Federation for Environment, Climate and Technology

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24 July 2020

EXPERIMENTAL CLIMATE MONITORING AND PREDICTION

By: Piushani Ellegala, Chethana Chandrasiri, Chayana Gunathilake, Lareef Zubair and Michael Bell[1] (FECT and IRI[1])

HIGHLIGHTS

Rainfall Forecast

- *The NOAA weekly rainfall forecast predicts up to 50 mm in Colombo, Galle, Kalutara, Kandy, Matara, Matale,Badulla, Ratnapura,Kegalle, Nuwara Eliya, Monaragala, Mullaitivu,Anuradhapura, Tincomalee, Polonnaruwa and Batticaloa districts during 22 -28 June.*

Monitored Rainfalls

- *Between 16th June - 22nd July: up to 90 mm of rainfall was recoreded in Nuwara Eliya district on 18th July.*

Monitored Wind

- *From 2 - 9 June: up to 8 km/h, northwesterly winds were experienced by the entire island.*

Monitored Sea Surface

- *1.5 ^{0}C above average sea surface temperature was observed in the seas around Sri Lanka.*

Monitoring

Rainfall

Weekly Monitoring

Date	Rainfall
16th July	Up to 70 mm in Ampara and Batticaloa districts; up to 40 mm in Badulla and Monaragala districts; and up to 30 mm in Polonnaruwa and Matale districts; up to 20mm in Gampaha, Colombo, Kegalle, Ratnapura and Kandy; up to 15 mm in Jaffna, Kilinochchi, Mannar, Mullaitivu, Puttalam, Vavuniya, Anuradhapura, Kurunegala, Nuwara Eliya, Kalutara, Galle, Matara and Hambantota districts; and up to 10 mm in Trincomalee district.
17th July	Up to 15 mm in Hambantota, Galle, Matara, Monaragala, Badulla, Ratnapura and Ampara districts; and up to 10 mm in Kalutara, Colombo, Gampaha, Kegalle, Kurunegala, Kandy and Nuwara Eliya districts.
18th July	Up to 90 mm in Nuwara Eliya district; up to 80 mm in Kandy district; and up to 70 mm in Badulla and Kegalle, districts; up to 60 mm in Kurunegala, Gampaha, Colombo, Ratnapura, Matale and Monaragala districts; up to 40 mm in Puttalam district; up to 30 mm in Matara, Hambantota, Polonnaruwa, Mannar, Vavuniya, Mullaitivu and

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Date	Rainfall
	Polonnaruwa districts; up to 20 mm in Anuradhapura, Trincomalee, Ampara, Hambantota and Mullaitivu districts; and up to 10 mm in Jaffna and Kilinochchi districts.
19th July	Up to 40 mm in Badulla, Puttalam, Gampaha and Kurunegala districts; up to 30 mm in Ampara, and Hambantota districts; and up to 20 mm in Colombo, Kegalle, Katutara, Ratnapura, Monaragala, Matale, Kandy and Polonnaruwa districts; up to 15 mm in Galle, Mannar and Anuradhapura districts; up to 10 mm in Matara, Nuwara Eliya, Vavuniya, Mullaitivu and Kilinochchi districts.
20th July	Up to 40 mm in Jaffna district; up to 30 mm in Kilinochchi district; up to 15 mm in Kalutara, Galle, Matara, and Hambantota districts; and up to 10 mm in Mannar, Kilinochchi, Vavuniya, Puttalam, Gampaha, Colombo, Ratnapura, Nuwara Eliya, Badulla, Monaragala and Ampara districts.
21st July	Up to 2.5 mm in Monaragala and Ampara Districts.
22nd July	Up to 10 mm in Gampaha, Puttalam, Kurunegala, Kegalle, Kandy, Matale, Nuwara Eliya, Polonnaruwa, Badulla, Ampara and Batticoloa districts.

Total Rainfall for the Past Week

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

Above rainfall average up to 50-100 mm in Gampaha, Colombo, Kegalle, Ratnapura, Nuwara Eliya, Badulla and Kandy districts; up to 25 – 50 mm in Puttalam, Kurunegala, Matale, Ampara, Batticaloa, Monaragala, Polonnaruwa, Mannar, Vavuniya, Jaffna and Hambantota districts; and up to 10 – 25 mm in Kilinochchi, Mullaitivu, Anuradhapura, Galle, Matara and Kalutara districts.

Monthly Monitoring

During June – Above average rainfall conditions up to 6 mm were experienced by Vavuniya and Anuradhapura districts; up to 4 mm in Mannar, Kurunegala, Polonnaruwa, Trincomalee, Kegalle, Kandy, Badulla, Ampara, Batticaloa, Monaragala and Hambantota districts and below average rainfall conditions upto 2 mm were experienced by Galle, Matara and Ratnapura districts.

Ocean State *(Text Courtesy IRI)*

Pacific sea state: June 24, 2020

SSTs in the east-central Pacific decreased to near the La Niña threshold in early June, 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 23rd July – 29th July: Total rainfall up to 75 mm in Galle, Matara and Ratnapura districts; up to 65 mm in Nuwara Eliya, Badulla, Kegalle, Monaragala and Hambantota districts; up to 55 mm in Gampaha and Kandy districts; up to 45 mm in Puttalam, Kurunegala and Ampara districts; up to 35 in Matale, Polonnaruwa and Batticaloa districts; and upto 25 mm in Anuradhapura district.

From 30th July – 05th August: Total rainfall up to 65 mm in Kalutara, Colombo, Galle, Matara, Ratnpura, Hambantota districts; up to 55 mm in Gampaha, Kegalle, Badulla, Nuwara Eliya, Kilinochchi, Mullaitivu, Vavuniya, Jaffna, Trincomalee and Anuradhapura districts; up to 45 mm in Kandy, Matale, Kurunegala, Mannar, Polonnaruwa and Ampara districts; and up to 35 mm in Puttalam, Batticaloa districts.

NOAA Model Forecast:

From 23th July – 28th July: Total rainfall up to 50 mm in Colombo, Kalutara, Galle, Matara, Ratnapura, Kegalle, Nuwara Eliya, Kandy, Monaragla, Badulla, Matale, Mullaitivu, Anuradhapura, Polonnaruwa, Trincomalee and Batticaloa districts.

MJO based OLR predictions

For the next 15 days:

MJO shall significantly enhance rainfall during 22 July - 10 August and shall remain neutral during 11 – 15 August.

[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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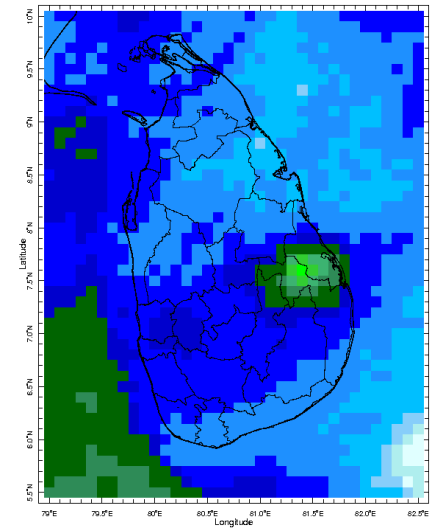
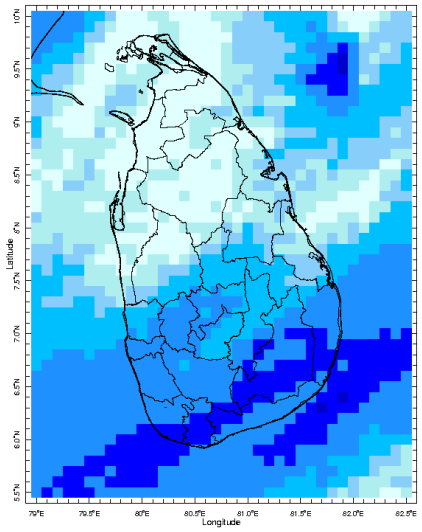
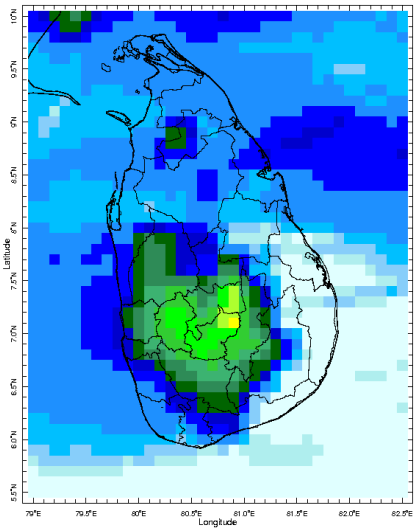
MONITORING

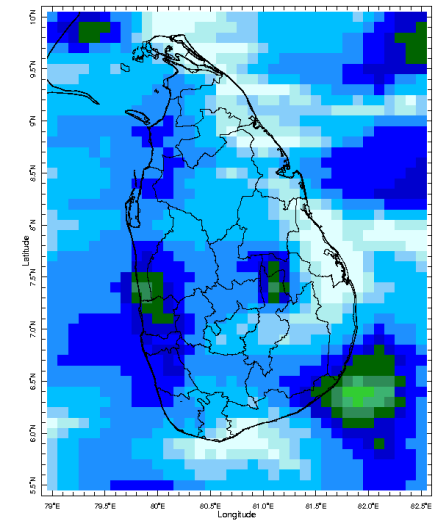
Daily Rainfall Monitoring

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









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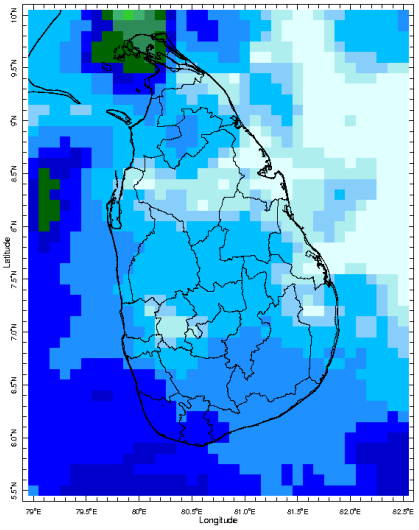

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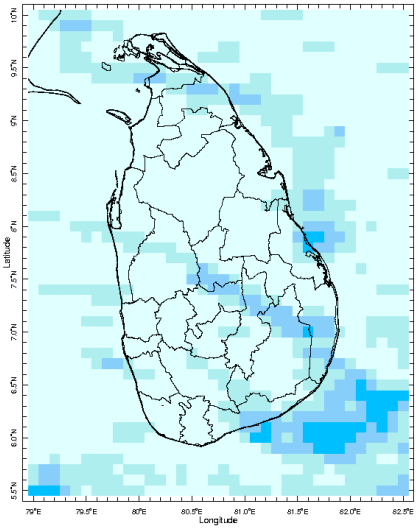

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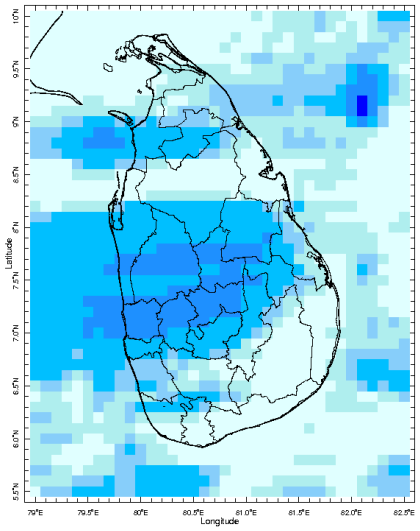
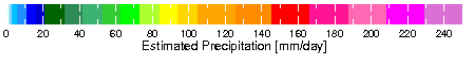
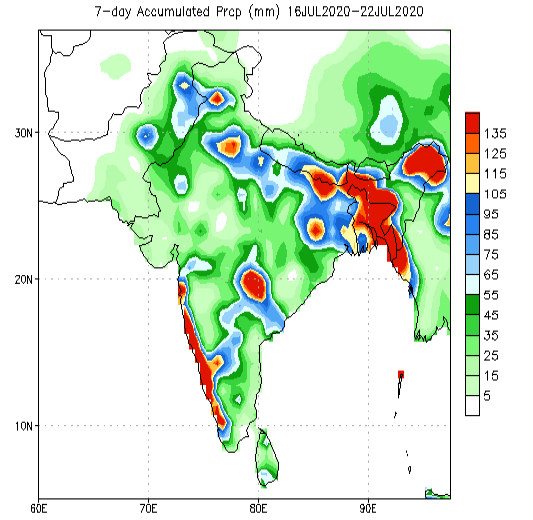


22 Jul 2020

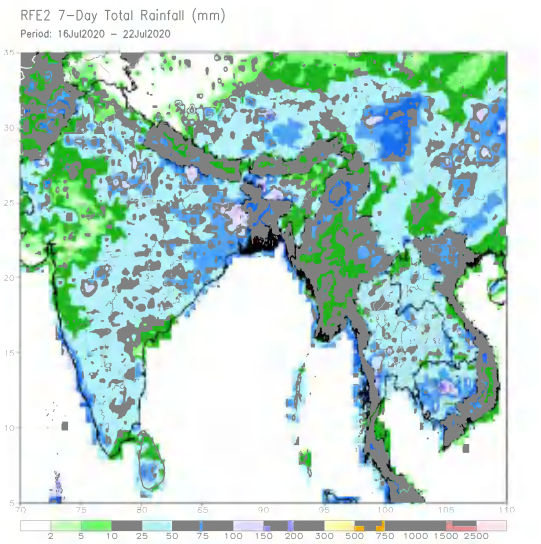


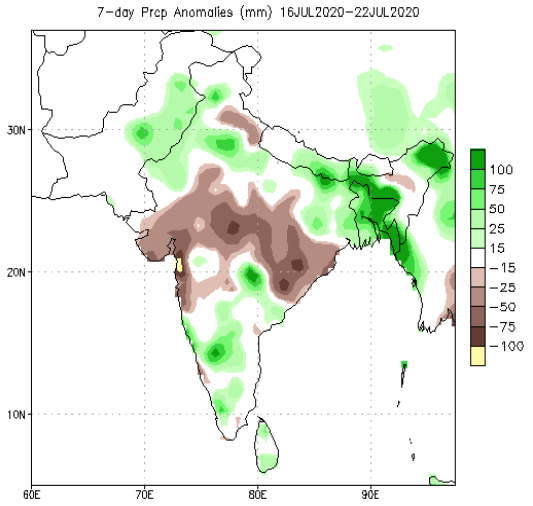
Weekly Rainfall Monitoring

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.

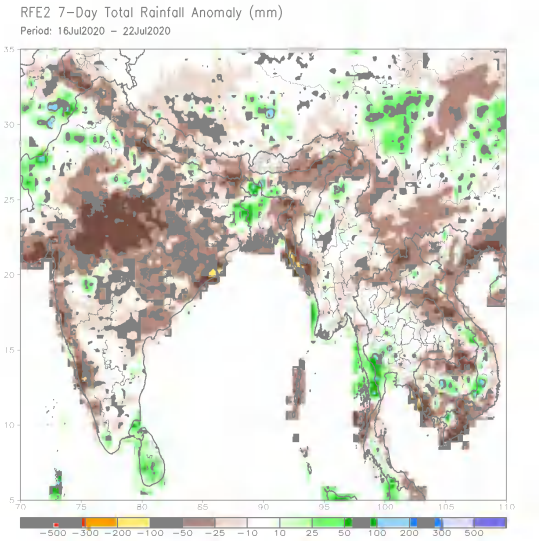


Data Source: CPC Unified (gauge-based & 0.5x0.5 deg resolution) Precipitation Analysis



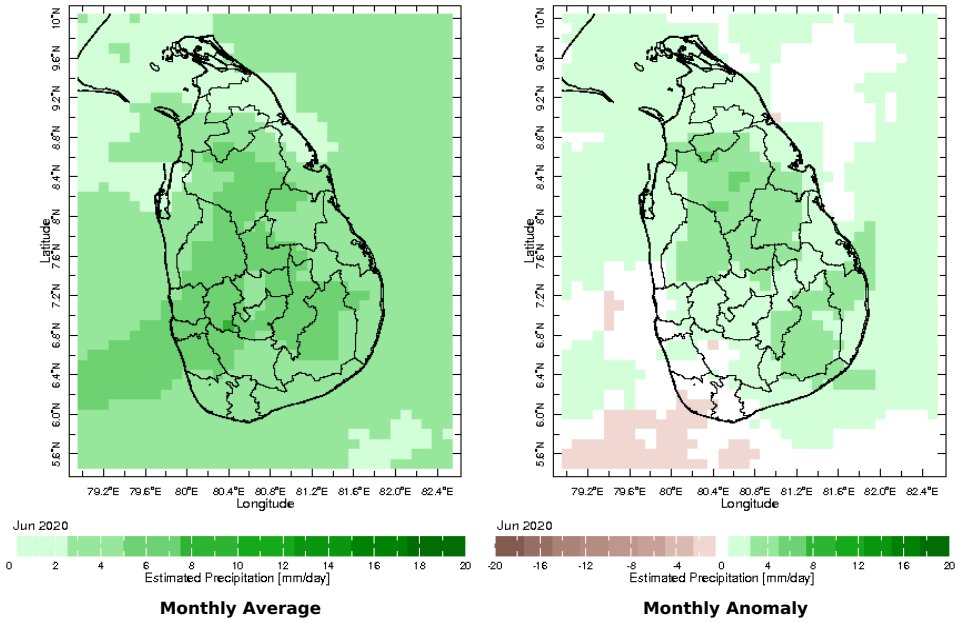


Data Source: CPC Unified (gauge-based & 0.5x0.5 deg resolution) Precipitation Analysis Climatology (1981-2010)



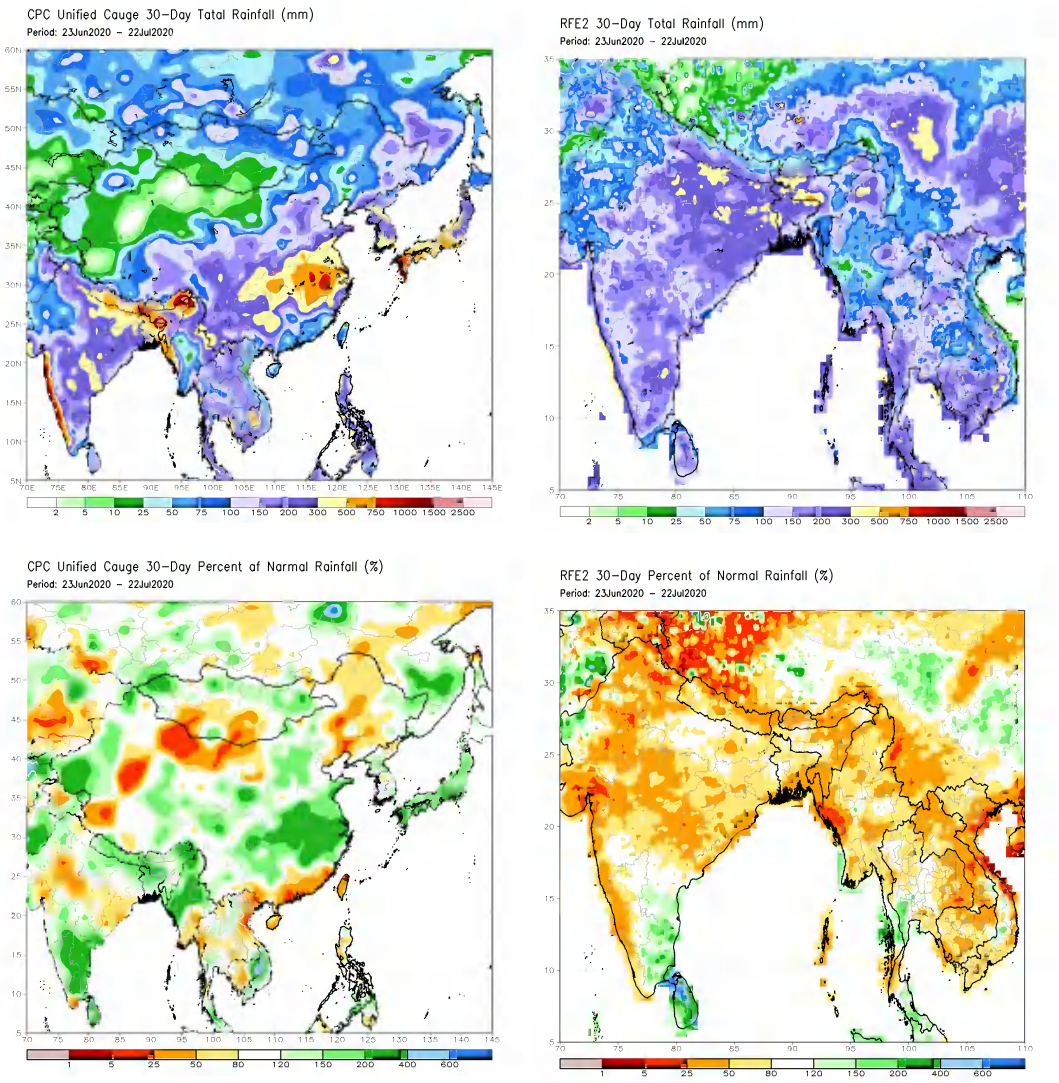
Monthly Rainfall Monitoring

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

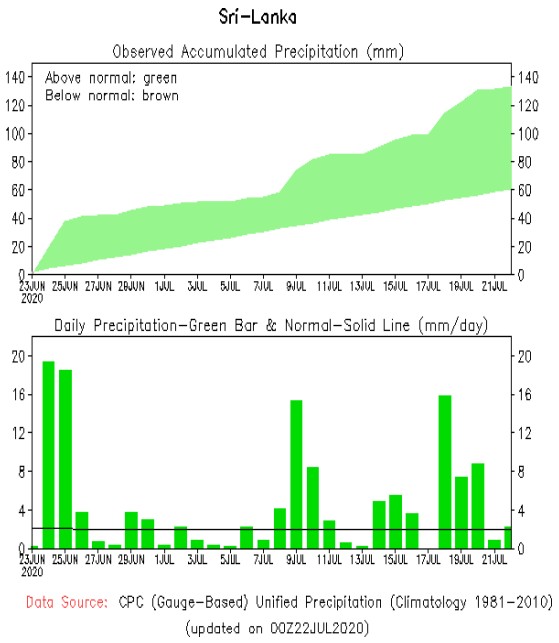


Monthly Average **Monthly Anomaly**

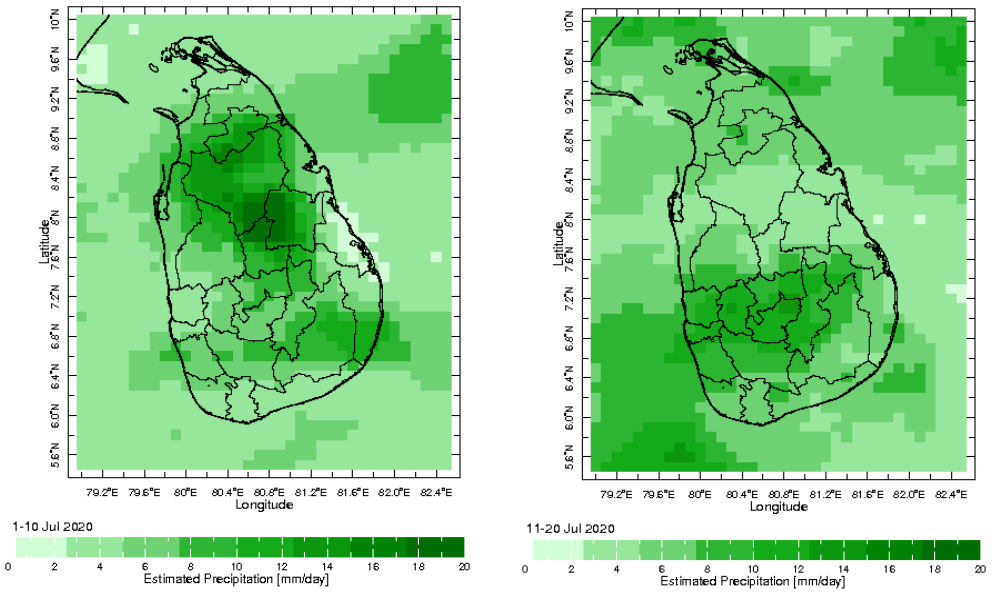
The figure in the top-left shows the total rainfall in the past 30 days from CPC Unified Precipitation Analysis while the figure in the top-right shows the total rainfall for the same period from RFE 2.0 Satellite Rainfall Estimates. The bottom two figures show the percentage of rainfall received in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



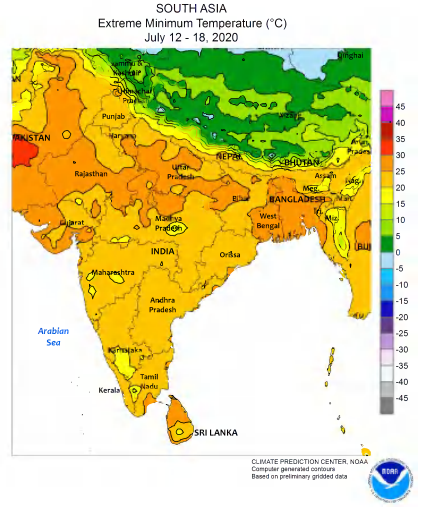
The following figure shows the observed accumulated rainfall (top) and daily observed rainfall (bottom) in Sri Lanka in the last 30 days.

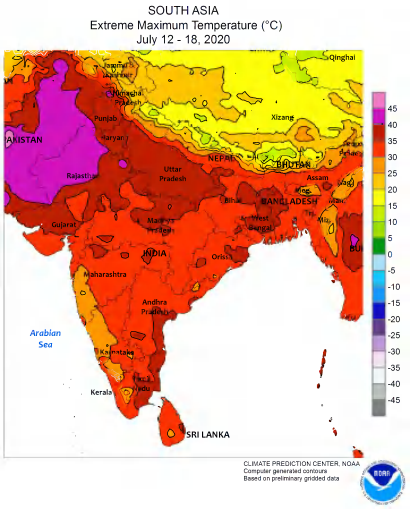


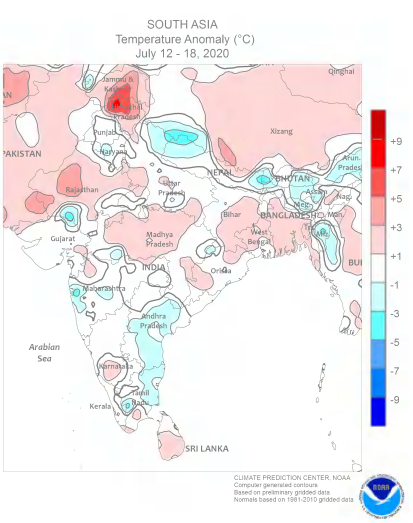
Dekadal (10 Day) Satellite Derived Rainfall Estimates



Weekly Temperature Monitoring

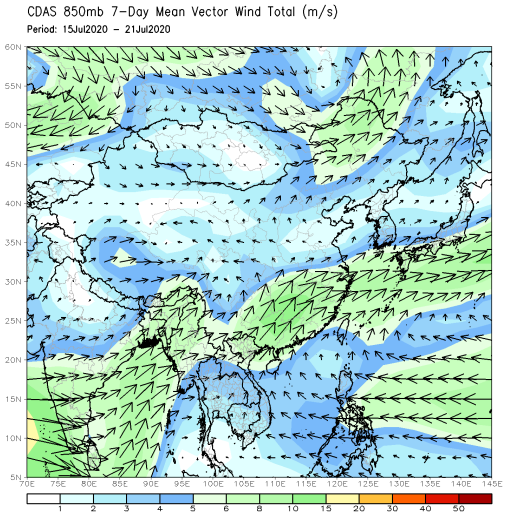


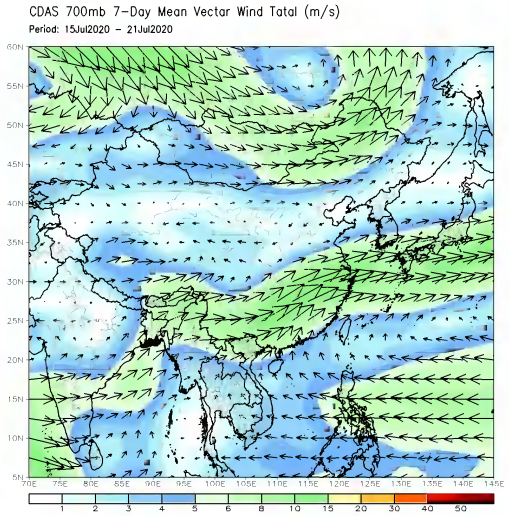




Weekly Wind Monitoring

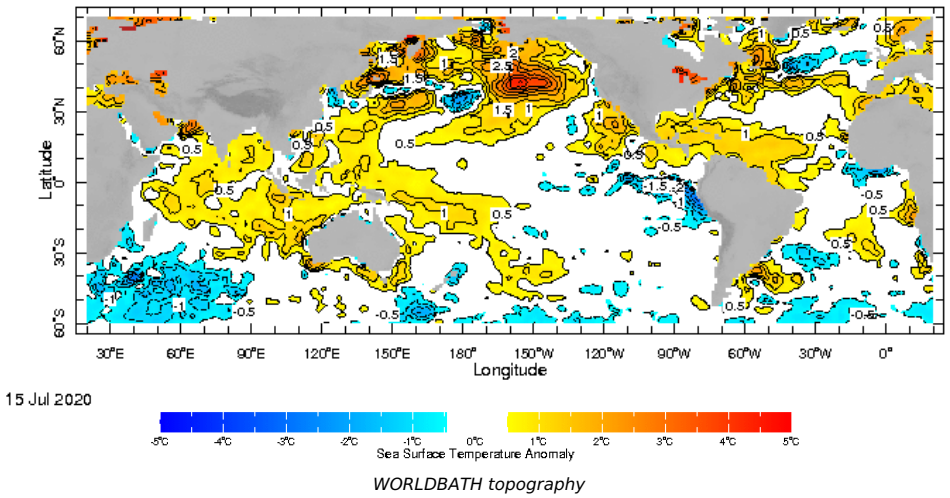
The following figures show the mean vector wind total of the past 7 days near Sri Lanka at two levels. The figure on the left shows 850 mb (~1500 m) level and the figure on the right shows 700 mb (~3000 m) level.





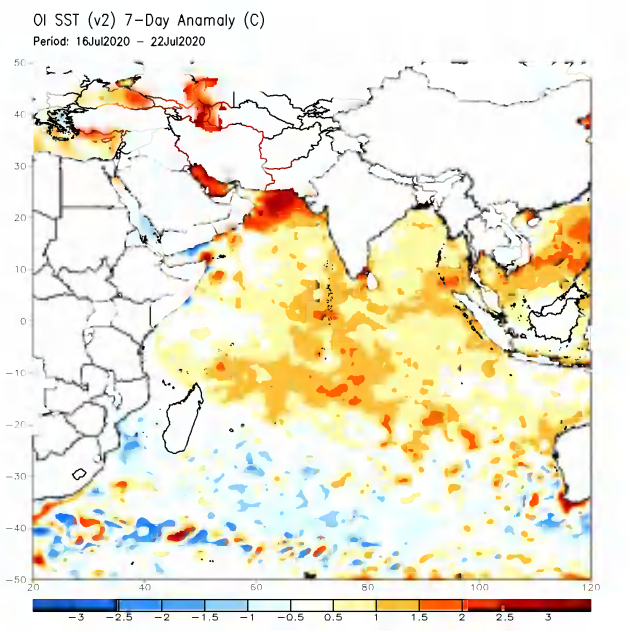
Weekly Average SST Anomalies

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



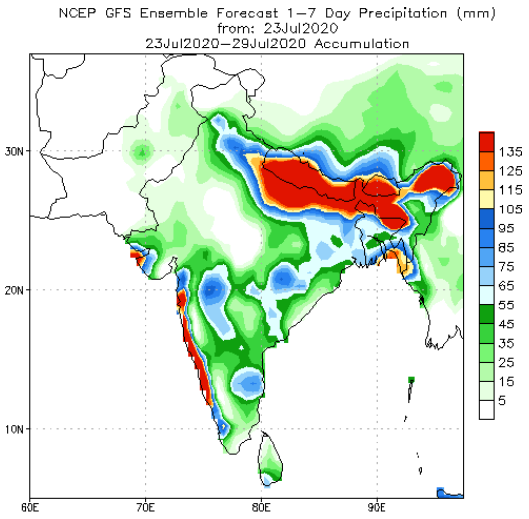
WORLDBATH topography

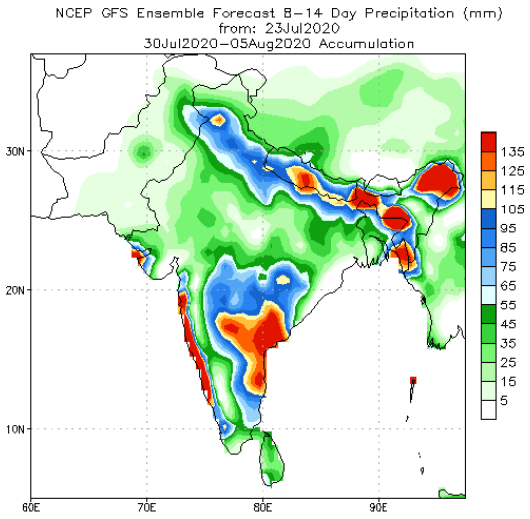
Optimum Interpolated Sea Surface Temperature Anomaly in the Indian Ocean from NOAA CPC



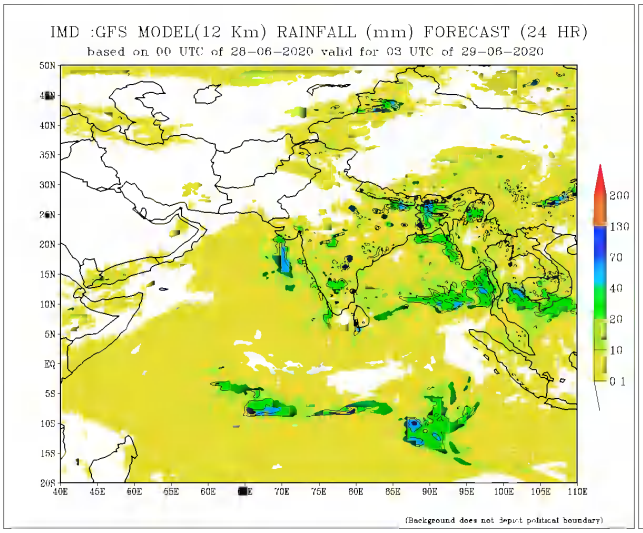
PREDICTIONS

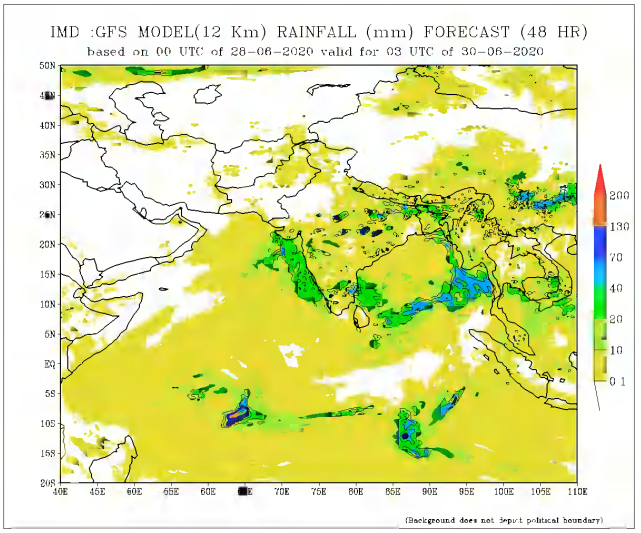
NCEP GFS 1- 14 Day prediction

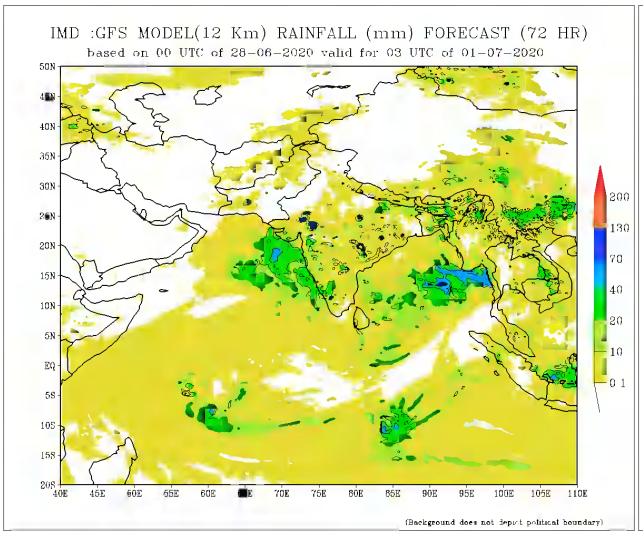




IMD GFS (T574) Model Rainfall Forecast from RMSC New Delhi, India


IMD :GFS MODEL(12 Km) RAINFALL (mm) FORECAST (24 HR)
based on 00 UTC of 28-06-2020 valid for 03 UTC of 29-06-2020
200
130
70
40
20
10
0.1
(Background does not depict political boundary)


IMD :GFS MODEL(12 Km) RAINFALL (mm) FORECAST (48 HR)
based on 00 UTC of 28-06-2020 valid for 03 UTC of 30-06-2020
200
130
70
40
20
10
0.1
(Background does not depict political boundary)


IMD :GFS MODEL(12 Km) RAINFALL (mm) FORECAST (72 HR)
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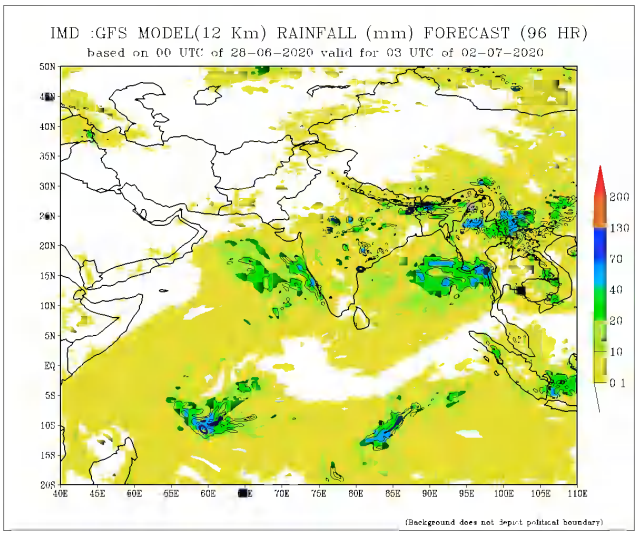
200
130
70
40
20
10
0.1
(Background does not depict political boundary)


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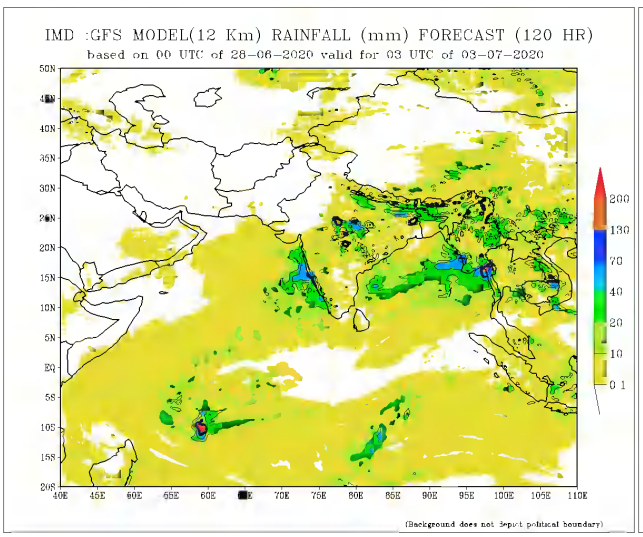
IMD :GFS MODEL(12 Km) RAINFALL (mm) FORECAST (120 HR)
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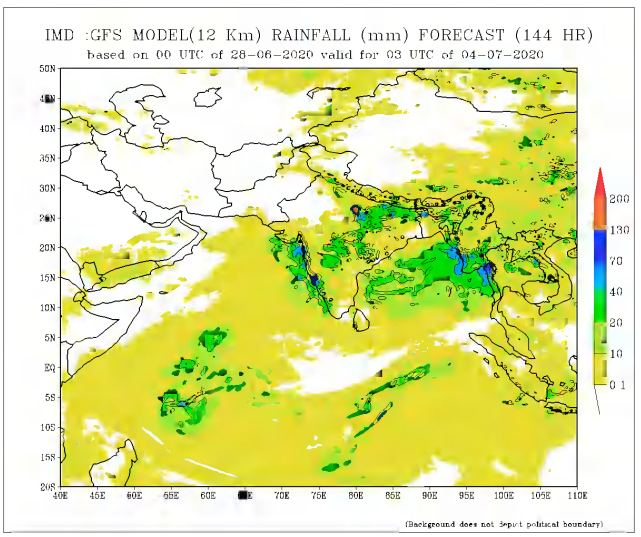
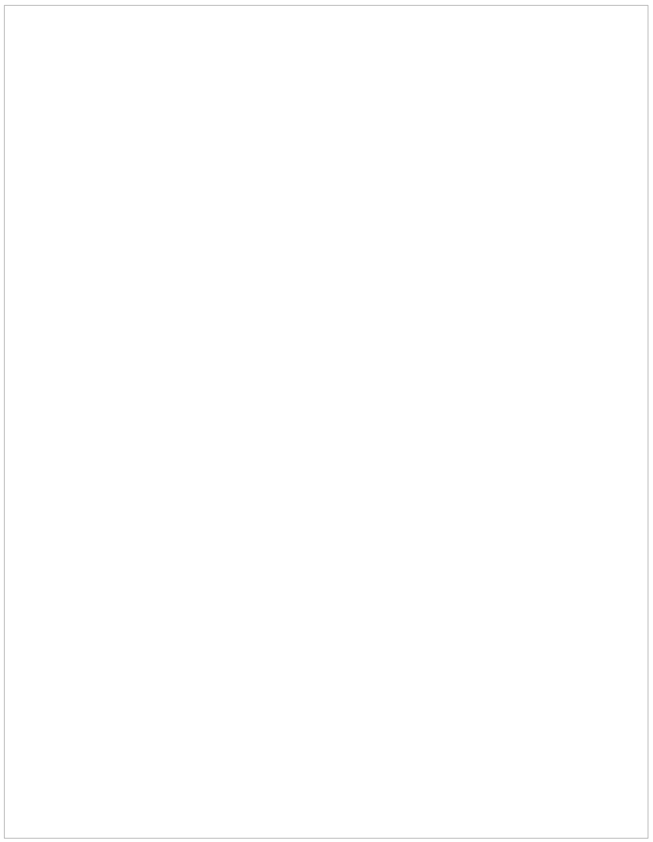
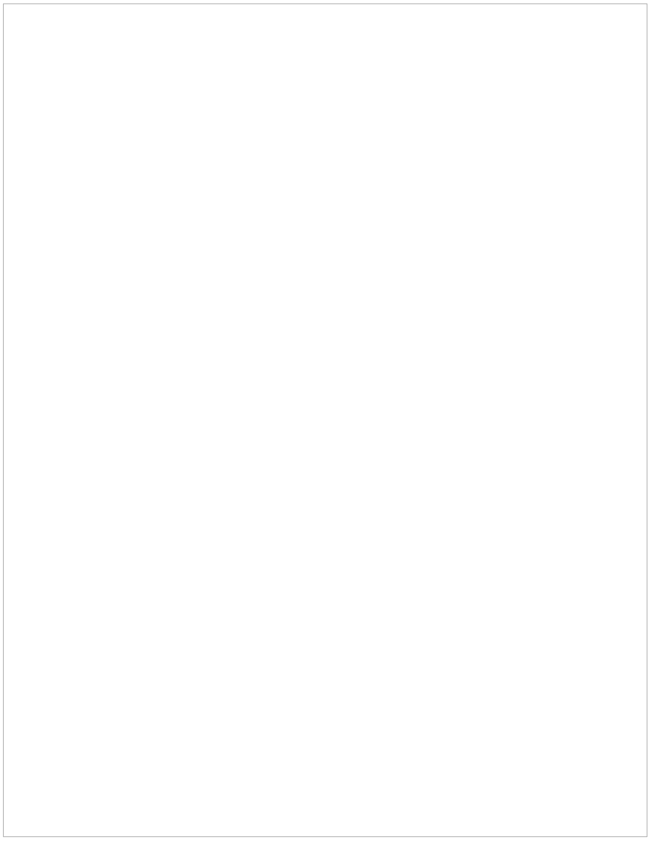
200
130
70
40
20
10
0.1
(Background does not depict political boundary)


IMD :GFS MODEL(12 Km) RAINFALL (mm) FORECAST (144 HR)
based on 00 UTC of 28-06-2020 valid for 03 UTC of 04-07-2020
200
130
70
40
20
10
0.1
(Background does not depict political boundary)

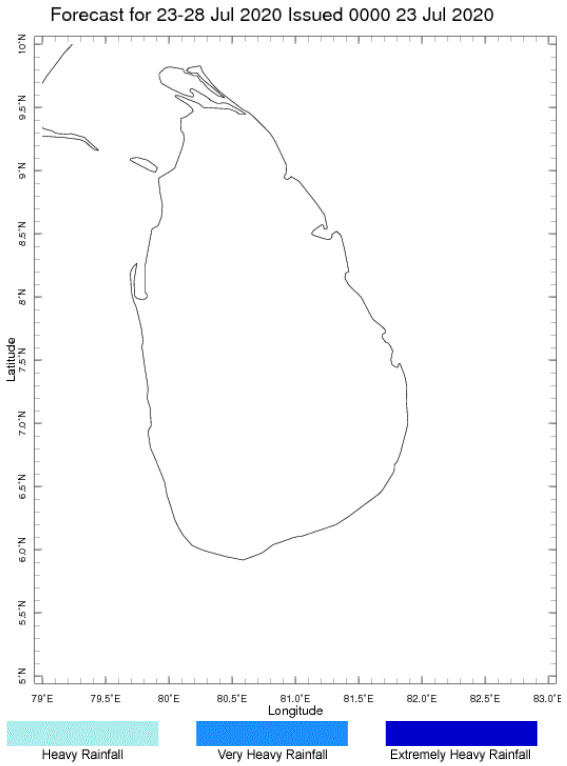
WRF Model Forecast (from IMD Chennai)



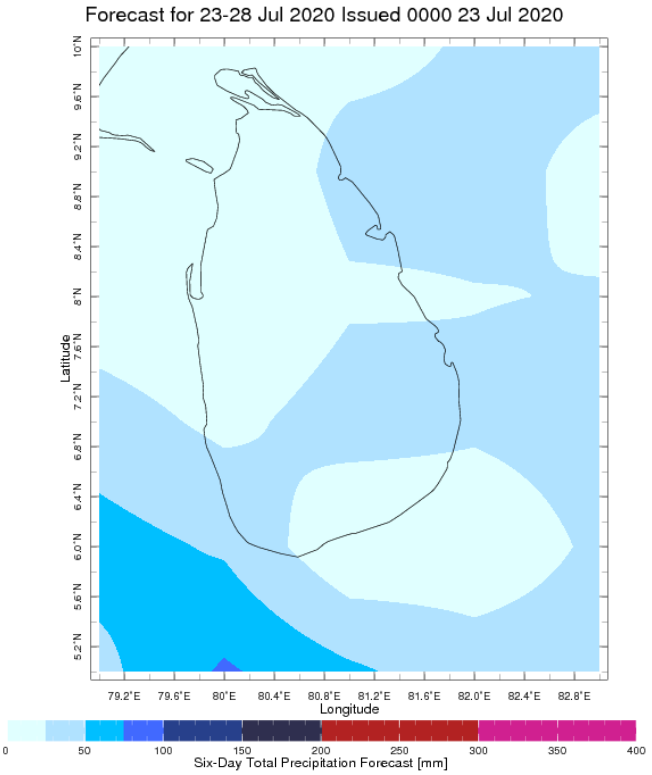


Weekly Rainfall Forecast from IRI

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.



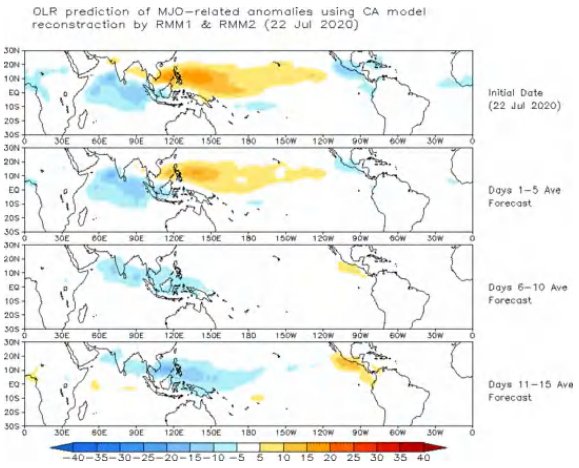
Extreme Rainfall Forecast



Total Six Day Precipitation Forecast

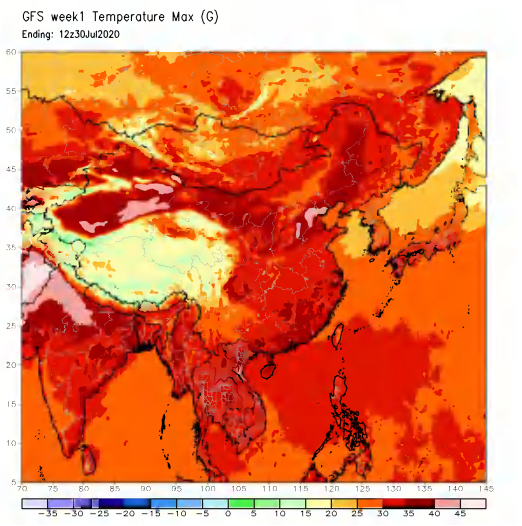
Madden Julian Oscillation (MJO) related Outgoing Longwave Radiation (OLR) Forecast

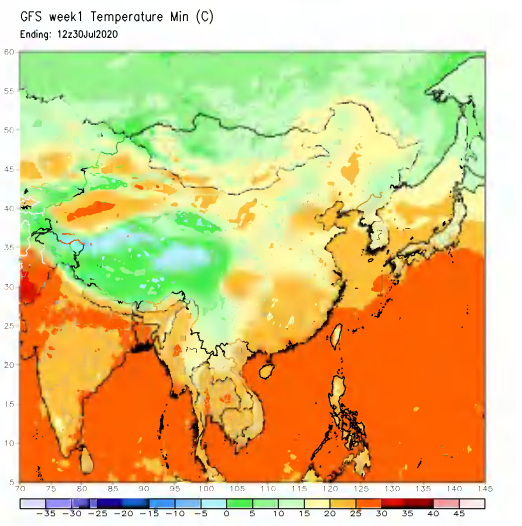
The Outgoing Longwave Radiation (OLR) is a proxy for rainfall. This can be used to identify convective rain clouds based on the MJO phase. Violet and Blue shading indicates enhanced tropical weather and Orange shading indicates suppressed conditions. The following figure shows the forecasts of MJO associated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



Weekly Temperature Forecast

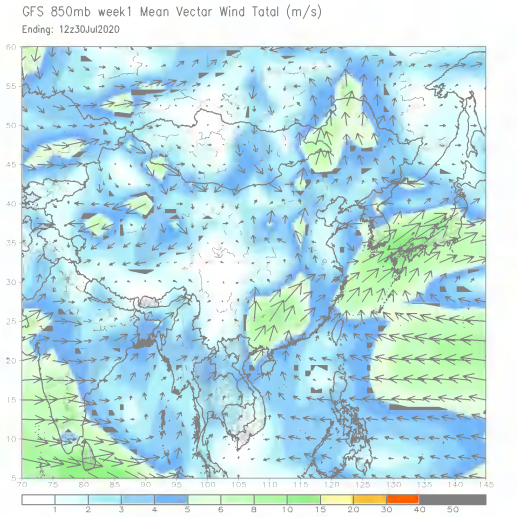
Weekly Minimum and Maximum Temperature prediction from the GFS model (from NOAA CPC)

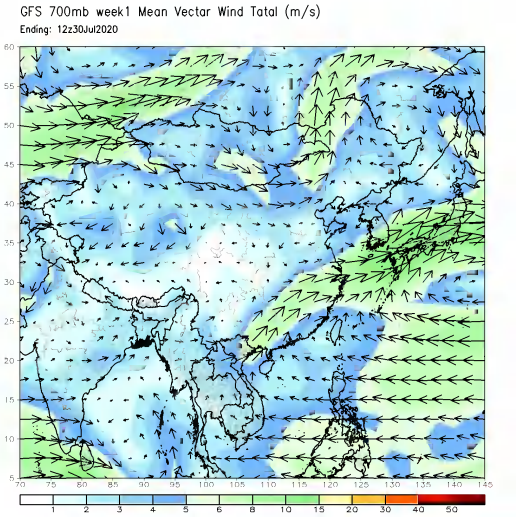




Weekly Wind Forecast

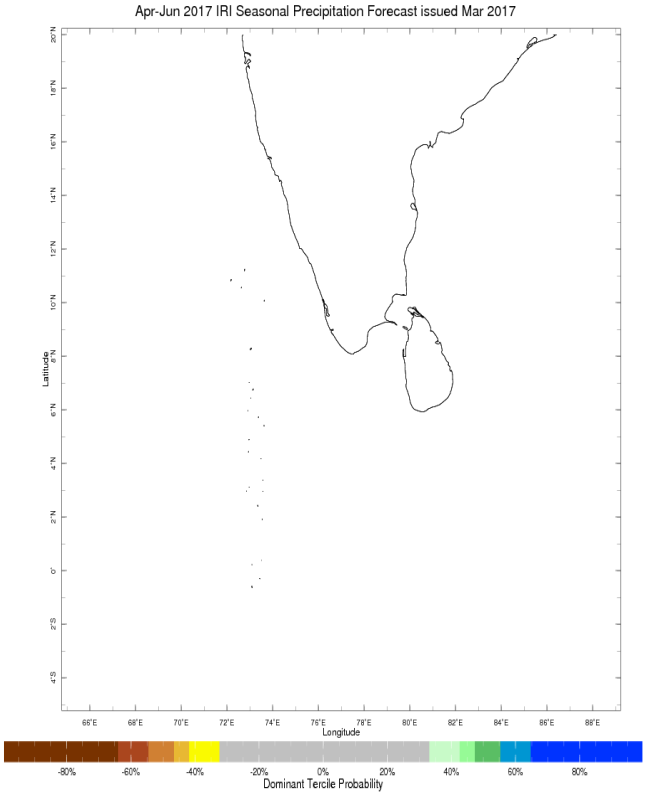
Weekly mean vector wind total prediction from the GFS model at 850 mb (left) and 700 mb (right) levels. (from NOAA CPC)



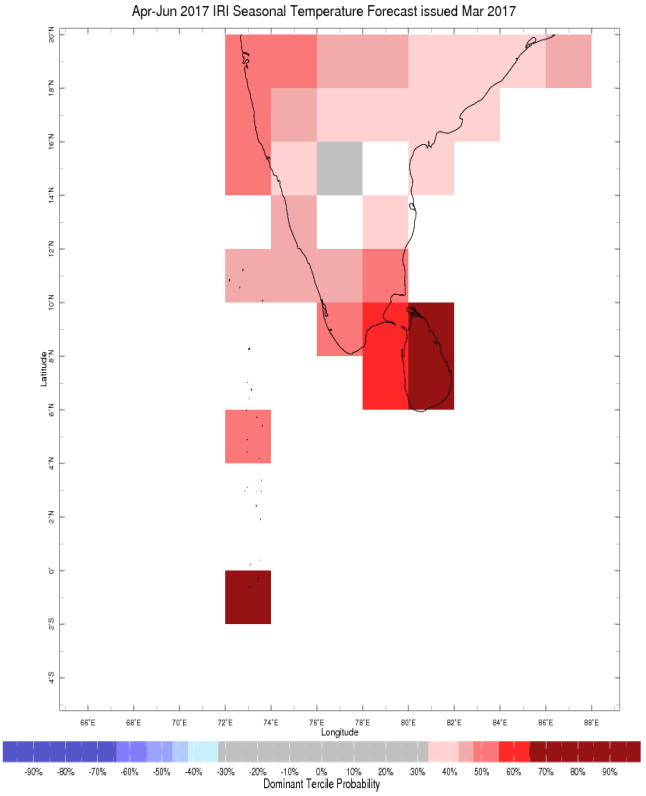


Seasonal Rainfall and Temperature Forecast

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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