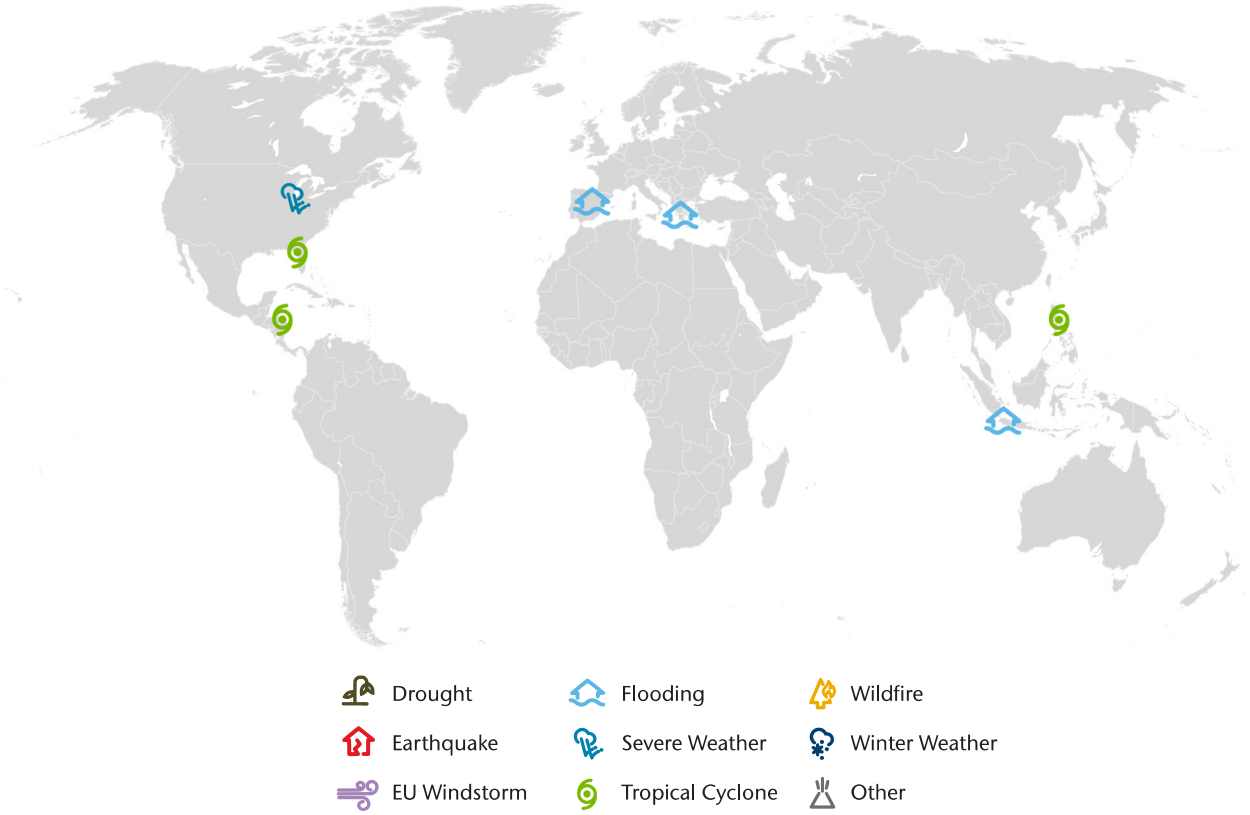
Weekly Cat Report

November 13, 2020

This Week's Natural Disaster Events



Event	Impacted Areas	Fatalities	Damaged Structures and/or Filed Claims	Preliminary Economic Loss (USD)*	Page
Hurricane Eta	Central America, United States	216+	10s of Thousands	1+ billion	3
TY Vamco & TS Etau	Philippines, Vietnam	13+	10s of Thousands	100s of Millions	12
Typhoon Goni	Philippines	25+	171,000+	400+ million	16
Flooding	Spain	0	Hundreds	140+ million	18
Flooding	Greece	0	Hundreds	Millions	19
Flooding	Indonesia	0	8,000+	Millions	19
Severe Weather	United States	0	Thousands	Millions	19

**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.*

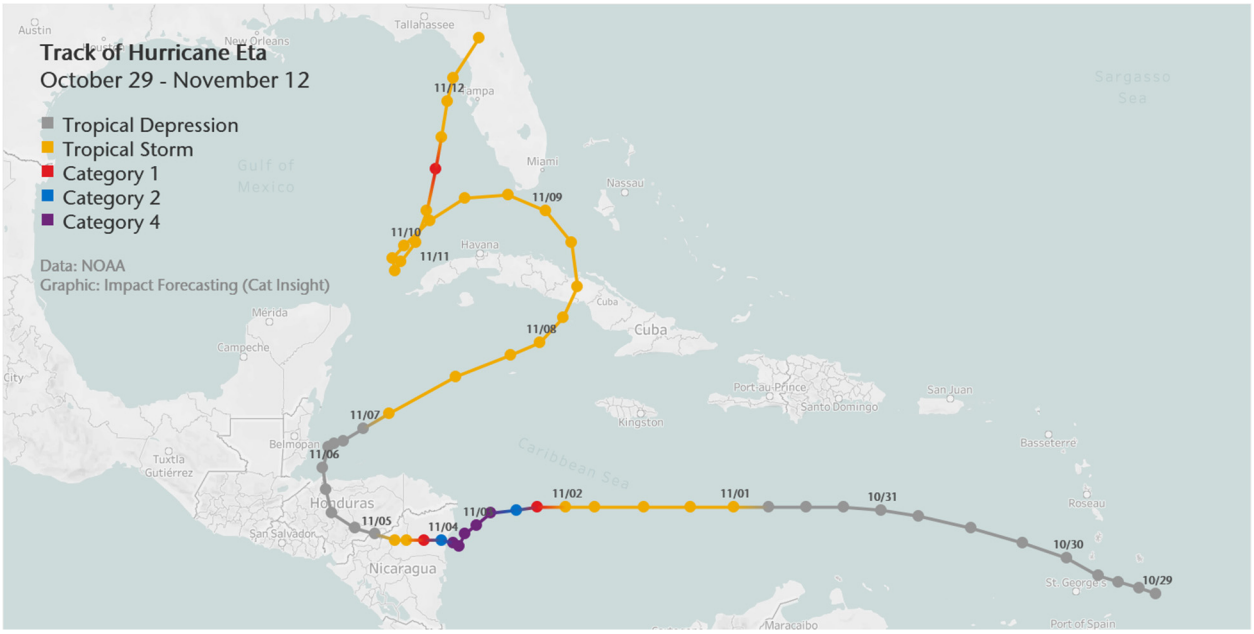
Along with this report, we continue to welcome users to access current and historical natural catastrophe data and event analysis on Impact Forecasting's Catastrophe Insight website: http://catastropheinsight.aon.com

Update: Hurricane Eta

Eta produced multiple days of torrential rainfall and life-threatening flooding that led to catastrophic damage across Central America between November 3-6. Portions of Nicaragua, Honduras, and Guatemala were most impacted. After emerging over open waters, a complex steering flow allowed Tropical Storm Eta to make landfalls in south-central Cuba and the Florida Keys on November 8; both with 65 mph (100 kph) winds. Eta made a fourth landfall near Cedar Key (Florida) on November 12 as a 50 mph (85 kph) storm. The storm produced flooding across southern and west-central Florida, while notable storm surge was observed along the western Florida coast. Locally heavy rainfall across the Southeast and Mid-Atlantic U.S. on November 11-12, was enhanced by interactions with the cyclone and a frontal boundary. As of this writing, 216 fatalities were confirmed, while many people remain missing. Total economic losses, much of which will come from Central America, were likely to result in a multi-billion-dollar cost.

Additional information regarding Hurricane Eta can be found in previous weekly Cat Reports.

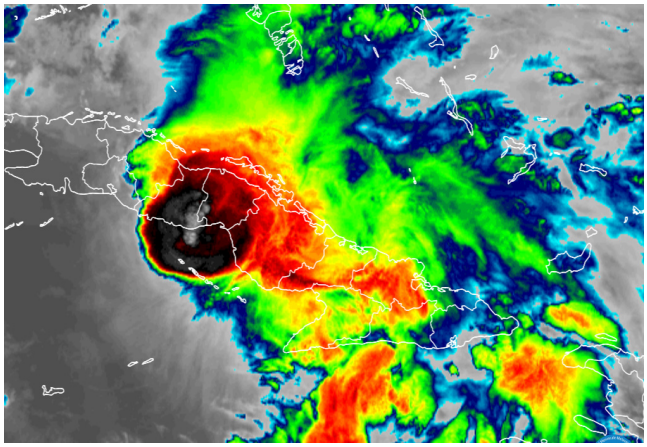
Meteorological Recap



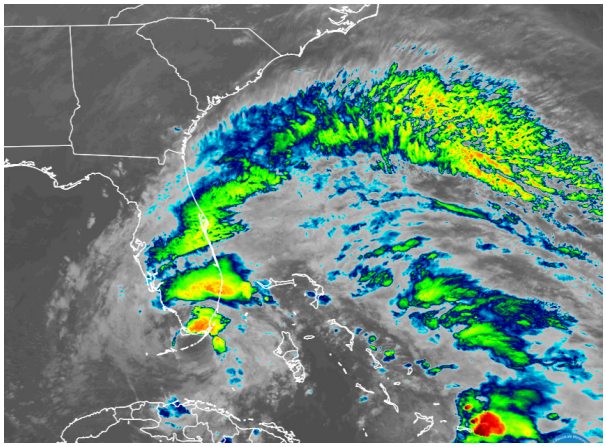
After producing multiple days of incessant rainfall and catastrophic damage across large portions of Central America, Eta emerged over the northwestern Caribbean Sea on November 5 as a weakened tropical depression exhibiting an elongated circulation. Initially off the coast of Belize, the cyclone proceeded on a north-northeastward trajectory steered by a deepening mid-level trough over the Gulf of Mexico. Gradual strengthening occurred between November 6-7 as Eta traversed the warm waters of the northern Caribbean, while being impacted by moderate southwesterly wind shear.

Eta regained Tropical Storm strength at 10:00 AM EST (15:00 UTC) on November 7, with maximum sustained winds of 40 mph (65 kph), located 45 miles (70 kilometers) west-northwest of Grand Cayman, and continuing northeast. During the day, additional intensification was confirmed by NOAA Hurricane Hunter Aircraft as the center of Eta reformed near a region of deep convection toward the northeast.

As the storm neared Cuba, Tropical Storm Warnings were in effect for the Cuban provinces of Camagüey, Ciego de Ávila, Sancti Spiritus, Villa Clara, Cienfuegos, and Matanzas. Tropical Storm Eta made landfall along the south-central coast of Cuba (Sancti Spíritus Province) at 4:00 AM EST (9:00 UTC) on November 8, with maximum sustained winds of 65 mph (100 kph) and a minimum central pressure of 991 millibars. The storm brought gusty winds and locally heavy rainfall to regions of central Cuba.



Tropical Storm Eta making landfall in Cuba
Source: NOAA/RAMMB



Tropical Storm Eta making landfall in the Florida Keys
Source: NOAA/RAMMB

By 10:00 AM EST (15:00 UTC) on November 8 the circulation of Eta again emerged over open waters, steered around a developing upper-level low toward the Florida Straits. Eta displayed a sheared look on satellite imagery, while radar imagery revealed a band of deep convection wrapping more than half way around the storms center. Throughout the day, interactions with the upper level low resulted in an injection of dry air on the eastern side of the cyclone, disrupting central thunderstorm activity and inhibiting intensification as Eta approached the Florida Keys. Hurricane and Storm Surge Warnings were in effect for the Florida Keys from Ocean Reef to the Dry Tortugas, including Florida Bay as the cyclone approached.

Doppler radar indicated Tropical Storm Eta officially made a third landfall along Matecumbe Key in the middle Florida Keys at 11:00 PM EST on November 8 (4:00 UTC on November 9), with maximum sustained winds of 65 mph (100 kph) and a minimum central pressure of 991 millibars. Eta became the record 12th named storm to make landfall in the continental United States this season, and the first landfall in the State of Florida. The cyclone brought strong tropical storm force wind gusts to portions of the Florida Keys and southern Florida. Continued heavy rainfall led to localized flooding and flash flooding in regions of Cuba, Jamaica, the Bahamas, and southern and central Florida where 10 to 15 inches (250 to 380 millimeters) of rainfall was recorded, with locally higher amounts.

By November 9, Eta continued into the Gulf of Mexico turning west-southwestward while continuing to pivot around the northern side of the upper level low. Eta's convective structure organized as the storm churned in an environment characterized by low to moderate wind shear, and relatively warm sea surface temperatures. The cyclone stalled for a brief period on November 10, about 60 miles (100 kilometers) north-northwest from the western top of Cuba, as steering currents collapsed. By the evening hours, the storm advanced on a northeastward trajectory around a building sub-tropical ridge off the east coast of Florida.

At 7:35 AM EST (12:35 UTC) on November 11 data from NOAA Hurricane Hunter Aircraft indicated that Eta had again strengthened into a hurricane, with maximum sustained winds of 75 mph (120 kph) – equivalent to a Category 1 storm on the Saffir-Simpson Hurricane Wind Scale (SSHWS). The hurricane continued north-northeastward toward the west coast of Florida. Throughout the afternoon hours, dry air entrainment degraded intense convection near the hurricanes center and weakened Eta back to tropical storm status. As Eta approached the western Florida coast, a Tropical Storm Warning was in effect from the middle of Longboat Key to Suwannee River (Florida), and the Flagler/Volusia County line (Florida) northward to St. Andrews Sound (Georgia).

Tropical Storm Eta made a fourth landfall near Cedar Key (Florida) at 4:20 AM EST (9:20 UTC) on November 12 with maximum sustained winds of 50 mph (85 kph), and a minimum central pressure of 996 millibars. Eta produced notable storm surge along the flood prone west-central Florida coast, including the Tampa Bay area, aided by a gradual shallow bathymetry in the Gulf of Mexico. Significant storm surge was measured in the Tampa East Bay (Florida). Portions of the west-central Florida coast received 6 to 8 inches (150 to 200 millimeters) of rainfall by the morning of November 12. Interactions with Eta and a plume of tropical moisture ahead of a cold frontal boundary, draped across the Mid-Atlantic and Southeastern United States, produced a broad region of locally heavy rainfall between November 11-12 - particularly in the Carolinas and Virginia where Flood and Flash Flood Warnings were in effect.

Landfall Time (UTC)	Landfall Time (local)	Location	Wind Speed (mph)	Saffir-Simpson Category Rating	Minimum Central Pressure
Nov 03, 21:00	4:00 PM	South of Puerto Cabezas (Nicaragua)	140	Category 4	940
Nov 08, 9:00	4:00 AM	Sancti Spíritus Province (Cuba)	65	Tropical Storm	991
Nov 09, 4:00	11:00 PM (Nov 8)	Matecumbe Key (Florida)	65	Tropical Storm	991
Nov 12, 9:20	4:20 AM	Cedar Key (Florida)	50	Tropical Storm	996

Throughout the morning hours of November 12, Tropical Storm Eta progressed north-northeast across northern Florida, maintaining tropical storm intensity. Further intensification of Eta over the western Atlantic was limited due to strong southwesterly shear.

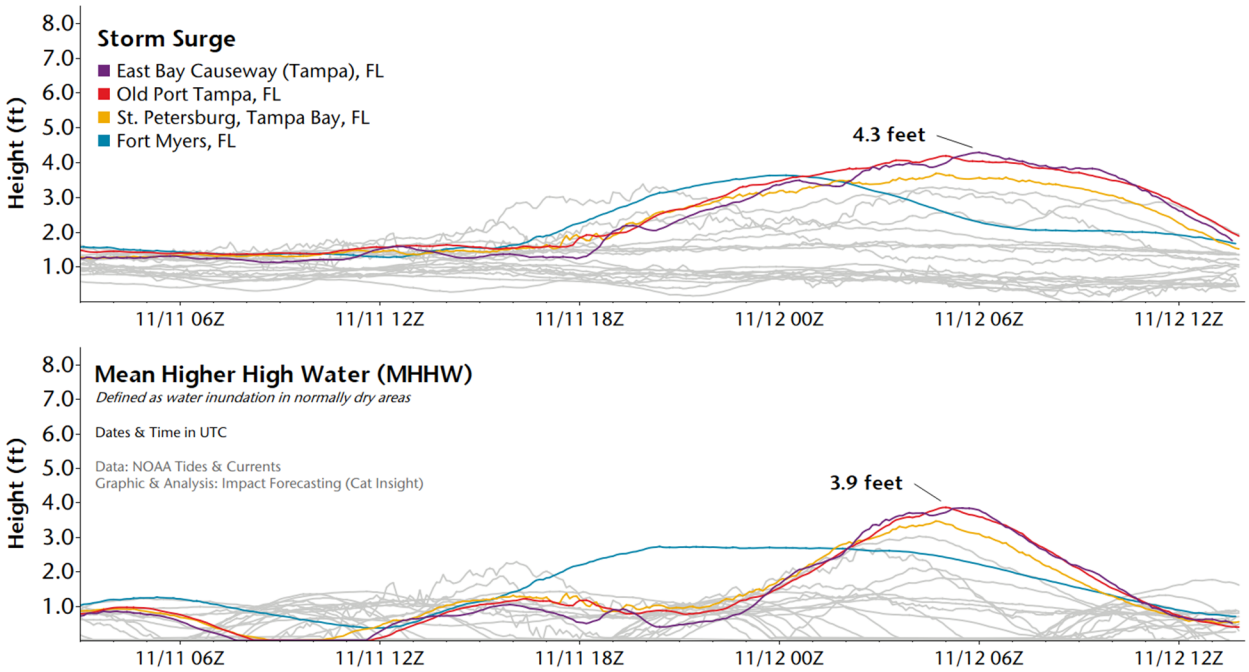
Storm Data

Storm Surge

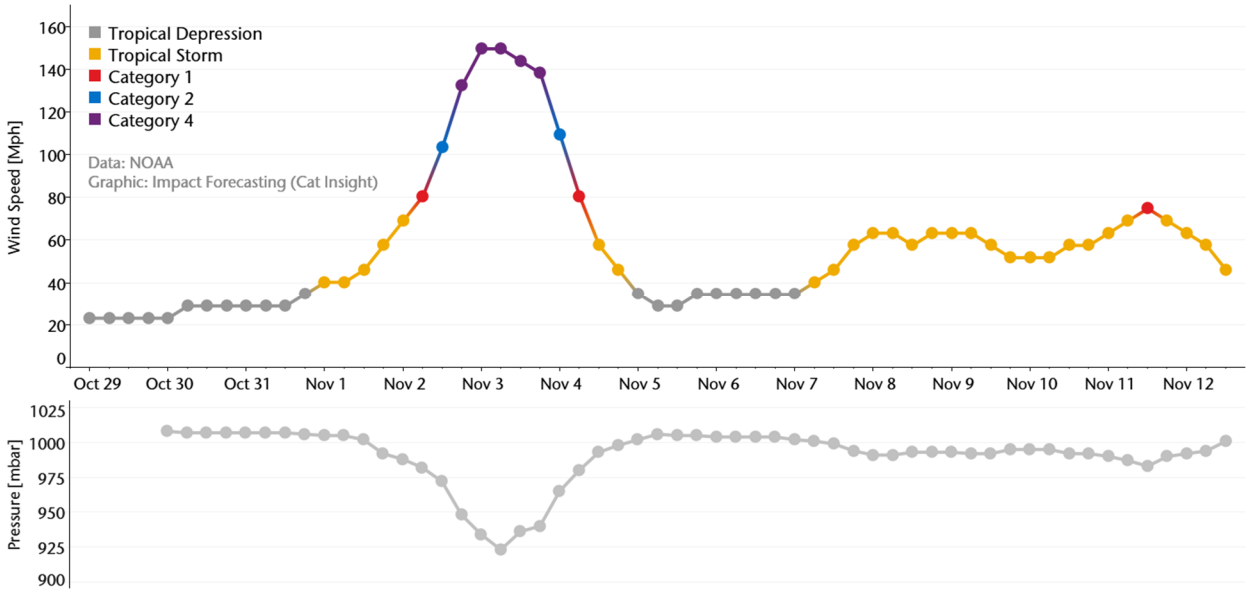
The most impactful storm surge from Eta occurred along the western coast of Florida, where measured Mean Higher High Water (MHHW) storm surge approached 4.3 feet (1.3 meters), while peak inundation heights reached 3.9 feet (1.2 meters).

Location	Storm Surge (ft)
Tampa East Bay, Florida	4.3
Old Port Tampa, Florida	4.2
St. Petersburg, Tampa Bay, Florida	3.7
Fort Myers, Florida	3.6

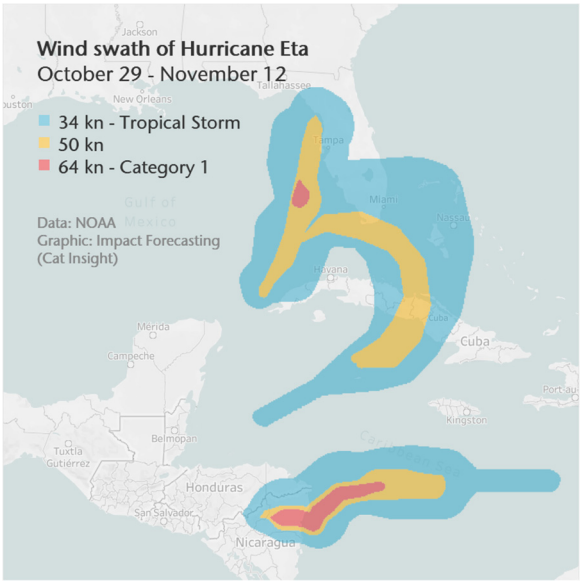
Location	Water Inundation (ft)
Old Port Tampa, Florida	3.9
Tampa East Bay, Florida	3.8
St. Petersburg, Tampa Bay, Florida	3.5
Port Manatee, Florida	3.0

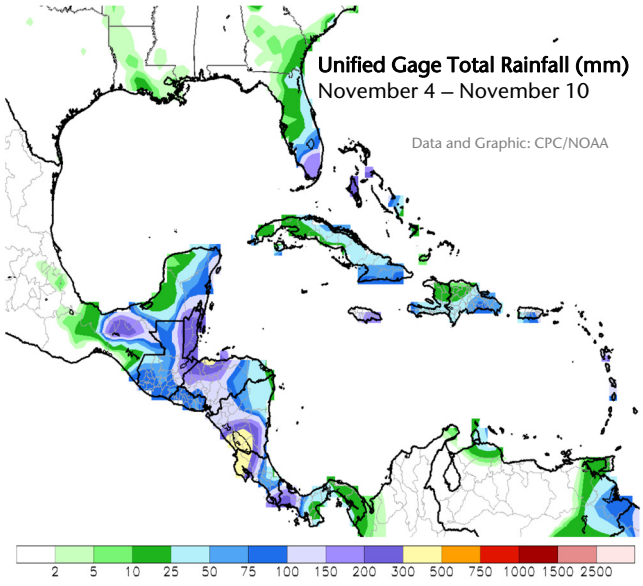


Intensity & Pressure

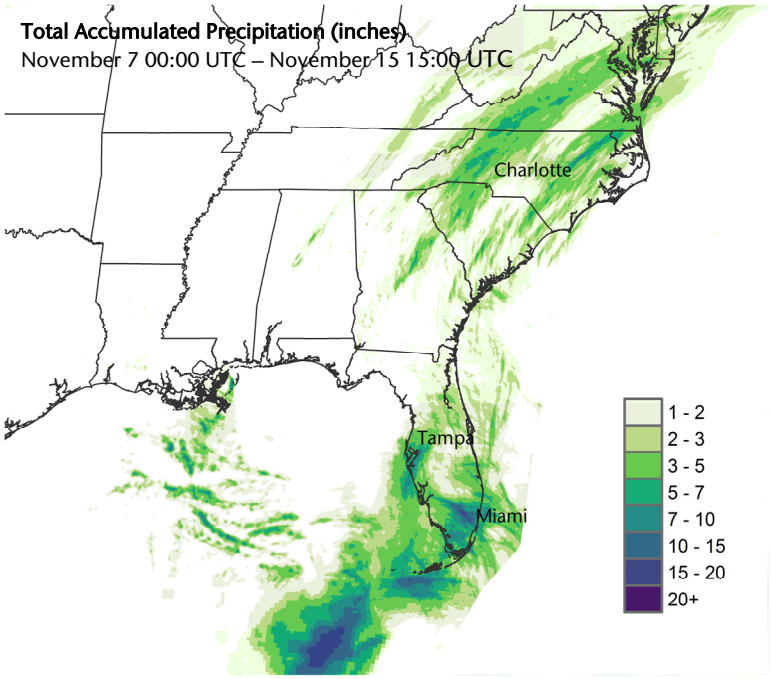


Wind Swath & Rainfall





In the United States, Eta produced significant rainfall accumulations across portions of southern and central Florida over a multi-day period between November 7-12. The table below highlights the highest station measured storm total precipitation values in Florida, based on data provided by the National Weather Service (NWS). By November 11-12, interactions between Eta and a frontal boundary created notable flash flooding in regions of the Carolinas and Mid-Atlantic.

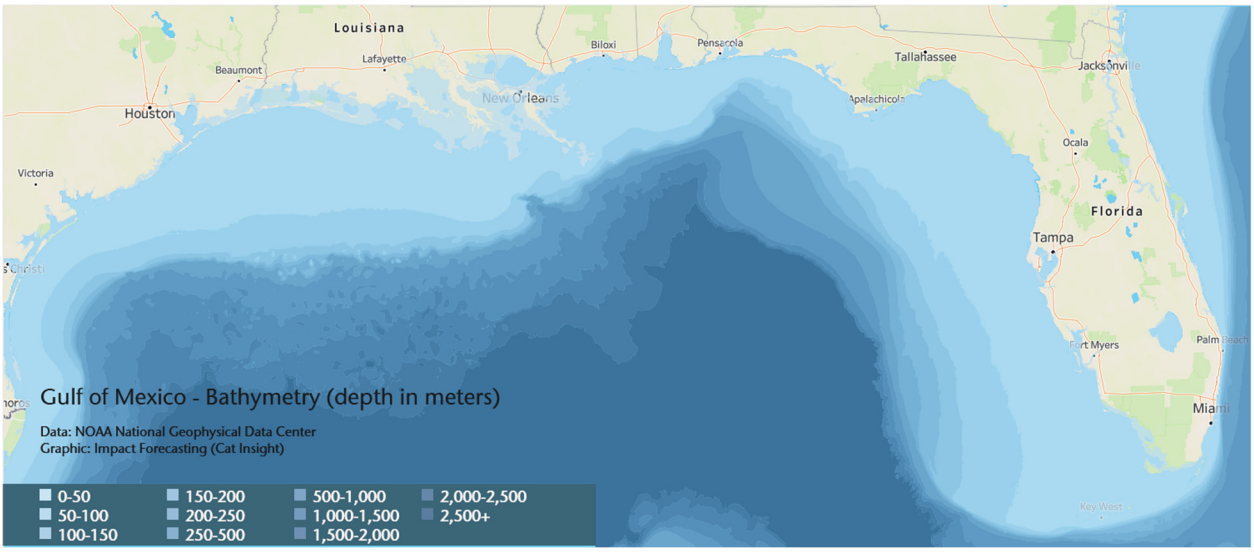


Location	Rainfall (in)
Miramar (2.1 miles W), Florida	14.12
Miramar (2.3 miles W), Florida	13.74
Weston, Florida	12.27
Cooper City, Florida	10.20
Southeast Weston, Florida	9.67
Davie, Florida	9.66
Site 63, Florida	9.64
Carol City, Florida	8.69
Northeast Weston, Florida	8.14
Rotenberger WMA, Florida	7.68

MRMS Multi-Sensor Precipitation (greater than 1 inch) from Eta
Data: NSSL/MRMS; Graphic: Impact Forecasting (Cat Insight)

Bathymetry

One of the biggest regional concerns in terms of tropical cyclone landfalls in the Atlantic Ocean is along the west coast of Florida. This is an area – particularly the Tampa metro region – that has experienced a decades-long drought from a direct hurricane landfall. During that time, population and exposure growth has skyrocketed. Much of that exposure is along coastal locations and highly vulnerable to storm risk. One of the main reasons for the concern is the nearly ideal bathymetry along the west coast of Florida for significant storm surge. This is largely driven by the gradual shallow incline all along the coast. Such a pattern can very quickly accumulate a large volume of water that can rush ashore in tandem with a landfalling storm. While Eta was a moderate tropical storm while passing Tampa metro, it still resulted in more than 4 feet (1.2 meters) of storm surge. This only amplifies the concern if and when the next hurricane approaches this region.



Event Details

Central America

In **Nicaragua**, at least 2 million people were affected by Hurricane Eta, a majority of which were located in the North Caribbean Coast Autonomous Region (RACCN). Nationwide, 71,145 people were evacuated. As of this writing, two fatalities had been confirmed. Preliminary damage surveys from the National System for the Prevention, Mitigation and Attention of Disasters (SINAPRED) indicated that 9,981 structures were impacted to varying degrees, of which 1,890 residences were destroyed. Among the damaged structures included the Nuevo Amanecer Regional Hospital in Puerto Cabazes. The international loading dock in Puerto Cabazes was also heavily damaged. No less than 66 bridges across the country were impacted. At the peak, 49,273 homes were without power. Substantial impacts to agriculture and fruit trees, in addition to national protected areas occurred.

In **Honduras**, no less than 63 fatalities have been reported. Hurricane Eta affected at least 1.8 million people across the country, while 73,657 were evacuated. According to the Permanent Contingency Commission (COPECO), preliminary damage surveys indicated 14,242 homes were damaged, along with 29 bridges and 113 roads. Major inundation levels were reached along the Chamelecón River and Ulúa River. The Sula Valley region, in northwestern Honduras, was most impacted by heavy rainfall associated with Hurricane Eta. Honduran authorities estimated 152,000 hectares (375,600 acres) of agricultural land was affected by the storm.

In **Guatemala**, the National Coordination for Disaster Reduction (CONRED) reported no less than 649,685 people affected by Eta, while 103,867 residents were evacuated. As of this writing, initial damage surveys indicted 1,953 homes with minor damage, 21,930 with moderate damage, and 1,558 with severe damage. Additionally, 23 bridges, 133 roads, and 238 educational centers were either damaged or destroyed. Rescue operations were ongoing in the remote community of Queja *(*Alta Verapaz*)*, where a landslide triggered by the torrential rains from Eta was estimated to have buried at least 100 residents. As of November 12, CONRED had confirmed 96 fatalities across the country, while 46 people remain missing.

Landslide in San Pedro Soloma (Guatemala)
Source: CONRED

In **Mexico**, at least 184,000 people were affected by the heavy rains from Eta and an associated cold frontal boundary. The greatest impacts occurred in the states of Tabasco, Chiapas and Veracruz. A 3-day rainfall total of 562 millimeters (22.1 inches) ending the morning of November 6 was measured at Tzimbac (Chiapas). The National Civil Protection Coordination (CNPC), reported 65,541 flooded homes, and 27 fatalities in the wake of the cyclone and heavy rains. Four others remained missing.

Additional fatalities associated with Eta were noted in Panama (17), Costa Rica (2), and El Salvador (1).

Cuba

In **Cuba**, the provinces of Villa Clara, Ciego de Ávila, Sancti Spíritus and Camagüey were most affected by Tropical Storm Eta beginning November 8. Eta initially left at least 150,000 customers without electricity. Notable agricultural impacts spanning thousands of hectares (acres) of land were observed. In Manicaragua (Villa Clara), 360 millimeters (14.1 inches) of rainfall were measured by November 10. Transportation throughout the most affected regions was impacted, as flooded rivers forced the closure of multiple roads and highways.

United States

November 7-9

In **Florida**, a maximum wind gust of 70 mph (112 kph) was measured at Carysfort Reef (Florida Keys National Marine Sanctuary) on November 8. Rainfall totals of 3 to 6 inches (75 to 150 millimeters) were common across the Florida Keys. A maximum 72-hour rainfall total, ending the evening of November 9, of 6.48 inches (165 millimeters) was recorded in Key Largo. The heaviest rainfall totals in southeastern Florida approached 10 to 15 inches (250 to 380 millimeters), with locally higher amounts – particularly in localities of Broward and Miami-Dade Counties. A maximum measured storm total rainfall total of 14.12 inches (358 millimeters) occurred near Miramar (Broward County), of which 13.46 inches (342 millimeters) were recorded in a 24-hour period.

Flooded streets in Miami-Dade County (Nov 9)
Source: Miami-Dade Fire Rescue

Heavy rainfall prompted the National Weather Service (NWS) to issue Flash Flood warnings for portions of Miami-Dade and Broward Counties. This included Fort Lauderdale, where local streets quickly became inundated with flood waters which encroached upon residences, vehicles, and parking garages. The City of Miami reported over 50 service calls regarding the storm, a majority of which related to downed power lines and trees. By the morning of November 9, no less than 40,000 customers across the state experienced power interruptions.

November 11-12

In **Florida**, at least one fatality was reported. A wind gust of 69 mph (111 kph) was measured in Port Charlotte (Charlotte County) as Eta approached the coast on November 11. The heaviest rainfall totals approaching and exceeding 6 to 8 inches (150 to 200 millimeters) were observed south and west of the Tampa Bay area. A maximum storm surge of 4.3 feet (1.3 meters) was recorded in Tampa's East Bay.

In Hillsborough County, the Sheriff's Office responded to at least 110 emergency calls related to the storm. A majority of the calls involved flooded streets and roadways, as well as downed power lines and trees. Notable flooding and storm surge inundation impacted downtown Tampa Bay, covering vehicles and roadways, and entering parking garages. Numerous roadways were closed due to high water, including portions of Bayshore Boulevard.

In Pinellas County, several sailboats were washed ashore near Gulfport Beach. The county Sheriff's Office deployed high water rescue teams, rescuing at least 33 people whom were stranded in homes and along roadways.

In **North Carolina**, at least 30 people had to be rescued due to rising flood waters at a campground in Alexander County on November 12. In Charlotte (Mecklenburg County), incessant rainfall forced the closure of sections of Interstate 85. Nearby, no less than 140 people were evacuated from a school as floodwater endangered the building. Multiple instances of flooded vehicles and roadways, along with downed trees and power lines were observed across western North Carolina. Preliminary reports indicated that at least seven people died and multiple others remained missing.

In **Virginia**, the James River in Richmond was anticipated to reach its highest levels since 1996 according to the NWS. On November 12, ongoing flooding prompted the City to close portions of the flood wall, which was built to protect low lying areas of Richmond. To the southwest, the Roanoke River at Brookneal rose to major flood stage, cresting near 34 feet (10.3 meters), which is 14 feet (4.3 meters) above the flood stage.

Financial Loss

Based on continued reports coming out of Central America – in addition to the United States – it is anticipated that the overall aggregate economic cost due to Hurricane Eta will reach a multi-billion-dollar threshold. Preliminary economic analysis out of Honduras and cited by regional officials suggest an impact approaching HNL125 billion (USD5.1 billion). This figure includes a mixture of direct and indirect costs due to physical damage to structures, infrastructure, and the agricultural sector. Should this estimate verify, it would represent a sizeable portion of the country's gross domestic product (GDP); USD25 billion (World Bank; 2019).

In Nicaragua, the government agency SINAPRED estimated the preliminary damage at USD172 million. Further damage costs across parts of Mexico, Costa Rica, Panama, El Salvador, Guatemala, Costa Rica, and Belize were likely to add hundreds of millions (USD) more to the overall total.

In the United States, it remains too preliminary to provide a specific economic or insured loss. The level of flood inundation across Florida, the Carolinas, and Virginia does suggest the economic loss exceeding USD100 million. Given low National Flood Insurance Program (NFIP) take-up across many of the hardest-hit flood areas, it is anticipated that much of the overall economic cost to residential and commercial property will not be insured.

Multiple tropical storms aggravate flooding in SE Asia

Multiple cyclonic storms made landfall and aided in enhancement of the flooding situation in the Southeast Asian countries of Philippines and Vietnam. From November 7-11, Tropical Storm Etau brought some flood- and wind-related impacts in the Philippines and Vietnam. Further, according to the JTWC, Typhoon Vamco rapidly intensified and attained an initial peak intensity of 175 kph (110 mph) – Category 2-equivalent on the Saffir-Simpson Scale – shortly before making its first landfall in Quezon Province, Philippines on November 11. It made two additional landfalls in Quezon while crossing Luzon. As of this writing, at least 13 people were confirmed dead in the Philippines (11) and Vietnam (2). In addition to tens of thousands of houses being damaged or destroyed, large swaths of agricultural land and public infrastructure were left inundated.

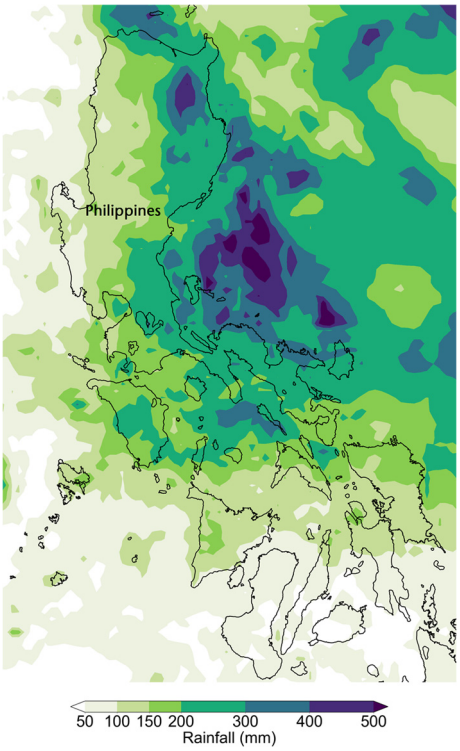
Meteorological Recap

Typhoon Vamco (Ulysses) – On November 8, strong moisture convergence resulted in the formation of a tropical depression approximately 245 kilometers (150 miles) north-northwest of Palau island in the West Pacific Ocean, and both the Joint Typhoon Warning Center (JTWC) and the Japan Meteorological Authority (JMA) began monitoring it. Given its proximity to the Philippines area of responsibility, the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) started issuing severe weather advisories on the system and assigned it a local name 'Ulysses'. During the morning hours on the next day, the system had consolidated further and the JMA upgraded the system into a tropical storm, naming it 'Vamco'. It became the 21st named storm of the 2020 Northwest Pacific Typhoon Season. Shortly after this, JTWC issued its first warning on the system after upgrading it to a tropical depression. The system continued to track generally west-northwest through the warm sea surface temperatures of the Northwest Pacific Ocean and became better organized.

As the system neared the Luzon Island of the Philippines, both the JMA and the PAGASA upgraded it into a severe tropical storm by the evening hours on November 10.

According to the JTWC, Vamco intensified to 140 kph (85 mph), based on the latest Dvorak satellite estimates at approximately 00:00 UTC on November 11 – Category 1-equivalent of the Atlantic hurricane on the Saffir-Simpson Hurricane Wind Scale. Vamco was the 10th typhoon of the 2020 Northwest Pacific Typhoon Season. Extremely favorable atmospheric and oceanic conditions aided in further intensification of the system and for one 24-hour stretch ending on November 11 18:00 UTC, it strengthened by 60 kph (40 mph) to attain an initial peak intensity of 175 kph (110 mph); Category 2 on the Saffir-Simpson Scale. At this point, Typhoon Vamco had developed well-defined central convection with super-dense, deep, and symmetrically aligned convective bands wrapping around its center, as revealed by the microwave satellite imagery and radar scans. At its peak, Vamco had 175 kph (110 mph) winds (1-minute average sustained) and minimum central pressure of 961 millibars. These values were based on various Dvorak satellite intensity estimates analyzed by the JTWC.

On November 11 at approximately 14:30 UTC (10:30 PM local time), Vamco first came ashore near the Patnanungan Municipality in northern Quezon Island of Philippines. Approximately one hour later, Vamco made its second landfall near the town of Burdeos in Quezon's Polillo Island. Later, at approximately 17:30 UTC, Vamco made its third landfall in Quezon's General Nakar. Shortly before the landfall, PAGASA raised a warning Signal 3 (on a scale of 1 to 5) for the Luzon island, including the metropolitan areas of Manila and CAR. On November 12 at 03:00 UTC, Vamco was located approximately 165 kilometers (100 miles) west-northwest of Manila in Philippines with 1-minute sustained winds of 140 kph (85 mph), according to the JTWC. The system is forecast to make landfall in Vietnam later this week.



Satellite estimate of rainfall (November 2 - 11)
Data: GPM, Graphic: Cat Insight

Tropical Strom Etau (Tonyo) – On November 7, the JMA identified a well-defined low-pressure system located approximately 850 kilometers (530 miles) east-southeast of Manila in Philippines. Since the system had originated in the Philippines area of responsibility, the PAGASA started monitoring the system after giving it a local name 'Tonyo'. Later, on November 8, the JTWC also started following the suit while it was tracking westward through the warn waters of the West Pacific Ocean. At this point in time, the JTWC assessed a moderate probability of tropical cyclogenesis; however, the rapid consolidation of the system prompted the JTWC to issue its first tropical cyclone formation alert on the system by the afternoon hours of November 8. At approximately 03:00 UTC on the same day, the JTWC upgraded the system into a tropical depression. Owing to the moderate wind shear, the system remained poorly organized as it neared the central Philippines archipelago. Tonyo tracked through the eastern Visayas and central Luzon islands of the Philippines archipelago on November 9 and emerged as a tropical depression in the western Philippines Sea. The system exited the Philippines area of responsibility by approximately 09:00 UTC and the PAGASA issued its final severe weather advisory on the system. It further intensified into a tropical storm according to the JMA and was named 'Etau'. Later, the system tracked generally westward through the South China Sea and came ashore near the near Nha Trang City of the Vietnamese province of Khanh Hoa on November 10. The system brought heavy rainfall and damaging winds in the central provinces of Vietnam. Further, Etau weakened into a remnant low as it entered the neighboring country of Cambodia.

Tropical Strom Atsani – On October 28, the Joint Typhoon Warning Centre (JTWC) identified a tropical disturbance located approximately 152 kilometers (95 miles) southwest of Chuuk island – one of the four states of the Federated States of Micronesia. The system rapidly organized while tracking through the favorable atmospheric and oceanic environment of the Western Pacific Ocean. The Japan Meteorological Agency which had already started tracking the system, upgraded it into a tropical depression. Later, on October 29, it developed into a tropical storm, receiving the international name 'Atsani' by the JMA, thus becoming the 20th named storm of the 2020 Northwest Pacific Typhoon Season.

By the morning hours on November 1, the system entered the Philippines area of responsibility and the PAGASA started issuing severe weather advisories on the system and locally named it 'Siony'. The system attained an initial peak intensity of 100 kph (60 mph) on November 5 at 00:00 UTC, according to the JTWC. Atsani continued to track northwest through the Luzon strait and started to weaken and rapidly deteriorated. The system was last tracked by the JTWC to the south of Taiwan on November 7. The storm brought damaging winds and heavy rainfall in the Northern Luzon Island of Philippines and southern Taiwan from November 4 – 6; however, it did not make landfall in any of these countries.

Event Details

Typhoon Vamco became the second typhoon to strike the **Philippines** in November of this year. Vamco made its first landfall near the Patnanungan Municipality located in the main Luzon Island of Philippines as a Category 2-equivalent storm, bringing hurricane-force winds and torrential rains there. Notable impacts from the Vamco were mostly limited to the Luzon island, where it made all the three landfalls. Several million residents were directly affected in the storm-related incidents. Due to the torrential rains associated with typhoon Vamco, the capital city of Manila saw one of the worst floods in years. Tens of thousands of houses in low-lying areas of Manila and its suburbs were flooded up to the first-floor ceiling, prompting the residents to take refuge on the rooftops while awaiting rescue. According to the media reports, thousands of residents of Manila were still stranded in some areas where the floodwater reached as high as electricity poles. Disaster officials used boats and other floats to evacuate the residents to safety; however, the rescue efforts were severely affected by the heavy waterlogging.

Fallen tree due to Typhoon Vamco
Source: Reuters

In anticipation of the storm, nearly 200,000 residents from the low-lying areas if the Luzon island were preemptively evacuated and shifted to the government evacuation centers. Disaster officials, along with the tens of thousands of Army and Police personnel were deployed for the restoration and rescue works. Massive power outages were reported and at least 5 million residents were left without electricity; most of these households were in Manila. As of this writing, electricity in most of the affected areas was yet to be restored. Mobile and internet communication in large areas of were knocked out, mainly due to the fallen trees and damaged utility poles. According to the initial reports, tens of thousands of residential houses along with thousands of other structures were either damaged or destroyed and a vast area of cropland was left inundated. Full extent of the damage was not available as of this writing.

Tropical Storm Etau brought damaging winds and heavy rains in southeastern parts of **Vietnam** on November 10-11. Heavy rains associated with the storm prompted flash flooding and waterlogging in large areas of Khanh Hoa province. In anticipation of the storm, approximately 15,000 residents belonging to the low-lying areas of coastal Vietnam were preemptively evacuated to the government relief centers. Tens of thousands of residents were critically affected in storm-related incidents. According to the Vietnam Disaster Management Authority, at least two people were killed. Hundreds of homes were damaged or destroyed and an extensive area of cropland was left inundated.

Financial Loss

Given the extensive nature of damage caused by Typhoon Vamco – particularly in the capital city of Manila – the aggregate economic losses were expected to be significant. Separately, economic losses associated with Tropical Storm Etau in Vietnam were likely to be generally negligible compared to the recent impacts from Typhoon Molave.

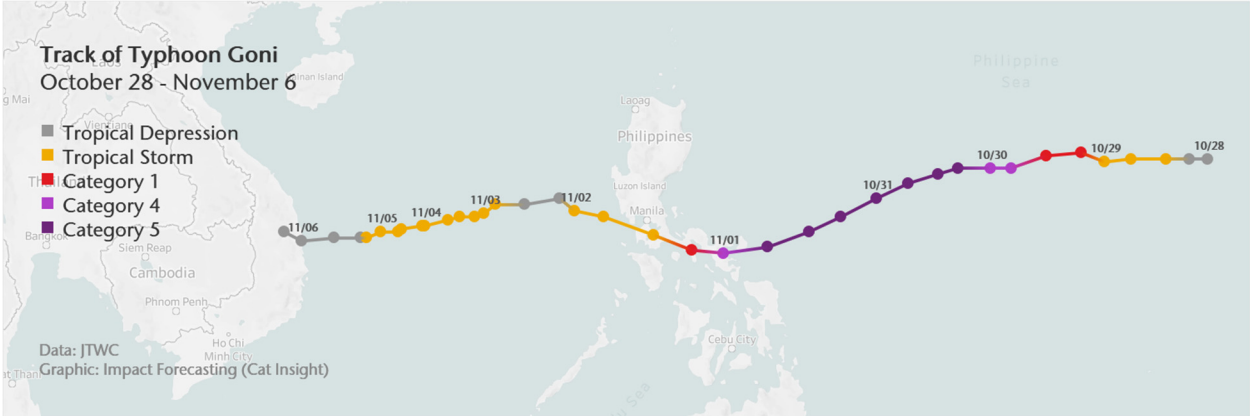
Given continued low insurance penetration across most Southeast Asian countries, it was anticipated that most economic losses will be uninsured.

Update: Typhoon Goni

Typhoon Goni became the strongest landfalling storm in recorded history. At its peak, Goni attained a peak intensity of 315 kph (195 mph) winds (1-minute sustained average) shortly before making landfall near Bato Town in the Philippines' Catanduanes Province on November 1. According to the Philippines' NDRRMC, at least 25 people were killed, and more than 400 others were injured in storm-related incidents. Nearly 171,000 homes and tens of thousands of other structures along with an extensive area of cropland were damaged in flood- and wind-related incidents. Total economic losses to agriculture and infrastructure alone were estimated at PHP18 billion (USD375 million).

Meteorological recap of Super Typhoon Goni can be found in previous weekly reports.

Event Details



On November 1, Super Typhoon Goni approached Bato Town of Luzon's Catanduanes Province with 1-minute average sustained winds of 315 kph (195 mph) and caused catastrophic damage in the parts of Visayas and Luzon islands of Philippines archipelago. The most widespread impacts of Typhoon Goni were predominantly seen in the Region V (Bicol Region); additional damage and casualties were reported from the administrative regions of Region III (central Luzon), Region VIII (eastern Visayas), Mimaropa, NCR, and Calabarzon.

In anticipation of the storm, more than 500,000 people were pre-emptively evacuated by disaster management officials while approximately 2 million people were critically affected or displaced in storm-related incidents. Due to the extensive damage caused by the Typhoon Goni, electricity and internet communication in large areas were knocked out and it took multiple days for the government officials to restore the supply. Thousands of Army and Police personnel along with the disaster management officials were deployed for the rescue and restoration efforts; however, the restoration and relief works were severely affected by the heavy waterlogging on highways caused by the prolonged rains in Philippines.

Damage caused by Goni in Philippines
Source: UN-OCHA

According to the Philippines' NDRRMC, at least 25 people were killed and no less than 400 others were injured while at least six people were still missing as the search operation continues. A minimum of 171,000 residential buildings along with tens of thousands of other structures were either damaged or destroyed. In addition, approximately 75,000 hectares (200,000 acres) rice and other crops were sustained damage in storm-related incidents. Severe losses were also incurred on the fisheries and live stocks. As of November 11, the NDRRMC monitored 35 incidents in which more than 60 road sections and 7 bridges were damaged – majority of them were not passable. Frightening storm surges of up to 5 meters (16 feet) in height swept away tens of thousands of houses in the coastal areas of Bicol Region, according to media reports.

These estimates could significantly increase as the broad damage assessments begin. As of November 11, damage to the residential houses reported by the NDRRMC is provided in the table below:

Region/ Province	Population Affected	Destroyed	Damaged	TOTAL
Region V (Bicol Region)	**1,089,000**	**35,476**	**110,008**	**145,484**
- Albay	475,000	17,299	58,975	76,274
- Catanduanes	205,000	13,029	22,076	35,105
- Camarines Sur	170,000	4,585	20,232	24,817
- Sorsogon	160,000	447	7,789	8,236
- Camarines Norte	39,000	116	934	1,050
- Masbate	42,000	0	2	2
Calabarzon	**485,000**	**1,880**	**22,603**	**24,483**
- Quezon	355,000	1,427	16,887	18,314
- Batangas	84,000	426	5,502	5,928
- Laguna	34,000	27	213	240
Mimaropa	**119,000**	**93**	**711**	**804**
- Marinduque	32,500	93	709	802
- Oriental Mindoro	35,500	0	2	2
CAR	**500**	**0**	**2**	**2**
Total (Philippines)	**2,030,000**	**37,449**	**133,324**	**170,773**

Financial Loss

Typhoon Goni inflicted severe losses to the agricultural sector and infrastructure. According to the NDRRMC, losses in the agricultural sector were estimated at PHP5 billion (USD105 million) and the infrastructure-related losses were estimated at around PHP13 billion (USD270 million); resulting in a total combined economic loss of PHP18 billion (USD375 million). Damage to residential, commercial, or automobile assets was not included in this figure.

Flooding in Eastern Spain results in notable economic loss

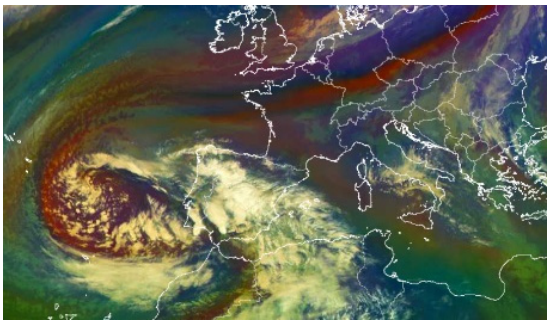
Strong storms generated heavy rainfall in parts of the Valencia region in Eastern Spain on November 5-6. Notable flooding occurred, with heavy agricultural loss and more than 9,000 property insurance claims expected to be filed. Total economic losses were expected to exceed EUR120 million (USD142 million).

Event Details

Extremely intense rainfall hit the Valencian Community region in eastern Spain on November 5-6, caused notable flooding. This period of heavy rain and strong winds was associated with a cut-off low pressure system (named “Ophelia” by the FU Berlin), which generated thunderstorms across the Iberian Peninsula. This was in contrast with much of Central and Eastern Europe, which experienced anticyclonic weather with little or no cloud formation and rainfall. At the same time, most of the Spanish territory did not experience damaging impacts, and severe effects were concentrated on the eastern coast. The most affected were Ribera Alta and Ribera Baixa areas, with rainfall peaking at 499 millimeters (19.6 inches).

Valencian Association of Farmers (AVA) estimated agricultural losses at EUR62 million (USD73 million), possibly even higher. Citrus and persimmon cultures were described as the most affected, with 15,000 and 4,000 hectares (37,000 and 10,000 acres) damaged, respectively. Notable loss also occurred on agricultural infrastructure. Another industry association, La Unió, initially reported EUR8.0 million (USD9.5 million) damage due to hail and wind alone, mostly in the Ribera area.

Emergency services received more than 4,000 calls for assistance, as water inundated infrastructure, homes and agricultural land. Further damage was noted on rail and road infrastructure, which was being assessed by local authorities. There was a widespread property flooding in the Valencian province, particularly in the area south of Valencia, with several thousands of homes, businesses and vehicles inundated. Additional damage was also reported from other provinces, including Andalucía and Malaga.



Low pressure system affecting Spain (Nov 5 12:00)
Source: CHMI

Washout and erosion damage on agriculture
Source: Provincial Council of Valencia

Financial Loss

The Insurance Compensation Consortium registered more than 4,000 claims as of November 12, expecting the total number of residential, motor and commercial claims to reach approximately 9,200; with losses of EUR43 million (USD51 million). Vast majority of notifications came from Valencia, the rest from Alicante and Castelló. The agency also provided a preliminary breakout of the registered claims by municipality, suggesting the highest impact in Sueca with 550 claims, followed by Algemesí (368) and Benifaió (340). Further insured losses were expected in the agricultural sector.

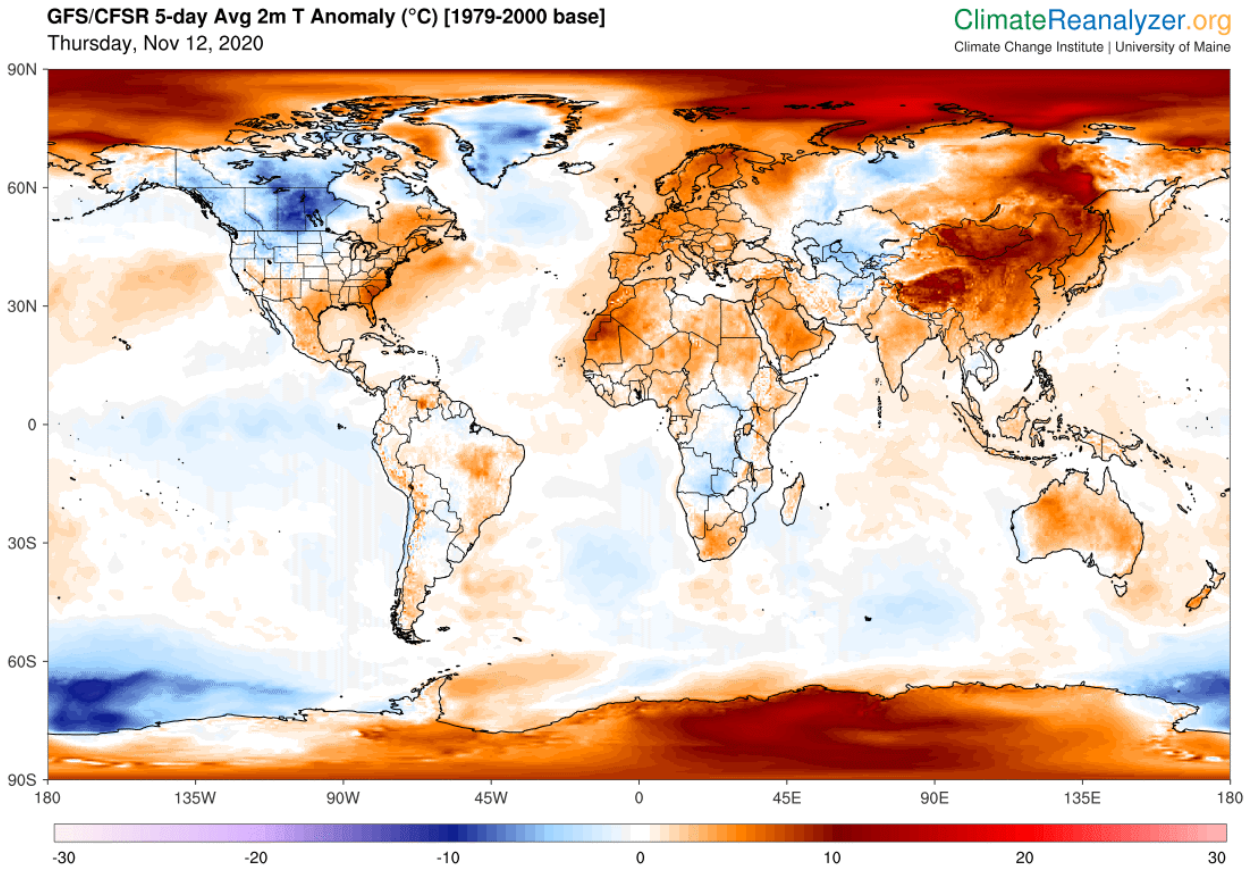
Natural Catastrophes: In Brief

Flooding (Greece)
Severe thunderstorms associated with a low-pressure area located in the eastern Mediterranean generated localized flash flooding in parts of Crete Island in Greece on November 9-10. Perhaps the worst situation was in the eastern part of the island with already saturated soils, particularly Hersonissos, which declared a state of emergency. There were dozens of flooded homes, and notable damage to infrastructure. Total losses were being assessed, and were expected to reach into the lower millions EUR. No fatalities were reported.

Flooding (Indonesia)
Torrential rainfall prompted flash floods and triggered landslides in the Indonesia's provinces of Aceh and East Java. Hundreds of thousands of residents were critically affected in rain-related incidents; however, no casualties were reported as of this writing. According to the ASEAN Coordinating Centre for Humanitarian Assistance on Disaster Management (AHA Centre), no less than 8,000 residential houses were either damaged or destroyed since November 1. In addition, severe losses were inflicted in agriculture and on the public infrastructure. Total combined economic losses were anticipated to be in the millions (USD).

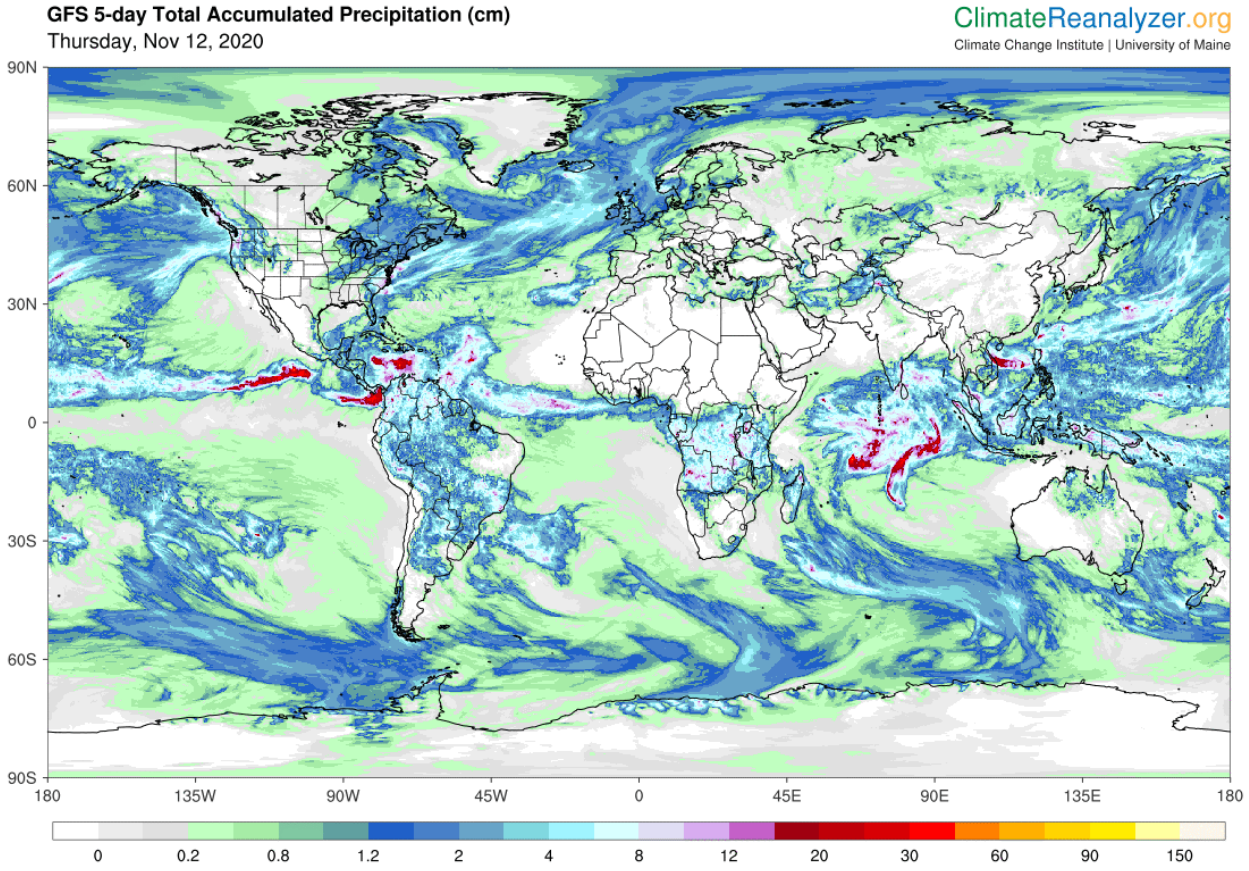
Severe Weather (United States)
A severe squall line associated with a cold frontal boundary swept across portions of the Midwest and Great Lakes throughout the afternoon and evening hours on November 10. The greatest impacts occurred throughout western and northern Illinois, southern Wisconsin, northwest Indiana, and western Michigan. Straight-line wind gusts exceeding 70 mph (112 kph), severe hail, and isolated tornadoes were the primary hazards associated with this event. Maximum straight-line wind gusts of 79 mph (127 kph) were measured in Wisconsin at Mitchell Airport (Milwaukee County), and in Illinois (Kane County). The storms left at least 85,000 customers in Illinois and Wisconsin without power. Multiple instances of downed trees and power lines were reported throughout the most affected regions. In Illinois, heavy rainfall flooded streets in Chicago (Cook County), while wind driven hail resulted in structural damage in Winnebago County. As of this writing, the National Weather Service (NWS) confirmed two EF-1 tornadoes in Mercer County. Total economic and insured losses were anticipated to reach into the millions (USD).

Global Temperature Anomaly Forecast



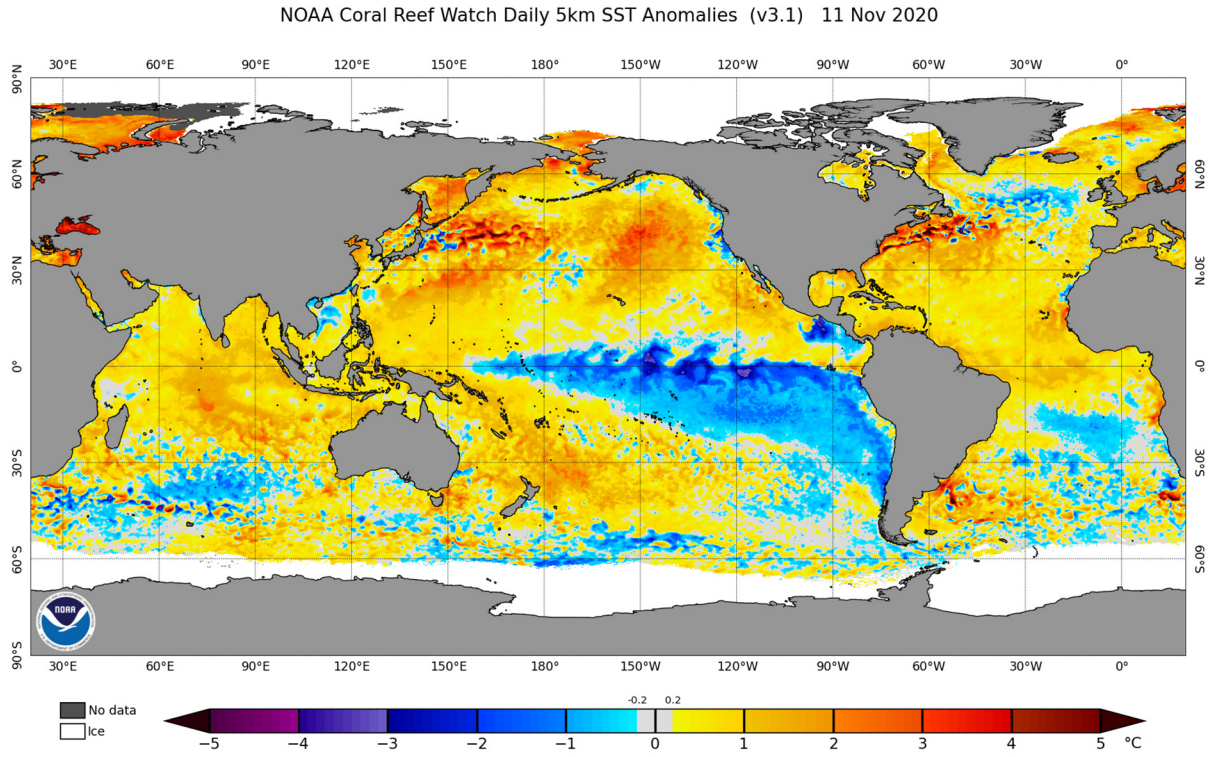
Source: Climate Reanalyzer, Climate Change Institute, University of Maine, USA

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.

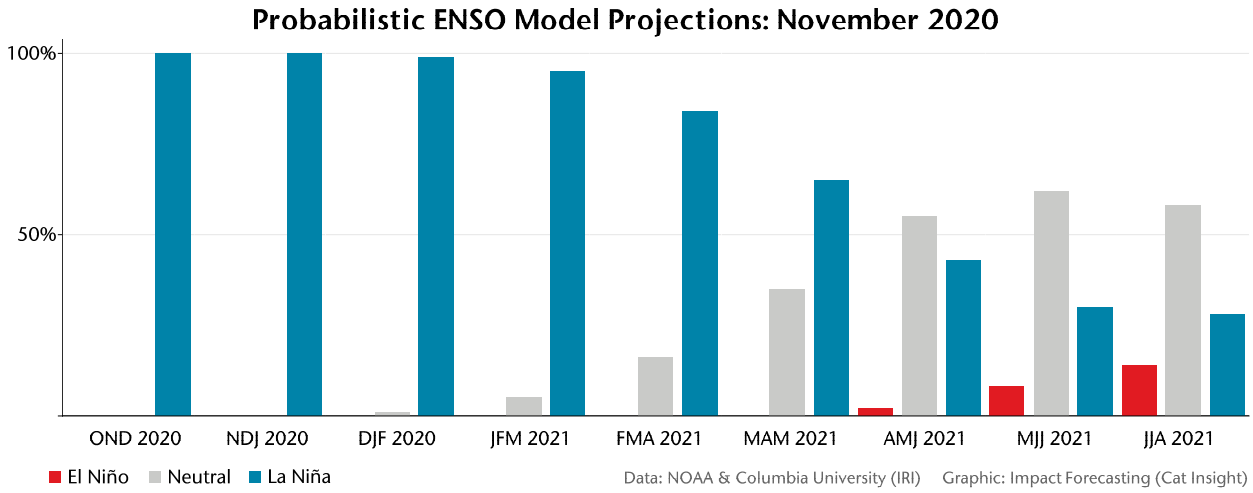
Select Current Global SSTs and Anomalies

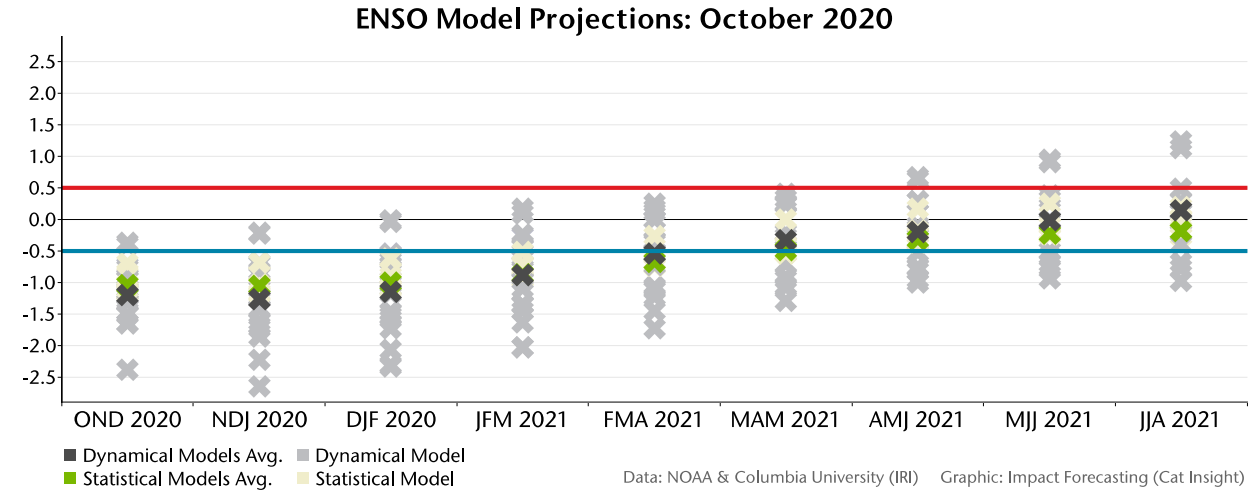
Location of Buoy	Temp (°C)	Departure from Last Year (°C)
Eastern Pacific Ocean (1,020 miles SW of San Salvador, El Salvador)	25.5	+0.8
Niño3.4 region (2°N latitude, 155°W longitude)	24.8	-1.9
Western Pacific Ocean (700 miles NNW of Honiara, Solomon Islands)	29.5	-0.8

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.





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.*

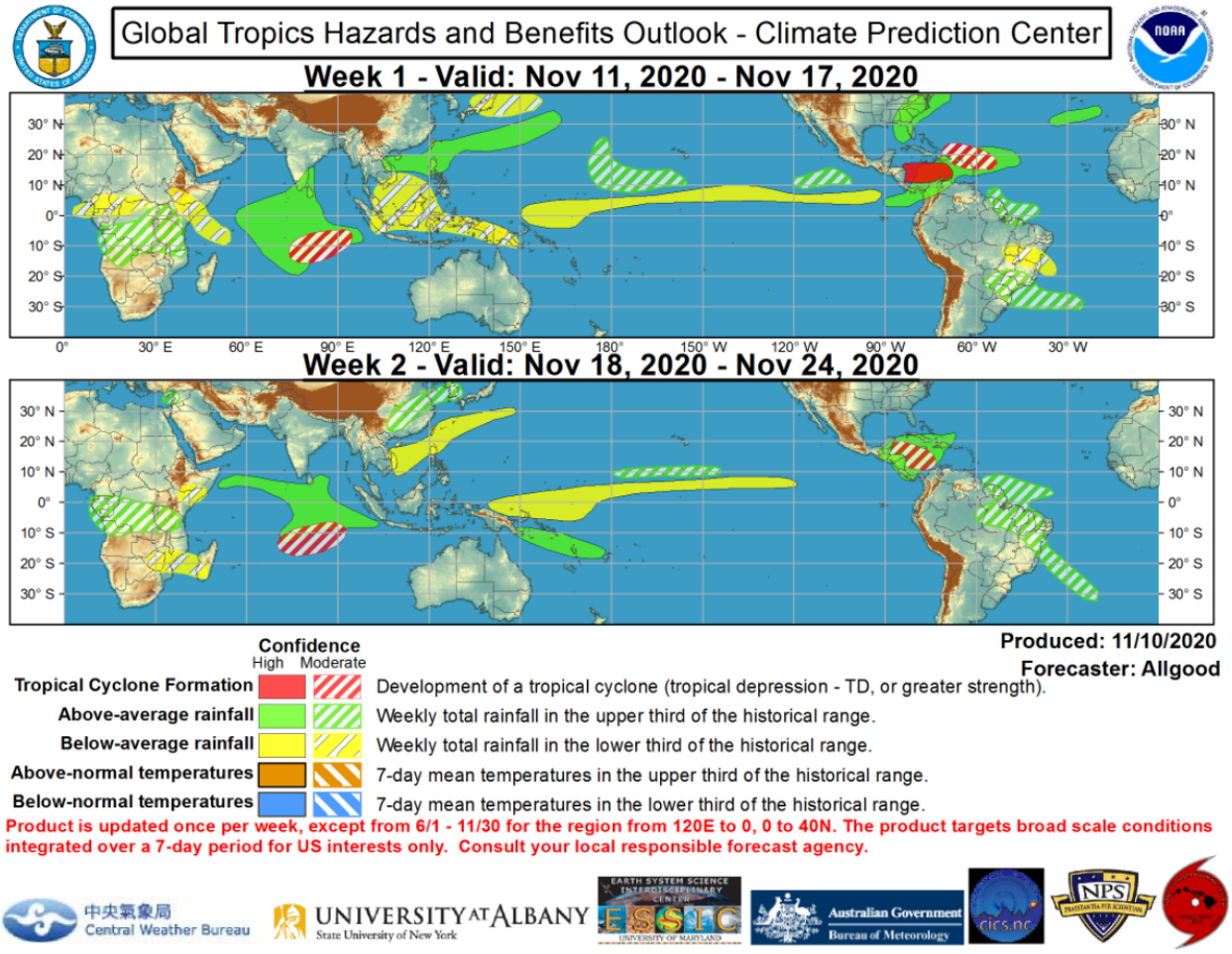
La Niña *refers to the periodic cooling of sea-surface temperatures (-0.5°C) across the east-central equatorial Pacific. It represents the cold phase of the ENSO cycle.*

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.*

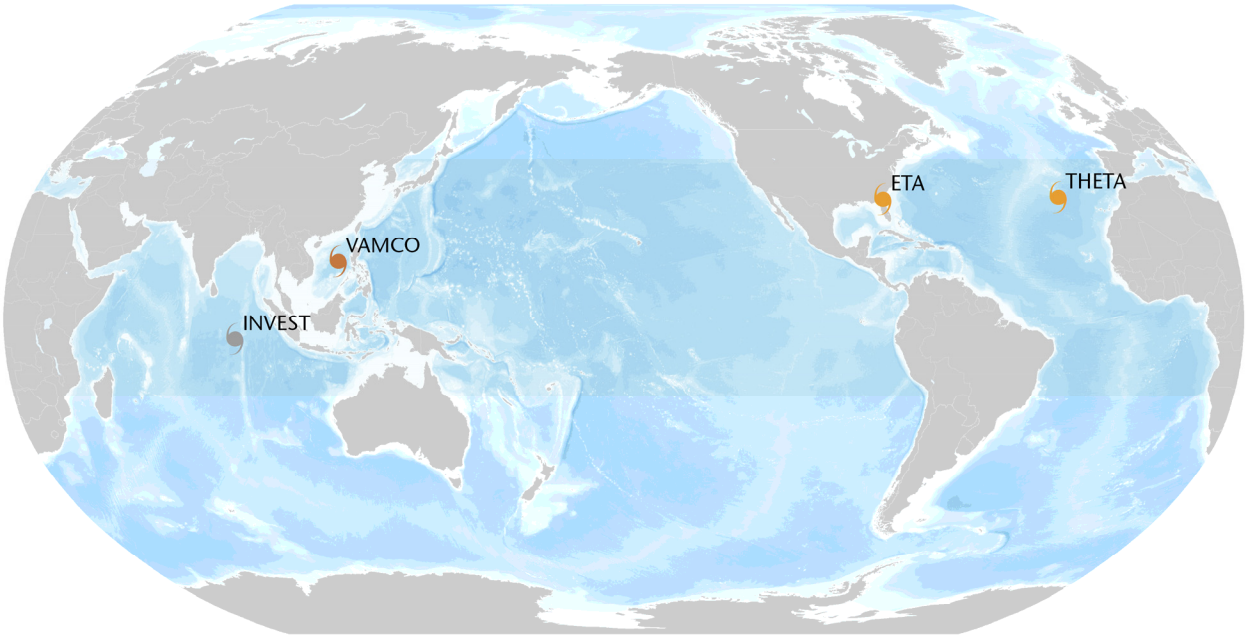
El Niño (La Niña) is a phenomenon in the equatorial Pacific Ocean characterized by a five consecutive 3-month running mean of sea surface temperature (SST) anomalies in the Niño 3.4 region that is above the threshold of +0.5°C (-0.5°C). This is known as the Oceanic Niño Index (ONI).

Global Tropics Outlook



Source: Climate Prediction Center

Current Tropical Systems



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

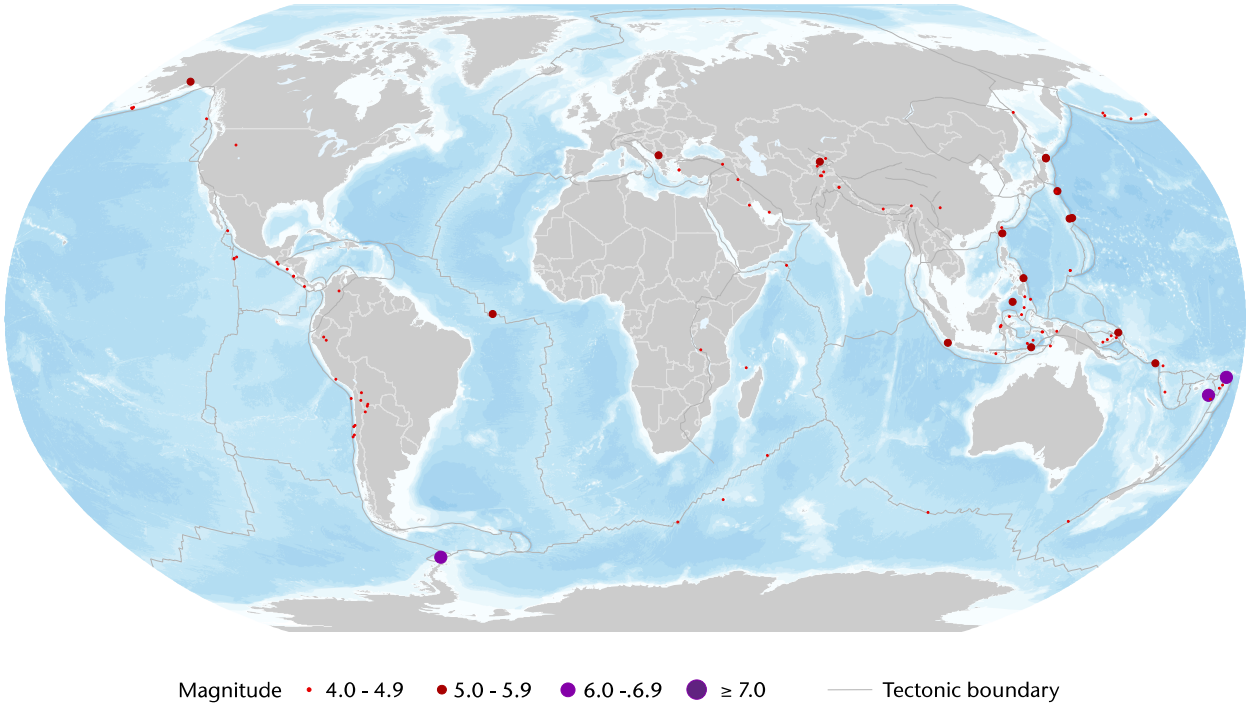
Location and Intensity Information

Name*	Location	Winds	Storm Reference from Land	Motion**
TS Eta	30.8°N, 81.4°W	40 mph	40 miles (65 kilometers) NNE of Jacksonville, Florida	NNE at 15 mph
TS Theta	31.6°N, 28.8°W	65 mph	455 miles (730 kilometers) SSW of the Azores	E at 12 mph
TY Vamco	15.2°N, 116.9°E	85 mph	610 miles (975 kilometers) E of Da Nang, Vietnam	W at 13 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 6 – 12

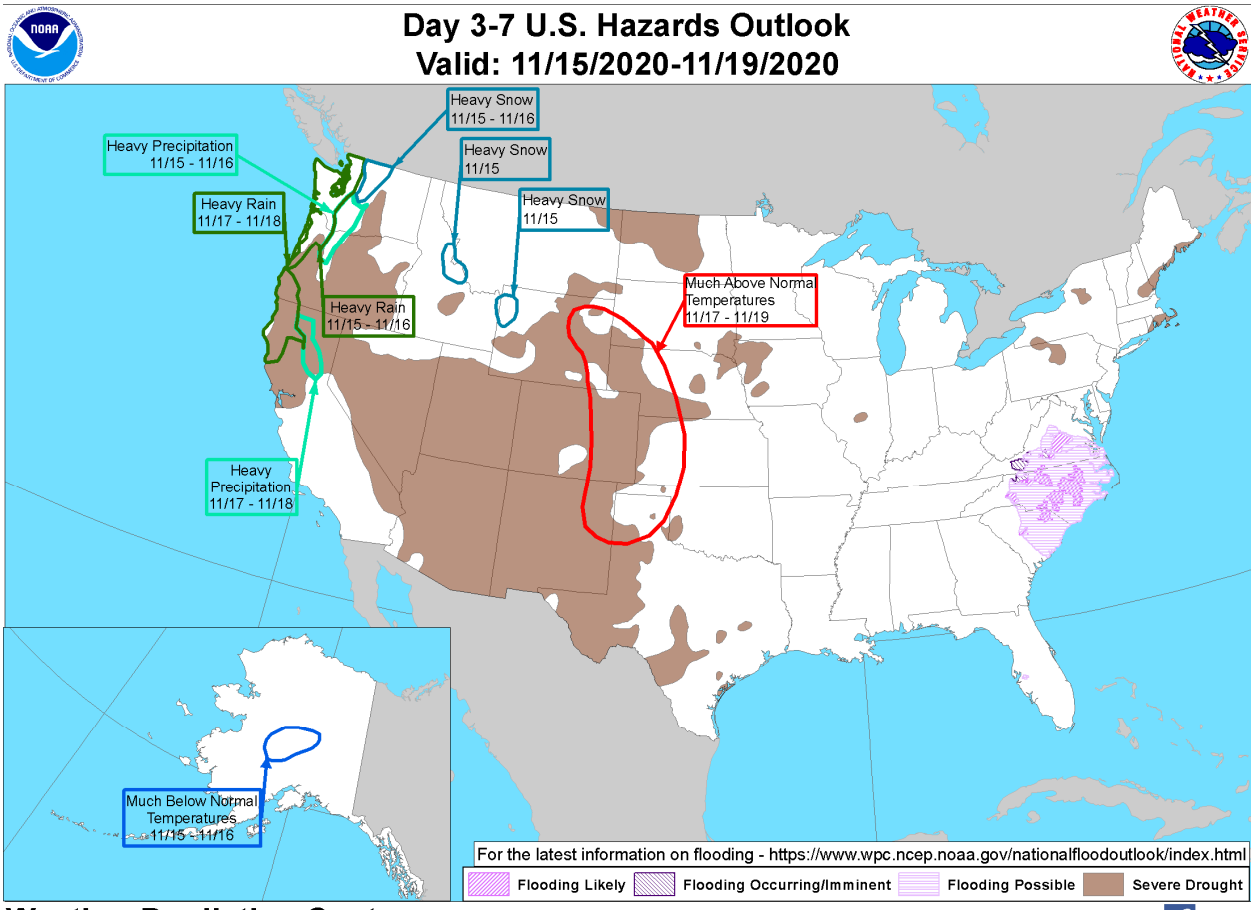


Significant EQ Location and Magnitude (≥M6.0) Information

Date (UTC)	Location	Magnitude	Depth	Epicenter
11/06/2020	62.28°S, 58.06°W	6.0	6 km	South Shetland Islands
11/07/2020	15.27°S, 173.56°W	6.1	29 km	79 kilometers (49 miles) NNE of Hihifo, Tonga
11/11/2020	19.74°S, 177.55°W	6.0	417 km	28 kilometers (17 miles) WNW of Haveluloto, Tonga

Source: United States Geological Survey

U.S. Weather Threat Outlook



Potential Threats

- In the short term, a potent low-pressure system, associated with an active pattern in the Pacific, will create unsettled weather in the Northwest. This will feature heavy rainfall across the coastal Pacific Northwest between November 15-16, with heavy wintry precipitation and snow at higher inland elevations.

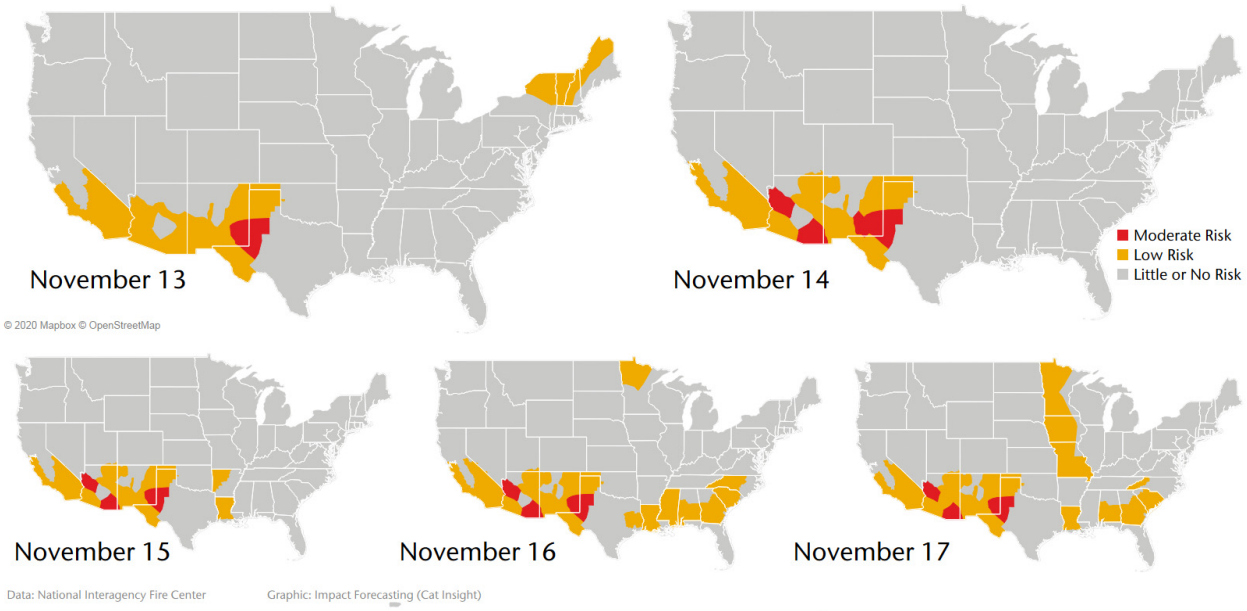
- The moisture will shift southward by November 17-18, bringing heavy precipitation to northwestern California and western Oregon.

- Much above normal temperatures, and dry downslope winds are anticipated across the central and southern High Plains between November 17-19.

- Ongoing flooding is likely across the Southeast and Mid-Atlantic, following incessant rainfall earlier in the week.

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.



Annual YTD Wildfire Comparison: November 10

Year	Number of Fires	Acres Burned	Acres Burned Per Fire
2016	57,117	5,087,449	89.07
2017	54,038	8,876,521	164.26
2018	51,593	8,346,029	161.77
2019	45,555	4,574,521	100.42
2020	49,557	8,727,443	176.11
10-Year Average (2010-2019)	**53,323**	**6,471,023**	**121.36**

Source: National Interagency Fire Center

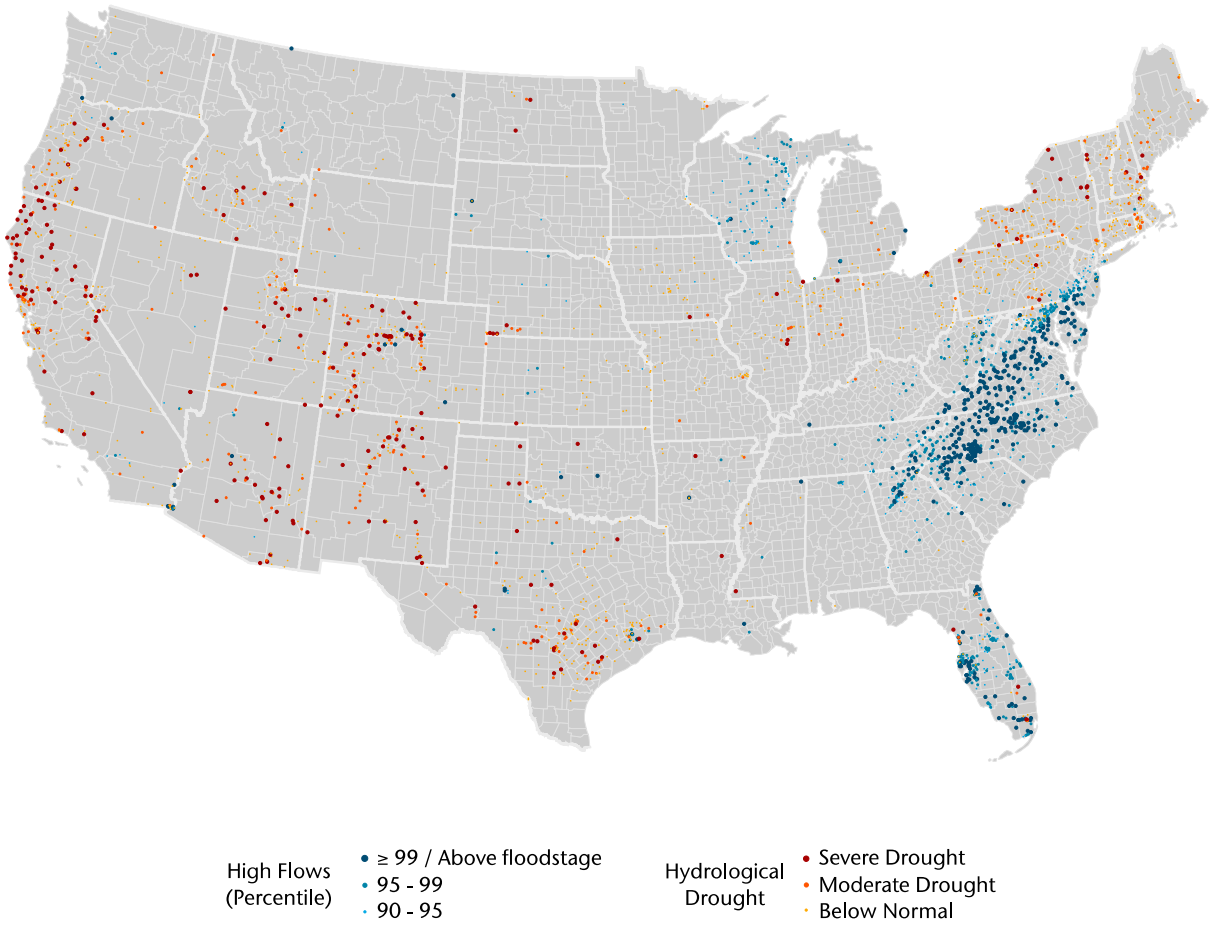
Top 5 Most Acres Burned by State: November 12

State	Number of Fires	Acres Burned	Acres Burned Per Fire
California	9,557	3,195,941	334.41
Arizona	2,357	954,832	405.10
Washington	1,611	788,055	489.17
Oregon	1,843	723,601	392.62
Colorado	1,070	625,317	584.41

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



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
James River at Cartersville, Virginia	21.23	99.18
Rappahannock River near Fredericksburg, Virginia	10.93	99.12
Tygart Valley River at Belington, West Virginia	9.83	99.12
Cheat River near Parsons, West Virginia	10.35	99.07
Buckhannon River at Hall, West Virginia	8.14	99.06

Source: United States Geological Survey

Source Information

Update: Hurricane Eta

U.S. National Hurricane Center
U.S. National Weather Service
Servicio Meteorológico Nacional (SMN)
Preliminary summary on damages caused by Hurricane ETA in Nicaragua, SINAPRED
The number of victims of tropical storm Eta rises to 62, La Presna
Economic damages for Eta in Honduras would amount to five billion dollars, La Prensa
Attention to 668 incidents caused by the tropical phenomenon Eta, CONRED
Cuba assesses damage caused by Eta, OnCuba News
Eta causes dangerous floods in central Cuba, OnCuba News
Eta leaves behind intense rains in Villa Clara and Sancti Spíritus, Juventud Rebelde
In Tabasco, Veracruz and Chiapas, 184 thousand affected, La Jornada
Tropical Storm Eta floods South Florida, could make second landfall late week, The Washington Post
Miami-Dade Residents See Major Flooding, Downed Trees, and Power Outages From Eta, NBC 6 South Florida
Latest Updates: The aftermath of Tropical Storm Eta, Tampa Bay Times
I-85 impassable around Charlotte area as flooding snarls region amid water rescues, The Charlotte Observer

Multiple tropical storms aggravate flooding in SE Asia

Joint Typhoon Warning Center
Japan Meteorological Agency
Philippine Atmospheric, Geophysical and Astronomical Services Administration
Vietnam Disaster Management Authority
National Committee for Disaster Management, Cambodia
Typhoon Vamco batters the Philippines, leaving millions without power, The Washington Post
Typhoon Vamco triggers flooding in Philippine capital, provinces, Xinhua
Typhoon Vamco lashes Philippines, 7 dead, The West Australian
Ship runs aground in Navotas, damages portion of R-10 bridge, Manila Times
Full power restoration takes days: Meralco, Philippines News Agency
25K cops mobilized for search, rescue ops, Philippines News Agency
Typhoon Vamco kills 11, unleashes major floods in Manila, CNA

Update: Typhoon Goni

Joint Typhoon Warning Center
National Disaster Risk Reduction and Management Council of Philippines
Typhoon Goni leaves vast devastation in Philippines, Borneo Post
Philippines: 20 dead, thousands of homes damaged in typhoon, AP
Typhoon Goni: Gusts of 190mph leaves 20 people dead in the Philippines, Sky News

Flooding in Eastern Spain results in notable economic loss

The Insurance Consortium estimates the compensation for the storm at 43 million, Levante
AEMET
AVA-ASAJA Valencia
Insurance Compensation Consortium, Spain

Natural Catastrophes: In Brief

ASEAN Coordinating Centre for Humanitarian Assistance on Disaster Management (AHA Centre)
Indonesian National Board for Disaster Management
U.S. Storm Prediction Center
U.S. National Weather Service
Chicago Weather: Chicago-area storms usher in cold conditions, leave damage behind, ABC 7 Chicago

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