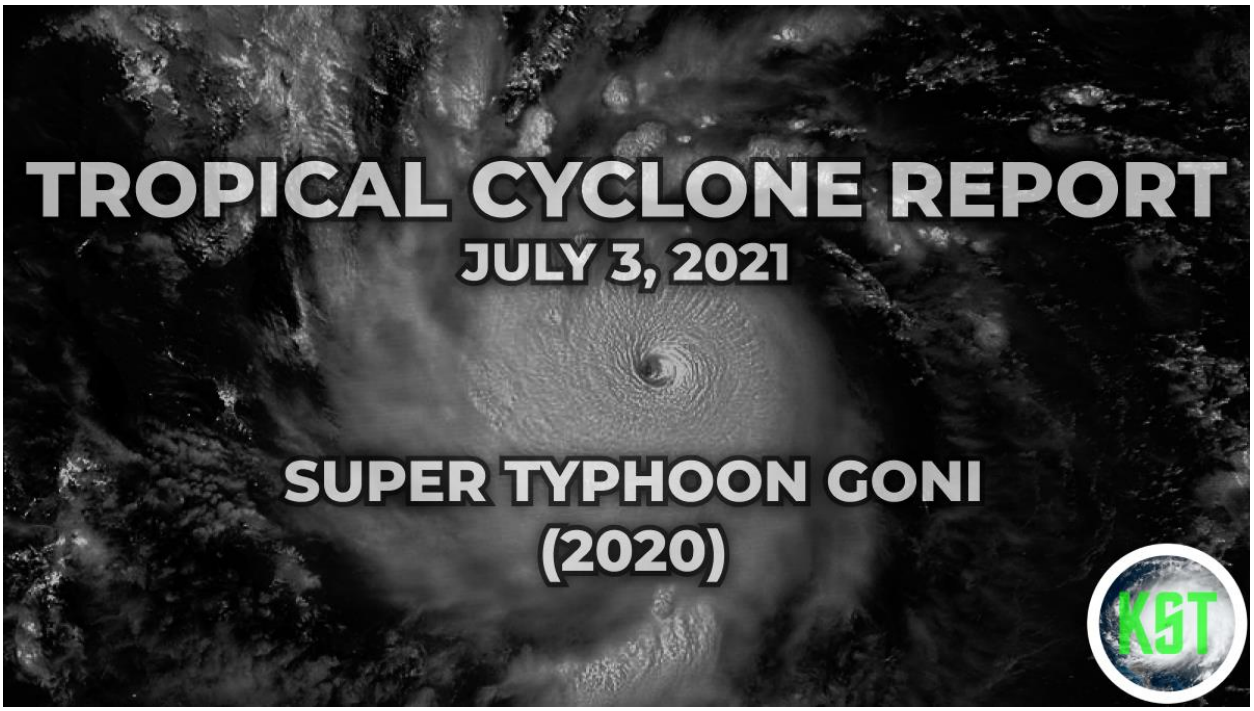
TROPICAL CYCLONE REPORT

SUPER TYPHOON GONI

Written by Khan for Khan Storm Tracking

JULY 3, 2021



AT A GLANCE

Typhoon Goni, known in the Philippines as Super Typhoon Rolly, was a profoundly strong typhoon that made landfall as a Category 5 super typhoon on Catanduanes in the Philippines and in Vietnam as a tropical storm.

Synoptic History

After Typhoon Molave devasted the Philippines days prior, a broad low-pressure system composed off the Mariana Islands, on October 27, 2020. The Japan Meteorological Agency had declared a new tropical depression, although KST estimates didn't have Goni as a Tropical Depression at that time stamp.

On the following day, the JTWC followed suit and declared the newly formed low a Tropical Depression, designating the system as "Tropical Depression 22W" at 9:00UTC. As the depression moved westward under favorable conditions, it intensified to a Tropical Storm, with the Japan Meteorological Agency naming the system "Goni" on the same day.

On the 29th, Goni underwent rapid intensification and became a typhoon, at 9:30UTC, Goni entered the Philippine Area of Responsibility. On the following day, Goni continued rapid intensification and became a Category 5 Super Typhoon.

After a brief eyewall replacement cyclone on the 30th, the system continued intensifying reaching a Dvorak Technique T-Number for 8.0. The JTWC went with a 170knots (195mph) peak estimate and a central pressure of 884mbar, while KST went with 175knots (200mph) and a pressure of 888mbar for the peak numbers for Goni. On October 31st 18:00UTC (2:00PHT November 1st), hours before the historic landfall in Catanduanes, the PAGASA upgraded Goni into a super typhoon. This was the second occasion PAGASA declared a tropical cyclone as a super typhoon since it's re-introduction of their revised tropical cyclone intensity scale, with the first being Haima in 2016. This was also the second time that the highest wind warning level, Signal #5, was raised in the Philippines as per the revised tropical cyclone wind signals. At 20:50UTC, Goni made a historic landfall on Bato, Catanduanes, Philippines, at peak intensity. Goni then made another landfall on Albay at 23:20UTC and San Narciso, Quezon on November 1st 4:00 UTC. Goni then made its final Philippine landfall in Lobo, Batangas at 9:30UTC.

As high wind shear and land interaction incremented, it caused Goni to rapidly weaken before it emerged into the South China Sea as a weak tropical storm.

Goni then moved westward over the South China Sea as a minimal tropical storm before making landfall in Vietnam on November 6, the system then rapidly weaken after landfall, degrading into a remnant low.

ANALYSIS

MAIN REASONINGS FOR 175KNOTS/888MBAR

Goni showed strong similarities in terms of structure, CDO ring and eye temperature on both IR and WV imagery with a tropical cyclone that KST rated a similar intensity to Goni based on surface observations, which is Typhoon Meranti 2016. Meranti showed a similar eye temperature (22-27°c), full ring temp (around -80°c) and a WV eye temp similar to Goni.

BEST TRACK DATA

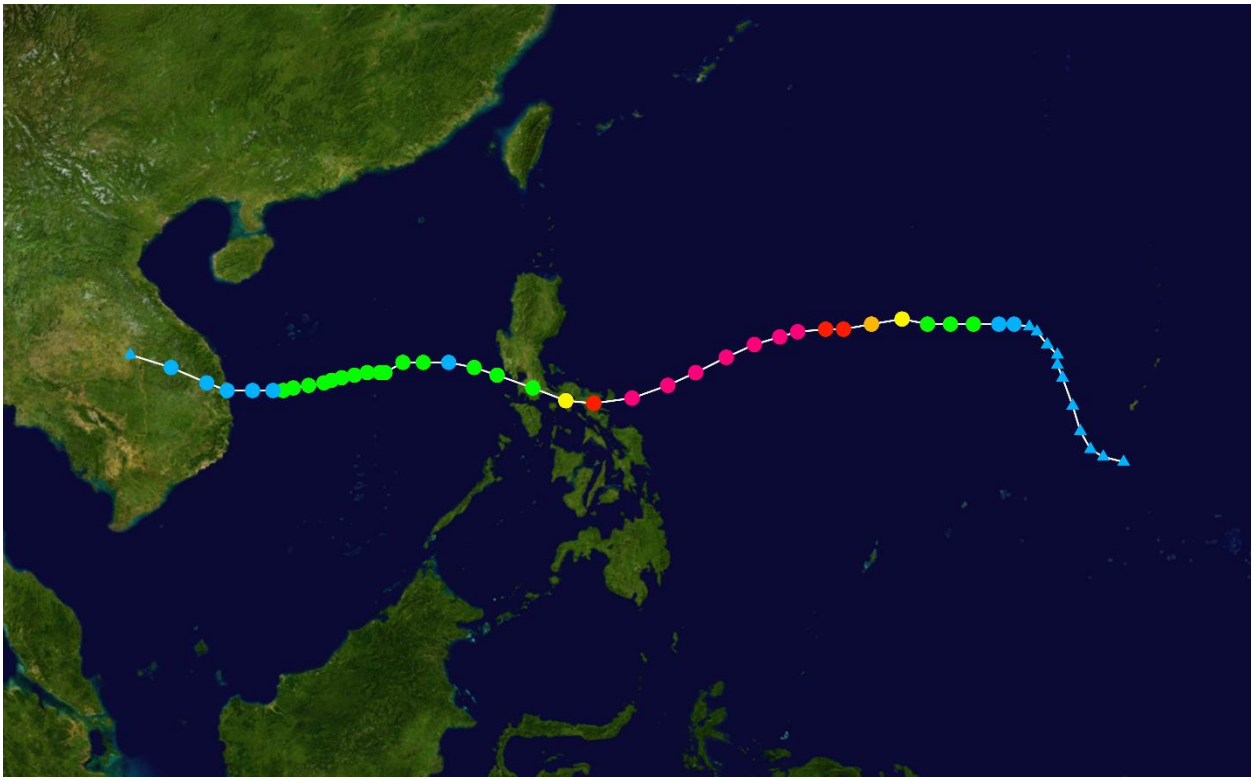
Below is the best track analysis from Khan Storm Tracking for STY Goni:

LEGENDS:
T – Tropical
S – Subtropical
M – Monsoonal
P - Peak Intensity

Date (yy/mm/dd)	Time (UTC)	Latitude	Longitude	Wind (mph)	Pressure (mb)	Stage
20201025	6:00UTC	11.2N	144.4E	20	1009	Disturbance
20201025	12:00UTC	11.4N	143.6E	20	1009	Disturbance
20201025	18:00UTC	11.7N	143.1E	20	1007	Disturbance
20201026	00:00UTC	12.4N	142.7E	20	1007	Disturbance
20201026	06:00UTC	13.4N	142.4E	20	1007	Disturbance
20201026	12:00UTC	14.5N	142.0E	25	1007	Disturbance
20201026	18:00UTC	15.0N	141.8E	25	1007	Disturbance
20201027	00:00UTC	15.4N	141.7E	25	1007	Disturbance
20201027	06:00UTC	15.8N	141.4E	25	1006	Disturbance
20201027	12:00UTC	16.3N	141.0E	25	1006	Disturbance
20201027	18:00UTC	16.5N	140.7E	30	1006	Disturbance
20201028	00:00UTC	16.6N	140.1E	35	1005	T Depression
20201028	06:00UTC	16.6N	139.5E	35	1004	T Depression
20201028	12:00UTC	16.6N	138.5E	40	1000	T Storm
20201028	18:00UTC	16.6N	137.6E	50	1000	T Storm
20201029	00:00UTC	16.6N	136.7E	65	995	T Storm
20201029	06:00UTC	16.8N	135.7E	80	982	Category 1
20201029	12:00UTC	16.6N	134.5E	105	971	Category 2
20201029	18:00UTC	16.4N	133.4E	140	943	Category 4
20201030	00:00UTC	16.4N	132.7E	150	934	Category 4

Date (yy/mm/dd)	Time (UTC)	Latitude	Longitude	Wind (mph)	Pressure (mb)	Stage
20201030	06:00UTC	16.3N	131.6E	175	911	Category 5
20201030	12:00UTC	16.1N	130.9E	180	905	Category 5
20201030	18:00UTC	15.8N	129.9E	185	904	Category 5
20201031	00:00UTC	15.3N	128.8E	185	895	Category 5
20201031	06:00UTC	14.7N	127.6E	190	894	Category 5
20201031	12:00UTC	14.2N	126.5E	195	892	Category 5
20201031	18:00UTC	13.7N	125.1E	200	888	P - Category 5
20201101	00:00UTC	13.5N	123.6E	150	932	Category 4
20201101	06:00UTC	13.6N	122.5E	85	980	Category 1
20201101	12:00UTC	14.1N	121.2E	70	990	T Storm
20201101	18:00UTC	14.6N	119.8E	65	992	T Storm
20201102	00:00UTC	14.9N	118.9E	45	1002	T Storm
20201102	06:00UTC	15.1N	117.9E	35	1002	T Depression
20201102	12:00UTC	15.1N	116.9E	40	1002	T Storm
20201102	18:00UTC	15.1N	116.1E	40	1004	T Storm
20201103	00:00UTC	14.7N	115.4E	40	1004	T Storm
20201103	06:00UTC	14.7N	115.2E	40	1004	T Storm
20201103	12:00UTC	14.7N	114.7E	45	1004	T Storm
20201103	18:00UTC	14.6N	114.2E	40	1004	T Storm
20201104	00:00UTC	14.5N	113.7E	40	1004	T Storm
20201104	06:00UTC	14.4N	113.3E	50	1001	T Storm
20201104	12:00UTC	14.3N	113.0E	45	1002	T Storm
20201104	18:00UTC	14.2N	112.4E	45	1000	T Storm
20201105	00:00UTC	14.1N	111.8E	40	1002	T Storm
20201105	06:00UTC	14.0N	111.4E	40	1002	T Storm
20201105	12:00UTC	14.0N	111.0E	35	1005	T Depression
20201105	18:00UTC	14.0N	110.2E	35	1005	T Depression
20201106	00:00UTC	14.0N	109.2E	35	1007	T Depression
20201106	06:00UTC	14.3N	108.4E	30	1008	T Depression
20201106	12:00UTC	14.9N	107.0E	30	1008	T Depression
20201106	18:00UTC	15.4N	105.4E	25	1008	Remnants
20201107	00:00UTC	- - - DISSIPATED - - -				

TRACK MAP BY KST ESTIMATES



IMPACTS

PHILIPPINES

When Goni first made landfall on Catanduanes during peak intensity, it brought belligerent, catastrophic winds to areas near the tropical cyclone. Around 125 cities and towns were left without electricity after the storms passing. 1,612,893 individuals over 6 regions were affected by the typhoon. Around 16,900 hectares of cropland were damaged, affecting some 18,000 farmers. It is estimated that 66,000 metric tons of rice, corn, and other high value crops were damaged. Laguna de Bay overflowed by 6 ft (1.8 m) due to the rains brought by the typhoon, and nearly 3,000 families were forced to evacuate. Floods in Batangas City reached the roofs of houses, trapping at least 300 families. The Batangas Disaster Risk Reduction and Management Council chief requested for more volunteers from regional government agencies to assist with emergency response. The floods subsided by 21:00 PHT on November 2, with 110 individuals having been rescued by the local disaster management team. In Marinduque, three municipalities experienced flooding, with Santa Cruz experiencing over 6 feet flood waters. By 8:00 PHT (0:00 UTC), power outages were widespread in the Bicol Region, as 10 electric cooperatives reported a loss of power caused by toppled electric posts and damaged transmission lines. Two evacuation centers lost their roofs from the force of the wind. In Legazpi, flash floods overwhelmed the local villages, and roads were blocked by debris from the mountains and lahar flow from Mayon Volcano. The lahar submerged at least 180 houses, as well as vehicles and livestock, in the locality of Guinobatan, as well as in Tabaco, Santo Domingo, and Camalig. The nearby Basud Bridge, which connects the first and second districts of the

province, was also destroyed and rendered impassable due to the lahar, while the famous Cagsawa Ruins were heavily flooded. The Civil Aviation Authority of the Philippines reported significant damage to Naga Airport and moderate damage to Legazpi Airport, along with the loss of contact with Virac Airport, the only airport serving the island of Catanduanes. The NDRRMC said a total of P8.47 billion (US$175.44 million) worth of roads, bridges, flood control systems, schools and government buildings were damaged in the Cordillera Administrative Region, National Capital Region, Ilocos, Cagayan Valley, Central Luzon, Calabarzon (Cavite, Laguna, Batangas, Rizal and Quezon), Mimaropa (Mindoro, Marinduque, Romblon and Palawan), Bicol and Eastern Visayas. Flights and train operations resumed a day after the typhoon's landfall. As of November 11, the NDRRMC has reported ₱12.9 billion (US$266 million) of infrastructure damages, along with ₱5 billion (US$103 million) of agricultural damage, with a combined total of ₱17.9 billion (US$369 million). By December 10, total damage to agriculture and infrastructure was estimated at ₱20 billion (US$415 million), and 31 people were reported dead.

VIETNAM

On November 5, Tropical Depression Goni made landfall in southern Bình Định, becoming the fifth tropical cyclone to strike the country in the previous 30 days. A person in Quảng Ngãi was swept away by floodwaters on November 6. Another sailor went missing on November 6 after the ship he was captaining sunk. Twenty houses in Quảng Nam Province collapsed into a river and a school was damaged. In Bình Định, 22 houses and infrastructures were destroyed by landslides and 108 hectares (270 acres) of croplands were damaged. Floods inundated a total of 1,074 houses. Roads in several areas were damaged by erosion and landslides, including parts of the Ho Chi Minh Highway. Damage in Bình Định Province from both Goni and Etau were calculated to be ₫543 billion (US$23.5 million).

NAMING

Due to the extensive damage brought by the typhoon in the Philippines, the PAGASA announced that Rolly will be stricken from the rotating list of typhoon designations, and will no longer be used in the future. In January 2021, the PAGASA chose the name Romina as its supersession for the 2024 season.

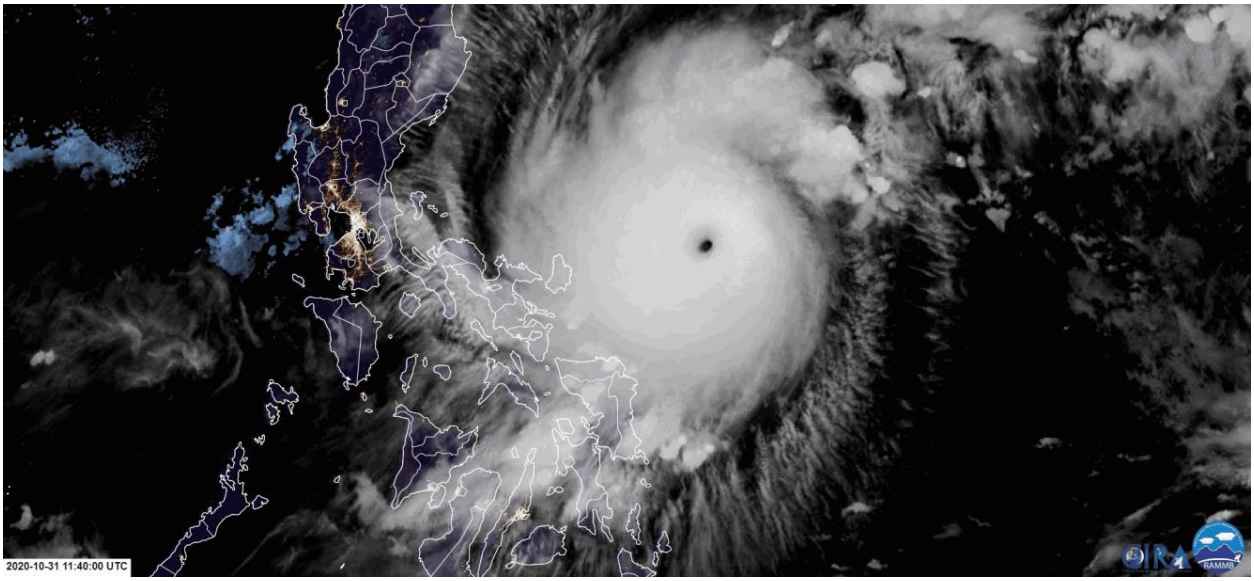
After the season, the Typhoon Committee announced that the name Goni, along with four others will be abstracted from the denominating lists, with supersessions to be announced in 2022.

FINAL STATISTICS

Wind Peak	Pressure Peak	Accumulated Cyclone Energy	Fatalities	Damages (2020 USD)
200	888	28.2	32	$415M

ACKNOWLEGEMENTS & CREDITS

The author would like to thank a few of Force Thirteen re-analysis team for giving some information on Goni's peak intensity. Another thanks to the Khan Storm Tracking re-analysis team for proofreading the Tropical Cyclone Report before publication.



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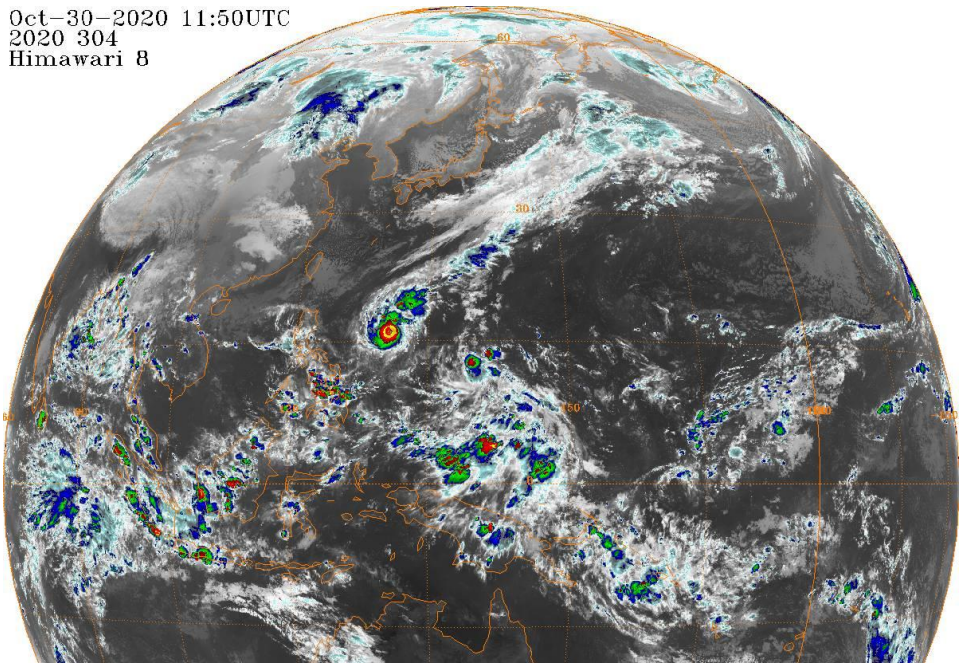

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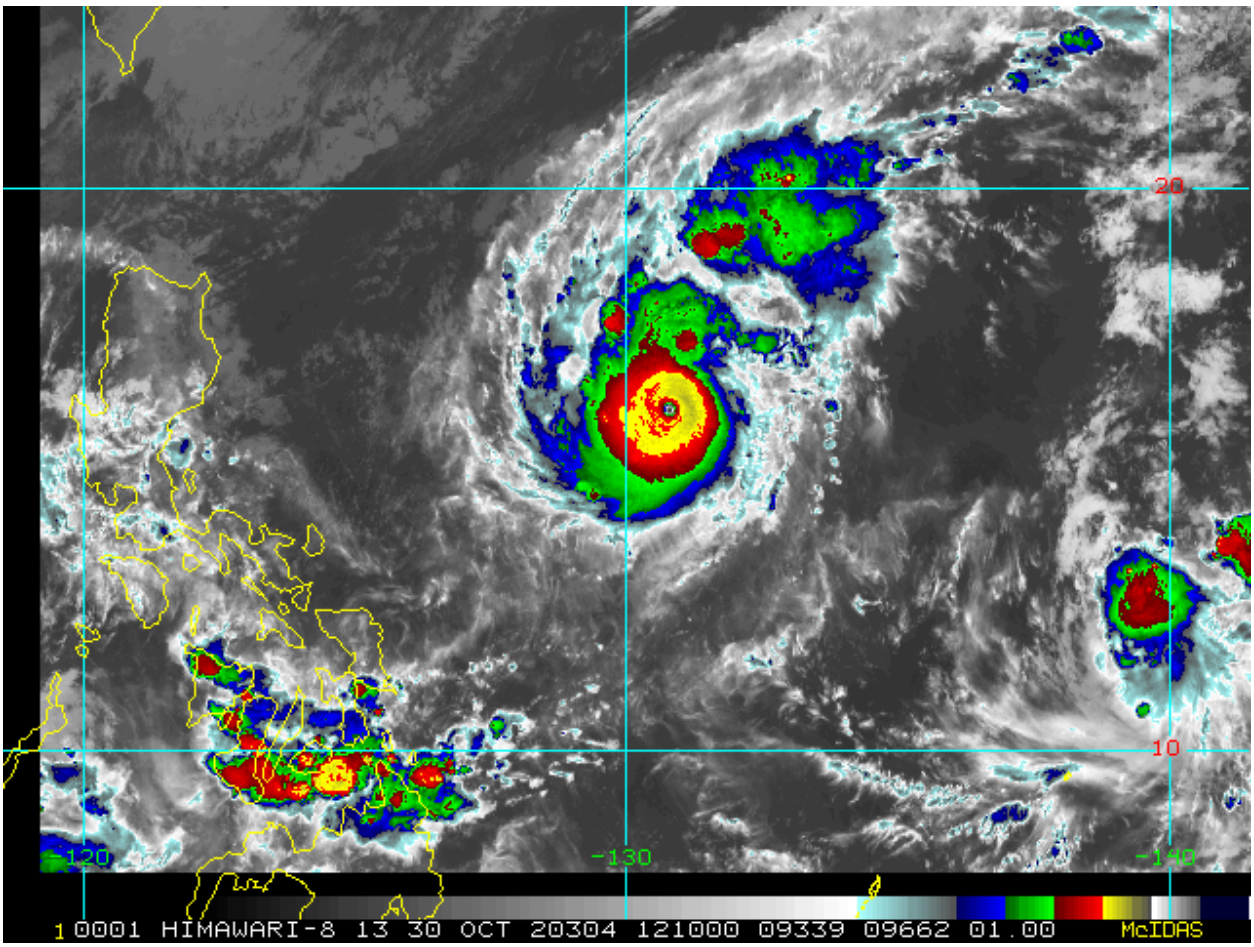
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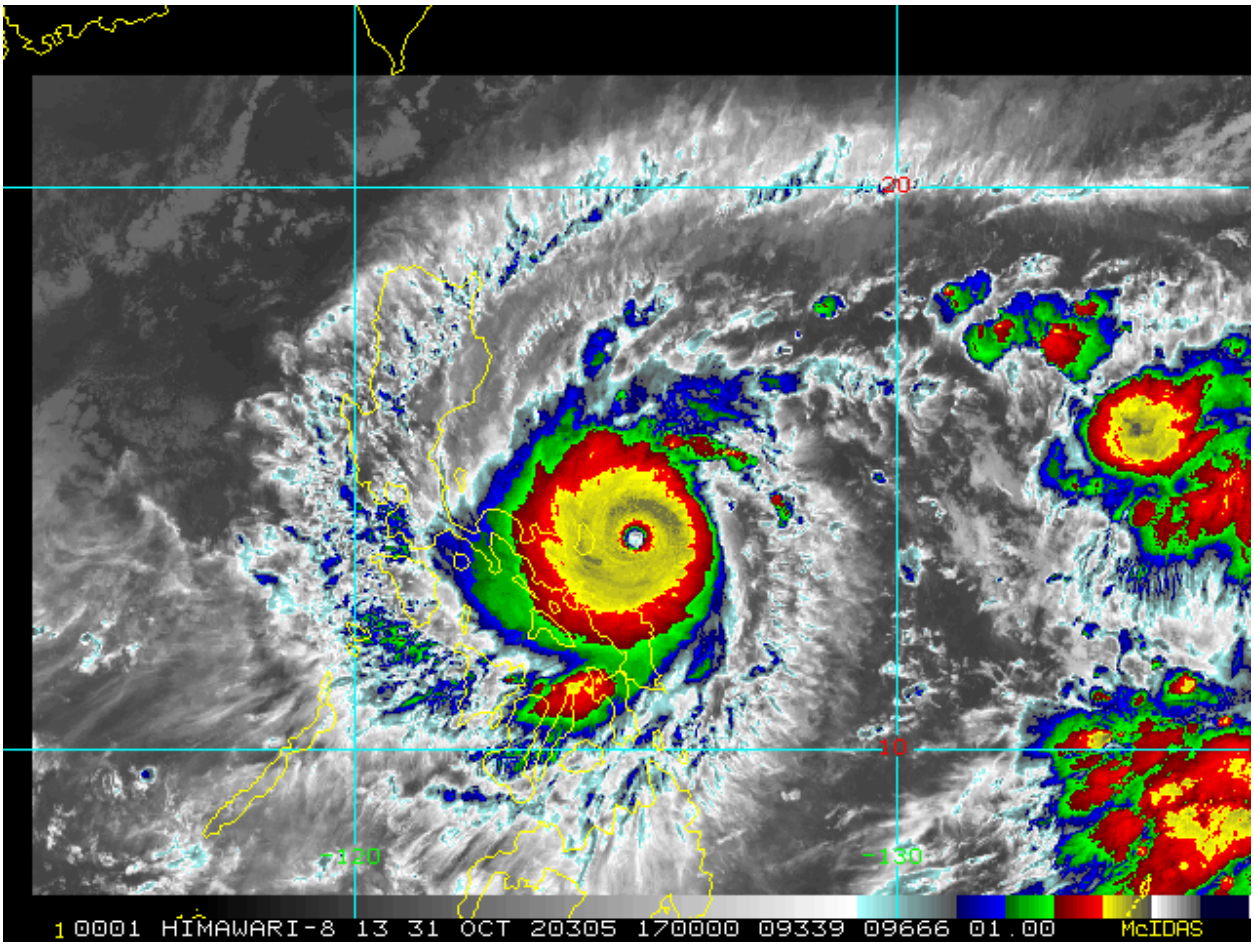
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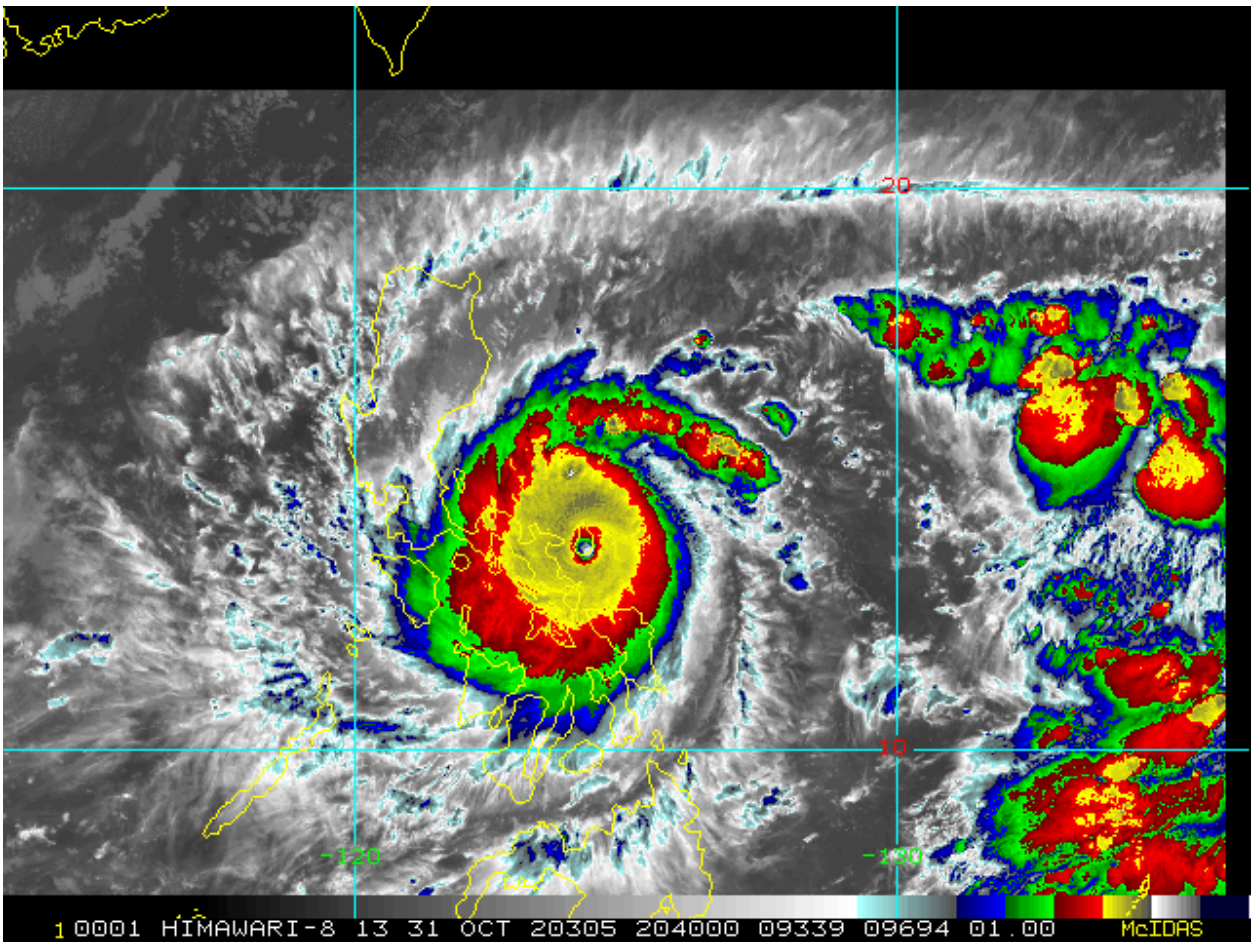

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