named storm to form in the month of November. Iota continued to intensify as the storm churned over warm sea surface temperatures in an environment characterized by ample atmospheric moisture and very low vertical wind shear. By November 14, Iota was steered west-northwestward at a gradually accelerated rate by an eastward building ridge over the Gulf of Mexico and Florida.

Data from NOAA Hurricane Hunter Aircraft officially confirmed Iota had strengthened into a Hurricane by 1:00 AM EST (6:00 UTC) on November 15, with maximum sustained winds of 75 mph (120 kph) – equivalent to a Category 1 hurricane on the Saffir-Simpson Hurricane Wind Scale (SSHWS). Throughout the evening and overnight hours, Iota's satellite presentation extraordinarily improved with a symmetric central dense overcast, well establish banding features, and a small eye becoming evident. Iota proceeded in near ideal atmospheric conditions, over sea surface temperatures of 84 °F (29 °C), allowing for a period of explosive rapid intensification.
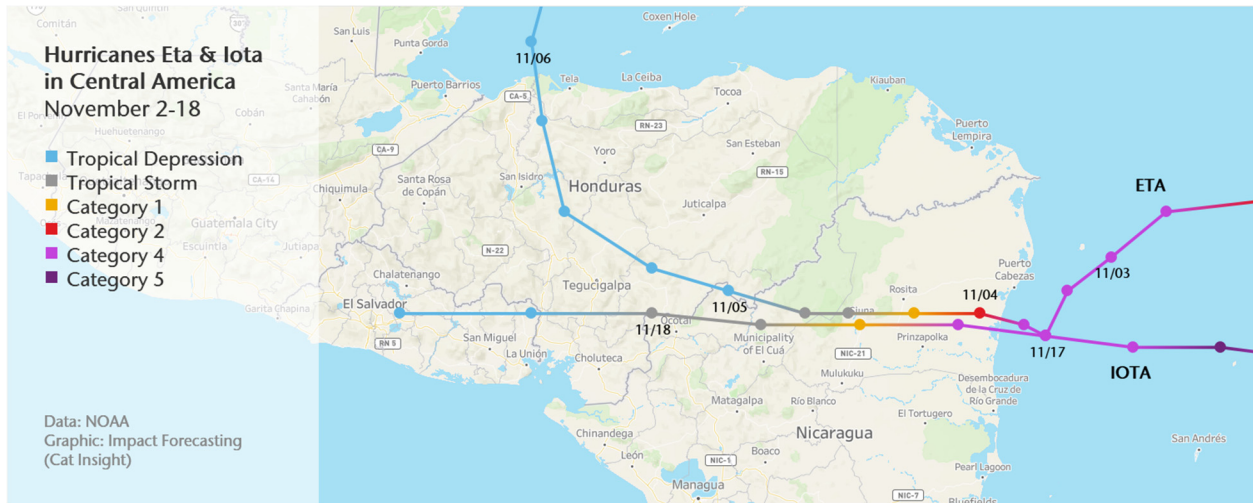
Iota became a dangerous Category 4 hurricane on the SSHWS by 1:40 AM EST (6:40 UTC) on November 16 with data from NOAA Hurricane Hunter Aircraft supporting maximum wind speeds of 140 mph (225 kph), and a minimum central pressure of 935 millibars. The NHC reported Iota had intensified by 40 mph (65 kph) over a 6-hour period ending at 4:00 AM EST (9:00 UTC) on November 16, while the storms minimum central pressure dropped 26 millibars over the same period. Hours later, Iota became the first Category 5 hurricane of the 2020 Atlantic Season at 10:00 EST (15:00 UTC), with maximum sustained winds reaching of 160 mph (260 kph), while minimum central pressure fell to 917 millibars. Iota was the latest season Category 5 Atlantic hurricane on record, and the first Greek letter named storm to reach Category 5 status. This marked the first time in recorded history two major Atlantic hurricanes formed in November – preceded by Eta earlier in the month. Iota exhibited a distinct warm eye on satellite images spanning approximately 17 miles (27 kilometers), with frequent lightning near the eyewall identified from the GOES lightning detector.

As Iota approached the Central American coast, a Hurricane Warning was in effect for the Island of Providencia (Colombia), in addition to the Nicaraguan coast from Sandy Bay Sirpi to the Honduras/Nicaragua border and continuing along the coast of northeastern Honduras to Punta Patuca. The NHC warned that Iota remained a catastrophic situation for northeastern Nicaragua with an extreme storm surge of 15-20 feet (4.6 to 6.1 meters) anticipated along the coast, accompanied by destructive winds, and localized potential for flash flooding.

Hurricane Iota made landfall along the northeast coast of Nicaragua, near the town of Haulover (North Caribbean Coast Autonomous Region) at 10:40 PM EST on November 16 (3:40 UTC November 17), as a powerful Category 4 hurricane with maximum sustained winds of 155 mph (250 kph) and a minimum central pressure of 920 millibars. Hurricane Iota's landfall location was approximately 15 miles (25 kilometers) south of where Hurricane Eta made landfall, as a Category 4 storm on November 3. Iota became the strongest November hurricane on record to make landfall in Nicaragua, exceeding the previous record set by Eta two weeks prior. Observations near Iota's landfall location were extremely limited due to sparse populations, and damage caused by Eta. The NHC revealed that a local amateur radio report, indicated a wind measurement of 124 mph (200 kph) near Wilbi,

Hurricane Iota making landfall in northern Nicaragua
Source: CIRA/RAMMB

Nicaragua. The Puerto Cabezas Airport, reported a sustained wind of 83 mph (134 kph) with a gust of 113 mph (182 kph) at 9:53 PM EST on November 16 (2:53 UTC November 17).

Hurricanes Eta & Iota
in Central America
November 2-18

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

Data: NOAA
Graphic: Impact Forecasting
(Cat Insight)

After landfall, Iota continued a westward trajectory, along the southern edge of a subtropical ridge, at 9 mph (15 kph). Iota proceeded to quickly weaken over north-central Nicaragua, while the cyclone continued to produce life-threatening flash flooding and extensive impacts across portions of Central America. By 12:00 PM CST (18:00 UTC) on November 17, Iota was downgraded to a tropical storm, with maximum sustained winds of 65 mph (105 kph) located 105 miles (160 kilometers) east of Tegucigalpa, Honduras. Iota further weakened to a Tropical Depression by 3:00 AM EST (9:00 UTC) on November 18 over El Salvador. While a heavy rain threat continued, Iota dissipated to a remnant low over Central America by 9:00 AM CST (15:00 UTC) on November 18.

Intensity and Pressure
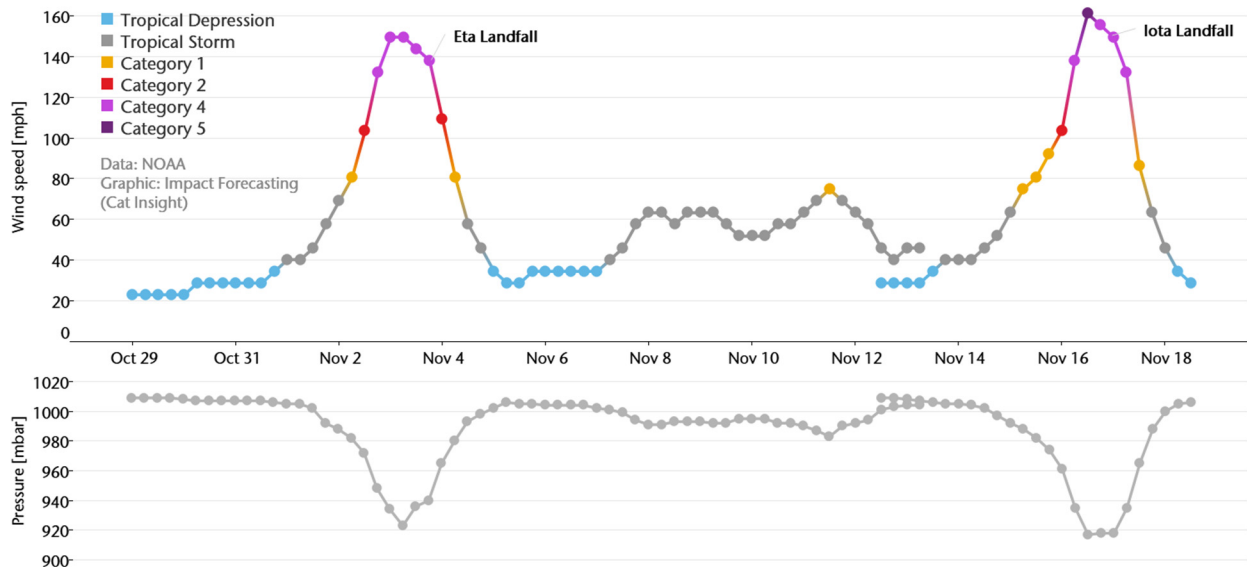
Event Details

As of this writing, there have been 44 fatalities contributed to Hurricane Iota across Central and Southern America: Nicaragua (18), Honduras (14), Colombia (7), Guatemala (2), Panama (2), and El Salvador (1).

Colombia

Heavy rains from Iota impacted portions of mainland Colombia, with the greatest impacts occurring along the Caribbean coast. As of this writing, at least seven fatalities have been confirmed. In **Antioquia**, torrential rains caused landslides and flooded local rivers. The Urumita-Dabeiba road was blocked by a mudslide, damaging vehicles, and prompting the Air Force to evacuate several families via helicopter. At least five people were killed in landslides near Dabeiba. The Dabeiba landslides impacted three educational centers, while destroying 67 homes and damaging 104 others. In **Santander**, 29 municipalities declared a local emergency. No less than 1,000 residents were isolated after a bridge between Carcasí and Enciso collapsed due to rising water levels in the Chicamocha River. In **Atlántico**, preliminary surveys indicated at least 943 homes were impacted by flooding. In **Bolivar**, according the Mayor of Cartagena, at least 155,000 residents and 31,500 homes in were impacted by flooding, which affected 70% of the City. Dozens of trees toppled, while 22 schools were impacted, and no less than 14 landslides were reported.

Impacts in Providencia Island, Colombia
Source: Presidential Advisor Ana Maria Palau

Before reaching the Nicaraguan coast, Hurricane Iota caused significant impacts along the Colombian islands of San Andrés and Providencia. Both islands suffered extensive electricity and communication blackouts. Storm surge destroyed and dislodged large sections of roadways across immediate coastal stretches of the islands. In San Andrés, 60 percent of the island lost electricity, and transportation was halted as roads were damaged and blocked by debris. The greatest impacts occurred on the Island of Providencia, located 145 miles (233 kilometers) east of Nicaragua's coast. The Colombian Minister of Housing noted approximately 80 percent of homes across the island were destroyed, while the President of Colombia reported that 98% of structures on the island were affected to varying degrees. Two shelters on Providencia had roofs torn off, and significant impacts were observed at the Local Providencia Hospital. As of this writing, two fatalities and several injuries were confirmed.

Nicaragua

The National System for the Prevention, Mitigation and Attention of Disasters (SINAPRED) began evacuating families in vulnerable coastal regions of Nicaragua several days prior to the arrival of Iota. Hurricane Iota made landfall on November 16, approximately 15 miles (25 kilometers) south of where Hurricane Eta made landfall on November 3, also as a Category 4 storm. The Nicaraguan government indicated that 63,000 people were evacuated, and at least 1,195 shelters were established across the affected regions. Impacts from Iota were compounded as localities in northern Nicaragua were still in the preliminary stages of surveying and recovering from damages caused by Hurricane Eta. In the wake of Iota, the National Electric Transmission Company (ENATREL) confirmed no less than 168,233 homes across the country were without electricity. As of this writing, 18 fatalities have been confirmed. A weather station in Masatepe recorded 238 millimeters (9.4 inches) of rainfall between November 17-18.

In the **North Caribbean Coast Autonomous Region** (RACCN), telecommunications services were suspended in Puerto Cabazes and surrounding communities. No less than 47,000 families were left without drinking water, and at least 114,000 homes without electricity. Extensive damage was noted in Puerto Cabazes as roofs were detached from structures in the commercial district – including a hotel, in addition to numerous fallen trees and power poles. Extensive damage was noted to the San Pedro church, as well as a temporary hospital which had to be evacuated.

In **Matagalpa**, significant damage was noted in the Rio Blanco community, including severely damaged homes with detached roofs, and downed trees. The Rio Grande de Matagalpa overflowed its banks, forcing the evacuation of multiple families. A landslide extensively impacted a mountain community in Peñas Blancas, where at least nine people were killed. In **Jinotega**, a landslide in Wiwilí de Jinotega killed at least two people. On the western coast, torrential rainfall produced notable flooding across portions of **Rivas.** In the urban regions, water levels reached 2 meters (6.5 feet) high. Impacts to homes were observed in the Tola and Potosí municipalities, as well as the Popoyuapa neighborhood where at least 30 homes were flooded.

Damage in Prinzapolka (Nicaruagua)
Source: SINAPRED

Honduras

The Permanent Contingency Commission of Honduras (COPECO) enacted mandatory evacuations for residents in vulnerable regions of ten departments in anticipation of the impacts from Iota. The cyclone prompted Toncontín International Airport to suspend all inbound and outbound flights on November 17. As of this writing, COPECO indicated 366,123 people were affected by Hurricane Iota, with at least 15,105 families remaining in 822 established shelters. Preliminary damage surveys indicated, no less than 8,111 homes were impacted, along with 65 roads, and 6 bridges. Throughout the country 81 rivers and streams overflowed, isolating at least three communities.

The northwestern departments and the flood prone **Sula Valley** received torrential rainfall from Hurricane Iota. Damages across the Sula Valley were exacerbated by ongoing impacts from Hurricane Eta, which occurred earlier in the month. Notable and widespread flooding was reported along the Ulúa and Chamelecón Rivers. Both rivers swelled to major inundation stages, while the Ulúa crested at least 4 meters (13 feet) above normal. The flooding led to catastrophic impacts across multiple municipalities of the **Cortés Department**, including the capital, San Pedro Sula. The Ramón Villeda Morales International Airport and surrounding areas were completely inundated as the Chamelecón River overflowed its banks. In the wake of the hurricane, the Honduras Government and COPECO continued to rescue residents who became trapped by rising flood waters.

Flooding in Cortés Department, Honduras
Source: National Police of Honduras

In the **Atlántida Department,** the Cangrejal River crested in major inundation stage at Las Mangas. A tropical storm force wind gust of 93 kph (58 mph) was reported in La Ceiba. In the **Ocotepeque Department**, at least five people were confirmed dead in Los Trapiches after a landslide buried their home.

Guatemala

According to the National Coordinating System for Disaster Reduction (CONRED) 131,298 people in Guatemala have been affected by Iota, with at least 6,469 evacuees and 4,027 residents remaining in shelters as of November 18. Two deaths were reported in the **Baja Verapaz** department in the village of El Carmen due to landslide, which severely impacted two homes. As of this writing, 1,329 homes across the country were damaged by the cyclone, along with 12 impacted roads, and 5 damaged bridges. The departments of Alta Verapaz, Baja Verapaz, Izabal, Chiquimula, Quiché and Zacapa were most affected by the storm

Financial Loss

The arrival of Hurricane Iota less than two weeks after Hurricane Eta caused catastrophic damage across parts of Central America only further exacerbated challenging conditions around the region. The economic toll from Eta in parts of Honduras, Nicaragua, Guatemala, Mexico, Panama, and Costa Rica was already tallied into the low-digit billions (USD). Additional direct economic costs associated with Iota were expected to additionally reach into the hundreds of millions (USD).

Severe storms, strong winds impact the U.S. & Canada

A potent surface low pressure system and associated cold front lifted northeastward across the upper Great Lakes between November 14-16. This disturbance produced a broad region of strong synoptic scale winds across the Great Lakes, while vigorous convective activity along the frontal boundary resulted in severe weather and straight-line wind damage spanning from the middle Mississippi Valley to portions of the Midwest, Ohio Valley, Mid Atlantic, Northeast, and southern Ontario (Canada). Wind gusts exceeding 45 to 65 mph (72 to 96 kph) caused extensive power outages, structural damage, and toppled trees across the most affected regions. Total economic and insured damages in the U.S. alone were each anticipated to exceed 100 million (USD).

Meteorological Recap

A strong pressure gradient associated with a powerful surface low pressure system, traversing northeastward across the Great Lakes and southern Canada, produced a broad swath of damaging synoptic scale winds on November 15-16. The National Weather Service (NWS) issued Wind Advisories and High Wind Warnings across a broad region of the United States as the system intensified - spanning from the Great Lakes, into the Ohio Valley and Northeast. Environment and Climate Change Canada (ECCC) issued High Wind Warnings for regions in southern Ontario. In many locations, synoptic scale wind gusts approached and exceeded 45 to 60 mph (72 to 96 kph).

An associated cold frontal boundary, which progressed from the middle Mississippi Valley toward the Northeastern United States and extreme southern Canada between November 14-16, produced multiple rounds of severe weather while enhancing the extent of damaging winds. On November 14, severe storms ahead of the front produced large hail and an isolated tornado in portions of Missouri and Arkansas. On November 15, the frontal boundary ushered a vigorous line of low topped thunderstorms and showers across portions of the Midwest, before a more pronounced squall line developed as the front accelerated through the Mid-Atlantic and Northeast. In the United States, the greatest impacts occurred in portions of Michigan, Ohio, Pennsylvania, Maryland, New York, New Jersey, and Connecticut. The storms along the front produced severe straight-line winds, with gusts approaching and exceeding 70 mph (112 kph).
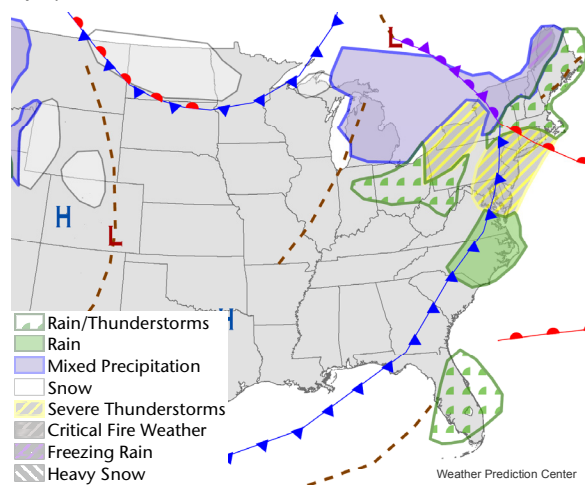
Location	Gust (mph)	Gust (kph)
Niagara District Airport, Ontario	88	141
Fort Erie, Ontario	81	131
Lorain, Ohio	79	127
Oregon, Ohio	77	124
Brunswick, Ohio	76	122
Brampton Caledon Airport, Ontario	75	120
Toronto Island, Ontario	73	118
Fairport, Ohio	73	117
Ottawa, Ohio	72	116
Cleveland, Ohio	71	114
Robins Reef, New York	70	112
Garnerville, New York	70	112

U.S. surface weather map for November 15, and table highlighting maximum wind gusts across the U.S. and Canada.

Event Details

United States

November 14

In Arkansas, an EF1 tornado was confirmed in White County on November 14, with maximum estimated wind speeds approaching 110 mph (177 kph). The tornado injured at least 4 people, while snapping trees and producing notable impacts to structures and mobile homes. In Lawrence County, no less than 15 empty train cars were derailed by strong winds. In Missouri, straight-line winds impacted numerous structures and outbuildings, while downing tree limbs and power lines. Several businesses were damaged in a shopping center near Osage Beach (Camden County).

Osage Beach strip mall damage (Missouri)
Source: Missouri State Highway Patrol

November 15

Waynedale School in Fort Wayne (Indiana)
Source: Nicalas Shimp/NWS

By the evening of November 15, no less than 800,000 customers across the Midwest, Mid-Atlantic, and Northeast were without power. In Michigan, DTE Energy indicated 285,000 customers were affected, while 340,000 customers were impacted in Ohio. A significant seiche, or water displacement, was recorded west to east along Lake Erie, driven by the prolonged period of intense westerly winds. Data from the National Oceanic and Atmospheric Administration (NOAA) revealed a 7-foot (2.1 meter) drop in water levels near Toledo (Ohio), and an 8-foot (2.4 meter) rise near Buffalo (New York) on November 15 – which led to notable lakeshore flooding.

As of this writing, the Storm Prediction Center (SPC) recorded 307 reports of severe storm related winds on November 15. One fatality was noted in Ohio due to a fallen tree, while several other injuries were sustained in Kentucky and Massachusetts. Throughout the day, widespread reports of damage were observed from the Great Lakes toward the Northeast. The damage included impacted and collapsed buildings, downed and uprooted trees, and fallen power and utility lines.

In **Ohio**, Cincinnati Fire and Rescue reported two barges which broke loose due to high winds along the Ohio River, west of Cincinnati. In Cleveland, several homes toward the west side of the City sustained damage due to uprooted and toppled trees. In **New York**, The NWS issued a Tornado Warning as the squall line raced through portions of New York City. The New York City Fire Department responded to multiple calls regarding downed trees and scaffolding. The winds were strong enough to topple street lights and traffic poles. Damage to vehicles was observed.

Canada

In **Ontario**, Hydro One reported at least 230,000 customers across southern and central portion of the providence were affected by power outages by the evening of November 15. Notable flooding occurred along the northern and eastern shores of Lake Erie, with impacts noted at the Port Camborne Hospital, in addition to Port Dover. The Port Stanley buoy measured waves of 4.7 meters (15.4 feet) in Lake Erie. In **Toronto**, airborne plywood and construction materials were observed near downtown (North York). Numerous instances of structural damage, along with significant impacts to trees and power lines were reported throughout southern and central Ontario between November 15-16. The Northern Tornado Project confirmed two areas of downburst wind damage in Dunnville and Ingersoli.

Financial Loss

Widespread wind related losses were incurred across broad regions of the northern United States in addition to southern and central Ontario in Canada. Notable lakeshore flooding resulted in additional damages, particularly along the eastern and northern shores of Lake Erie. Total economic losses in the U.S. alone were anticipated to surpass USD100 million, with most of the wind-related damage covered by insurance. The impacts in Canada were likely to result in economic and insured losses reaching into the tens of millions (USD).

Update: Typhoon Vamco

Typhoon Vamco, known as Ulysses in the Philippines, became the 10th typhoon of the 2020 Northwest Pacific Typhoon Season. At its peak, the JTWC highlighted that the system attained an initial peak intensity of 215 kph (130 mph), which made it a Category 4-equivalent storm on the Saffir-Simpson Scale. Vamco made three separate landfalls in the Philippines' Luzon Island on November 11-12, continued to track west-northwest through the South China Sea, and subsequently came ashore near the Vietnamese city of Da Nang on November 15. According to the federal governments, as many as 74 people were killed in storm-related incidents. Approximately 74,000 residential houses in Philippines (65,000) and Vietnam (9,000) were damaged to varying degrees. In addition, several thousand other structures and businesses along with a vast area of cropland were also affected. Total combined economic losses were anticipated to surpass PHP50 billion (USD1 billion) in Philippines alone.

Meteorological Recap
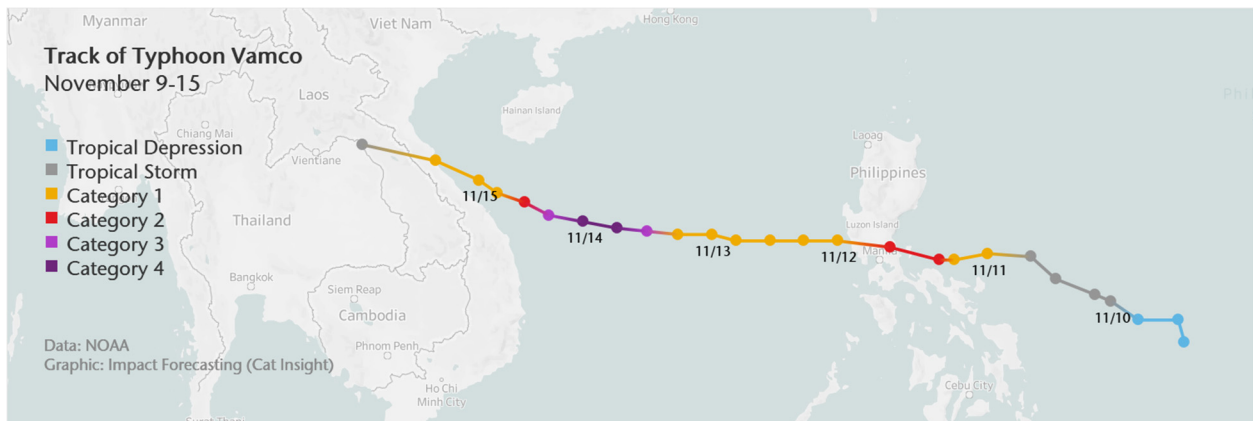
Vamco became the 22nd named storm and 10th typhoon of the 2020 Northwest Pacific Typhoon Season. Surrounded by extremely favorable atmospheric and oceanic environment, Vamco strengthened to an initial peak of intensity of 175 km/h (110 mph) winds (1-minute sustained winds) – Category 2-equivalent of the Atlantic hurricane, according to the Saffir-Simpson Hurricane Wind Scale – on November 11 at 18:00 UTC. At this time, the minimum central pressure was 961 millibars; these estimates are based on the data provided by the Joint Typhoon Warning Center (JTWC). By this time, both the PAGASA and the JMA had upgraded it into a typhoon. Between November 11 through 12, Vamco made three separate landfalls in the Luzon Island of Philippines archipelago. Initially, the Philippines' government placed Region II and Calabarzon regions of Luzon Island under the state of calamity. Later, on November 18, due to the catastrophic damage caused by the Typhoon Vamco, the entire Luzon Island Group was placed under the state of Calamity.

Refer our previous weekly report for the complete Meteorological Recap of the Typhoon Vamco until this time.

Later, during the afternoon hours of November 12, it emerged as a Category 1 typhoon over the South China Sea. The system further strengthened as it continued north-northwestward track through the warm sea surface temperatures over the central South China Sea. Later, Vamco had undergone an explosive rapid intensification cycle on November 13. According to the JTWC, for one 24-hour stretch ending at 18:00 UTC on November 13, the system further intensified by 55 kph (35 mph) to an initial peak intensity of 215 kph (130 mph) – Category 4-equivalent typhoon on the Saffir-Simpson Hurricane Wind Scale.
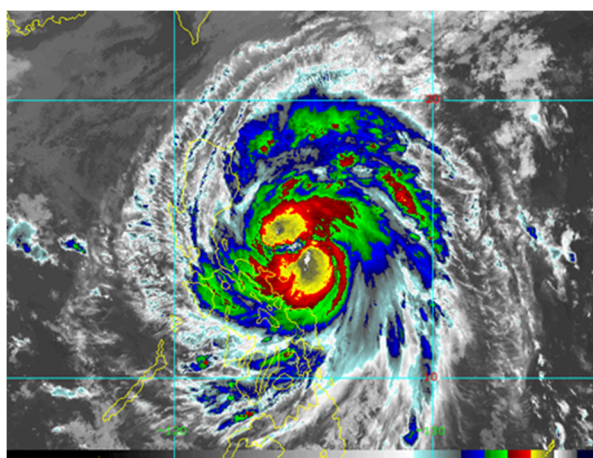
Typhoon Vamco making landfall in Philippines
Source: CIRA/ RAMMB
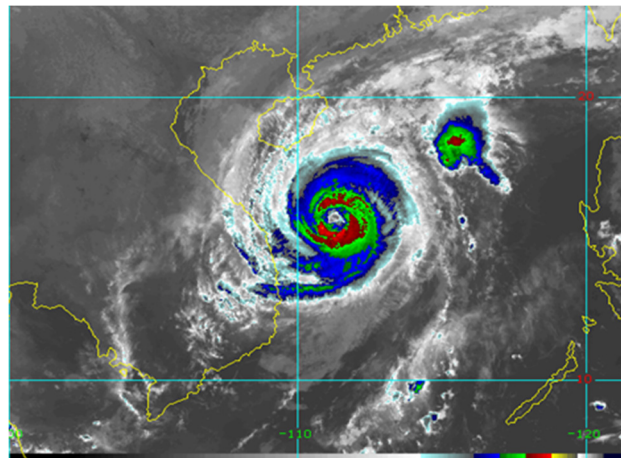
Typhoon Vamco nearing Vietnam
Source: CIRA/ RAMMB

By this time, super-dense and deep convective cloud bands continued to consolidate tightly around the low-level circulation center, which led to the formation of a disorganized eye feature, as revealed by the microwave satellite imagery. On November 14, the system exhibited a net weakening while tracking generally westward through the moderate wind-shear conditions. Later, on November 15, Typhoon Vamco made its final landfall approximately 100 km (62 miles) northwest of Da Nang City (between Ha Tinh and Thua Thien-Hue provinces) in north-central Vietnam as a Category 1 typhoon. Shortly after this, Vamco rapidly weakened into a Severe Tropical Storm under the influence of frictional effects offered by the rugged mountainous terrain in the eastern Vietnam and the JTWC issued its last advisory on the system later that day. The JMA then downgraded it to a Tropical Depression and released its final advisory on the system.

**Summary of Vamco's landfalls is presented in table below:**

Landfall Time (UTC)	Landfall Time (local)	Location	Wind Speed (mph)	Saffir-Simpson Category Rating
Nov 11, 14:30	22:30	Patnanungan, Quezon, Philippines	95	Category 2
Nov 11, 15:20	23:20	Burdeos, Quezon, Philippines	95	Category 2
Nov 11, 17:40	01:40 (Nov 12)	General Nakar, Quezon, Philippines	95	Category 2
Nov 15, 00:00	07:00 AM	Da Nang, Central Vietnam	90	Category 1

Miscellaneous - Typhoon Vamco produced torrential rainfall and hurricane-force winds in the central parts of Philippines; particularly affected were the provinces located along the central parts of Luzon Island including the metropolitan region of Manila and its suburbs. Due to the heavy flooding caused by typhoon Vamco, most of the major rivers, including the Cagayan River and its tributaries, swelled to above the flood-stage, causing widespread damage and casualties. Several dams in the main Luzon Island neared their spilling points, prompting the officials to open floodgates of Angat, Ipo, La Mesa, Ambuklao, Binga, San Roque and Magat dams.

Large amounts of water discharge due to the opening these dams triggered severe flash-flooding and mudslides in Benguet, Isabela, Pangasinan, Cagayan Valley, and the Manila metropolitan region and its suburbs. According to PAGASA, total rainfall accumulations associated with Typhoon Vamco exceeded 250 millimeters (10 inches) in parts of central and northern Luzon Island. Later, Vamco brought heavy rainfall and hurricane-force winds in the central and northern parts of Vietnam, that had been affected by multiple storms which led to historical flooding in October of this year. Precipitation accumulations in the provinces of Ha Tinh, Quang Binh, Quang Tri, and Thua Thien-Hue were recorded in the range of 100 – 150 millimeters (4 – 6 inches); with locally higher amounts.

Event Details

Vietnam
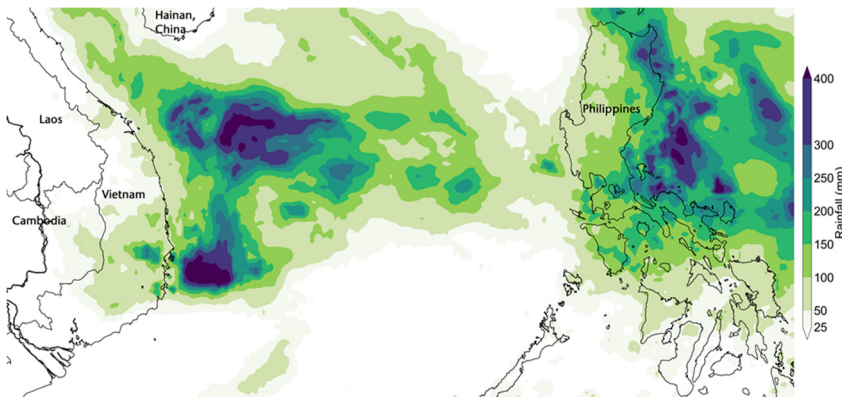
Satellite estimate of Vamco's precipitation (November 9-16)
Data: NASA, Graphic: Cat Insight, Impact Forecasting

Vamco produced measured wind gusts approaching and exceeding 155 kph (95 mph) along the central parts of Vietnam. Moderate to heavy precipitation associated with Typhoon Vamco were reported from the affected provinces, with several districts recorded up to 200 millimeters (8 inches) of accumulated precipitation; with locally much higher amounts. In anticipation of the storm, Vietnamese government issued evacuation advisories for roughly 500,000 residents while no fewer than 200,000 people were pre-emptively evacuated from the vulnerable low-lying areas along the coastline of Vietnam. The Central Electricity Corporation (EVNCPC) reported at least 800,000 customers were affected by power outages in the storm-related incidents, mainly due to downed trees and power lines. The electricity restoration work took multiple days and the power supply was restored in most of the areas, as of this writing.

Landslide caused by Vamco in Vietnam
Source: VDMA

According to the latest information provided by the VDMA, one person was killed and at least 4 others remained missing as of this writing. As many as 36 people were severely injured in storm-related incidents. Heavy precipitation by Vamco triggered flash floods and landslides in Vietnam; particularly in the provinces of Thua Thien – Hue, Quang Tri, Ha Tinh, and Quang Binh. As many as 9,000 houses were either damaged or destroyed in storm-related incidents. In addition, several thousands of other structures endured severe damage, and a large number of public infrastructures along with an extensive area of cropland were left inundated. Detailed damage assessments remained ongoing as of this writing.

Philippines

Typhoon Vamco made three separate landfalls in Philippines' Luzon Island, producing hurricane-force winds and extremely heavy precipitation in the central and northern parts. Among the hardest-hit areas included Region I (Ilocos), Region II (Cagayan Valley), Region III (Central Luzon), Calabarzon, Mimaropa, National Capital Region (NCR), Cordillera Administrative Region (CAR), and Region V (Bicol). In anticipation of the storm, roughly 225,000 residents of the vulnerable low-lying coastal areas were pre-emptively evacuated and served inside the government relief centers. According to the Philippines' National Disaster Risk Reduction and Management Council (NDRRMC), no fewer than 3.5 million residents belonging to roughly 6,000 administrative divisions were critically affected in the storm-related incidents. Tens of thousands of Army and Police personnel along with the disaster management officials were deployed and approximately 225,000 people were rescued and shifted to the government evacuation centers. Officials used helicopters for the rescue operations due to heavy waterlogging in the metropolitan area of Manila and its suburbs; however, the air rescue efforts were severely hampered by the prevailing rough weather conditions.

Massive power outages were reported with several million residents belonging to 360 cities and municipalities were left without electricity for multiple days. As of this writing, the electricity restoration work in only 85 cities and municipalities had been completed. Internet and communication in large areas were knocked out, mainly due to damaged utility poles and fallen trees. Vamco damaged or destroyed drinking water and sewage treatment plants, which led to acute shortage of drinking water, particularly in the central parts of Luzon Island. Schools, colleges, and offices remained closed for multiple days. Due to the extensive damage caused by Vamco in Marikina City and other areas in Metro Manila, the local governments ordered suspension of classes at all levels for the next month.

Submerged houses in Cagayan Valley
Source: Philippines News Agency

Search, rescue, and restoration works remained ongoing for multiple days, given the extensive flooding caused by Vamco in the central parts of Luzon. As many as 73 people were killed, another 24 were injured, and at least 19 people were reported missing in storm-related incidents; most of these casualties and injuries were reported from the Region II, V, Calabarzon, and CAR administrative regions. According to the Philippines' NDRRMC, as many as 65,200 residential houses were either damaged or destroyed and tens of thousands of homes were inundated in storm-related incidents. As of this writing, the NDRRMC monitored roughly 300 incidents in which no fewer than 250 road sections and 120 bridges were damaged to varying degrees. In addition, tens of thousands of businesses endured damaged, and a vast area of agricultural land – 102,000 hectares (250,000 acres) – was left inundated. It is important to note that these estimates are based on the initial reports and are expected to substantially increase after broad damage assessments begins. As of November 19, the data of affected population and damage to the residential houses as reported by the NDRRMC is provided in the table below:

Region	Population Affected	Destroyed	Damaged	TOTAL
Region III (Central Luzon)	2,077,000	4,746	52,395	57,141
Region V (Bicol)	438,000	961	3,171	4,132
Calabarzon	248,000	231	1,358	1,589
Region I (Ilocos)	54,000	55	1,509	1,564
CAR	4,800	45	699	744
Region II (Cagayan Valley)	629,000	12	40	52
Grand Total (Philippines)	**3,513,000**	**6,050**	**59,172**	**65,222**

Financial Loss

Cyclonic storms with heavy rainfall, such as Typhoon Vamco, are notorious for inflicting significant economic losses, including the recent storms Goni (2020), Rammasun (2014), Mangkhut (2018), Haiyan (2013), and Tropical Storm Ketsana (2009); each one of these events resulted in at least USD300 million economic losses. Therefore, the economic toll of Typhoon Vamco (Ulysses) in Philippines were anticipated to be substantial. According to the unofficial damage assessment reports, total combined economic losses were estimated at PHP44 billion (USD910 million) in Marikina City alone. Given the wide damage footprint elsewhere, particularly in rest of the Metropolitan Manila and its suburbs, Isabela, Pangasinan, Benguet, and, Cagayan Valley and further across the Luzon Island, the economic toll was likely to surpass USD1 billion.

However, according to the initial damage assessment reports, the Philippines' NDRRMC cited the total economic toll at PHP10 billion (USD210 million), of which approximately PHP4 billion (USD85 million) worth losses occurred in agricultural sector and remaining PHP6 billion (USD125 million) were noted as the infrastructure-related losses. Economic costs associated with the damage to residential houses, businesses, commercial properties, and automobile assets were not included in this estimate. Given the continued low insurance penetration in the region, most of these economic losses were anticipated to be uninsured.

With Typhoon Vamco being significantly weakened before making landfall in Vietnam, the damage, as well as the economic losses in the country were anticipated to be relatively minor. There were notable instances of flash flooding and landslides in central and northern Vietnam, and the associated economic toll was likely to be in the millions.

Natural Catastrophes: In Brief

Flooding (Indonesia)
Incessant rains triggered flash floods and prompted landslides in central parts of Indonesia; particularly in the Java Island. According to the Indonesian National Board for Disaster Management (BNPB), at least five were killed in landslides which occurred in Bogangin and Banjarpanepen Villages of the Banyumas Regency located in the Central Java Province. Hundreds of residential houses were either damaged or destroyed in rain-related incidents.

Wildfire (United States)
The Pinehaven Fire ignited near Caughlin Ranch, southwest of Reno (Nevada) on November 17. The brushfire quickly expanded, aided by strong winds ahead of an approaching cold front. As of this writing, the fire burned 512 acres (207 hectares), leaving five homes destroyed, three homes with major damage, and 21 homes with minor damage. For safety reasons, Nevada Energy temporarily cut power to 7,100 customers surrounding the fires perimeter. The blaze forced the closure of several roads, including portions of McCarran Boulevard, while at least 1,300 homes were under evacuation orders. The Governor declared a state of emergency for the City of Reno and Washoe County. Efforts to contain the fire were aided by a period of precipitation on November 18.

Global Temperature Anomaly Forecast

**GFS/CFSR 5-day Avg 2m T Anomaly (°C) [1979-2000 base]**
Thursday, Nov 19, 2020

ClimateReanalyzer.org
Climate Change Institute | University of Maine
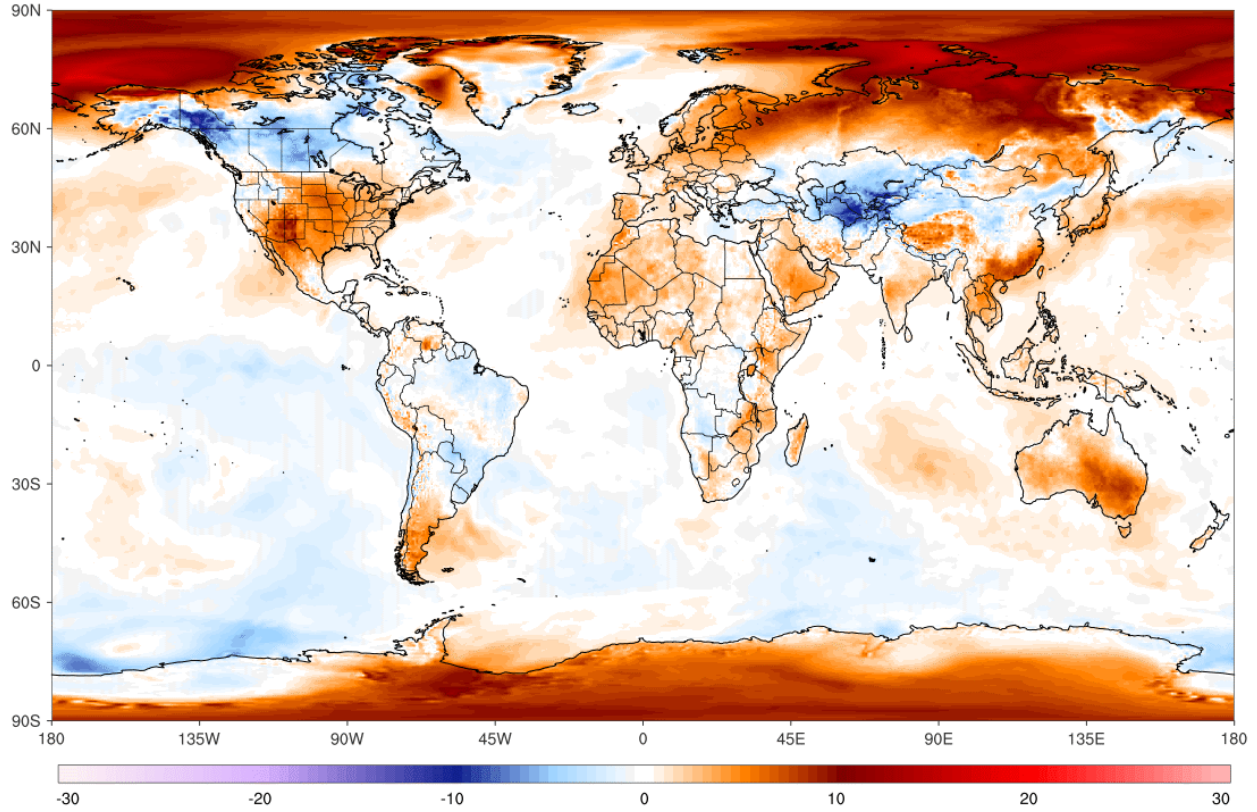
Source: Climate Reanalyzer, Climate Change Institute, University of Maine, USA

Global Precipitation Forecast

GFS 5-day Total Accumulated Precipitation (cm)
Thursday, Nov 19, 2020

ClimateReanalyzer.org
Climate Change Institute | University of Maine
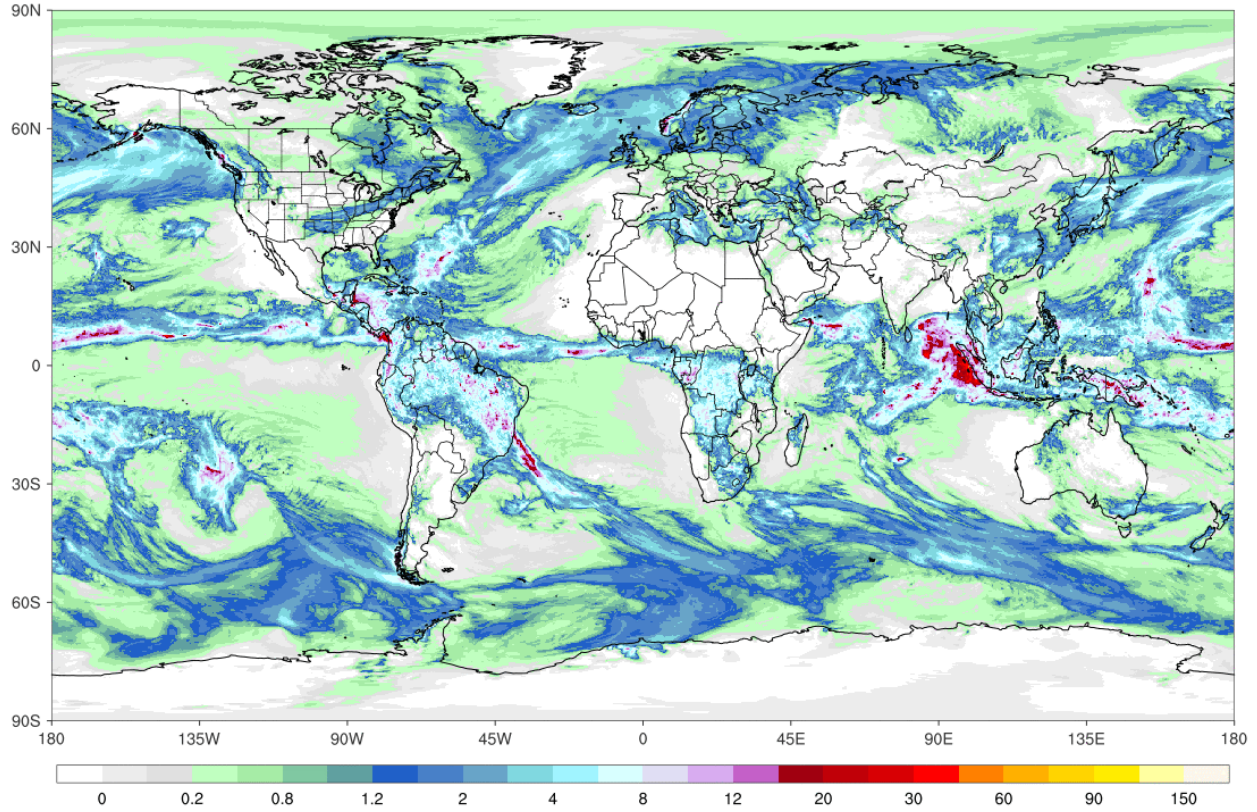
Source: Climate Reanalyzer, Climate Change Institute, University of Maine, USA

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

NOAA Coral Reef Watch Daily 5km SST Anomalies (v3.1)   18 Nov 2020
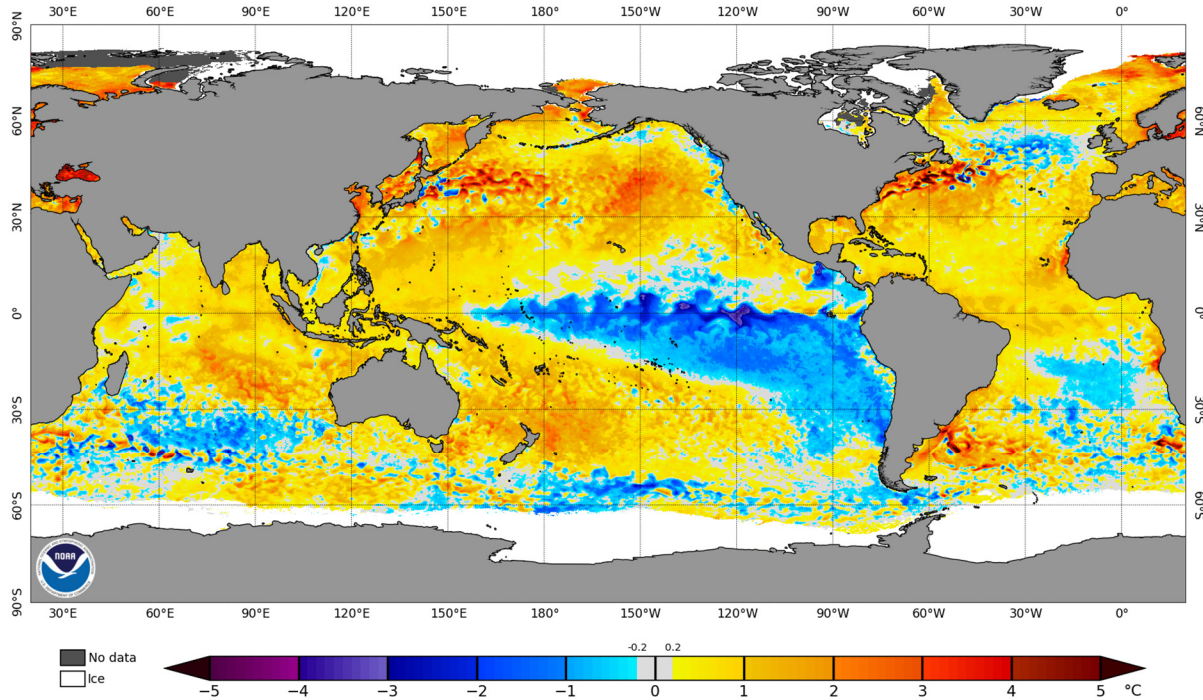
The SST anomalies are produced by subtracting the long-term mean SST (for that location in that time of year) from the current value. This product with a spatial resolution of 0.5 degree (50 kilometers) is based on NOAA/NESDIS operational daily global 5 kilometer Geo-polar Blended Night-only SST Analysis. 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)	26.1	+0.5
Niño3.4 region (2°N latitude, 155°W longitude)	24.2	-1.9
Western Pacific Ocean (700 miles NNW of Honiara, Solomon Islands)	29.5	-0.6

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 an 95 percent chance that La Niña conditions will persist through boreal (Northern Hemisphere) winter of 2020 / 2021, and a 65 percent chance that these conditions will linger into the spring months.

Probabilistic ENSO Model Projections: November 2020

Data: NOAA & Columbia University (IRI)   Graphic: Impact Forecasting (Cat Insight)

ENSO Model Projections: November 2020

Data: NOAA & Columbia University (IRI)   Graphic: Impact Forecasting (Cat Insight)
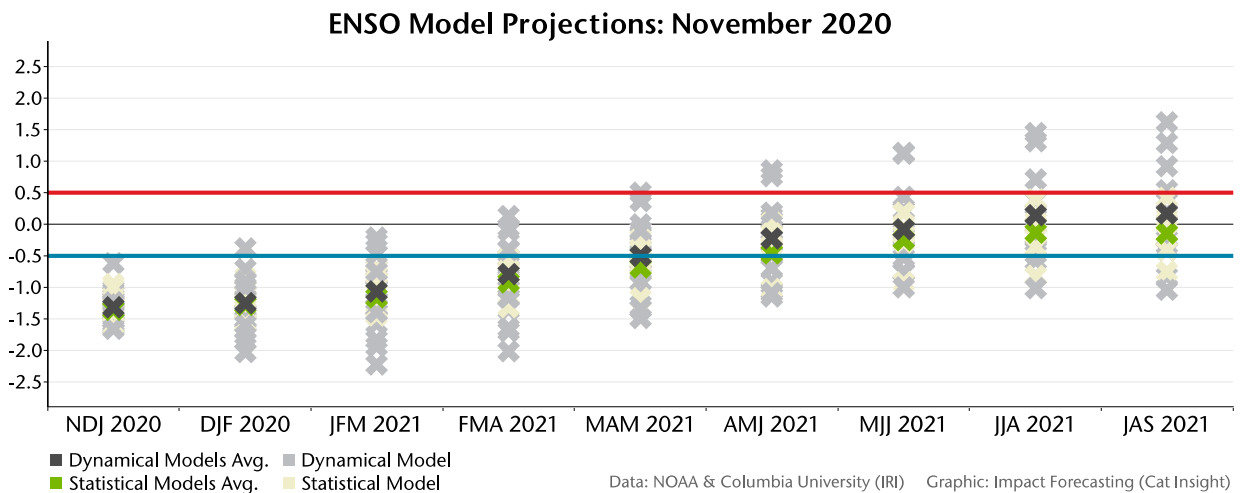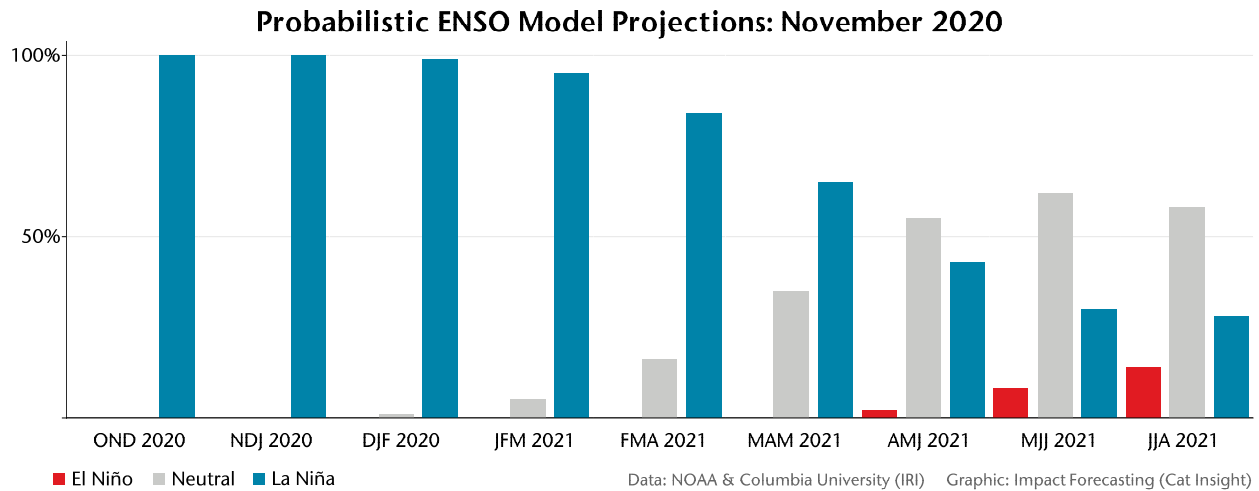
El Niño *refers to the above-average sea-surface temperatures (+0.5°C) that periodically develop across the east-central equatorial Pacific. It represents the warm phase of the ENSO cycle.*

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).
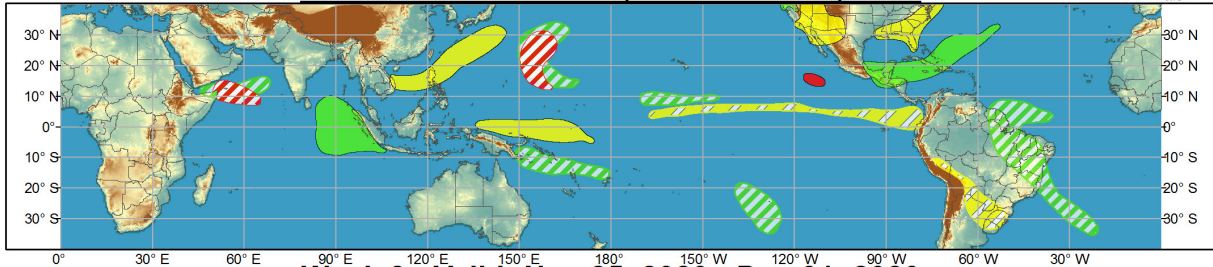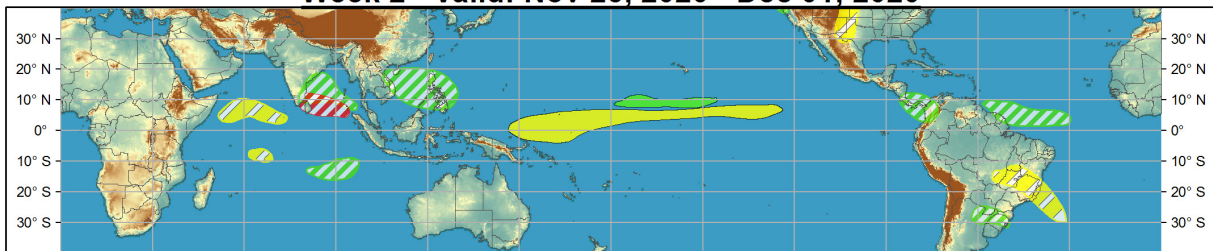
Global Tropics Outlook

Global Tropics Hazards and Benefits Outlook - Climate Prediction Center

Week 1 - Valid: Nov 18, 2020 - Nov 24, 2020

Week 2 - Valid: Nov 25, 2020 - Dec 01, 2020

Produced: 11/17/2020
Forecaster: Harnos

Confidence

	High	Moderate	
Tropical Cyclone Formation			Development of a tropical cyclone (tropical depression - TD, or greater strength).
Above-average rainfall			Weekly total rainfall in the upper third of the historical range.
Below-average rainfall			Weekly total rainfall in the lower third of the historical range.
Above-normal temperatures			7-day mean temperatures in the upper third of the historical range.
Below-normal temperatures			7-day mean temperatures in the lower third of the historical range.

Product is updated once per week, except from 6/1 - 11/30 for the region from 120E to 0, 0 to 40N. The product targets broad scale conditions integrated over a 7-day period for US interests only. Consult your local responsible forecast agency.

Source: Climate Prediction Center

Current Tropical Systems
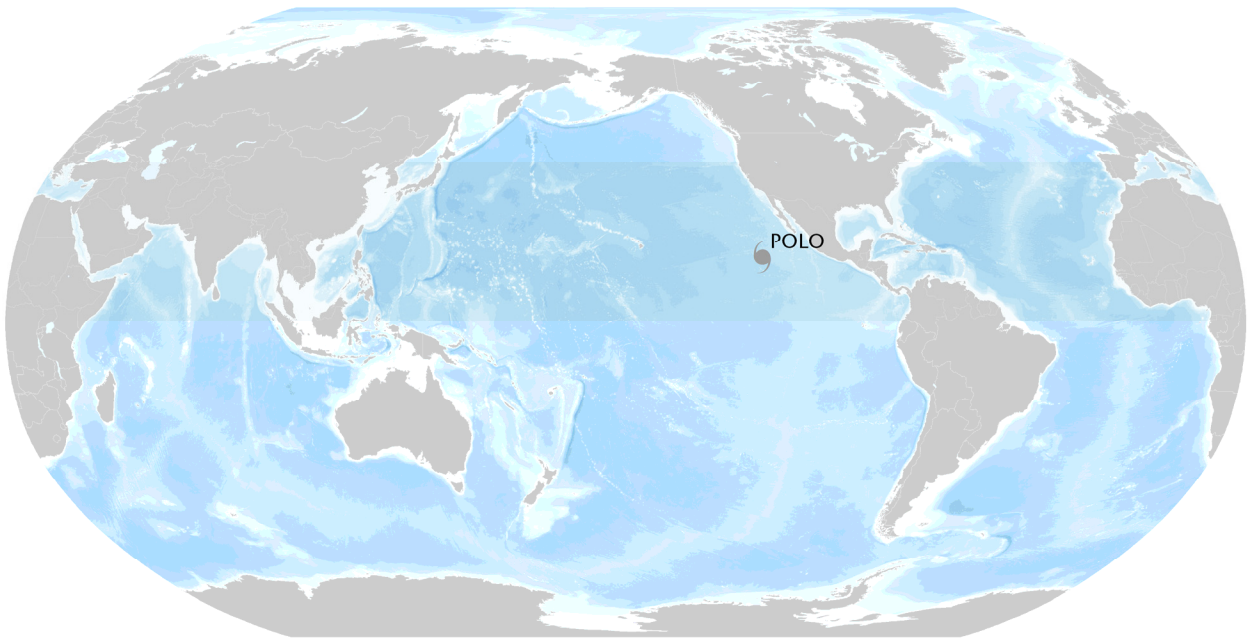
🌀 Tropical Depression 🌀 Tropical Storm 🌀 Category 1 🌀 Category 2 🌀 Category 3 🌀 Category 4 🌀 Category 5

Location and Intensity Information

Name*	Location	Winds	Storm Reference from Land	Motion**
TD Polo	17.1°N, 120.3°W	35 mph	785 miles (1,260 kilometers) WSW from Baja California	W 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): November 13 – 19

Magnitude   • 4.0 - 4.9   ● 5.0 - 5.9   ● 6.0 -.6.9   ● ≥ 7.0   —— Tectonic boundary
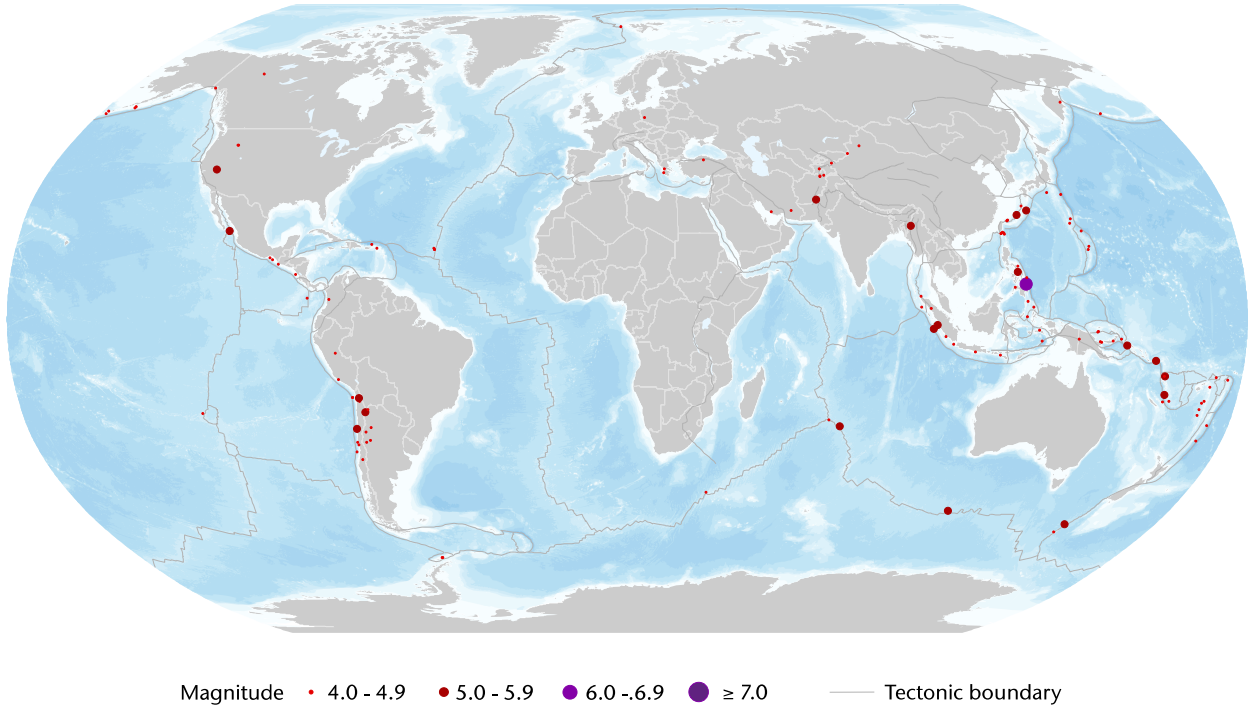
Significant EQ Location and Magnitude (≥M6.0) Information

Date (UTC)	Location	Magnitude	Depth	Epicenter
11/15/2020	8.76°N, 126.29°E	6	43 km	5 kilometers (3 miles) S of Marihatag, Philippines

Source: United States Geological Survey

U.S. Weather Threat Outlook

Day 3-7 U.S. Hazards Outlook
Valid: 11/22/2020-11/26/2020

Heavy Snow 11/24

Heavy Precipitation 11/22

Heavy Rain 11/24

Heavy Precipitation 11/25

Heavy Precipitation 11/23

Significant Waves 11/24

For the latest information on flooding - https://www.wpc.ncep.noaa.gov/nationalfloodoutlook/index.html

Flooding Likely | Flooding Occurring/Imminent | Flooding Possible | Severe Drought

Weather Prediction Center
Made: 11/19/2020 3PM EST

Follow us: [f]
www.wpc.ncep.noaa.gov

Potential Threats

- In the short term, an upper level disturbance will produce heavy precipitation downwind of the Great Lakes on November 22. Rain/snowfall accumulations are expected to be aided by lake effect enhancement.

- Heavy rainfall, focused along a frontal boundary, is anticipated across the Mid-South and Midwest on November 24, before expanding eastward.

- A trough digging into the Pacific Northwest is expected to bring heavy snowfall to portions of the Cascades on November 24.

- Severe drought conditions persist across large regions of the Western United States, spanning from the Southern Plains and Rockies, through the Great Basin, and toward the West Coast.

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

The National Interagency Fire Center has highlighted a reduction of the most serious fire risks across much of the country during the next week. This comes despite most of the Western U.S. remains mired in increasingly severe drought conditions.

November 20

November 21

Moderate Risk
Low Risk
Little or No Risk

© 2020 Mapbox © OpenStreetMap

November 22

November 23

November 24

Data: National Interagency Fire Center   Graphic: Impact Forecasting (Cat Insight)
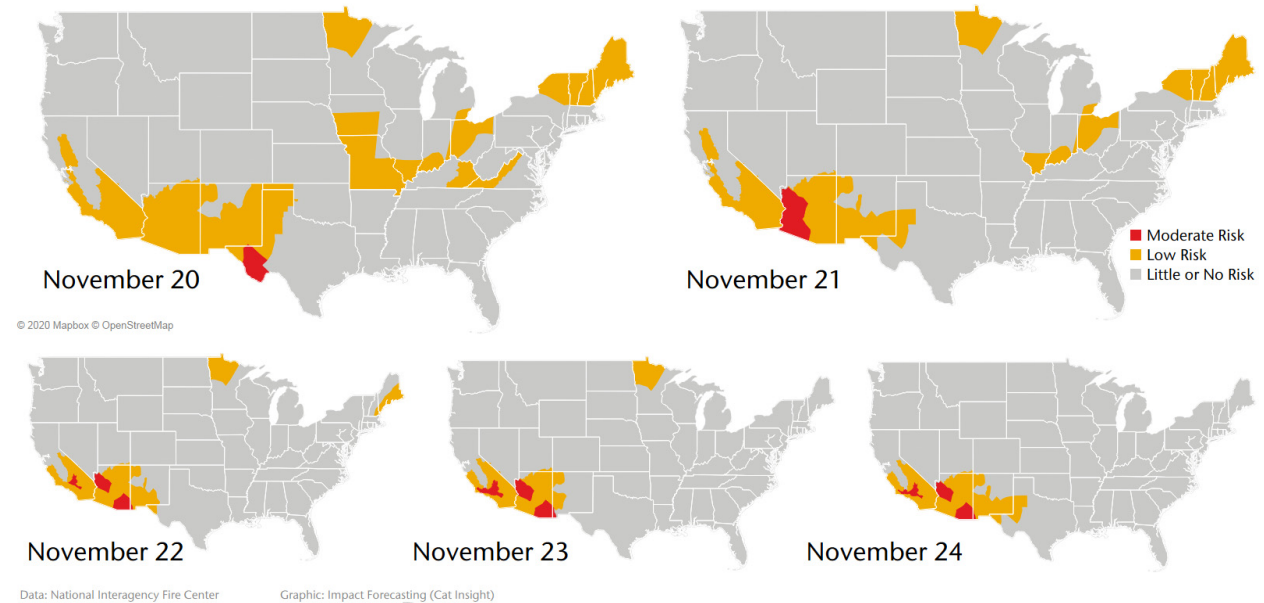
Annual YTD Wildfire Comparison: November 13*

Year	Number of Fires	Acres Burned	Acres Burned Per Fire
2016	56,771	5,126,918	90.31
2017	54,153	8,893,198	164.22
2018	51,721	8,498,644	164.32
2019	45,840	5,418,234	118.20
2020	49,815	8,750,197	175.65
10-Year Average (2010-2019)	**53,522**	**6,539,980**	**122.19**

*Last update from NIFC. Source: National Interagency Fire Center

Top 5 Most Acres Burned by State: November 19

State	Number of Fires	Acres Burned	Acres Burned Per Fire
California	9,667	3,235,801	334.73
Arizona	2,382	955,366	401.08
Washington	1,610	788,052	489.47
Oregon	1,854	727,209	392.24
Colorado	1,071	625,317	583.86

Source: National Interagency Fire Center

Note: There is often a multi-day lag between NIFC and the California Department of Forestry and Fire Protection (CAL FIRE)

Current U.S. Streamflow Status

High Flows (Percentile)	• ≥ 99 / Above floodstage • 95 - 99 • 90 - 95	Hydrological Drought	• Severe Drought • Moderate Drought • Below Normal
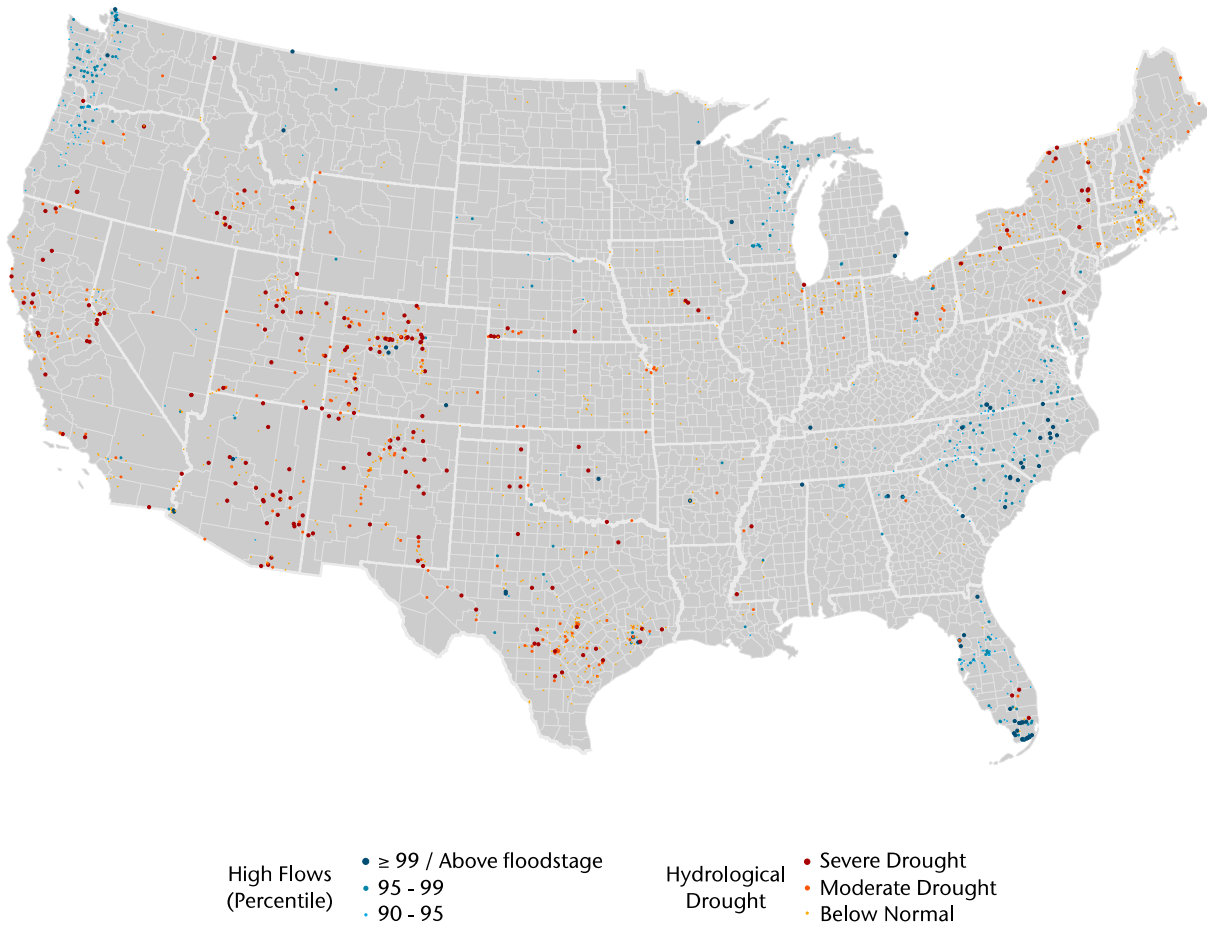
A ≥99th percentile indicates that estimated streamflow is greater than the 99th percentile for all days of the year. This methodology also applies for the other two categories. A steam in a state of severe drought has 7-day average streamflow of less than or equal to the 5th percentile for this day of 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
Tar River at Tarboro, North Carolina	25.64	98.95
Contentnea Creek at Hookerton, North Carolina	15.28	98.91
Lumber River at Boardman, North Carolina	9.15	98.91
Wateree River near Camden, South Carolina	21.65	98.90
Menominee River near Koss, Michigan	12.55	98.89

Source: United States Geological Survey

Source Information

Iota compounds catastrophic impacts in Central America
U.S. National Hurricane Center
National System for the Prevention, Mitigation and Attention of Disasters (SINAPRED)
Permanent Contingency Commission of Honduras (COPECO)
National Coordinating System for Disaster Reduction (CONRED)
This is how the emergency progresses in San Andrés and Providencia due to a hurricane, El Tiempo
They confirm that there is a 98% deterioration in Providencia's infrastructure, El Tiempo
Floods, deaths and hundreds of affected leave the rains in Colombia, Canal RCN
Torrential rains from Hurricane Iota cause disasters in Colombia, La Tribuna Honduras
'Extraordinary': Iota becomes second category 4 hurricane to strike Central America in past two weeks, Yale Climate Connections
Six dead and 63 thousand evacuated in Nicaragua by Iota, La Prensa
Iota-caused avalanche leaves 16 dead in Nicaragua, La Tribuna
To date, 15 Hondurans have died after passing Iota, La Presna Honduras

Severe storms, strong winds impact the U.S. & Canada
U.S. National Weather Service
U.S. Storm Prediction Center
National Oceanic and Atmospheric Administration (NOAA)
Environment and Climate Change Canada (ECCC)
CatIQ
PowerOutage.US
Intense winds shake ground, send debris flying in Ontario, The Weather Network
Tracking power outages in SE Michigan on Nov. 16, 2020, 4 WDIV Detroit
Storms, High Winds Knock Out Power to Over Three Quarters of a Million Customers, The Weather Channel
Severe storms damage Osage Beach strip mall, KMOV 4
Some Without Power After Severe Storms Knock Down Scaf-foldings and Trees in NYC, Spectrum 1 NYC

Update: Typhoon Vamco
Joint Typhoon Warning Center
Japan Meteorological Agency
Philippine Atmospheric, Geophysical and Astronomical Services Administration
Vietnam Disaster Management Authority
Central Electricity Corporation (EVNCPC), Vietnam
Typhoon "Vamco" makes landfall in disaster-stricken Central Vietnam, The Watchers
Nỗ lực khắc phục hậu quả mưa bão, VDMA
Công tác chỉ đạo ứng phó với cơn bão số 13, VDMA
Storm Vamco strikes central Vietnam, VnExpress
Vamco moves inland across Vietnam after unleashing devastating flooding in Philippines, AccuWeather
Makati sends more augmentation support to Marikina, Philippines News Agency
Storm Vamco hits Vietnam as Philippines death toll rises to 67, CNA
Typhoon Vamco: at least 67 killed in Philippines' deadliest storm of year, South China Morning Post
Marikina to sue Angat Dam for floods higher than what Ondoy caused, GMA News Online

Natural Catastrophes: In Brief
United States Geological Survey
Indonesian National Board for Disaster Management (BNPB)
City of Reno
Reno Fire Department
Updates On The Pinehaven Fire Near Caughlin Ranch, KUNR

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