



AGENDA ITEM 3: REVIEW OF THE 2018 HURRICANE SEASON

ITEM 3.2: COUNTRY REPORTS

AGENDA ITEM 3.2(8): MEXICO

1. Impacts related to tropical cyclones or other severe weather events

During the 2018 tropical cyclone season, ten of these systems made landfall on or came very close to Mexican coasts. Of these, two affected the Atlantic Ocean side of the the country, and eight the Pacific Ocean side.

Cyclones affecting the Atlantic coast

During the 2018 tropical cyclone season, two cyclones passed very close to the Mexican coast. Although neither made landfall as a tropical cyclone, both came very close to the coast of Quintana Roo (less than 100 km). Owing to the significant amount of rainfall produced in both cases, these cyclones, in chronological order *Alberto* and *Michael*, are considered to have directly affected Mexico.

Subtropical storm Alberto (25 to 29 May)

This event formed before the start of the 2018 season, 70 km east-south-east of Punta Allen, Quintana Roo, and 90 km south of the island of Cozumel, Quintana Roo, with maximum sustained winds of 65 km/h and gusts of 85 km/h, shortly after moving out to sea and advancing into the south of the state of Quintana Roo as an area of low pressure with cyclonic potential. The circulation of *Alberto* led to high winds in the eastern Yucatan peninsular and its bands of strong convection produced heavy rainfall over southern Quintana Roo; owing to this, and to its proximity on becoming a tropical storm, *Alberto* was considered as one of the two Atlantic Ocean cyclones to have directly affected Mexican territory during the 2018 tropical cyclone season.

Hurricane Michael (6 to 12 October)

After it had formed, *Michael* maintained its movement predominantly northwards, developing into tropical storm *Michael* at 1300 hours on 7 October, when it was at its closest point to the coast, 60 km east of Punta Herrero, Quintana Roo, with maximum sustained winds of 65 km/h and gusts of 85 km/h. At 1000 hours on 10 October (Mexico Central Time), *Michael* reached category 4 on the Saffir-Simpson scale over the eastern Gulf of Mexico, with maximum sustained winds of 230 km/h and gusts of 280 km/h. It was at that strength that, some hours later, the centre of the cyclone arrived in the vicinity of Mexico Beach on the north-east coast of Florida, United States of America.

Owing to its proximity to the coast of Quintana Roo, the circulation of *Michael* caused strong winds and swell and heavy rainfall, and is therefore considered as one of the two Atlantic Ocean cyclones to have directly affected Mexico during the 2018 season.

Cyclones affecting the Pacific coast

The cyclones that made landfall or came very close to the Mexican coast on the Pacific side were, in chronological order, hurricane *Bud*, tropical storm *Carlotta*, hurricanes *Rosa* and *Sergio*, tropical storms *Tara* and *Vicente* and, finally, hurricane *Willia*.

Hurricane Bud (9 to 15 June)

At 2200 hours (Mexico Central Time) on the 14th, tropical storm *Bud* was located 20 km east of San José del Cabo, Baja California Sur, and 45 km east-north-east of Cabo San Lucas, Baja California Sur, with maximum sustained winds of 65 km/h and gusts of 85 km/h. Ten minutes later it made landfall at the same strength, 8 km east-north-east of the town of La Laguna and 20 km east-north-east of the town of San José del Cabo, both on the far south-eastern tip of Baja California Sur.

Tropical storm Carlotta (14 to 18 de June)

Tropical storm *Carlotta* moved predominantly north-westward, parallel and very close to the coasts of Guerrero and Michoacán. It came closest at 1900 hours on 18 June, by which time it was a tropical depression, 9 km off the coastline of the state of Michoacán, with maximum sustained winds of 45 km/h and gusts of 65 km/h, bringing humidity and rainfall to a number of central southern and western states of Mexico. Given its proximity to the coast, this cyclone was considered as one of those directly affecting the Pacific side of the country during the 2018 tropical cyclone season.

Tropical depression 19-E (19 to 20 September)

At 2200 hours on 19 September, the centre of tropical depression *19-E* made landfall on the south coast of Sonora, east of Isla Lobos, approximately 60 km west of Ciudad Obregón and 85 km south-south-east of Guaymas, both towns in the state of Sonora, with maximum sustained winds of 45 km/h and gusts of 65 km/h.

At no time on record (1949-2018) had a cyclone formed in the Gulf of California; however, conditions were very favourable to the development of tropical depression *19-E* in this maritime region, where the sea surface temperature was 7 °C above average, having reached 34 °C compared with the seasonal normal of 27 °C.

Hurricane Rosa (23 September to 2 October)

After being a category 4 hurricane on the Saffir-Simpson scale in the open waters of the Pacific Ocean, *Rosa* curved back towards the Baja California Peninsula. Having begun to weaken on moving into cooler waters, it made landfall 55 km north-west of San José de las Palomas, Baja California at 0430 hours (Mexico Central Time) on 2 October as a tropical depression, with maximum sustained winds of 55 km/h and gusts of 75 km/h; six hours later it made landfall 10 km south-east of Calamajue, Baja California, very shortly before beginning to dissipate.

Hurricane Sergio (29 September to 12 October)

At 0430 hours Baja California Sur Time (0530 hours Mexico Central Time) on Friday, 12 October, *Sergio* made landfall as a tropical storm in a sparsely populated region, approximately 80 km south-south-east of Punta Abreojos, Baja California Sur, and 75 km south-west of Santa Rosalía, Baja California Sur, with maximum sustained winds of 70 km/h and gusts of 85 km/h, moving north-eastward at 39 km/h. At 1115 hours Sonora Local Time (1215 hours Mexico Central Time), having crossed the state of Baja California Sur and the Gulf of California, *Sergio* made a second landfall, this time over the territory of Sonora, in the Cajón del Diablo special biosphere reserve between Bahía Kino and Guaymas, Sonora, as a tropical storm with maximum sustained winds of 65 km/h and gusts of 85 km/h.

Tropical storm Tara (14 to 16 October)

The path of tropical storm *Tara* started in the Gulf of Tehuantepec and continued parallel and very close to the coasts of Oaxaca, Guerrero, Michoacán, Colima and Jalisco, producing heavy rainfall in these states. It ended its journey 40 km south-south-west of Manzanillo, Colima,

without, however, making landfall, and was considered to be one of the eight cyclones to affect Mexican coasts on the Pacific Ocean side during the 2018 season.

Tropical storm Vicente (19 to 23 October)

Tropical storm *Vicente* formed off the coast of El Salvador and cut a path close to and parallel to the coasts of El Salvador, Guatemala and Mexico.

As it moved north-westward close to the coast of Mexico, it was absorbed by the circulation of Hurricane *Willa*, which prevented it from developing further, and began to decline, weakening on the morning of 23 October to a tropical depression with maximum sustained winds of 55 km/h and gusts of 75 km/h. It was at this strength that it made landfall between 0800 and 0830 hours in the town of La Mira, Michoacán, 17 km west-north-west of Puerto de Lázaro Cárdenas, Michoacán.

Hurricane Willa (20 to 24 October)

At 1300 hours on 23 October, the eye of the hurricane was located over San Juanito Island, (in the far north of the Islas Mariás), with maximum sustained winds of 195 km/h and gusts of 240 km/h. While at this strength, the centre of hurricane *Willa* made landfall at 2000 hours (Mexico Central Time) in the town of Isla del Bosque, 15 km south of Escuinapa, Sinaloa, on the south coast of Sinaloa, as a category 3 hurricane with maximum sustained winds of 195 km/h and gusts of 240 km/h. It brought humidity and torrential rainfall, causing severe flooding in Nayarit and south Sinaloa.

Operation of the National Meteorological Service of Mexico Warning System

During the 2018 season, a total of 145 tropical cyclone warnings were issued for the Atlantic Ocean and 540 for the Pacific; thus, the NMS maintained continuous surveillance of tropical cyclones and informed the civil protection authorities and the general public in order to avert their consequences.

Hydrometeorological events in Mexico in 2018

In addition to the 10 tropical cyclones that struck or came very close to its coastlines, Mexico was affected by 49 cold fronts, 42 tropical waves and seven winter storms (cold low pressure systems). Owing to the effects of these systems, the National Meteorological Service received a total of 1,869 reports of maximum point precipitation, with accumulations greater than 70 mm in 24 hours, the peak for the year being 472.9 mm in Cuetzamaloapan, Veracruz, from 18 to 19 October. This was caused by the interaction of frontal system No. 6 extending over the north-west Gulf of Mexico, a trough off the coast of Veracruz and the presence of humidity associated with tropical storm *Vicente*, which was located to the south of Chiapas.

2. Coordination with emergency managers and other parties concerned

Among the measures taken in 2018 to prevent damage arising from the presence of tropical cyclones and other severe hydrometeorological events, the National Meteorological Service took part in 12 preparatory meetings and 10 meetings on tropical cyclones with the National Coordination Body for Civil Protection of the Ministry of the Interior. In addition, it maintained close communication with that body by issuing 135 weather warnings to the Civil Protection Agency, detailing the possible effects of the different weather systems occurring throughout the year.

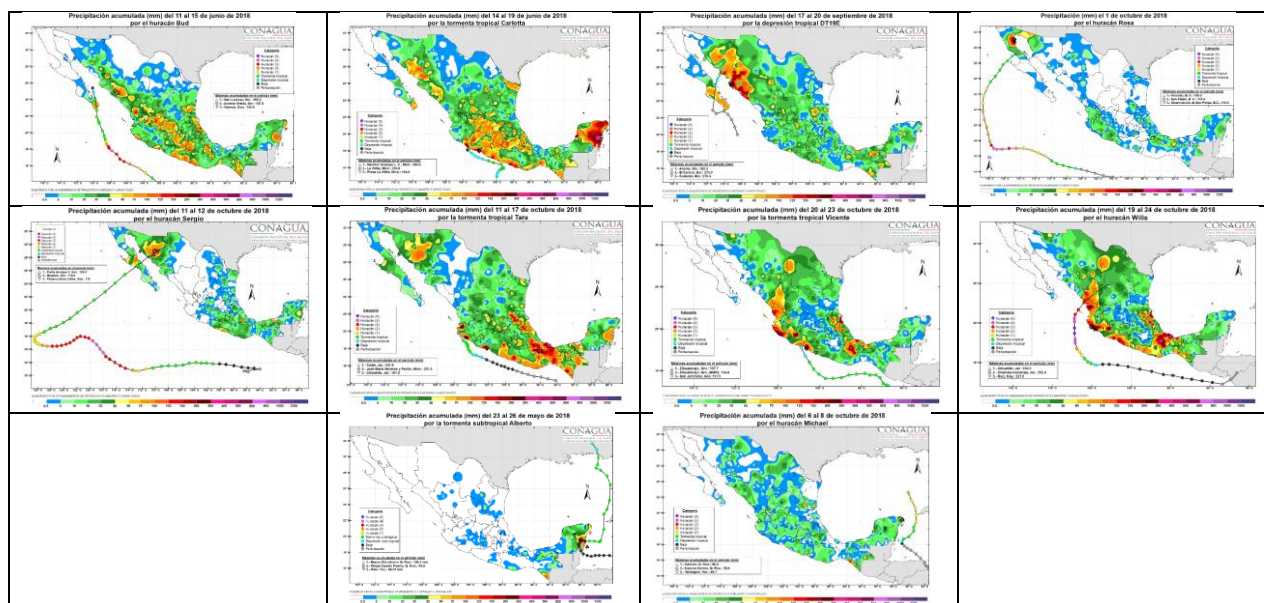
Within the Common Alerting Protocol (CAP) disseminated worldwide via the Google platform, 220 warnings were issued, with charts showing the dangerous areas. In addition, 35 warnings were generated giving rise to a total of 3,847,052 SMS (Short Message Service) messages disseminated by the AT&T and Telefónica cell phone operators.

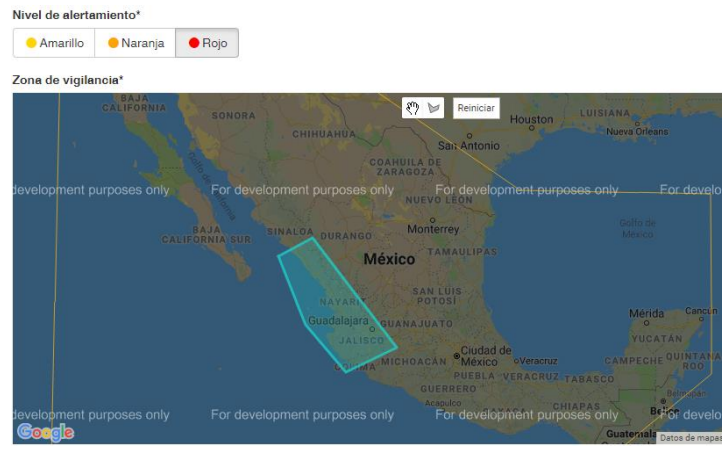
LOCATIONS AFFECTED BY TROPICAL CYCLONES DURING THE 2018 SEASON IN MEXICO

NAME OF TROPICAL CYCLONE	REPORTS OF MAXIMUM POINT RAINFALL IN 24 HOURS >100 mm	DATE
<i>Alberto</i> *	45.0 mm in Cancún, Q.R.	25 May
<i>Michael</i> *	35.6 mm in Mococho, Yuc.	6 Oct.
<i>Bud</i>	120.2 mm in La Paz, B.C.S.	14 June
	130.5 mm in Culiacán, Sin.	
<i>Carlotta</i>	102.3 mm in Atoyac, Gro.	16 June
	147.6 mm in Cerro de Ortega, Col.	17 June
	145.0 mm in Lázaro Cárdenas, Mich.	18 June
<i>DT 19-E</i>	359.5 mm in Ahome, Sin.	19 Sep.
	181.0 mm in Calle Doscientos y Canal Bajo, Son.	
	103.2 mm in Sierra La Laguna, B.C.S.	
<i>Rosa</i>	214.2 mm in Culiacán, Sin.	20 Sep.
	166.0 mm in Percebu, B. C.	1 Oct.
<i>Sergio</i>	120.0 mm in Mulegé, B. C. S.	11 Oct.
	104.0 mm in Plutarco Elías Calles, Son.	12 Oct.
<i>Tara</i>	130.0 mm in Melchor Ocampo, Mich.	14 Oct.
	104.3 mm in Cuale, Jal.	15 Oct.
	110.0 mm in Cihuatlán, Jal.	16 Oct.
<i>Vicente</i>	149.5 mm in Arriaga, Chis.	19 Oct.
	148.5 mm in Jacatepec, Oax.	
	310.7 mm in Valle Nacional, Oax.	
<i>Willa</i>	197.8 mm in Higuera Blanca, Jal.	22 Oct.
	124.0 mm in Los Olivos, Mich.	
	184.1 mm in Ruiz, Nay.	23 Oct.
	182.8 mm in Escuinapa, Sin.	
	114.5 mm in Cihuatlán, Jal.	

* *Alberto* and *Michael* did not produce point rainfall greater than 100 mm in 24 hours.

ACCUMULATED PRECIPITATION FROM TROPICAL CYCLONES IN MEXICO





CONAGUA warning for telephone companies relating to DT 19-E

CONAGUA warning. Heavy rainfall in your area on Friday.
Follow directions from Civil Protection Agency

