Federation for Environment, Climate and Technology

c/o, Maintenance Office, Mahaweli Authority, Digana Village, Rajawella, Sri Lanka.
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Web Site http://www.climate.lk

4 September 2020

EXPERIMENTAL CLIMATE MONITORING AND PREDICTION

By: Nipuni Alahakoon, Chethana Chandrasiri , Chayana Gunathilake, Tuan Hedgie Lareef Zubair and Michael Bell[1] (FECT and IRI[1])

HIGHLIGHTS

Rainfall Forecast

- *The NOAA weekly rainfall forecast predicts up to 85 mm Galle district during 10th -16th September.*

Monitored Rainfalls

- *Between 27th August- 2nd September: up to 100 mm of rainfall was recorded in Mannar district on 1st September.*

Monitored Wind

- *From 25th- 31st August: up to 10 km/h, northwesterly winds were experienced by the Southern half island.*

Monitored Sea Surface

- *1^{0}C above average sea surface temperature was observed in the seas around Sri Lanka.*

Monitoring

Rainfall

Weekly Monitoring

Date	Rainfall
27th August	Up to up to 40 mm in Ampara, Polonnaruwa and Badulla districts; up to 30 mm in Batticaloa, Monaragala, Matale, Kandy and Nuwara Eliya districts; up to 15 mm in Trincoamalee districts; up to 10 mm Anuradhapura, Kurunegala, and Kegalle districts; up to 5.0 mm Puttalam, Gampaha, Matara and Hambantota districts; and up to 2.5 mm in Galle district.
28th August	Up to 20 mm in Monaragala district; up to 5 mm in Hambantota, Ampara, Badulla, Kandy, Nuwara Eliya, Ratnapura, Kegalle, Puttalam, Kurunegala and Matale districts; and up to 2.5 mm in Kaluthara, Colombo, Gampaha, Anuradhapura and Polonnaruwa districts.
29th August	Up to 15 mm in Mullaitivu and Vavuniya districts; up to 10 mm in Kilinochchi district; up to 5 mm in Anuradhapura and Mannar districts; and up to 2.5 mm in Jaffna, Trincomalee, Monaragala and Badulla districts.
30th August	Up to 50 mm in Vavuniya, Anuradhapura and Polonnaruwa districts; up to 40 mm in Trincomalee district; up to 30 mm in Monaragala and Badulla districts; up to 20 mm in Batticaloa district; up to 15 mm in Hambantota, Rathnapura, Colombo, Kaluthara, Kurunegala, Kegalle, Ampara and Mullaitivu districts; and up to 10 mm in Kilinichchi, Mannar, Puttalam, Matale, Gampaha, Kandy, Nuwara Eliya, Galle and Matara districts.
31th August	Up to 60 mm in Monaragala and Badulla districts; up to 50 mm in Nuwara Eliya, Kandy, Mullaitivu and Vavuniya districts; up to 40 mm in Amapara, Rathnapura and Polonnaruwa districts; up to 30 mm in Mannar, Anuradhapura, Kurunegala, Batticaloa,

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Date	Rainfall
	Matale and Hambantota districts; up to 20 mm in Kegalle and puttalam districts; up to 15 mm in Kilinochchi, Trincomalee, Gampaha, Colombo, Kaluthara, Galle and Matara districts; and up to 2.5 mm in Jaffna district.
1st September	Up to 100 mm in Mannar district; up to 60 mm in Puttalam district; up to 40 mm in Kilinochchi. Mullaitivu and Vavuniya districts; up to 30 mm in Anuradhapura, Kurunegala, Matale, Polonnaruwa, Ampara, Batticaloa, Kaluthara and Galle; up to 20 mm in Jaffna, Gampaha, Colombo, Rathnapura, Hambantota, Badulla and Monaragala districts; and up to 15 mm in Trincomalee, Kegalle, Kandy, Nuwara Eliya and Matara distrivts.
2nd September	Up to 40 mm in Mannar, Anuradhapura and Vavuniya districts; up to 30 mm in Puttalam district; up to 20 mm in Jaffna, Mullaitivu and Kilinochchi districts, up to 15 mm in Trincomalee, Ampara, Hambantota, Monaragala, Badulla, Kandy, Nuwara Eliya, Rathnapura, Kegalle, Colombo and Kaluthara districts; and up to 10 mm in Galle, Matara, Gampaha. Kurunegala, Matale, Polonnaruwa and Batticaloa districts.

Total Rainfall for the Past Week

The RFE 2.0 tool shows total up to 75 – 100 mm in Monaragala, Mannar, Puttalam, and Ampara districts; up to 50 – 75 mm in Badulla, Nuwara Eliya, Kandy, Matale, Polonnaruwa, Anuradhapura, Batticaloa, Vavuniya and Mullaitivu districts; up to 25 -50 mm in Kilinochchi, Trincomalee, Kurunegala, Rathnapura, Kegalle, Gampaha, Colombo, Kaluthara, Galle, Matara and Hambantota districts; and up to 10 – 25 mm in Jaffna district.

Above rainfall average up to 50 – 100 mm in Monaragala, Badulla, Ampara, Polonnaruwa, Puttalam, Mannar, Mullaitivu and Vavuniya districts; up to 25 – 50 mm in Anuradhapura, Batticaloa, Hambantota, Nuwara Eliya, Kandy, Matale and Kurunegala districts; and up to 10 – 25 mm in Rathnapura and Trincomalee districts. Below rainfall average up to 25 – 50 mm in Galle district; and up to 10 – 25 mm in Matara, Kalutara and Colombo districts.

Monthly Monitoring

During August – Above average rainfall conditions up to 4 mm in Monaragala, Badulla and Ampara districts; and up to 3 mm in Hambantota, Rathnapura, Nuwara Eliya, Kandy, Matale, Polonnaruwa, Batticaloa, Anuradhapura, Gampaha, Kurunegala, Puttalam, Trincomalee, Vavuniya, Mullaitivu, Mannar, Kilinochchi and Jaffna districts. Below average rainfall conditions up to 3 mm in Kegalle, Colombo, Kaluthara, Galle and Matara.

Ocean State *(Text Courtesy IRI)*

Pacific sea state: August 26, 2020

SSTs in the east-central and central Pacific decreased to near the La Niña threshold in late-august, and the atmospheric variables were either ENSO-neutral or indicative of weak La Niña conditions. The average of the forecasts of many models just short of the borderline of weak La Niña SST conditions through fall, becoming slightly weaker beginning in early winter. The official CPC/IRI outlook is somewhat similar to these model forecasts, calling for a likely continuation of ENSO-neutral in summer, with approximately equal chances of ENSO-neutral or La Niña for fall and winter.

Indian Ocean State

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1 ^{0}C above average sea surface temperature was observed in the seas around Sri Lanka.

Predictions

Rainfall

14-day prediction: NOAA NCEP models

From 03rd September – 09th September: Total rainfall up to 75 mm in Galle district; up to 65 mm in Ratnapura, Matara, Kalutara and Colombo districts; up to 55 mm in Gampaha, Kegalle, Kandy, Nuwara Eliya, Monaragala and Badulla districts; up to 45 mm in Kurunegala, Matale, Ampara and Hambantota districsts; up to 35 mm in Puttalam and Batticaloa districts; up to 25 mm in Polonnaruwa, Jaffna and Kilinochchi districts; and up to 15 mm in Trincomalee, Mullaitivu, Mannar, Anuradhapura and Vavuniya districts.

From 10th September– 16th September: Total rainfall up to 85 mm in Galle district; up to 75 mm in Ratnapura, Kaluthara, Matara and Hambantota districts; up to 65 mm in Nuwara Eliya and Kegalle districts; up to 55 mm in Kandy, Gampaha, Badulla and Monaragala districts; up to 45 mm in Ampara district; up to 35 mm in Puttalam, Kurunegala, Matale and Batticaloa districts; up to 25 mm in Polonnaruwa, Trincomalee, Kilinochchi, Mullaitivu, Vavuniya and Anuradhapura districts and up to 15 mm in Mannar district.

NOAA Model Forecast:

From 3rd – 8th September: Total rainfall up to 75 mm in Colombo, Kalutara, Galle, Matale, Kandy, Kegale, Nuwara Eliya, Badulla, Mullaitivu and Trincomalee districts; and up to 50 mm in Kilinochchi, Vavuniya, Anuradhapura, Polonnaruwa, Kurunegala, Gampaha, Puttalam, Ratnapura, Matara, Hambantota, Ampara, Monaragala and Batticaloa districts.

MJO based OLR predictions

For the next 15 days:

MJO shall significantly enhance rainfall during 1st -5th September, slightly enhance during 6th -10th September and neutralize during 11th – 15th September.

[1] International Research Institute for Climate and Society, Earth Institute at Columbia University, New York.
Official hydro-meteorological statements are provided by the Sri Lanka Department of Meteorology and Department of Irrigation.

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Weekly Hydro- Meteorological Report for Sri Lanka

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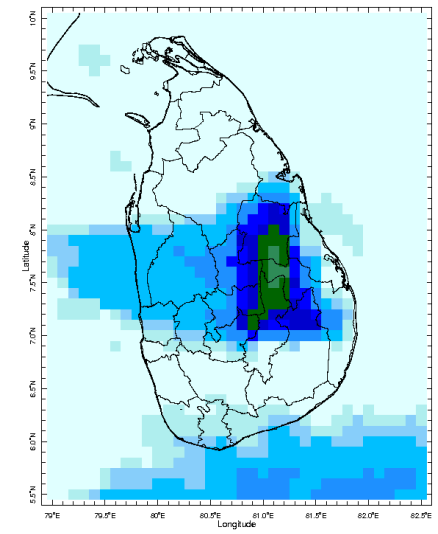
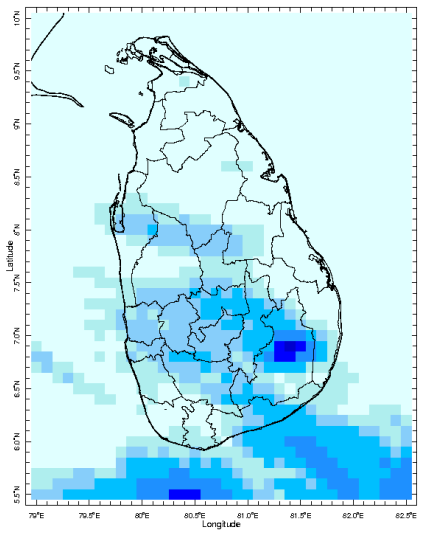
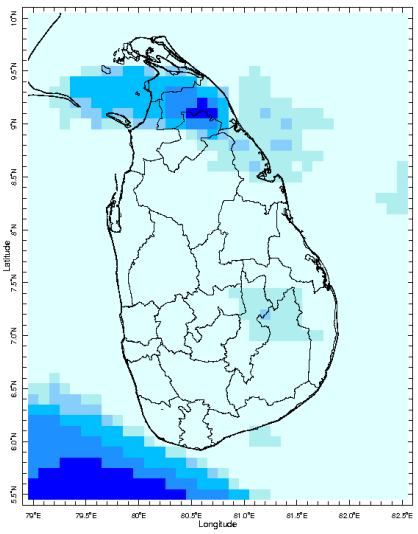
MONITORING

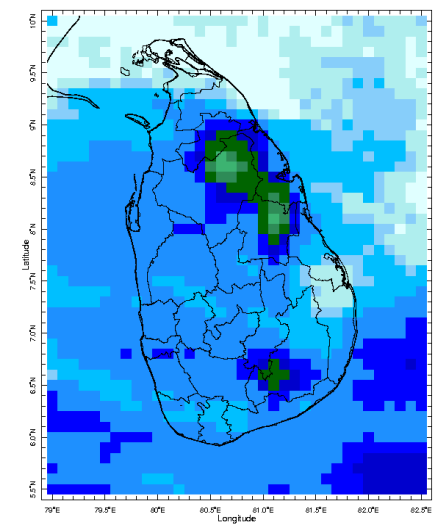
Daily Rainfall Monitoring

The following figures show the satellite observed rainfall in the last 7 days in Sri Lanka.









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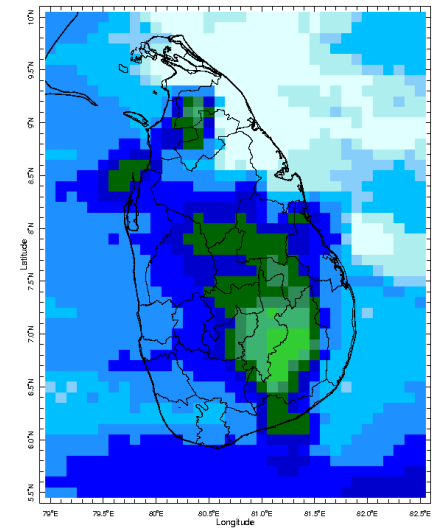
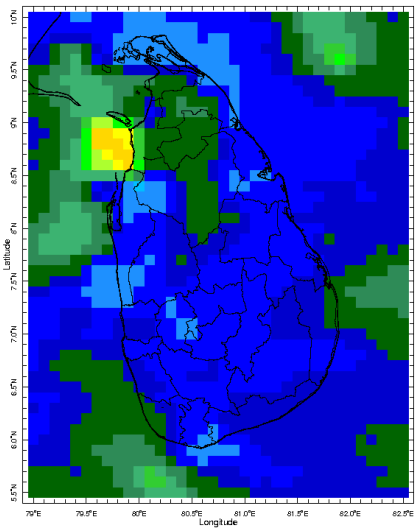
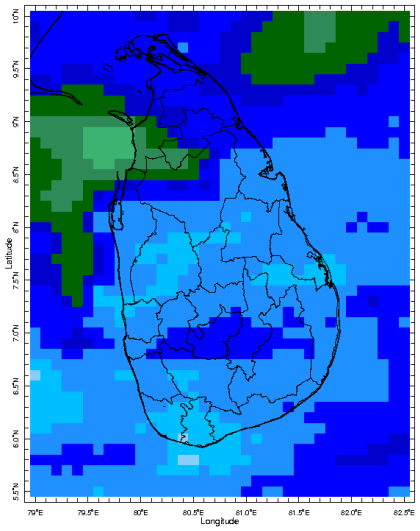


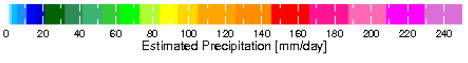
31 Aug 2020



1 Sep 2020

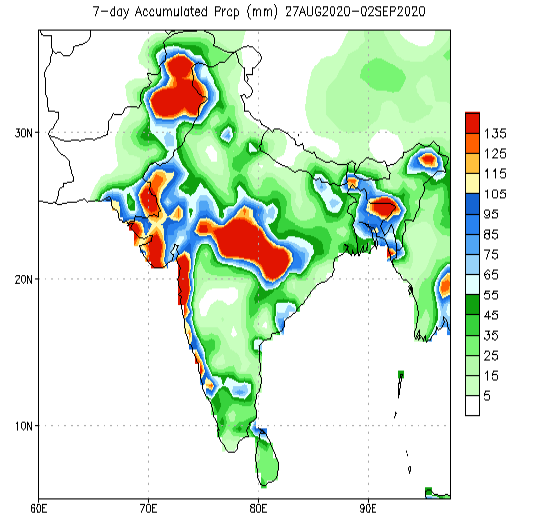


2 Sep 2020

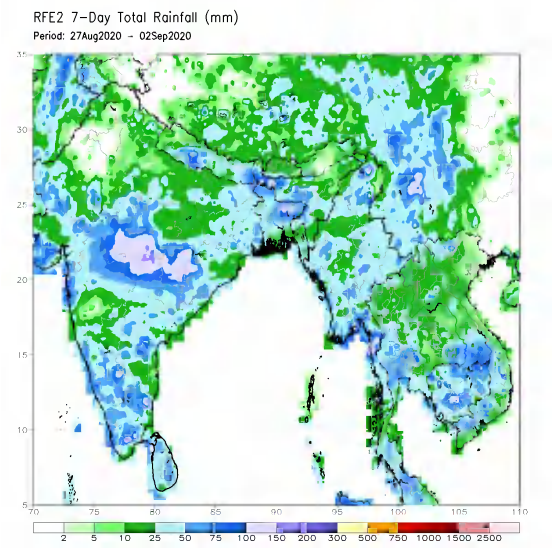


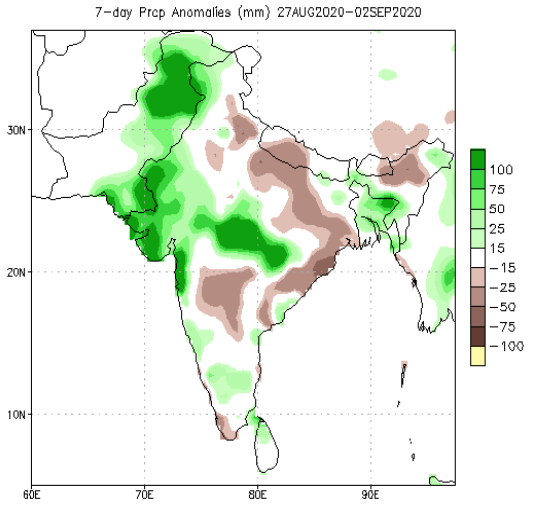
Weekly Rainfall Monitoring

The following figures show the total satellite observed rainfall in the last week in Sri Lanka. The figure in the left is the total 7-day rainfall from NOAA Climate Prediction Center (CPC) Unified Precipitation Analysis and the figure in the right is the total 7-day rainfall from CPC RFE 2.0 Satellite Rainfall Estimates. The bottom two figures are the respective anomalies.

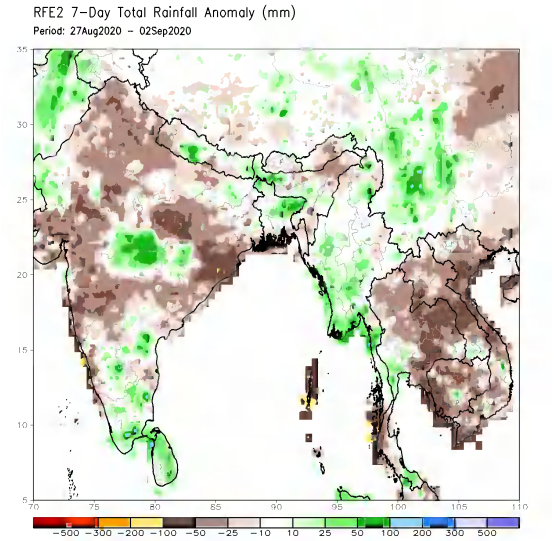


Data Source: CPC Unified (gauge-based & 0.5x0.5 deg resolution) Precipitation Analysis



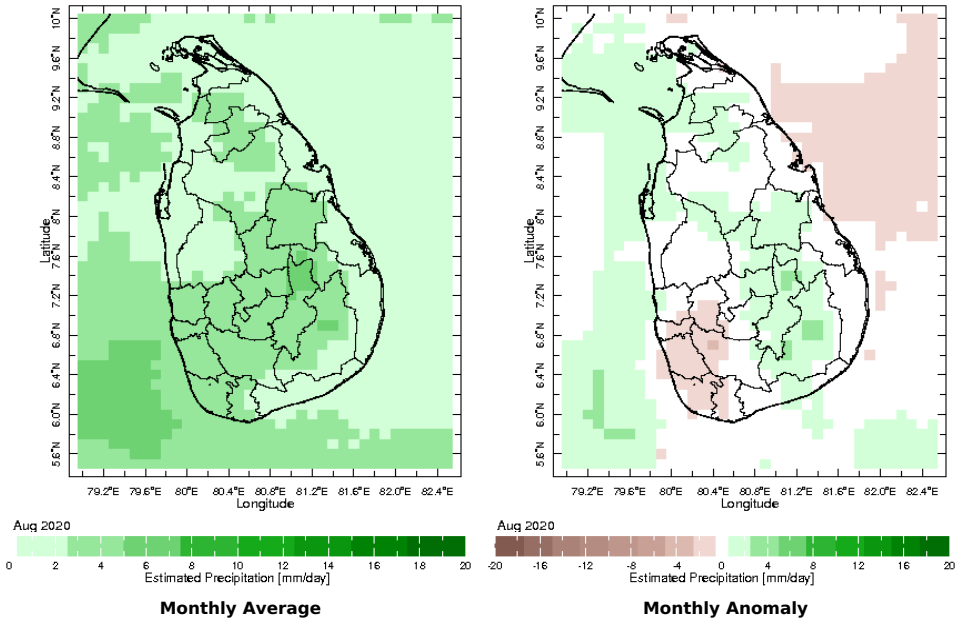


Data Source: CPC Unified (gauge-based & 0.5x0.5 deg resolution) Precipitation Analysis Climatology (1981-2010)



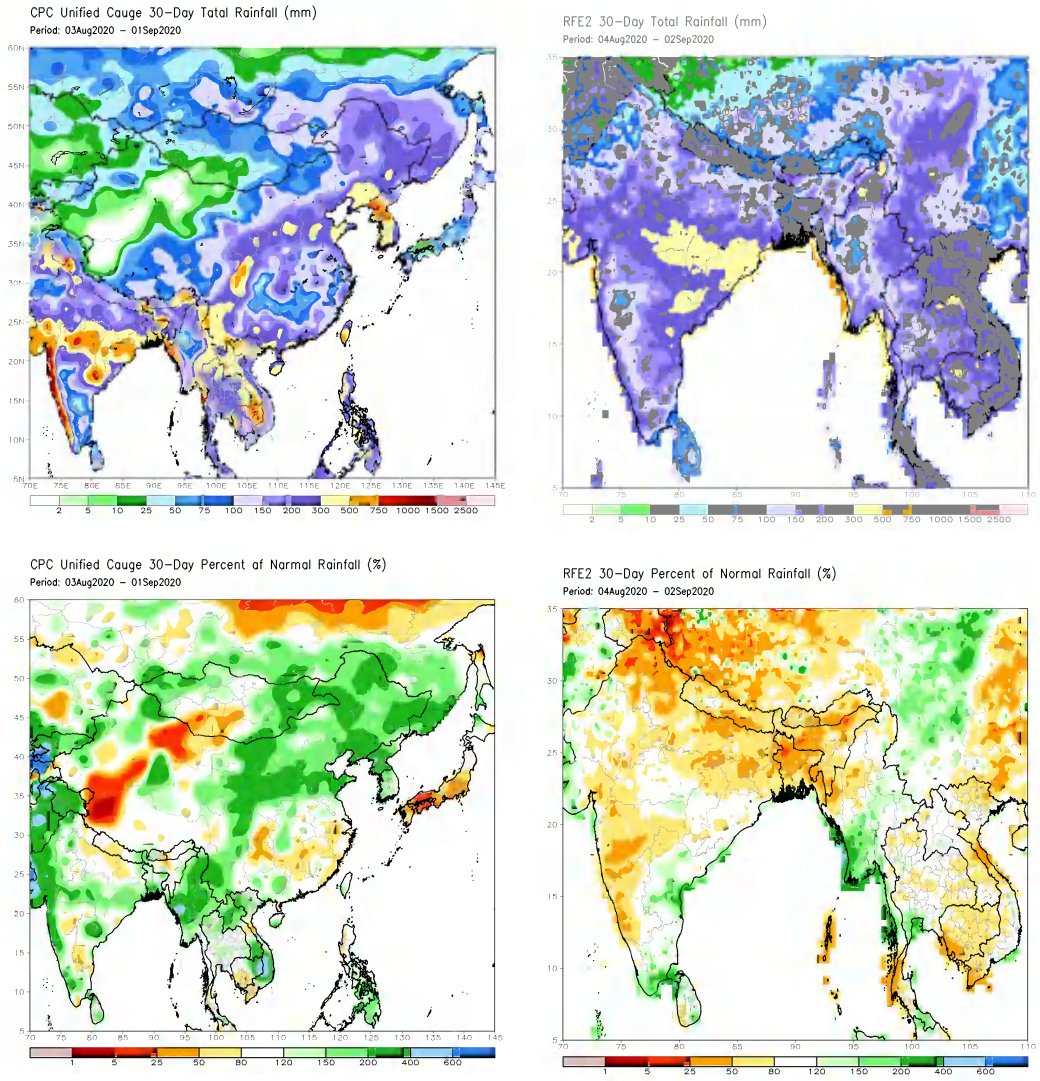
Monthly Rainfall Monitoring

The figure in the left shows the average observed rainfall in the previous month. The rainfall anomaly in the previous month is shown in the figure to the right. The brown color in the anomaly figure shows places which received less rainfall than the historical average while the green color shows places with above average rainfall. Darker shades show higher magnitudes in rainfall

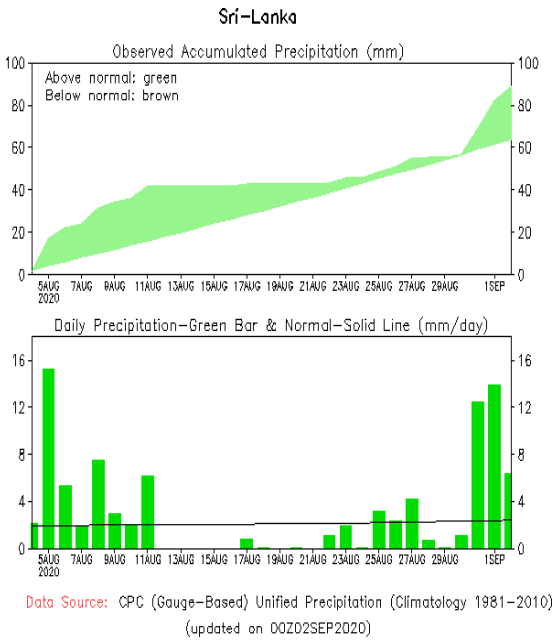


Monthly Average **Monthly Anomaly**

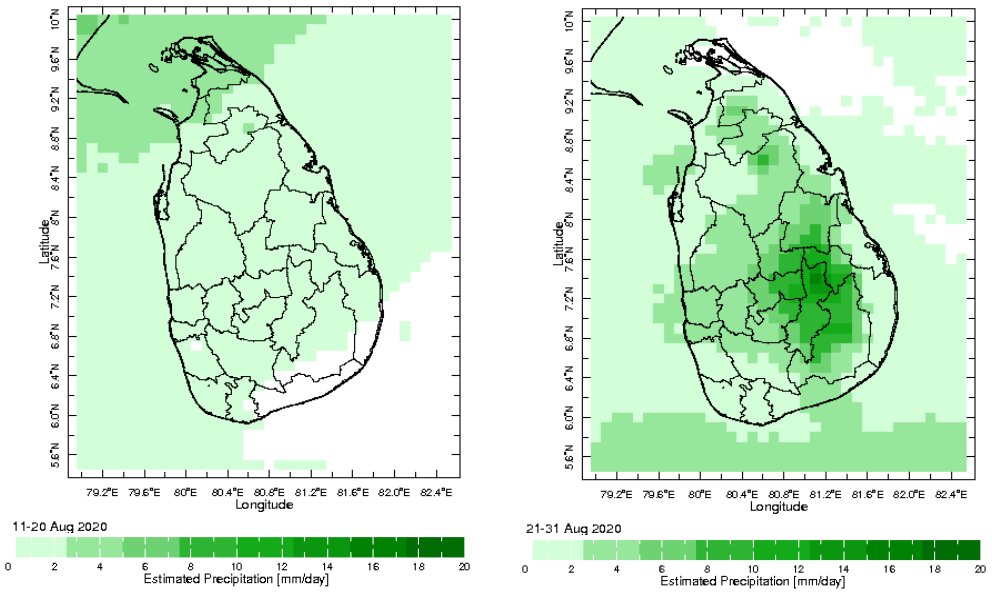
The figure in the top-left shows the total rainfall in the past 30 days from CPC Unified Precipitation Analysis while the figure in the top-right shows the total rainfall for the same period from RFE 2.0 Satellite Rainfall Estimates. The bottom two figures show the percentage of rainfall received in the past 30 days compared to normal rainfall in this period.



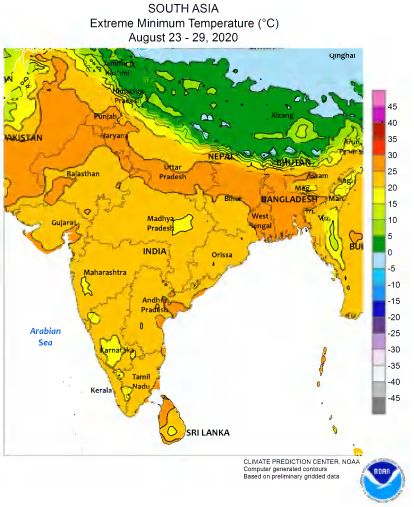
The following figure shows the observed accumulated rainfall (top) and daily observed rainfall (bottom) in Sri Lanka in the last 30 days.

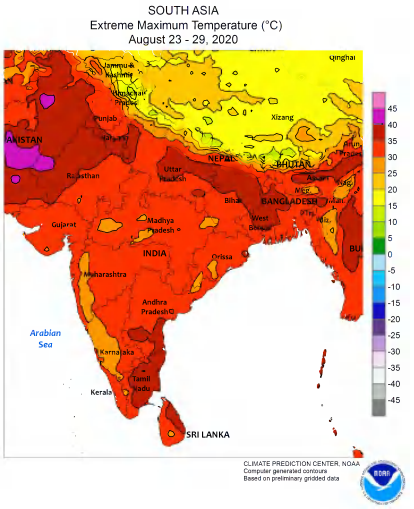


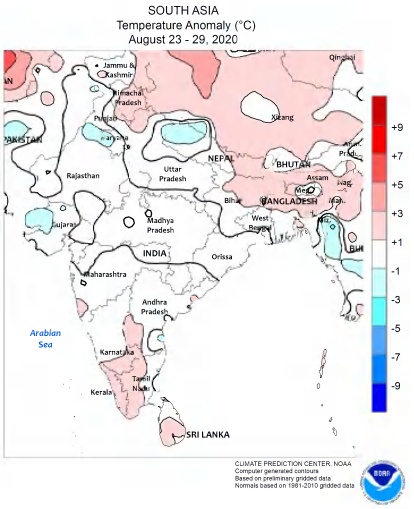
Dekadal (10 Day) Satellite Derived Rainfall Estimates



Weekly Temperature Monitoring

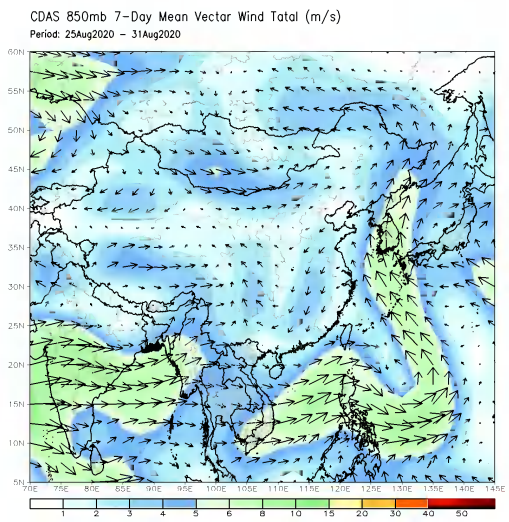


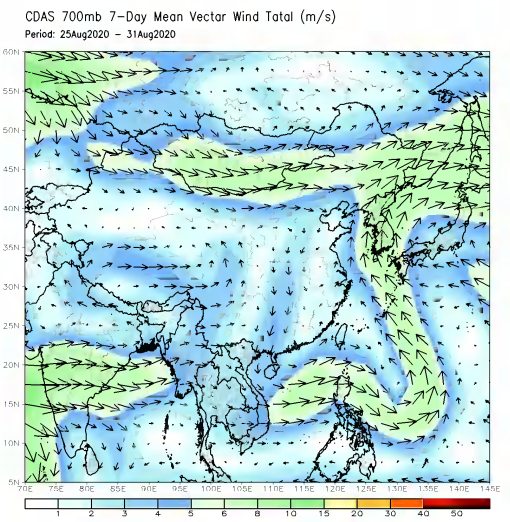




Weekly Wind Monitoring

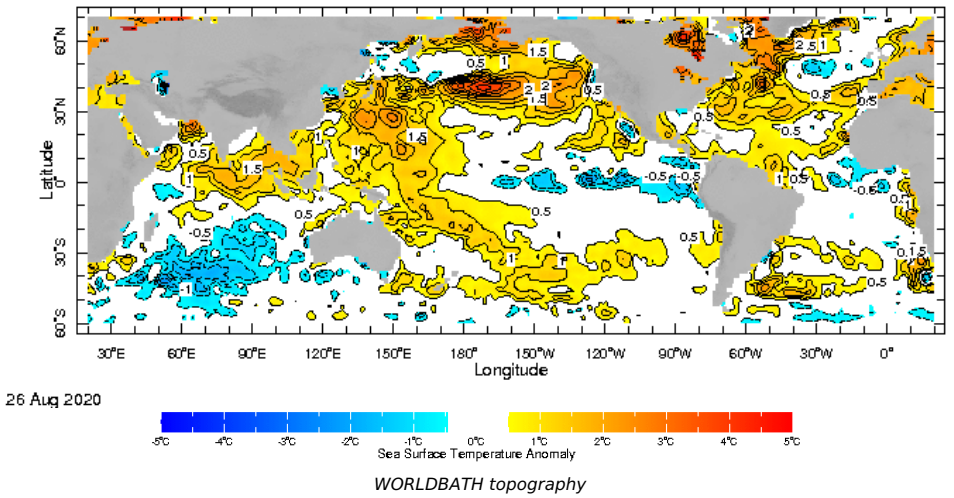
The following figures show the mean vector wind total of the past 7 days near Sri Lanka at two levels. The figure on the left shows 850 mb (~1500 m) level and the figure on the right shows 700 mb (~3000 m) level.





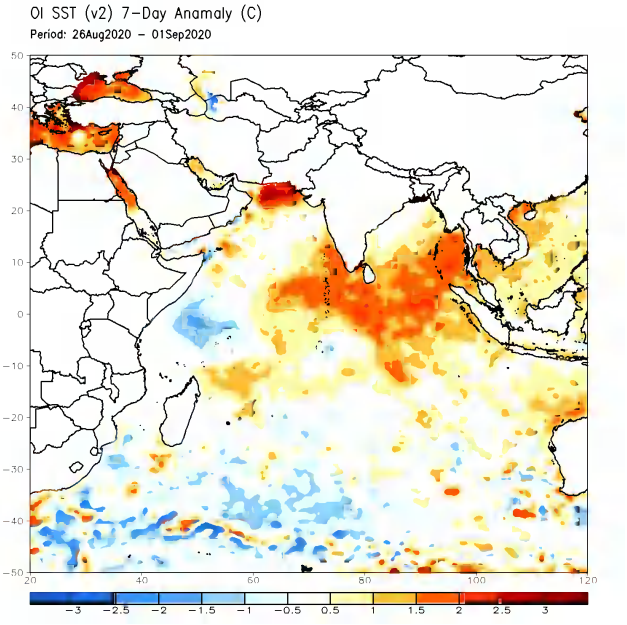
Weekly Average SST Anomalies

Weekly average Sea Surface Temperature (SST) anomaly in the world from NOAA NCEP



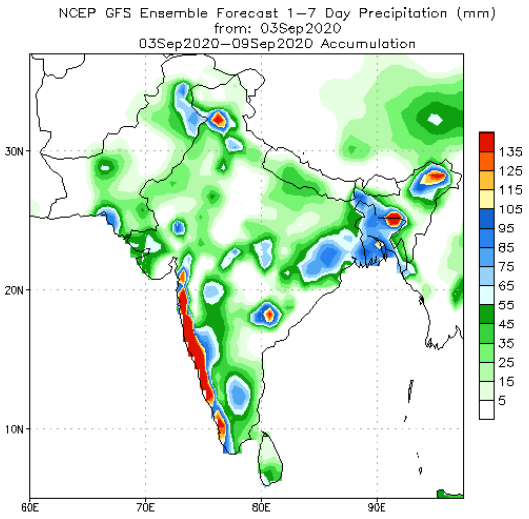
WORLDBATH topography

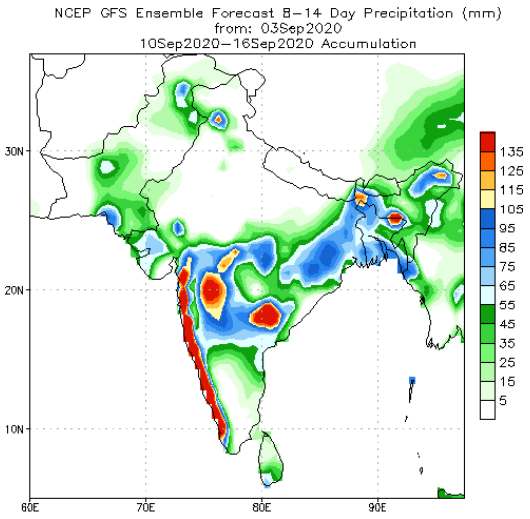
Optimum Interpolated Sea Surface Temperature Anomaly in the Indian Ocean from NOAA CPC



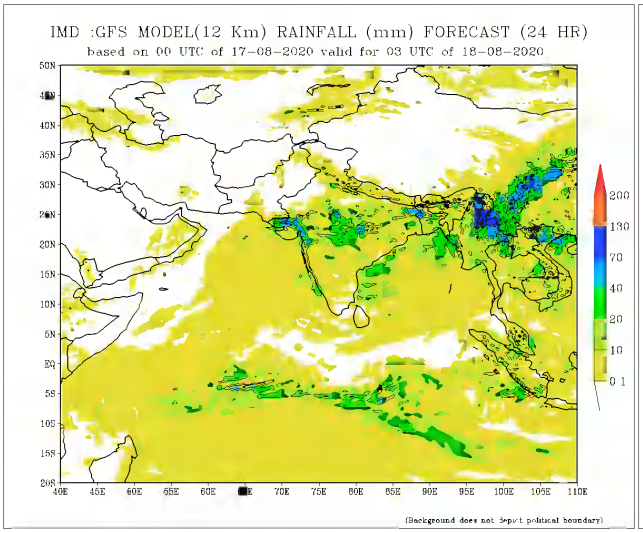
PREDICTIONS

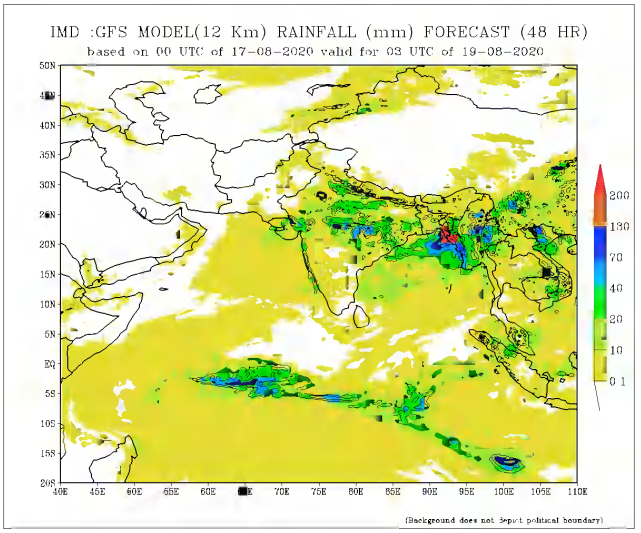
NCEP GFS 1- 14 Day prediction





IMD GFS (T574) Model Rainfall Forecast from RMSC New Delhi, India


IMD :GFS MODEL(12 Km) RAINFALL (mm) FORECAST (24 HR)
based on 00 UTC of 17-08-2020 valid for 03 UTC of 18-08-2020
200
130
70
40
20
10
0.1
(Background does not depict political boundary)


IMD :GFS MODEL(12 Km) RAINFALL (mm) FORECAST (48 HR)
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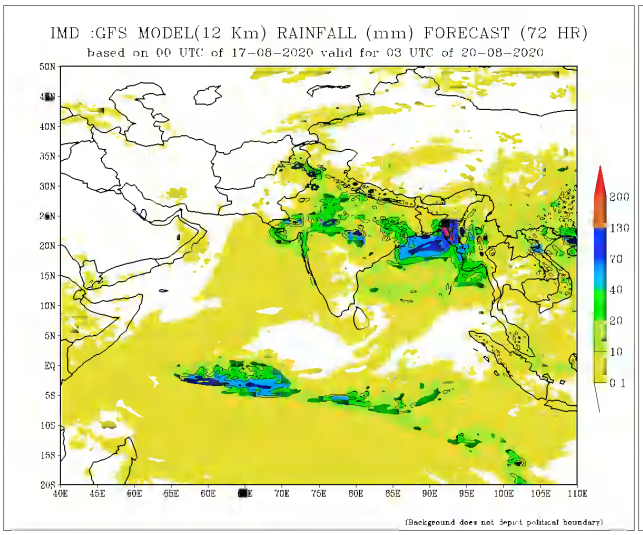
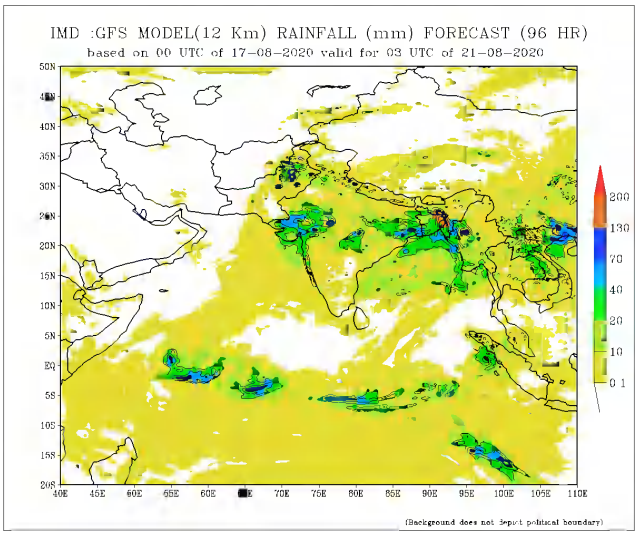
200
130
70
40
20
10
0.1
(Background does not depict political boundary)


IMD :GFS MODEL(12 Km) RAINFALL (mm) FORECAST (72 HR)
based on 00 UTC of 17-08-2020 valid for 03 UTC of 20-08-2020
200
130
70
40
20
10
0.1
(Background does not depict political boundary)


IMD :GFS MODEL(12 Km) RAINFALL (mm) FORECAST (96 HR)
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200
130
70
40
20
10
0.1
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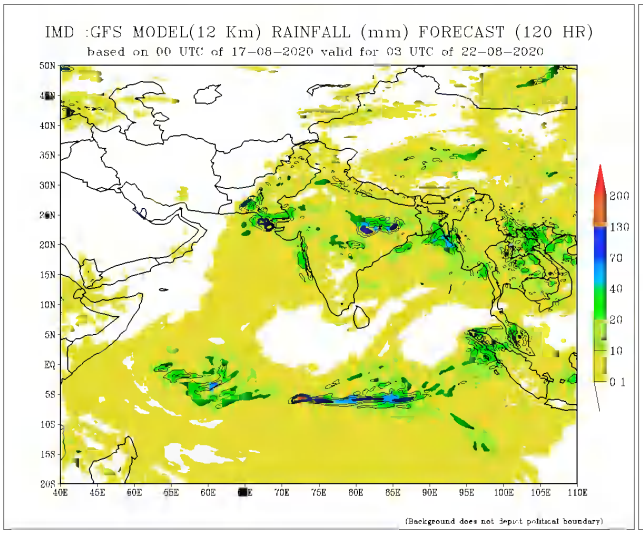
IMD :GFS MODEL(12 Km) RAINFALL (mm) FORECAST (120 HR)
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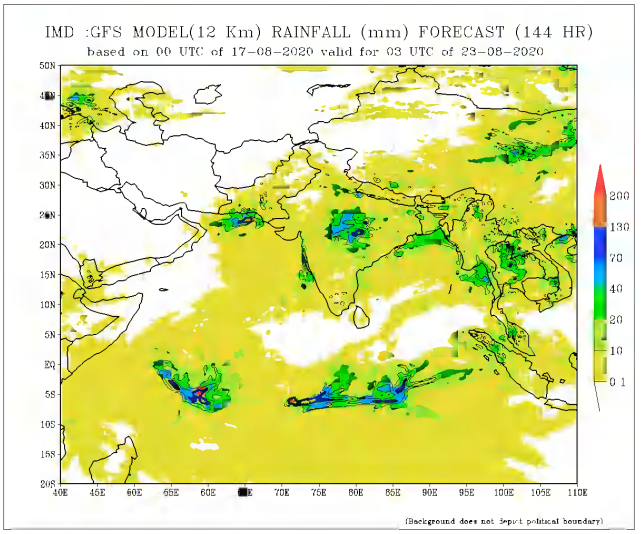
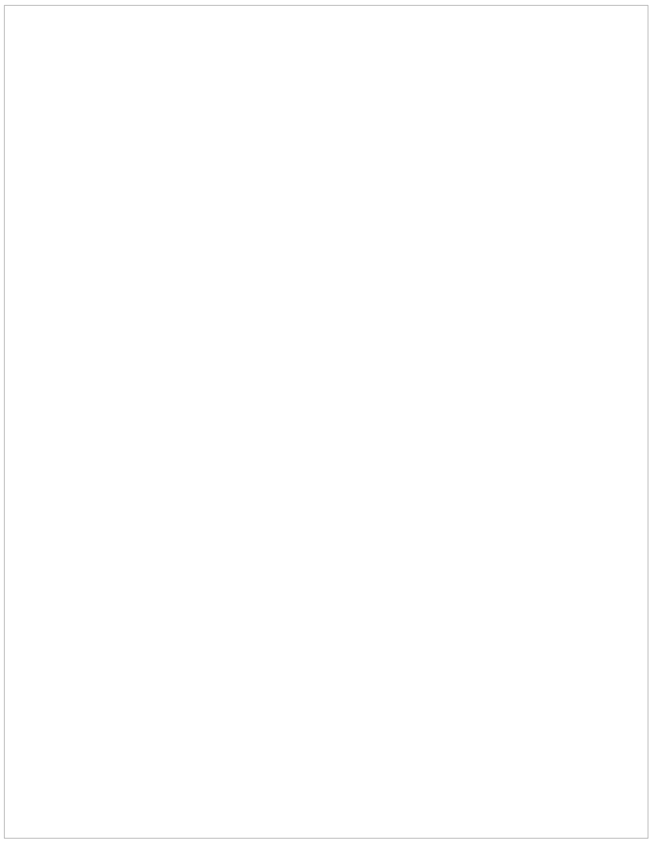
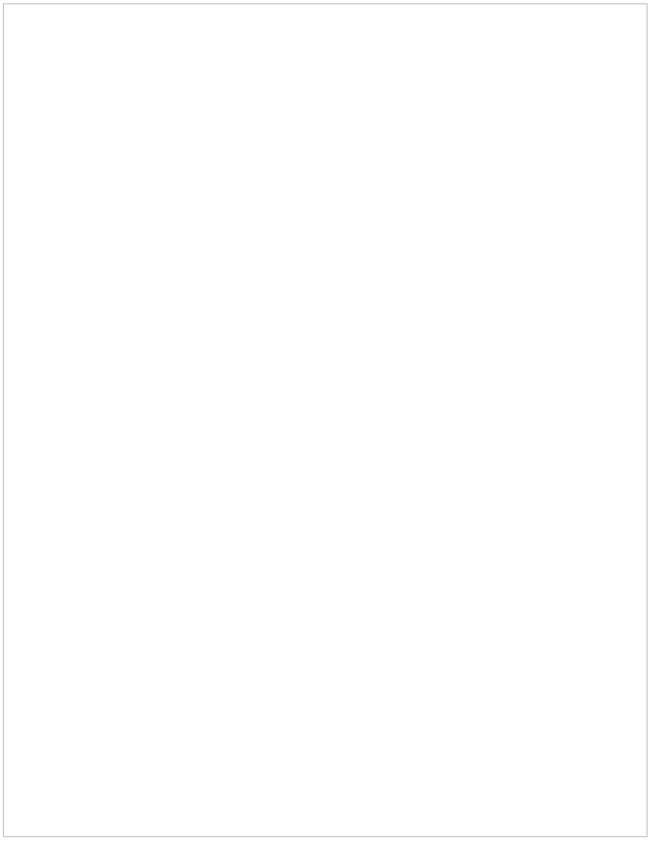
200
130
70
40
20
10
0.1
(Background does not depict political boundary)


IMD :GFS MODEL(12 Km) RAINFALL (mm) FORECAST (144 HR)
based on 00 UTC of 17-08-2020 valid for 03 UTC of 23-08-2020
200
130
70
40
20
10
0.1
(Background does not depict political boundary)

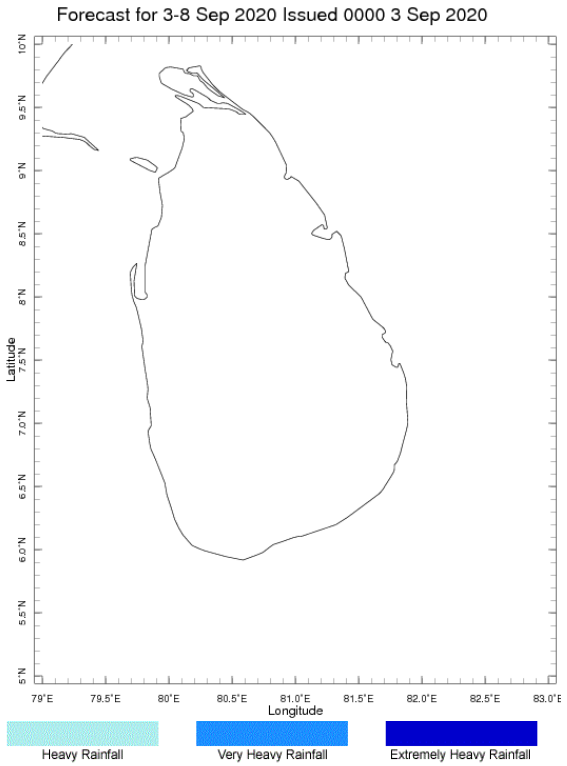
WRF Model Forecast (from IMD Chennai)



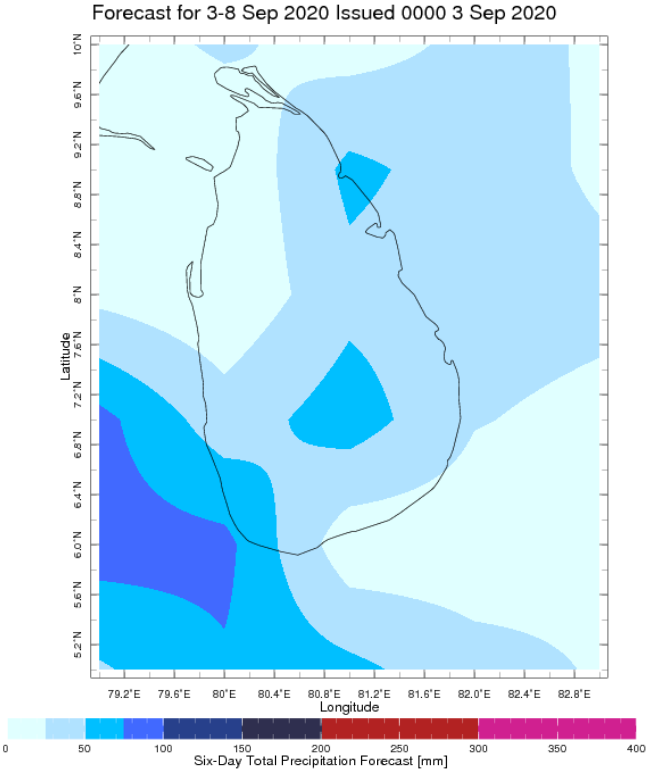


Weekly Rainfall Forecast from IRI

Total rainfall forecast from the IRI for next six days is provided in figures below. The figure to the left shows the expectancy of heavy rainfall events during these six days while the figure to the right is the prediction of total rainfall amount during this period.



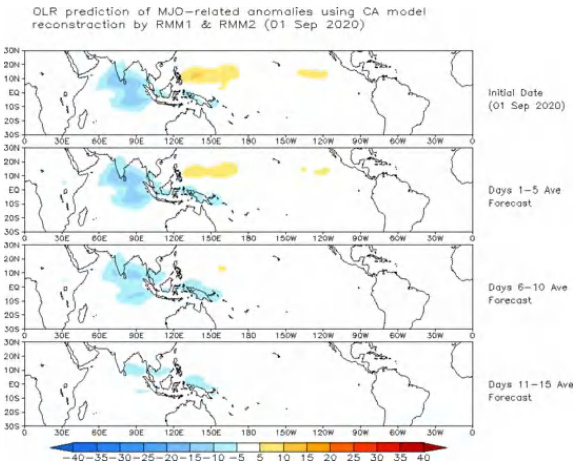
Extreme Rainfall Forecast



Total Six Day Precipitation Forecast

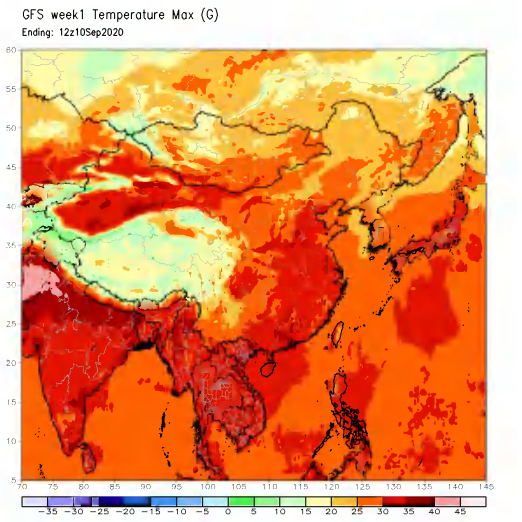
Madden Julian Oscillation (MJO) related Outgoing Longwave Radiation (OLR) Forecast

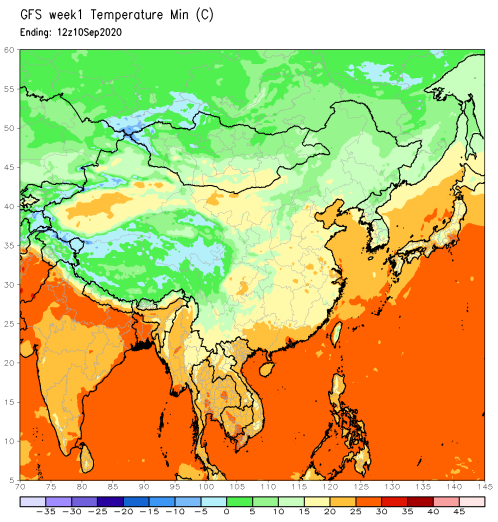
The Outgoing Longwave Radiation (OLR) is a proxy for rainfall. This can be used to identify convective rain clouds based on the MJO phase. Violet and Blue shading indicates enhanced tropical weather and Orange shading indicates suppressed conditions. The following figure shows the forecasts of MJO associated anomolous OLR for the next 15 days from the Constructed Analogue (CA) model forecasts.



Weekly Temperature Forecast

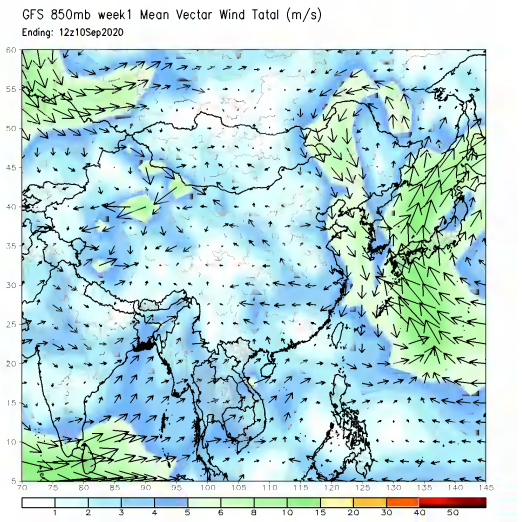
Weekly Minimum and Maximum Temperature prediction from the GFS model (from NOAA CPC)

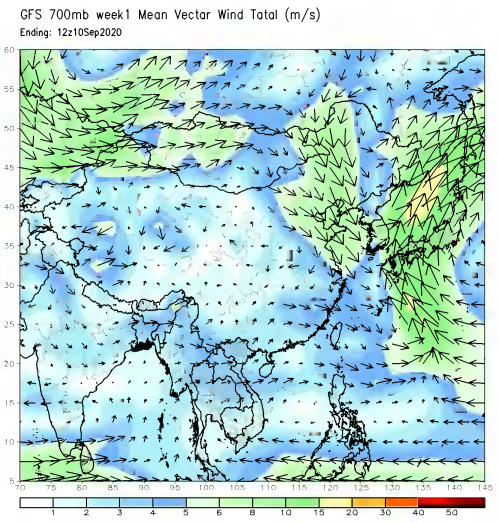




Weekly Wind Forecast

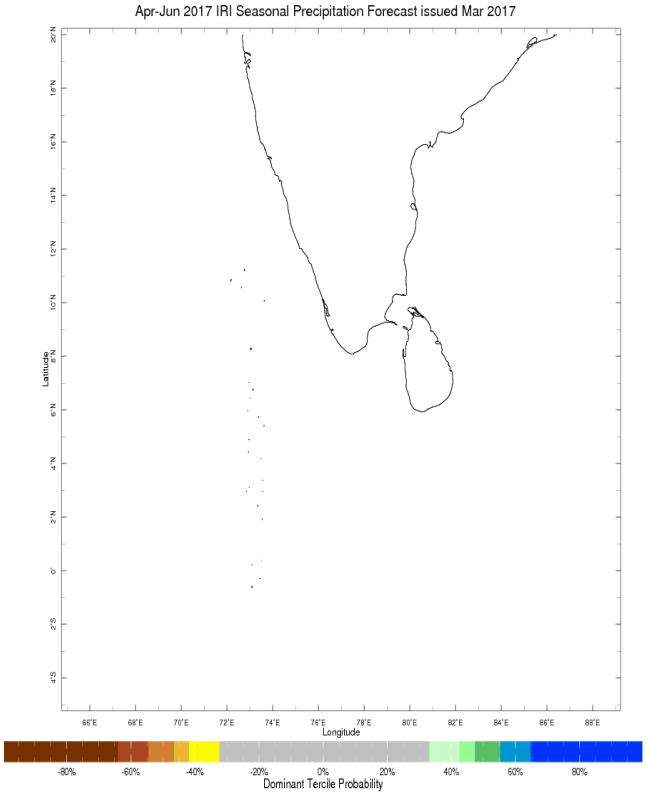
Weekly mean vector wind total prediction from the GFS model at 850 mb (left) and 700 mb (right) levels. (from NOAA CPC)



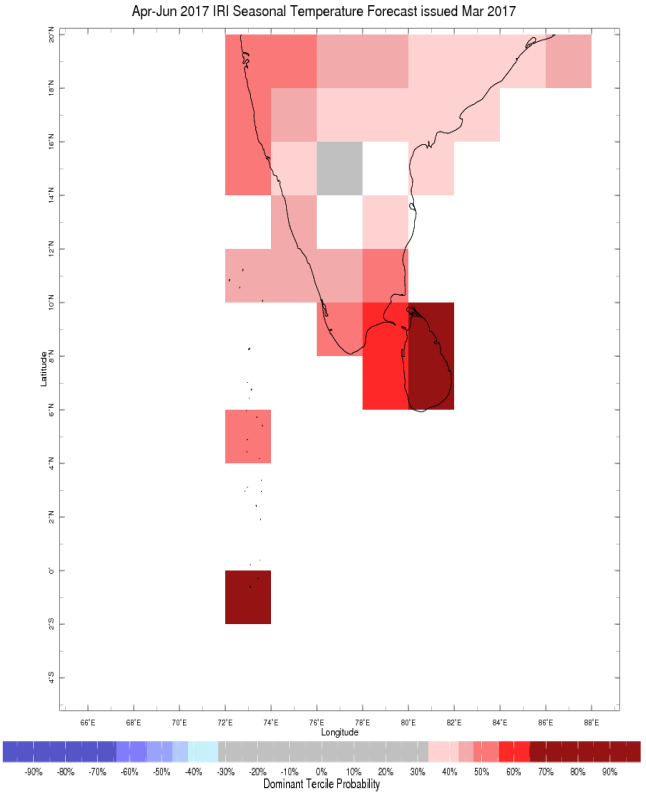


Seasonal Rainfall and Temperature Forecast

Following is the latest seasonal precipitation and temperature prediction for the next 3 months by the IRI. The color shading indicates the probability of the most dominant tercile -- that is, the tercile having the highest forecast probability. The color bar alongside the map defines these dominant tercile probability levels. The upper side of the color bar shows the colors used for increasingly strong probabilities when the dominant tercile is the above-normal tercile, while the lower side shows likewise for the below-normal tercile. The gray color indicates an enhanced probability for the near-normal tercile (nearly always limited to 40%).



Precipitation Forecast



Temperature Forecast

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