



ANNUAL REPORT 2021

Maldives Meteorology Service
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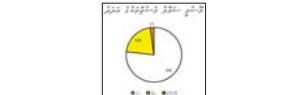


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JUNE 2021

Apart from few days with scattered showers, June 2021 was observed drier than normal across the country. Environmental conditions were also consistent with suppressed convection over the area. According to global climate models, MJO signal was over phase 2/3 (suppressed convection phase for Indian Ocean) and had a westward propagation during the 1st week of the month. It emerged into phase 3 (convective phase for Indian Ocean) during the 2nd week and had a successive re-emergence over phase 1. It also remained in the unit circle during part of week 2 and week 3. Hence, there was no rain augmenting over the Maldives. Environmental Position centers (Figure 26) Center of abating monthly accumulated rainfall in west of Maldives suggested that it could be due to enhanced convection associated with tropical cyclones that were developed in the Indian Ocean during the previous month. May 2021, this monsoon break was experienced over the area with anomalous subsidence since early June.

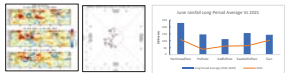


Figure 26: Center of abating monthly accumulated rainfall in west of Maldives. Source: Climate Prediction Center / NCEP



Figure 27: OLR Anomalies and MJO Phase space. Source: Climate Prediction Center / NCEP



Figure 28: Rainfall recorded in 5 stations during June 2021. Source: HMD Meteorological Service



Figure 29: Surface circulation analysis of MMS model run of 21 UTC on 09JUN21. Source: HMD Meteorological Service

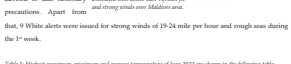


Figure 30: Surface circulation analysis of MMS model run of 21 UTC on 10JUN21. Source: HMD Meteorological Service

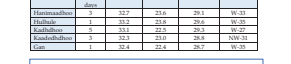


Figure 31: Daily rainfall recorded during June 2021. Source: HMD Meteorological Service

Table 2: Highest maximum winds and average temperature of June 2021 are shown in the following table including number of observations and maximum gust wind.

Station	Number of Observations	Lowest Temp. Max	Average Temp. Max	Max. Gust (km/h)
Male	327	23.6	26.1	61.33
Kaadhoo	1	23.6	26.6	50.29
Hakuraa	3	22.3	26.0	50.29
Kaadhoo	3	22.3	26.0	50.29



Figure 32: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



Figure 33: Change warning issued by MMS on 18th July 2021. Source: HMD Meteorological Service



Figure 34: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service

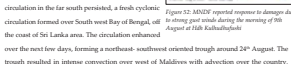


Figure 35: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



Figure 36: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



Figure 37: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



Figure 38: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



Figure 39: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



Figure 40: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



Figure 41: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



Figure 42: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service

Days with showers were observed on 4th, 12th, 25th, 26th and 28th. Among them, firstly in over southern most atolls on 4th, due to convection associated with Low Level Circulation near southeast of Andhra And. On 12th June, showers experienced over northern atolls while there was an off-shore trough at mean sea level extending over Lakshadweep area. Subsequently there were showers over the country on 25th and 26th that resulted from combined effect of a trough over the coast of South India and a low pressure over southeast of Maldives.

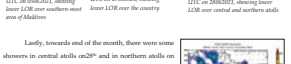


Figure 29: MMS model run of 21 UTC on 09JUN21. Source: HMD Meteorological Service



Figure 30: MMS model run of 21 UTC on 10JUN21. Source: HMD Meteorological Service

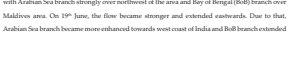


Figure 31: Daily rainfall recorded during June 2021. Source: HMD Meteorological Service



Figure 32: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service

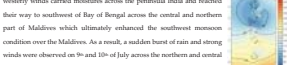


Figure 33: Change warning issued by MMS on 18th July 2021. Source: HMD Meteorological Service



Figure 34: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service

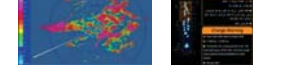


Figure 35: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



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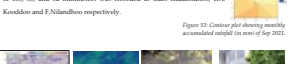


Figure 39: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



Figure 40: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service

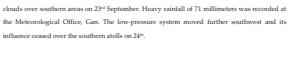


Figure 41: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



Figure 42: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service

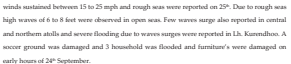


Figure 43: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



Figure 44: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service

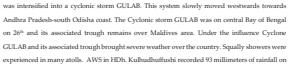


Figure 45: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



Figure 46: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



Figure 47: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service

During the first 10 days of the month, daily average strong winds of 10 – 20 miles per hour prevailed in central and northern part of the country. When the strong wind started to ease from 13th July onwards, there were consecutive two days where Male¹ was hit by swell waves. The waves were progressing from the east in northern side of Male. It occurred mostly during high tides and flooded the streets near the eastern and northern side of Male.

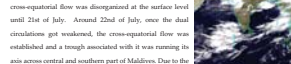


Figure 35: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service

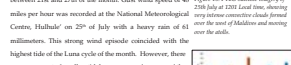


Figure 36: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



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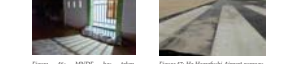


Figure 40: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



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Figure 48: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



Figure 49: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service

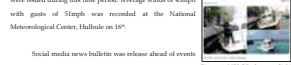


Figure 50: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



Figure 51: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



Figure 52: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



Figure 53: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service

towards the coast of West Bengal and neighborhood and weakened on 31st of July. During the month of July, 33 white alerts, 8 yellow alerts and 1 Orange advisory were issued.



Figure 42: IMD/CFS Model (12h) of 09 July 2021 at 12 UTC. Source: HMD Meteorological Service

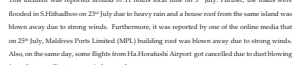


Figure 43: MMS model run of 21 UTC on 09JUN21. Source: HMD Meteorological Service



Figure 44: MMS model run of 21 UTC on 10JUN21. Source: HMD Meteorological Service



Figure 45: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service

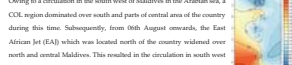


Figure 46: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service

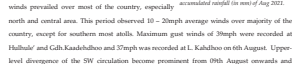


Figure 47: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



Figure 48: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



Figure 49: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



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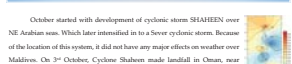


Figure 51: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



Figure 52: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



Figure 53: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service

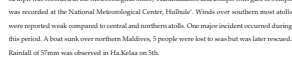


Figure 54: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



Figure 55: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



Figure 56: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



Figure 57: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



Figure 58: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



Figure 59: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



Figure 60: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service

July 2021

During the month of July, strong monsoon surge was developed over the Arabian sea due to the intensification of Somali Jet. The strong westerly winds carried moisture across the peninsula India and reached there with southwesterly flow of Bay of Bengal across the central and southern part of Maldives which ultimately enhanced the southwest monsoon condition over the Maldives. As a result, a sudden burst of rain and strong winds were observed on 9th and 10th of July across the northern and central part of the country. Heaviest rainfall of 71 millimetres were recorded at the Meteorological office in HEDs, Hanimaadhu on 9th July and 51 millimetres in Hakuraa on the following day. Gust wind speed of 44 mph and 41 mph per hour were registered at the National Meteorological Centre, Hulhule and at the Meteorological office in Hanimaadhu on 9th and 10th July respectively. Maldives Meteorological Service (MMS) had issued an Orange warning on 9th July with validity from 1700 hours to 2100 hours local time with the possible occurrence of torrential rain, strong winds of 34 to 40 miles per hour, gust of 55 miles per hour and very rough seas with swell wave surges.

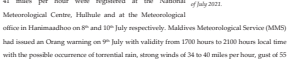


Figure 35: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service

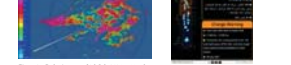


Figure 36: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



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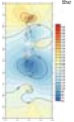


Figure 38: Radar imagery of 18 July 2021 at 1127 hours. Source: HMD Meteorological Service



NOVEMBER 2021

Windy conditions were observed over Maldives for the most of days in November. Low level cyclonic circulations formed in both and Concomit areas moved to Arabian sea while intensifying in LOPA and depression during this month. The joint effect of systems in Arabian sea and both Concomit areas caused strong wind over Maldives. Near Equatorial Trough was over south of Maldives during November. A total of 89 weather alerts were issued in November (80 white and 9 yellow), most of them were issued for strong winds. Fairly widespread precipitation occurred over the country during first week of the month followed by scattered showers in mid-month. **ITCZ** moved in mid-month and heavy showers occurred in southern areas. In the southern and central Maldives causing some heavy showers in this area.



As mentioned above

starting of November scattered heavy showers were observed over country due to the low pressure area over conomitic area.



Figure 82: Synoptic chart of 27th Nov showing a Low Pressure Area over Concomit. Figure 83: Cloud cover by heavy rain in 2 islands of Maavea atoll on 3rd Nov 2021.

In Maavea atoll scattered severe floods. MAAH saw the most affected island but unfortunately M.MAH AWS stopped recording data later observed on 3rd. Storm on rain was reported before the AWS went down. On 1st Haha, Kadhafushi received a rainfall of 51mm.

Scattered showers continued over the country till 8th. On 9th MMS released social media news highlighting followed by another building up 11th, predicting strong winds over the country for the upcoming three days due to low pressure systems in Arabian sea and Bay of Bengal (both systems later intensified in to Depressions). Generally, most of the days in November was windy specially during mid-November where average winds were between 13 to 23 mph, gales reaching up to 30 mph, winds were not as strong as they were in October and also due to convection caused by bad weather in October general public were more cautious leading to no major incidents caused by rough and strong winds. Also, government passed on a law which mandated vehicles less than 5m in length cannot travel during yellow, orange and red alerts.



Figure 84: 2000Lt ferrying over sea. Figure 85: News highlighting issued the social media on 1st November by predicting severe weather for next three days.

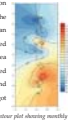
On 21st november southern atolls experienced heavy rainfall of 53 mm in Ga-Koodoo, 48mm in G.Bh. Kaadhelhoos, 51mm in G.Gavahmah, 49 in S.Hulhulhoos, 67 mm in S.Hulhulhoos and 51 in S.Can. At the end of the month, convection associated with ITCZ moved in to central and southern areas and caused heavy showers in this region. Notably 44 mm was observed on Haha, Kadhafushi on 27th and 53 mm in Kadhafushi on 28th.



Figure 86: News highlighting issued the social media for predicting strong winds and rough sea from Nov 10th to Nov 14th. Figure 87: Satellite image of the Maldives region.

DECEMBER 2021

The month of December is climatologically knowing as a transition month between southwest monsoon and northeast monsoon and is also the post cyclone duration for the two basins of Bay of Bengal and Andaman Sea. Much like last year's December, this year's December also highlighted a cyclonic storm "JAWAD" that has intensified from a low pressure area over Andaman Sea around 4th December. The significant weather observed over the country for the month of December are namely on the second week with heavy rainfall and the third week of the month where winds get much lighter and shifted northwesterly bringing in haze from the Indian peninsula over northern and central Maldives, diminishing the visibility to less than 4 km. Apart from these synoptic scale climatic conditions prevailed over the country with light and variable winds and thunderstorms.



The month started off with a cyclonic circulation over Andaman Sea which later would intensify to a cyclone and move in to Bay of Bengal, along with a cyclonic circulation over Lakshadweep area, although this system had no effect on Maldives. Meanwhile on 4th Near Equatorial trough (NET) remained over south of Maldives with embedded circulations, due to this convective activity increased over southern atolls. Heavy rainfall of 51mm was observed on 4th December at the AWS in G.Bh.Kaadhelhoos. On the following day a heavy rainfall of 52mm and 69mm was observed at G.Bh.Kaadhelhoos and G.Bh.Thinaadhoos AWS respectively.



Figure 88: 24 hours accumulated rainfall for 4th Dec. Figure 89: 24 hours accumulated rainfall for 10th Dec.

After the first week of December the remnants of Cyclone "JAWAD" has weakened over to north Arabian sea, and ITCZ had stated its annual northward movement. This movement of ITCZ was the synoptic highlight of this year's December. From 9th onwards almost all parts of the country received a substantial number of showers along with heavy showers as well. A staggering 151mm was recorded at the National Meteorological Centre, Hulhule on 11th December. This had caused a major flooding incident in Haha City.

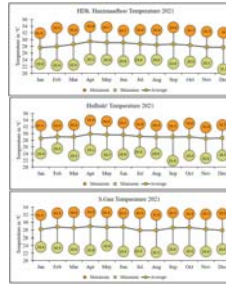


Figure 88: 2000Lt ferrying over sea. Figure 89: Sat. Image. Figure 90: Sat. Image.

The third week began with a cyclonic circulation off the coast of Sri Lanka on 18th December which has influenced a formation of a new Low-Pressure Area (LPA) over southern Bay of Bengal and a ridge extending from southwest Arabian sea towards Maldives. Although these systems have a very little impact on Maldives, wind direction had started to change to northwesterly thus bringing in the annual haze phenomena over the country. Haze typically starts to show around mid-December up until end of March. This time with the inhibition of convective activity from third week onwards and strong northwesterly's over gulf of Mannar have had a tremendous impact. Meteorological office of Haaemadhoos and National Meteorological Center had also reported low than 5km of visibility.

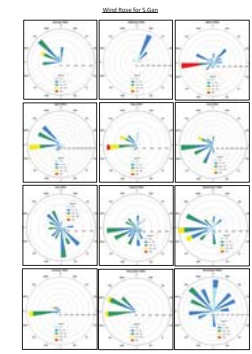
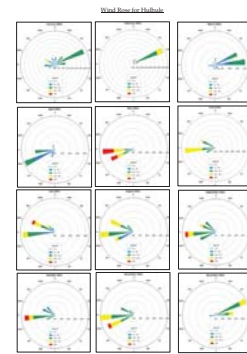
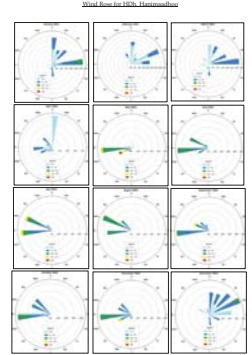
This concludes the main report.

Appendix 1: Monthly Maximum, Minimum and Average Temperature for North (Haaemadhoos Meteorological Office), Central (National Meteorological Centre, Hulhule) and South (Gan Meteorological Office).

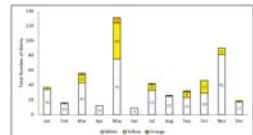


Highest Maximum temperature seen 33.0 degree Celsius, recorded at the National Meteorological Centre, Hulhule on 28th April 2021. Lowest Minimum temperature seen 21.9 degree Celsius, recorded at the National Meteorological Centre, Hulhule on 21th September 2021.

Appendix 2: The following are the Monthly Wind Rose for North (Haha, Haaemadhoos), Central (Hulhule) and South (S.Can). Wind rose was computed with daily mean wind direction and wind speed. Wind speed is shown in miles per hour (mph).



Appendix 3: The following figure shows the monthly distribution of weather alerts issued in the year 2021 and their categories.



During the year 2021, total of 104 of the White Alerts, 108 Yellow Alerts and 12 Orange Alerts were issued. The highest number (121) of alerts were issued in the month of July 2021. The second highest number of alerts were issued in the month of November 2021.