



Tropical Cyclone Iota (AL312020)

Wind and Storm Surge

Final Event Briefing

Nicaragua

25 November 2020

1 SUMMARY

Tropical Cyclone Iota was the thirty-first and most powerful tropical cyclone of the 2020 Atlantic Hurricane Season, overtaking in intensity the recent Hurricane Eta. Iota developed from a powerful tropical wave moving across the eastern Caribbean Sea, which evolved into a tropical depression on 13 November. Six hours later, it strengthened into a tropical storm while it was over the central Caribbean Sea, north of Colombia. In the following days Tropical Storm Iota intensified, becoming a major hurricane on 16 November. On 17 November, it made landfall in Nicaragua as a category 4 hurricane. Hurricane-force winds and catastrophic storm surge were experienced near the point of landfall, approximately 15 miles (25 km) south of where category 4 Hurricane Eta made landfall on 3 November. While moving across Nicaragua, Iota rapidly lost intensity, becoming a tropical storm the same day. While weakening, Iota left the country and moved across Honduras. During this period, tropical-storm-force winds extended over a large area of Nicaragua. At the time of this writing, Nicaragua was the only CCRIF member country where wind speeds, computed with the CCRIF SPHERA model, were greater than 39 mph (62.7 km/h) due to Hurricane Iota.

The final runs of the CCRIF loss model for wind and storm surge produced government losses for Nicaragua, which were above the attachment point of Nicaragua's Tropical Cyclone policy. Final calculations show that a payout of US\$19,891,162.26 is due under the policy.

This event briefing is designed to review the modelled losses due to wind and storm surge calculated by CCRIF's models for affected CCRIF member countries, to be analyzed with respect to members' Tropical Cyclone policies. A separate report on rainfall impacts on affected CCRIF member countries will be issued if applicable.

2 INTRODUCTION

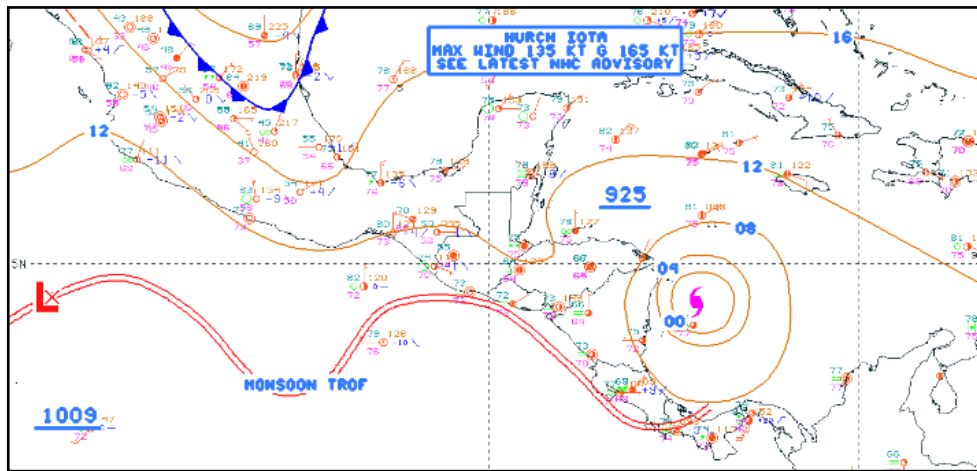
On 13 November 2020 at 1500UTC, the US National Hurricane Center (NHC) reported that Tropical Depression Thirty-One formed over the central Caribbean Sea, approximately 310 mi (500 km) SSE of Kingston, Jamaica (14.2°N, 74.3°W). It originated from a vigorous tropical wave moving westward across the Caribbean Sea, which developed a low-level closed circulation. Six hours later, at 2100UTC, the tropical depression was upgraded to a tropical storm and was named Iota. The minimum central pressure was 1006 mb and the maximum sustained winds were estimated at 40 mph (65 km/h). The system moved towards the west southwest with an estimated forward velocity of 3 mph (6 km/h).

In the following day, on 14 November, the structure of Tropical Storm Iota remained quite disorganized due to the presence a light westerly wind shear that hindered its intensification. However, on 2100UTC the upper-level wind pattern became more favorable while the storm traversed the very warm waters (around 29°C) NW of the Colombia coast. These conditions supported a steady and very rapid intensification of the tropical storm.

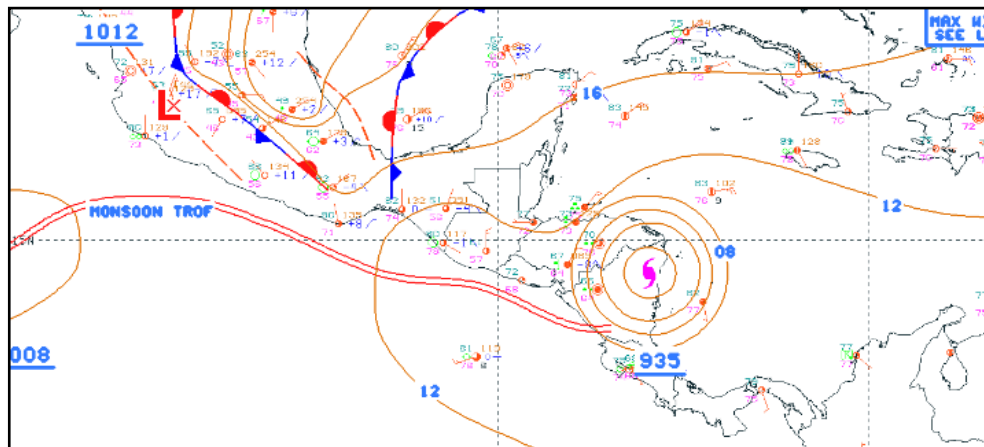
On 15 November at 0600UTC, the NHC reported that the maximum sustained winds increased to 75 mph (120 km/h) and Iota became a Category 1 hurricane. The centre of the hurricane was located at 13.0°N 77.0°W, about 440 mi (705 km) ESE of Cabo Gracias a Dios, Nicaragua, and the minimum central pressure was estimated at 989 mb. Moreover, at this time, the system steered toward the west at a slightly increased velocity (5 mph, 7 km/h), due to the development of a high pressure system over Florida and the western Atlantic Ocean. Iota continued to rapidly intensify and 24 hours later, on 16 November at 0600UTC, it became a major hurricane, with maximum sustained winds of 125 mph (205 km/h) and minimum pressure of 945 mb. Only nine hours later, at 1500UTC, it reached category 5 strength, with maximum sustained winds of 160 mph (260 km/h) and a minimum central pressure of 917 mb (Figure 1a). Satellite images shown the impressive extension of the hurricane, with a circular well-defined eye and a fairly symmetric convective ring surrounding it (Figure 2a). At this time, the centre of Iota was sited at 13.5°N 82.0°W, at a distance of approximately 100 mi (160 km) from Puerto Cabezas, Nicaragua, approaching it with increasing forward velocity (9 mph, 15 km/h). Hurricane-force winds extended outward up to 35 miles (55 km) from the centre, while tropical-storm-force winds spread outward up to 150 miles (240 km) from the centre. Starting at this time, winds of tropical-storm intensity affected northeastern Nicaragua (Figure 3a).

In the following nine hours, while Iota was approaching the Nicaragua coast, it maintained unchanged intensity and on 17 November at 0300UTC, it was downgraded to category 4, as it began to interact with land. The hurricane made landfall along the northeastern coast of Nicaragua near the town of Haulover, about 30 miles (45 km) S of Puerto Cabezas at 0340UTC (Figure 1b and Figure 2b). Maximum sustained winds were near 155 mph (250 km/h) with higher gusts. Hurricane-force winds extended outward up to 45 miles (75 km) from the centre, while tropical-storm-force winds extended up to 175 miles (285 km) (Figure 3b). The storm surge was forecast by NHC to increase water levels by up to 15 to 20 feet (4.5 m to 6 m) above normal tide levels in areas of onshore winds along the coast of Nicaragua and Honduras. Moreover, the surge was expected to be accompanied by large and destructive waves.

After landfall, Iota rapidly weakened due to the interaction with the mountainous terrain and 15 hours later, on 17 November at 1800UTC, it was downgraded to tropical storm strength. However, due to its extension and strength, hurricane-force winds existed for several hours over northeastern Nicaragua along the westward path of Iota across Nicaragua (Figure 3c, 3d). Moreover, tropical-storm-force winds invested the northern portion of the country (Figure 3c, 3d and 3e). On 18 November at 0000UTC, the centre of Iota (13.7°N 86.9°W) left Nicaragua and moved into southern Honduras. In the following hours, the tropical storm weakened further and became a tropical depression at 0900UTC, while moving into El Salvador. Six hours later, Iota's low-level circulation dissipated over El Salvador.



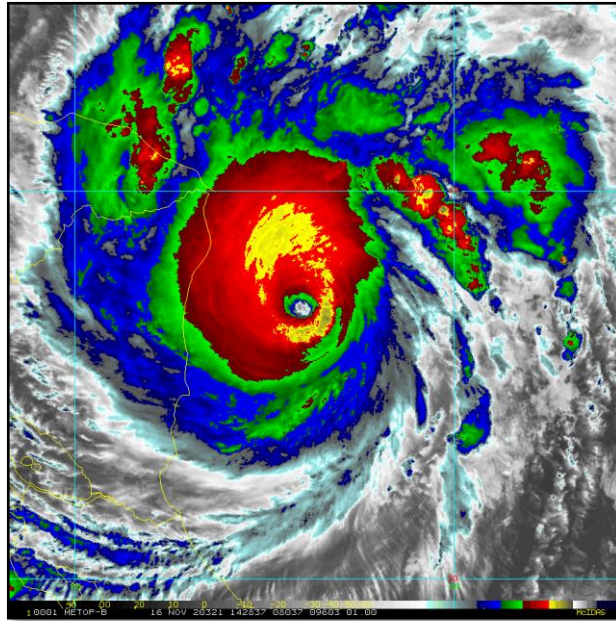
a) 16 November at 1200UTC



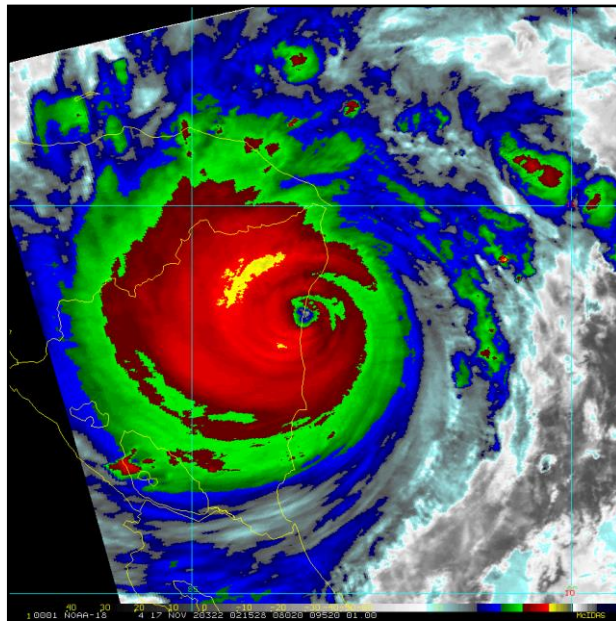
b) 17 November at 0600UTC

Figure 1 Surface analysis over the Caribbean area at different times as indicated in the labels.
Source: US National Hurricane Center¹

¹ National Oceanic and Atmospheric Administration - FTP, National Hurricane Center, review dates: 16-17 November 2020, available at: https://www.nhc.noaa.gov/tafb/EPAC_18Z.gif



a) 16 November at 1428UTC



b) 17 November at 0215UTC

Figure 2 Satellite imagery at different times (as indicated in the labels) from thermal infrared channel enhanced with colour. Blue/green colours represent high altitude clouds (top cloud temperature between -50°C and -70°C), while the red/yellow colours represent very high altitude clouds (top cloud lower than -70°C). High altitude clouds indicate strong convection associated with intense precipitation. Source: NOAA, National Environmental Satellite, Data and Information Service².

² RAMSDIS Online Archive, NOAA Satellite and Information Service, available at: https://rammb-data.cira.colostate.edu/tc_realtime/storm.asp?storm_identifier=al312020

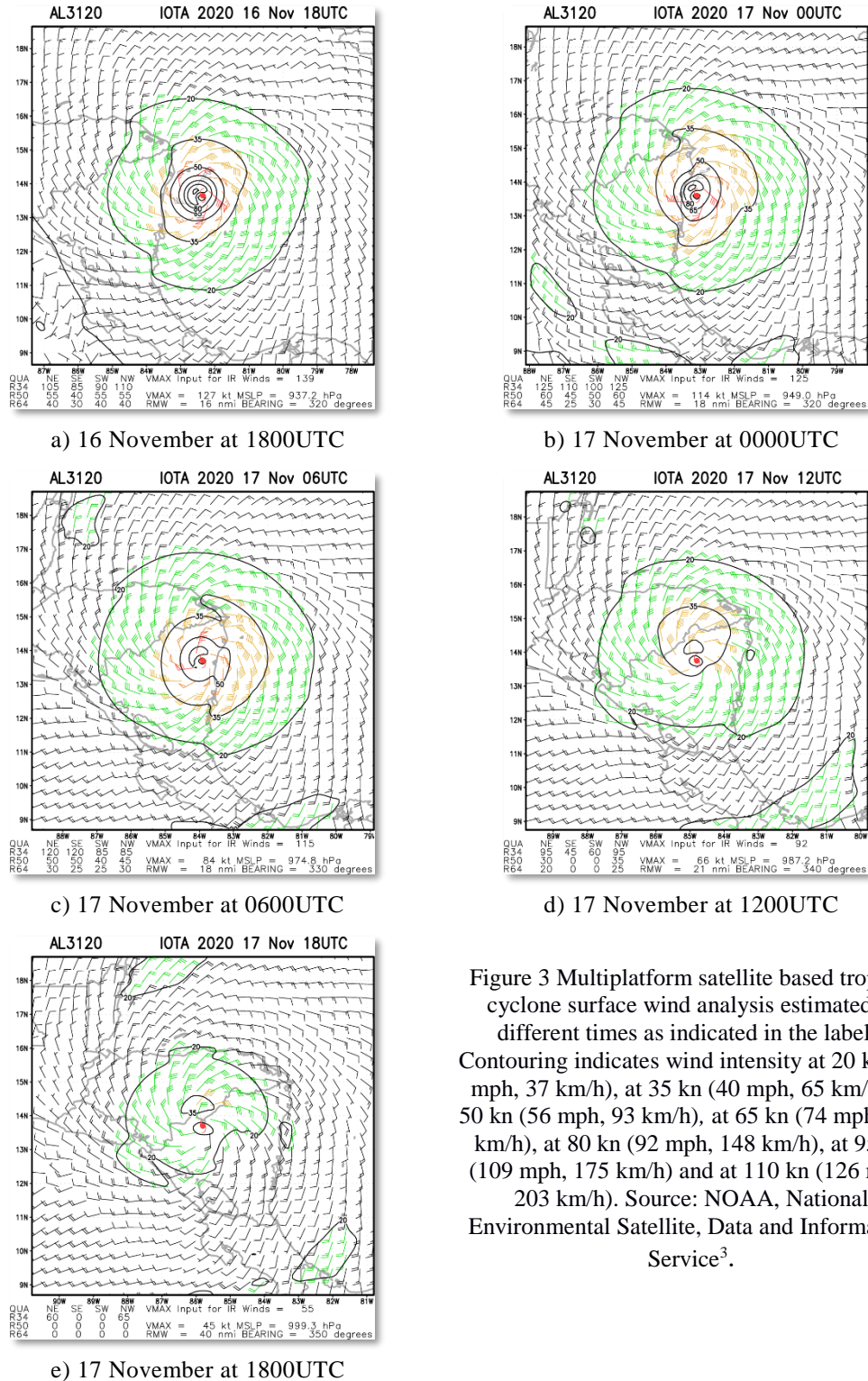


Figure 3 Multiplatform satellite based tropical cyclone surface wind analysis estimated at different times as indicated in the labels. Contouring indicates wind intensity at 20 kn (23 mph, 37 km/h), at 35 kn (40 mph, 65 km/h) at 50 kn (56 mph, 93 km/h), at 65 kn (74 mph, 120 km/h), at 80 kn (92 mph, 148 km/h), at 95 kn (109 mph, 175 km/h) and at 110 kn (126 mph, 203 km/h). Source: NOAA, National Environmental Satellite, Data and Information Service³.

³ RAMSDIS Online Archive, NOAA Satellite and Information Service, available at: https://rammb-data.cira.colostate.edu/tc_realtime/storm.asp?storm_identifier=al312020

3 CCRIF SPC MODEL OUTPUTS

Under CCRIF’s loss calculation protocol, a CCRIF System for Probabilistic Hazard Evaluation and Risk Assessment (SPHERA) report is required for any tropical cyclone affecting at least one member country with winds greater than 39 mph (62.7 km/h).

Based on the SPHERA footprint for this tropical cyclone, wind speeds between 13.6 mph (22 km/h) and 146 mph (235 km/h) were estimated across Nicaragua. The wind footprint (Figure 4) and surge field (Figure 5) are two of the outputs from the CCRIF model, which show the regions affected by certain extents of Tropical Cyclone Iota in Nicaragua.

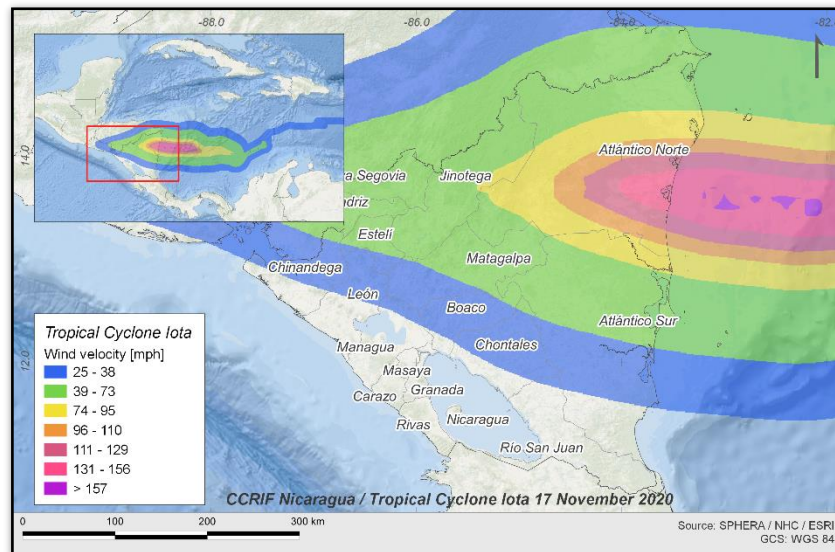


Figure 4 Map showing the wind field associated with Tropical Cyclone Iota in Nicaragua. Source: NHC & CCRIF/SPHERA

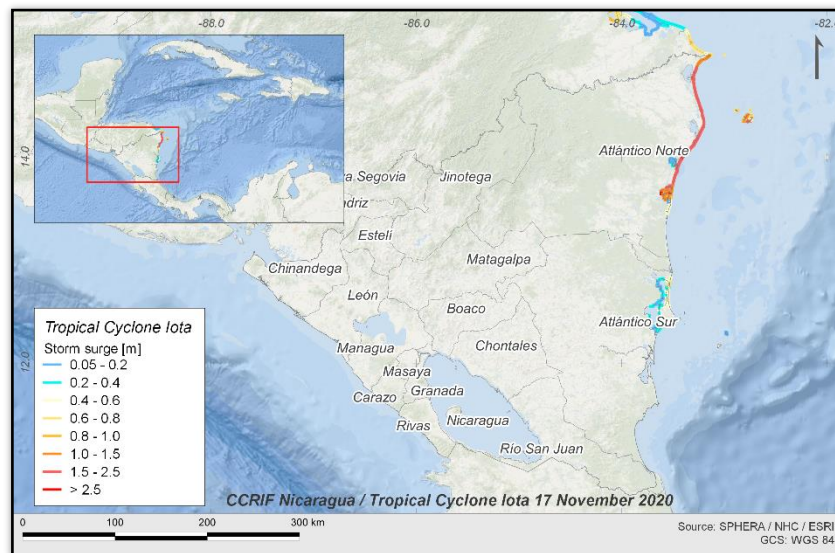


Figure 5 Map showing the storm surge field associated with Tropical Cyclone Iota in Nicaragua. Source: NHC & CCRIF/SPHERA

4 IMPACTS

According to the assessments provided by Nicaragua’s National Disaster Prevention System (SINAPRED), Hurricane Iota (Figure 6) built on the panorama of destruction left by the passage of Hurricane Eta (Figure 7) through northern Nicaragua two weeks earlier.

SINAPRED’s CEO, Guillermo J. González G., reported that “the passage of Hurricane Eta left a trail of material damage in the country, as well as a significant number of families who lost their livelihoods in different areas, especially in the North Caribbean Coast Autonomous Region (RACCN) and Triángulo Minero, whose magnitude will be increased by the effects of Hurricane Iota”.

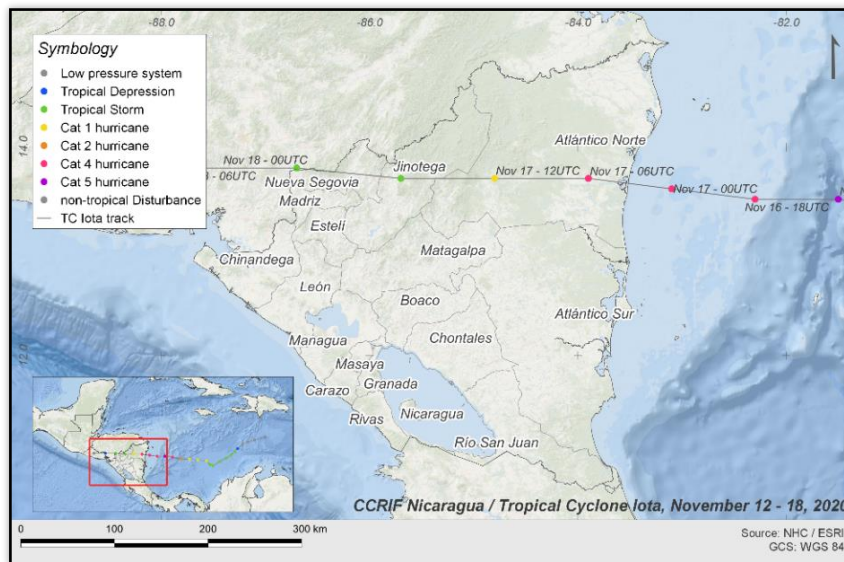


Figure 6 Hurricane Iota track over Nicaragua – November 2020

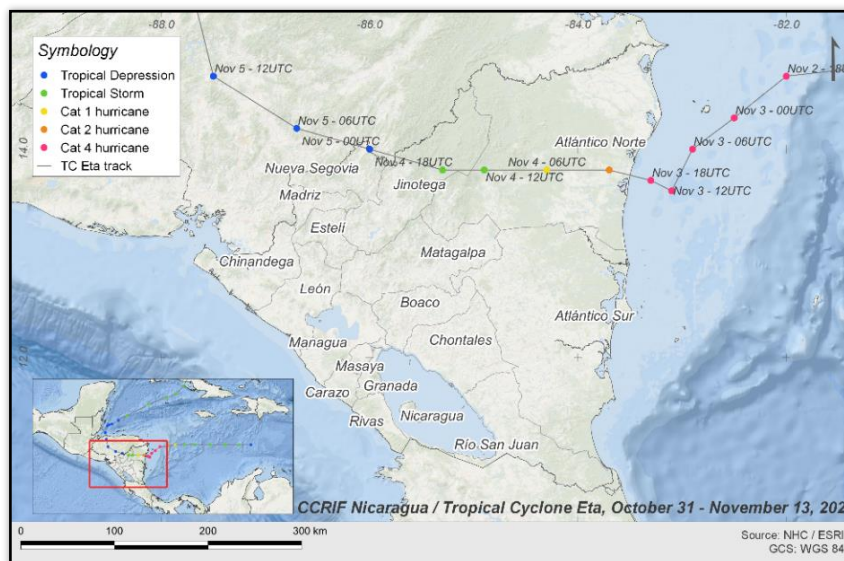


Figure 7 Hurricane Eta track over Nicaragua – November 2020

The area severely affected by Hurricane Iota was the RACCN, which was also the region primarily affected by Eta. The majority of the impacts were related to flooding, landslides, fallen trees and power poles that affected roads and infrastructure. Due to heavy winds, multiples homes suffered damage such as collapsed roofs. Several Districts were affected by wind and rainfall due to Hurricane Iota.

Eight days after the passage of Tropical Cyclone Iota, the impact in Nicaragua from the SINAPRED was reported as described below:

- 16 persons died due to Hurricane Iota⁴
- approximately 50,000 people were evacuated and sheltered, mainly in the municipalities of Puerto Cabezas (Bilwi), Prinzapolka, Wiwilí, Nueva Segovia, Jinotega, Rivas, Chinandega, Rio San Juan, Matagalpa and Madriz
- 53,130 families, of 25 municipalities, were affected by the interruption of water service
 - The most affected municipalities include; Puerto Cabezas, San Jorge, Matagalpa, Rivas, Matiguás, Boaco, La Libertad, Muy Muy, San Rafael del Norte and El Rosario
- interruptions of electric power occurred, affecting approximately 114,200 homes; approximately 75% of these homes located within the RACCN
- telecommunication services were affected
 - in Puerto Cabezas region serious affectations were reported
 - Due to the winds and fallen poles, general affectations were registered in municipalities like; Bocana de Paiwas, Bonanza, Ciudad Darío, El Cuá, El Rama, Jinotega, La Cruz de Río Grande, Laguna de Perla, among others.
- 3 bridges were affected: Banacruz bridge (between Siuna and Rosita) was partially damaged. Rosa Grande bridge (between Siuna and Waslala) and Siuna bridge (over the Yiya River) were totally damaged.

According to the reports from Nicaragua's National Meteorological Service, Tropical Depression Thirty-One and its development to become Hurricane Iota were closely monitored. Prior to the arrival of Hurricane Iota, Nicaragua's authorities took precautionary measures such as issuing declarations of a Red Alert (maximum) in the RACCN and Triángulo Minero, and a Yellow (warning) Alert for the rest of the country⁵. Emergency shelters such as churches, schools were opened and some family homes were also used as shelters. As a preventive measures; electric power service was suspended as well as suggesting restrictions on navigation to minimize possible impacts due to storm surge and high swell.

Figure 8 shows some of the wind and storm surge damage caused by Hurricane Iota in Nicaragua.

⁴ CNN, Cable News Network, review date: 19 November 2020, available at: '[Tropical Storm Iota deals devastation to Central America still recovering from Eta](#)'

⁵ SINAPRED, *Sistema Nacional para la Prevención, Mitigación y Atención de Desastres*, 'Comunicado No. 003-2020 Huracán Iota' review date: 19 November 2020, available at: <http://www.sinapred.gob.ni/>



Figure 8 Some damage caused by hurricane Iota in Nicaragua – November 2020.
Source: *SINAPRED*

5 CCRIF LOSS MODEL

For Nicaragua, the final runs of the CCRIF loss model for wind and storm surge produced government losses for Nicaragua. For this country's Tropical Cyclone policy, the government losses were above the attachment point. Therefore, the final analysis shows that a payment of US\$19,891,162.26 is due.

CCRIF expresses sympathy with the Government and people of Nicaragua for the loss of life and impacts on communities and infrastructure caused by this event.

For additional information, please contact CCRIF SPC at: pr@ccrif.org