

**18 September
2020**

EXPERIMENTAL CLIMATE MONITORING AND PREDICTION

By: Nipuni Alahakoon, Chethana Chandrasiri, Chayana Gunathilake, Tuan Hedgie Lareef Zubair and Michael Bell¹ (FECT and IRI¹)

HIGHLIGHTS

Rainfall Forecast



- The NOAA weekly rainfall forecast predicts up to 100 mm in Galle, Kalutara, Colombo and Gampaha districts during 17th -22nd Sep.

Monitored Rainfalls



- Between 10th-16th Sep: up to 30 mm in Jaffna, Kilinochchi, Trincomalee, Anuradhapura, Polonnaruwa and Ratnapura districts 13th Sep.

Monitored Wind



- From 18th- 24th Sep: up to 15 km/h, westerly winds were experienced by the entire island.

Monitored Sea Surface

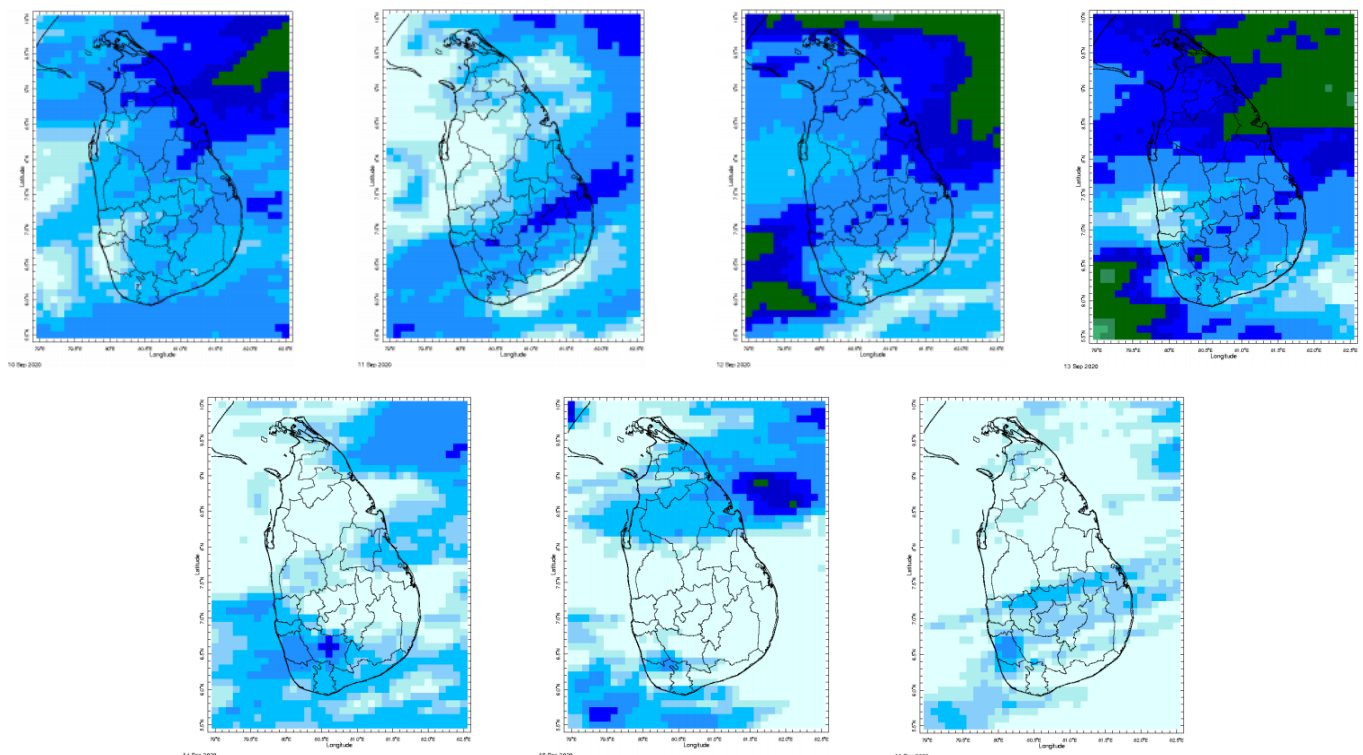


- 1^oC above average sea surface temperature was observed in the seas around Sri Lanka.

Monitoring

Rainfall

Weekly Monitoring





Federation for Environment, Climate and Technology

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Date	Rainfall
10 th September	Up to 20 mm in Kilinochchi, Mannar, Mullaitivu, Vavuniya, Anuradhapura, Trincomalee, Polonnaruwa and Batticaloa districts.
11 th September	Up to 20 mm in Ratnapura, Kegalle, Nuwara Eliya, Badulla, Moneragala, Ampara and Batticaloa districts.
12 th September	Up to 20 mm in Jaffna, Kilinochchi, Mullaitivu, Vavuniya, Mannar, Anuradhapura, Trincomalee, Polonnaruwa, Batticaloa, Matale, Ampara, Moneragala, Badulla, Nuwara Eliya, Kandy, Kegalle, Gampaha, Puttalam and Colombo districts.
13 th September	Up to 30 mm in Jaffna, Kilinochchi, Trincomalee, Anuradhapura, Polonnaruwa and Ratnapura districts.
14 th September	Up to 20 mm in Ratnapura district.
15 th September	Up to 10 mm in Galle, Ratnapura, Kalutara, Anuradhapura, Polonnaruwa, Trincomalee and Mullaitivu districts.
16 th September	Up to 10 mm in Kautara and Ratnapura districts.

Total Rainfall for the Past Week

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

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

Ocean State (Text Courtesy IRI)

Pacific sea state: September 9, 2020

Equatorial Eastern Pacific SST decreased to near the La Niña threshold in Early-September, 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

1 °C above average sea surface temperature was observed in the seas around Sri Lanka.



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Predictions

Rainfall

14-day prediction: NOAA NCEP models

From 17th September – 23rd September: Total rainfall up to 55 mm in Matara, Hambantota, Ratnapura, Colombo and Galle; up to 45 mm in Moneragala, Badulla, Kandy, Nuwara Eliya, Gampaha and Kegalle; up to 35 mm in Puttalam, Kurunegala, Matale, Jaffna and Ampara and up to 25 mm in Anuradhapura, Polonnaruwa and Batticaloa districts.

From 24th September– 30th September: Total rainfall up to 85 mm in Jaffna district; up to 55 mm in Mullaitivu, Mannar, Anuradhapura and Vavuniya districts; up to 45 mm in Trincomalee, Polonnaruwa, Batticaloa, Ampara, Moneragala, Matale and Badulla districts; and up to 35 mm in Puttalam, Kurunegala, Kandy, Kegalle, Nuwara Eliya, Colombo, Ratnapura, Galle, Hambantota and Matara.

NOAA Model Forecast:

From 17th – 22th September: Total rainfall up to 100 mm in Galle, Kalutara, Colombo and Gampaha districts; up to 75 mm in Matara, Ratnapura, Kegalle and Kurunegala districts; up to 50 mm in Puttalam, Matale, Kandy, Nuwara Eliya, Hambantota, Moneragala and Badulla districts and up to 25 mm in Ampara, Vavuniya, Mullaitivu, Trincomalee, Kilinochchi, Vavuniya, Anuradhapura, Polonnaruwa, Mannar, Jaffna and Batticaloa districts.

MJO based OLR predictions

For the next 15 days:

MJO shall remain neutral during 16th -25th September and slightly suppressed during 26th – 30th 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.



FECT Web

<http://www.climate.lk>
<http://www.tropicalclimate.org/>



FECT Blog

Past reports available at
<http://fectsl.blogspot.com/>



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Weekly Hydro- Meteorological Report for Sri Lanka

Inside This Issue

1. Monitoring

- a. Daily Rainfall Monitoring
- b. Weekly Rainfall Monitoring
- c. Monthly Rainfall Monitoring
- d. Dekadal (10 Day) Satellite Derived Rainfall Estimates
- e. Weekly Temperature Monitoring
- f. Weekly Wind Monitoring
- g. Weekly Average SST Anomalies

2. Predictions

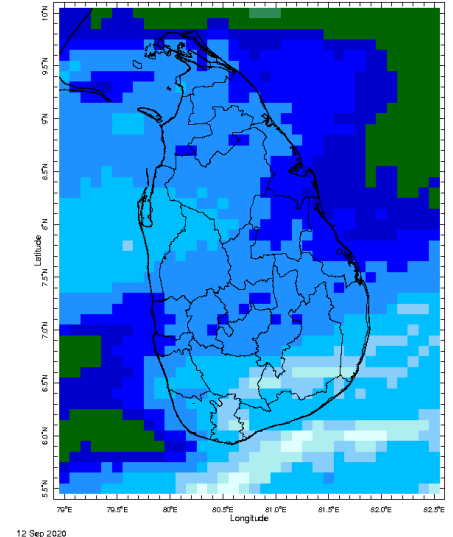
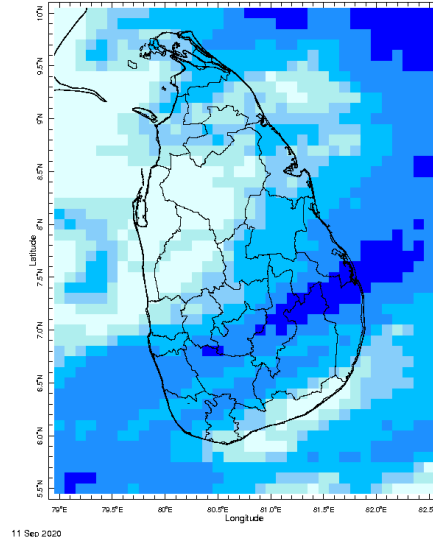
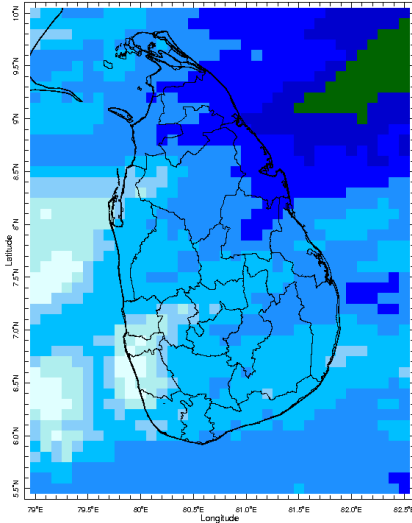
- a. NCEP GFS Ensemble 1-14 day Rainfall Predictions
- b. GFS (T574) Model Rainfall Forecast from RMSC New Delhi
- c. WRF Model Rainfall Forecast from IMD Chennai
- d. MJO Related OLR Forecast
- e. Weekly Precipitation Forecast from IRI
- f. Weekly Temperature Forecast
- g. Weekly Wind Forecast
- h. Seasonal Predictions from IRI

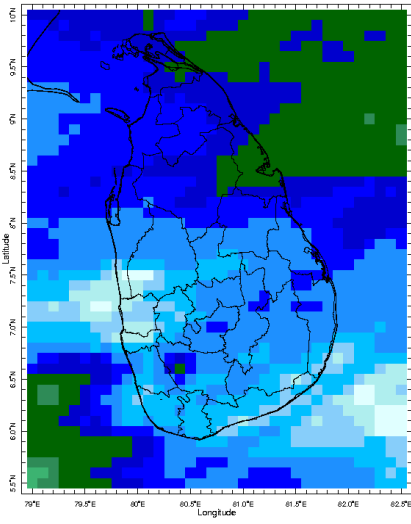


MONITORING

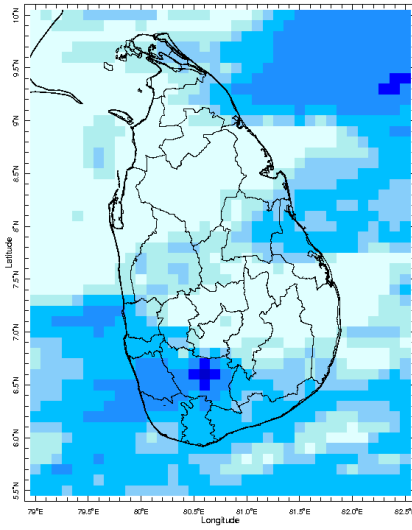
Daily Rainfall Monitoring

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

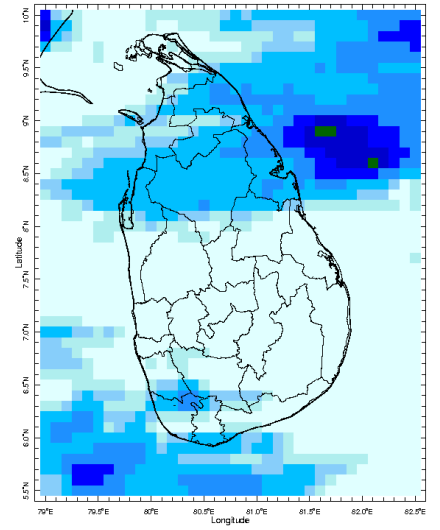




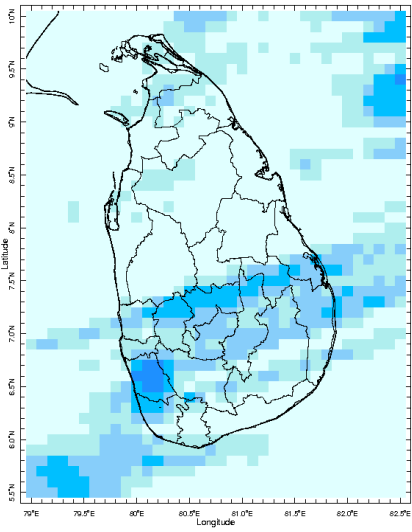
13 Sep 2020



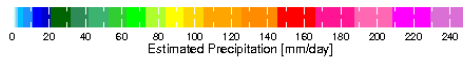
14 Sep 2020



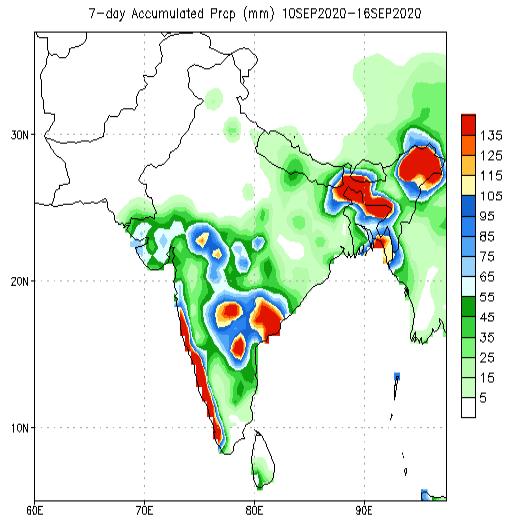
15 Sep 2020



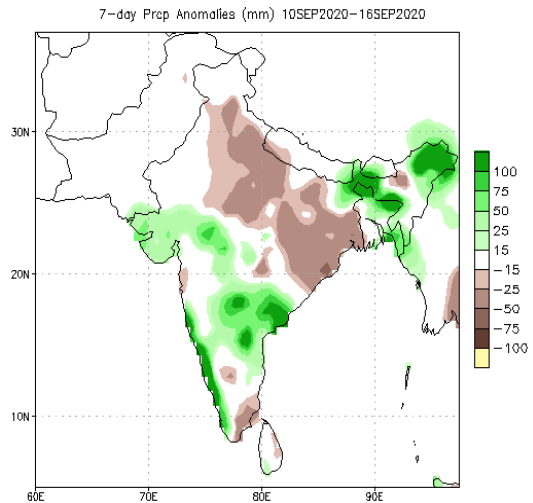
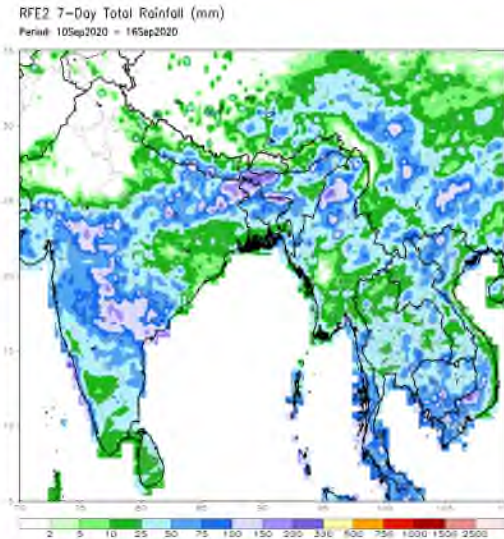
16 Sep 2020



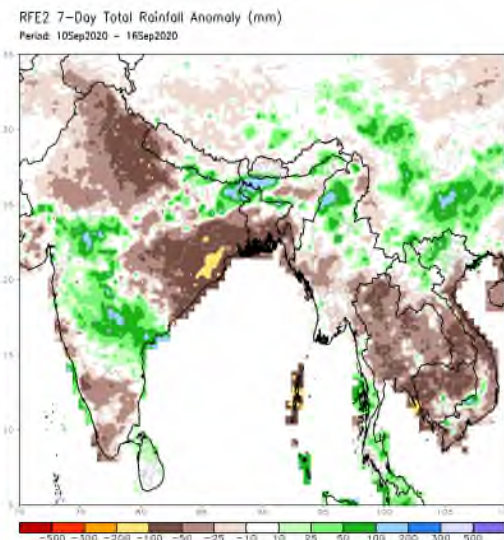
The following figures show the total satellite observed rainfall in the last week in Sri Lanka. The figure in the left is the total 7-day rainfall from NOAA Climate Prediction Center (CPC) Unified Precipitation Analysis and the figure in the right is the total 7-day rainfall from CPC RFE 2.0 Satellite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



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

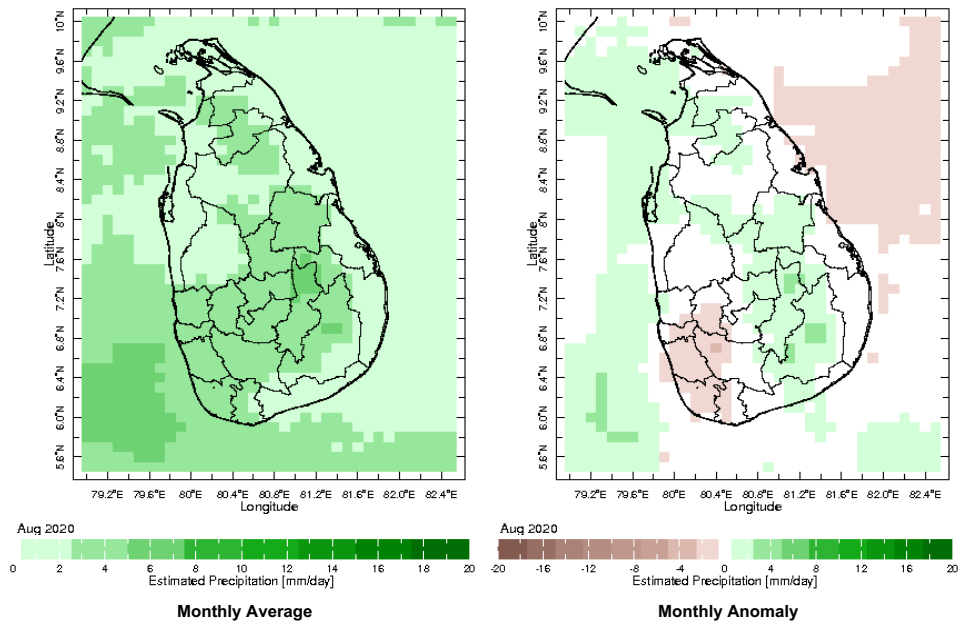


Data Source: CPC Unified (gauge-based & 0.5x0.5 deg resolution) Precipitation Climatology (1981-2010)

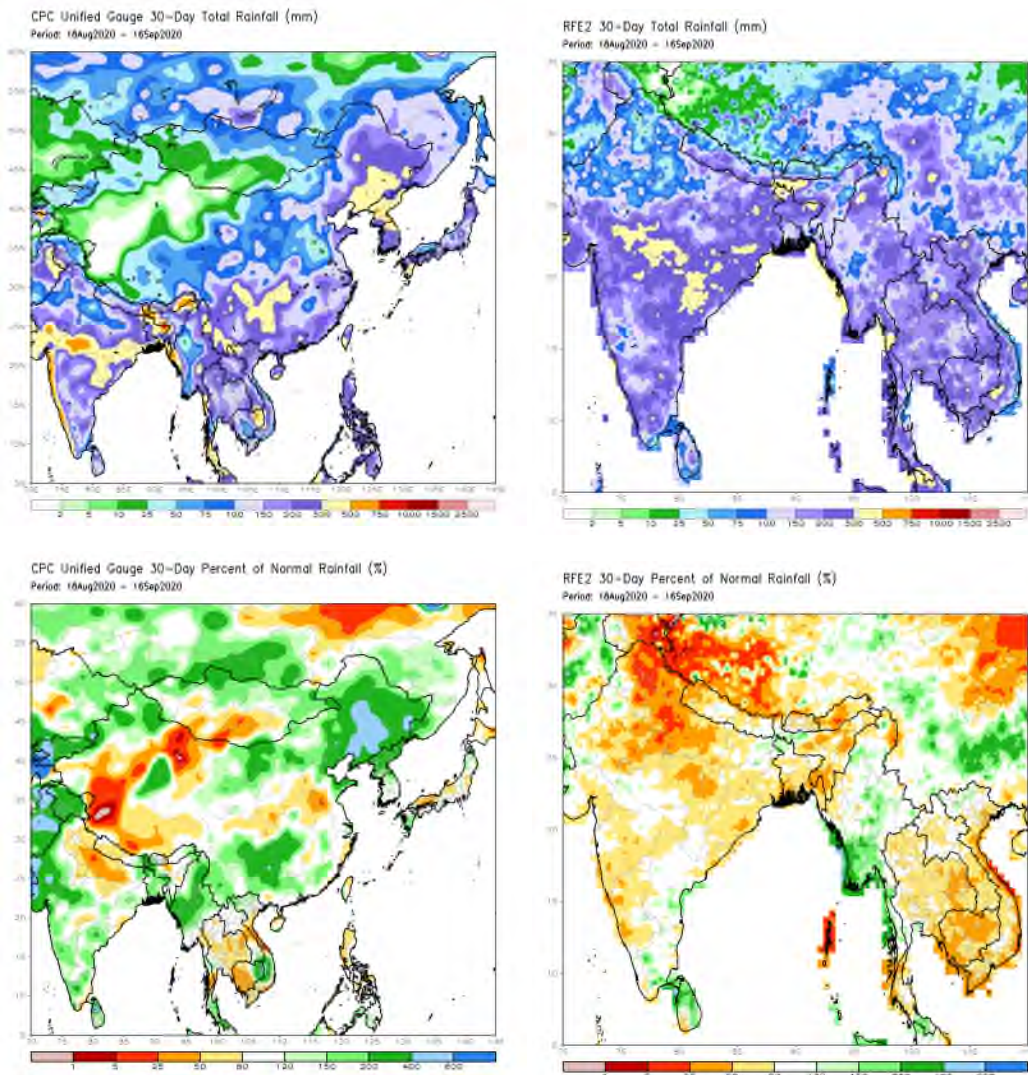


Monthly Rainfall Monitoring

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

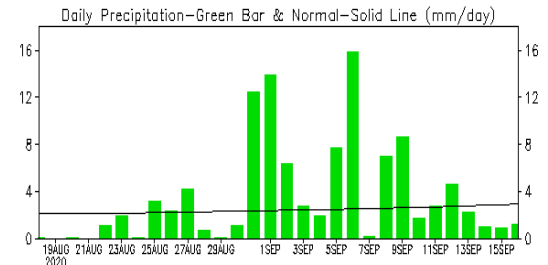
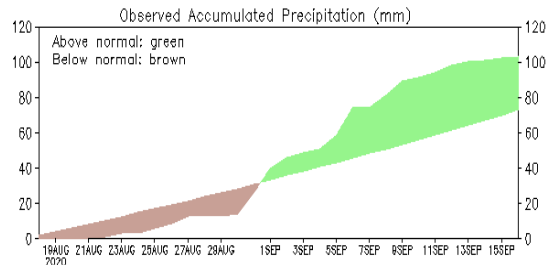


The figure in the top-left shows the total rainfall in the past 30 days from CPC Unified Precipitation Analysis while the figure in the top-right shows the total rainfall for the same period from RFE 2.0 Satellite Rainfall Estimates. The bottom two figures show the percentage of rainfall received in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



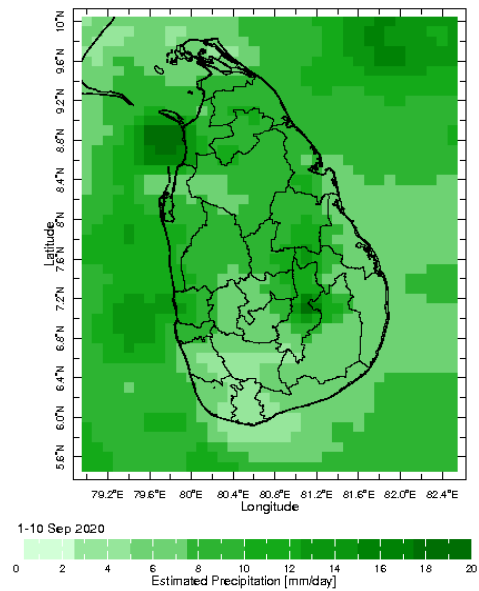
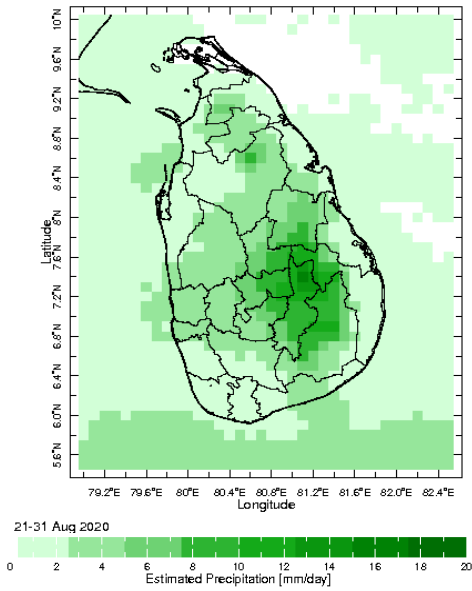
The following figure shows the observed accumulated rainfall (top) and daily observed rainfall (bottom) in Sri Lanka in the last 30 days.

Sri-Lanka

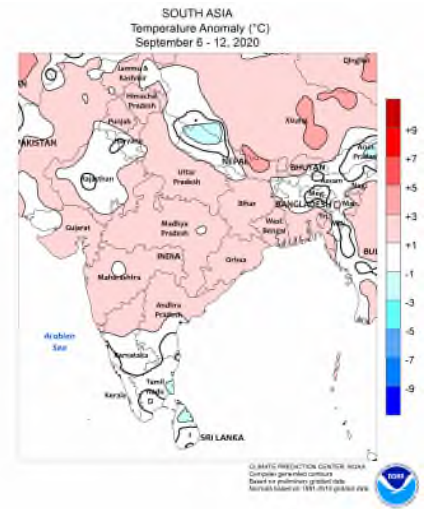
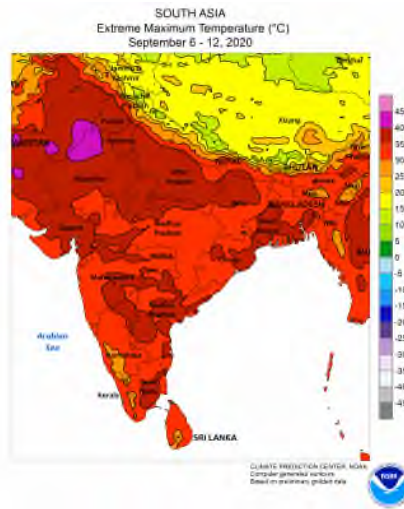
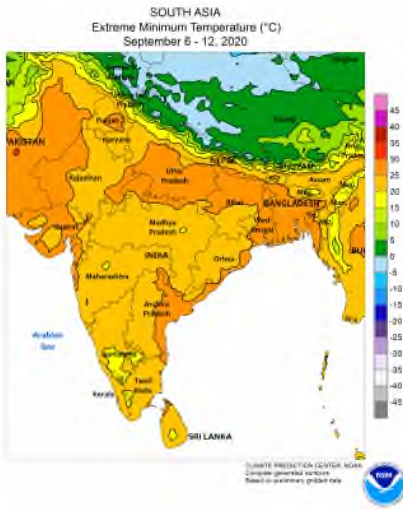


Data Source: CPC (Gauge-Based) Unified Precipitation (Climatology 1981–2010)
(updated on 00Z16SEP2020)

Dekadal (10 Day) Satellite Derived Rainfall Estimates

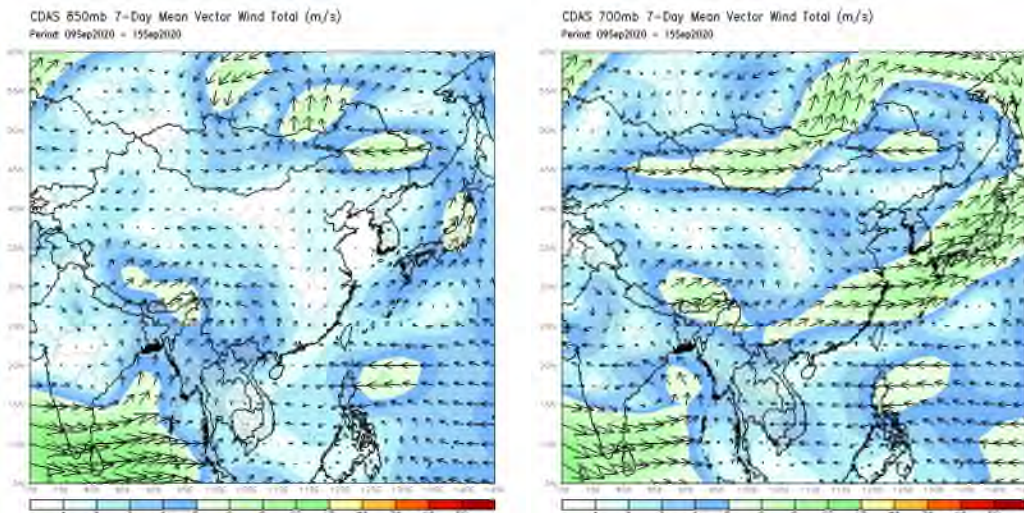


Weekly Temperature Monitoring



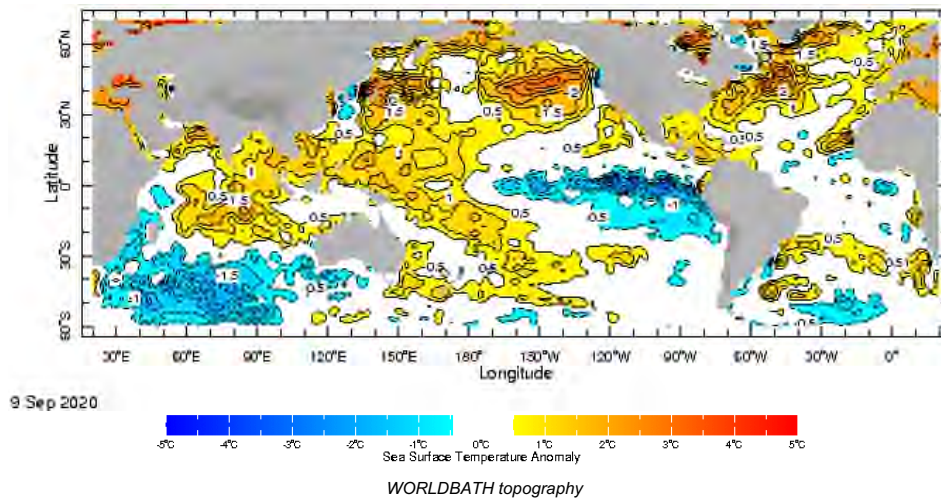
Weekly Wind Monitoring

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.



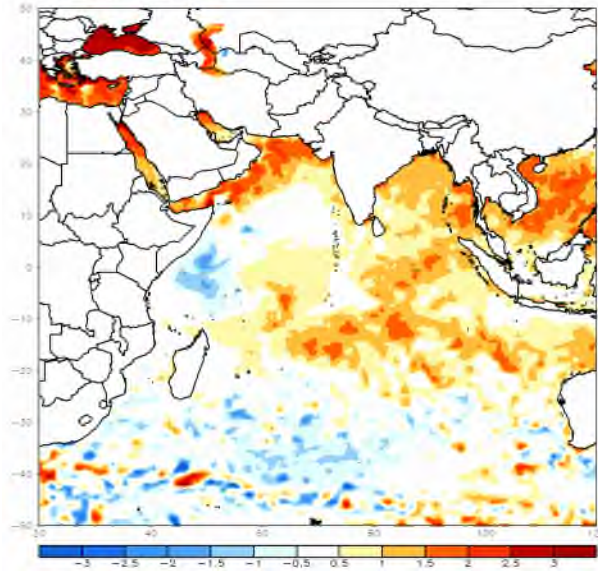
Weekly Average SST Anomalies

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



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

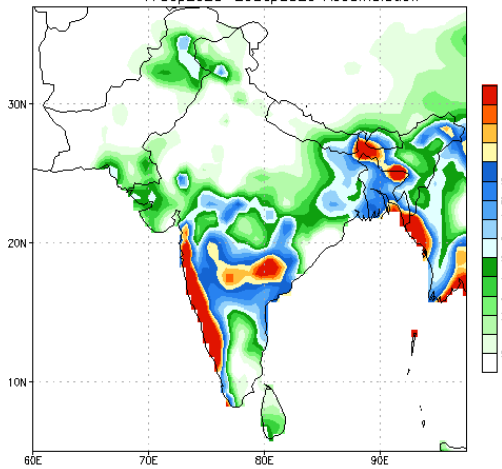
OI SST (v2) 7-Day Anomaly (C)
Period: 10Sep2020 - 16Sep2020



PREDICTIONS

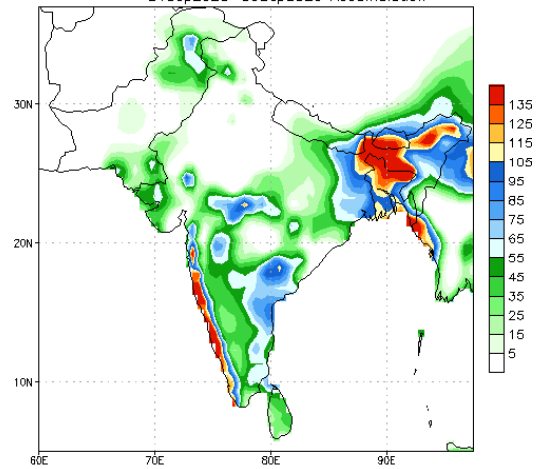
NCEP GFS 1- 14 Day prediction

NCEP GFS Ensemble Forecast 1-7 Day Precipitation (mm)
from: 17Sep2020
17Sep2020-23Sep2020 Accumulation



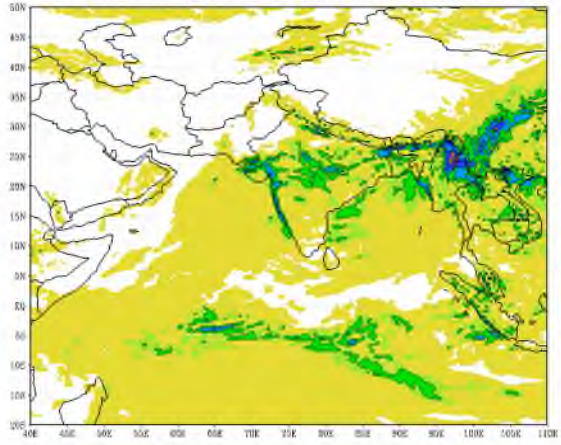
Bias correction based on last 30-day forecast error

NCEP GFS Ensemble Forecast 8-14 Day Precipitation (mm)
from: 17Sep2020
24Sep2020-30Sep2020 Accumulation



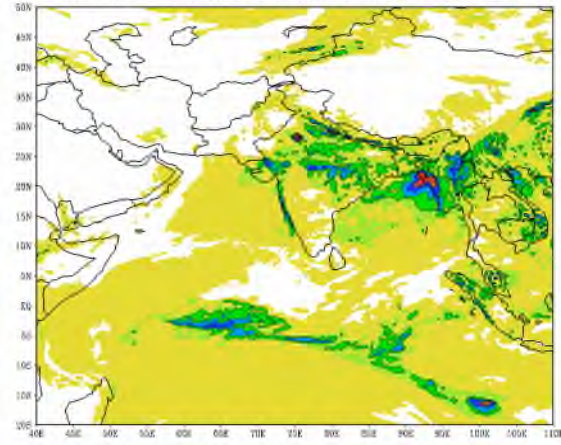
Bias correction based on last 30-day forecast error

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



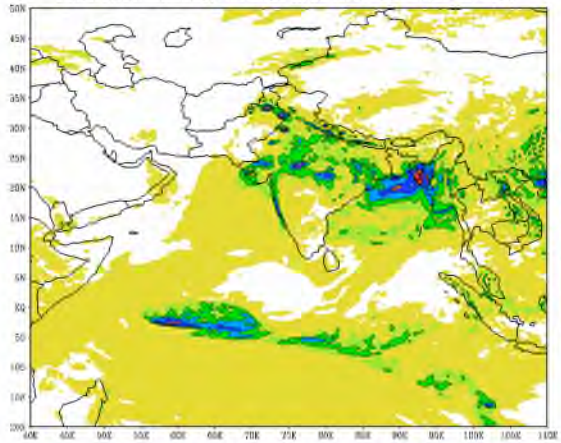
(Geographical Area not to be plotted separately)

IMD :GFS MODEL(12 Km) RAINFALL (mm) FORECAST (48 HR)
based on 00 UTC of 17-08-2020 valid for 03 UTC of 19-08-2020



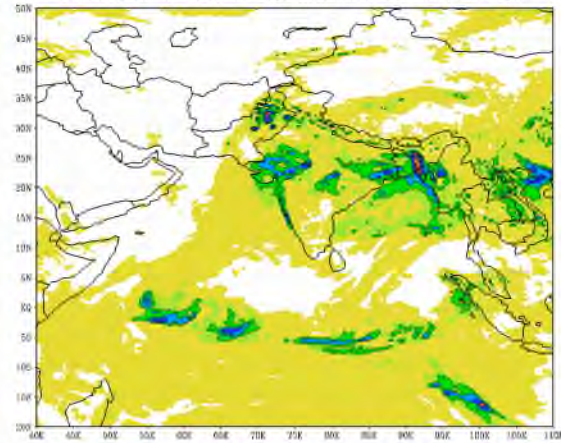
(Geographical Area not to be plotted separately)

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



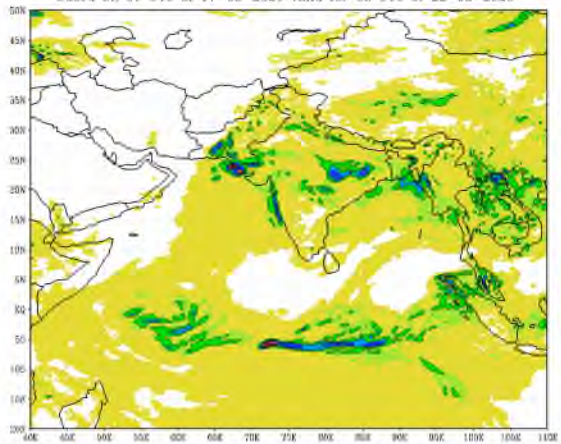
(Geographical Area not to be plotted separately)

IMD :GFS MODEL(12 Km) RAINFALL (mm) FORECAST (96 HR)
based on 00 UTC of 17-08-2020 valid for 03 UTC of 21-08-2020



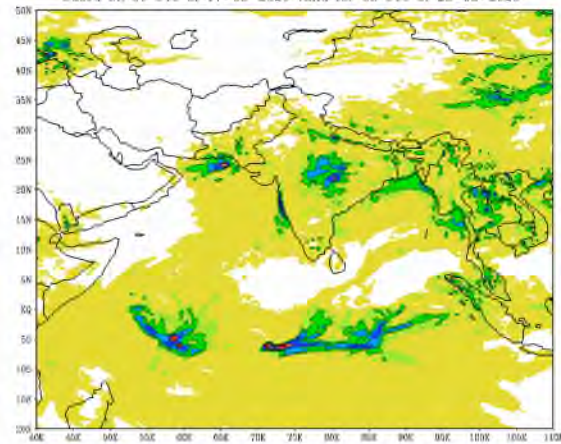
(Geographical Area not to be plotted separately)

IMD :GFS MODEL(12 Km) RAINFALL (mm) FORECAST (130 HR)
based on 00 UTC of 17-08-2020 valid for 03 UTC of 23-08-2020

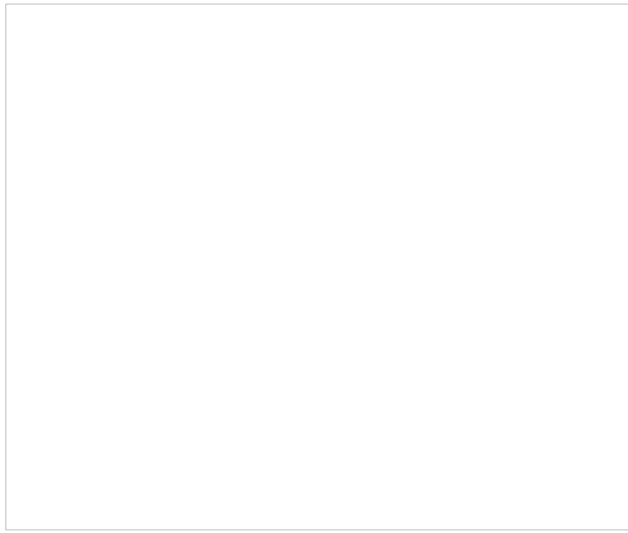


(Geographical Area not to be plotted separately)

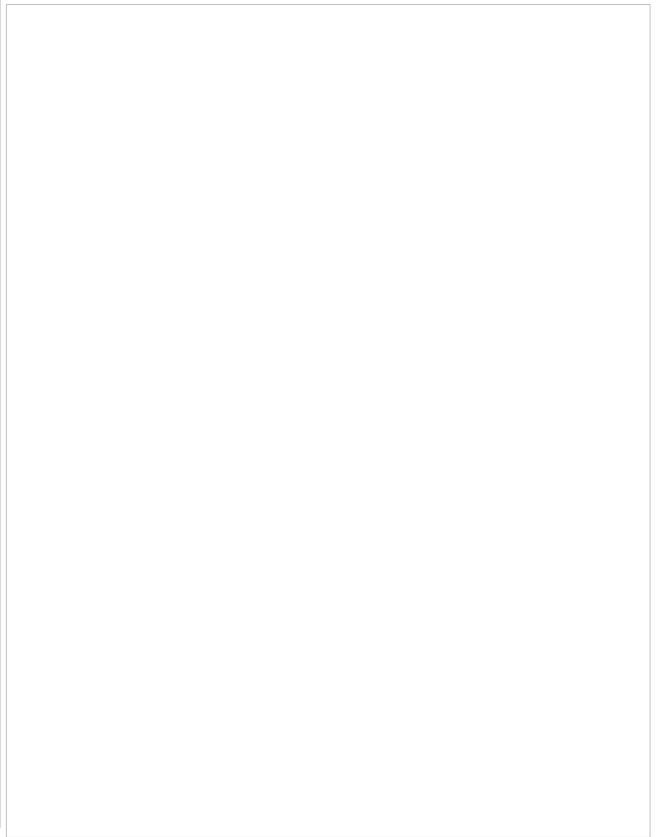
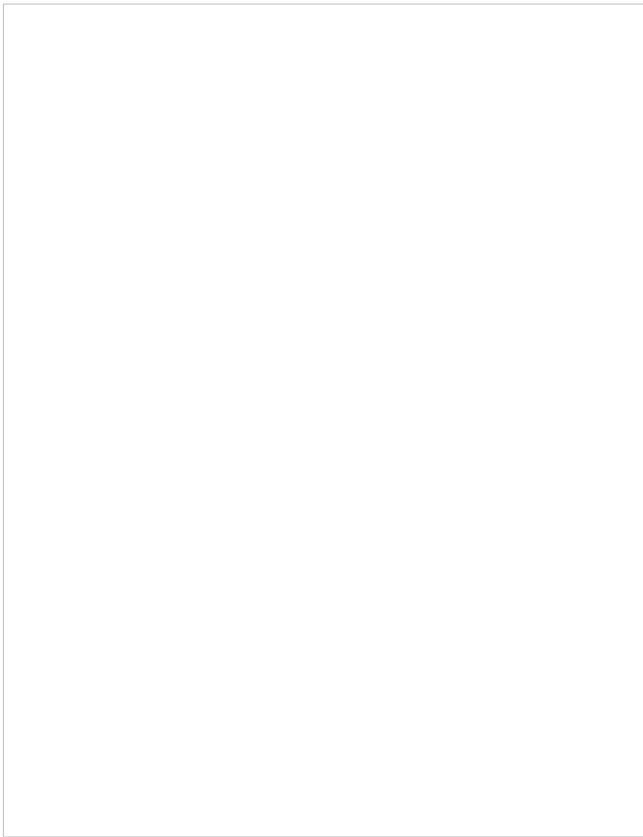
IMD :GFS MODEL(12 Km) RAINFALL (mm) FORECAST (144 HR)
based on 00 UTC of 17-08-2020 valid for 03 UTC of 23-08-2020



(Geographical Area not to be plotted separately)



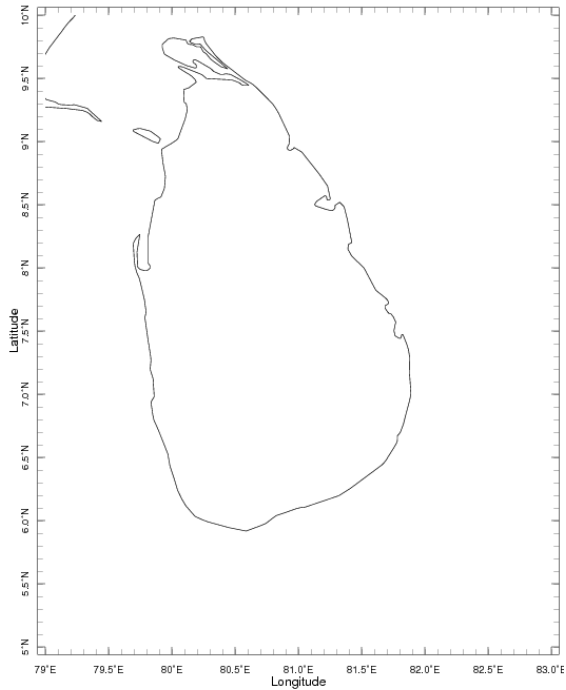
WRF Model Forecast (from IMD Chennai)



Weekly Rainfall Forecast from IRI

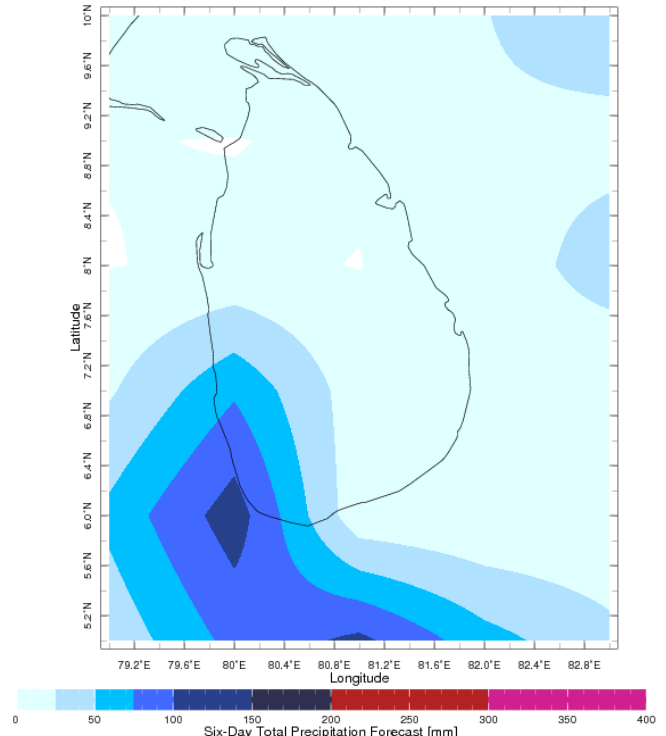
Total rainfall forecast from the IRI for next six days is provided in figures below. The figure to the left shows the expectancy of heavy rainfall events during these six days while the figure to the right is the prediction of total rainfall amount during this period.

Forecast for 17-22 Sep 2020 Issued 0000 17 Sep 2020



Extreme Rainfall Forecast

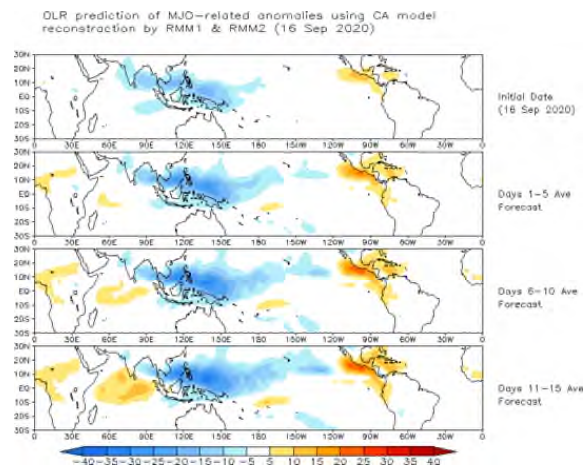
Forecast for 17-22 Sep 2020 Issued 0000 17 Sep 2020



Total Six Day Precipitation Forecast

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

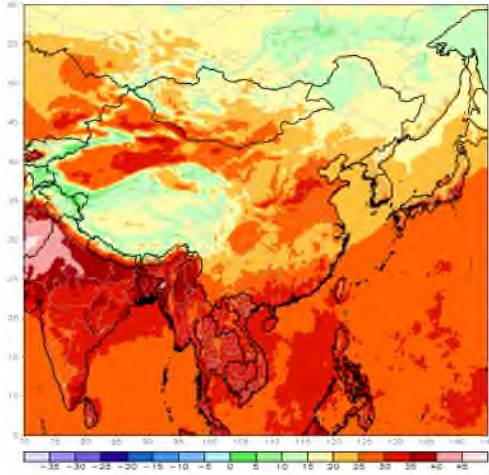
The Outgoing Longwave Radiation (OLR) is a proxy for rainfall. This can be used to identify convective rain clouds based on the MJO phase. Violet and Blue shading indicates enhanced tropical weather and Orange shading indicates suppressed conditions. The following figure shows the forecasts of MJO associated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



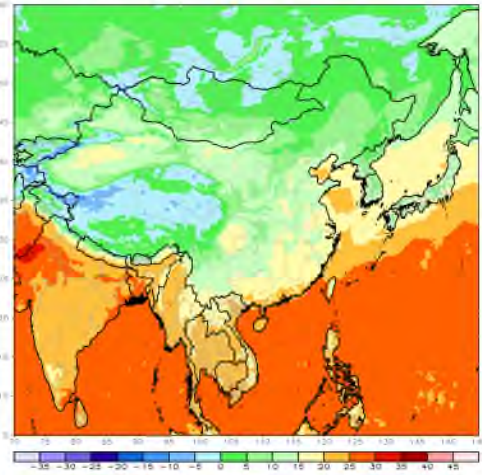
Weekly Temperature Forecast

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

GFS week1 Temperature Max (C)
Ending: 18z24sep2020



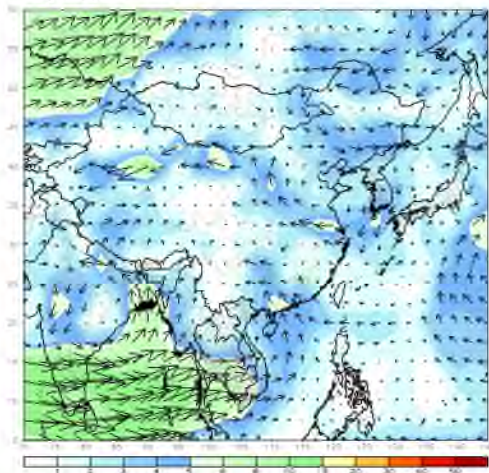
GFS week1 Temperature Min (C)
Ending: 18z24sep2020



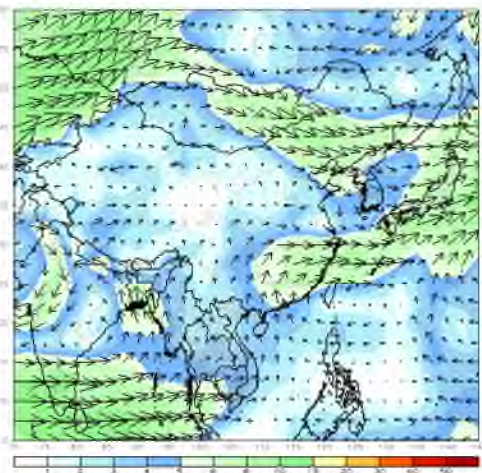
Weekly Wind Forecast

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

GFS 850mb week1 Mean Vector Wind Total (m/s)
Ending: 18z24sep2020



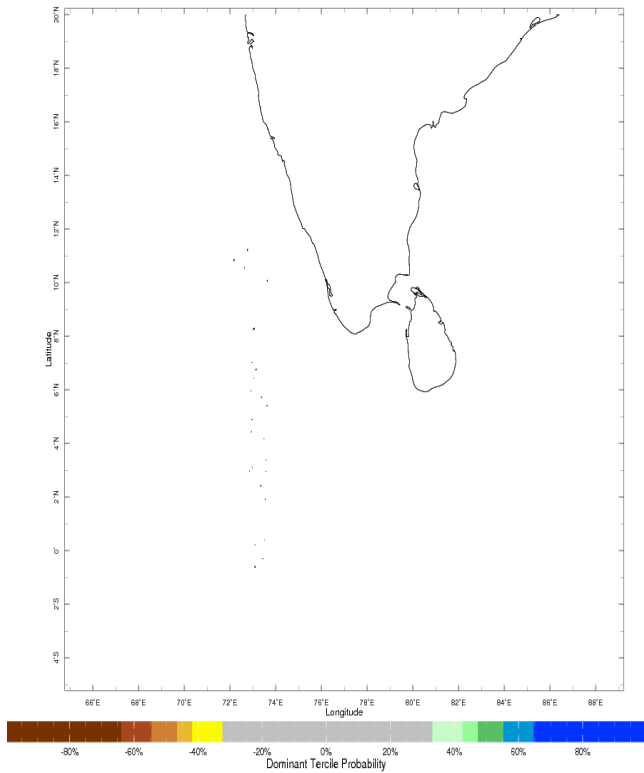
GFS 700mb week1 Mean Vector Wind Total (m/s)
Ending: 18z24sep2020



Seasonal Rainfall and Temperature Forecast

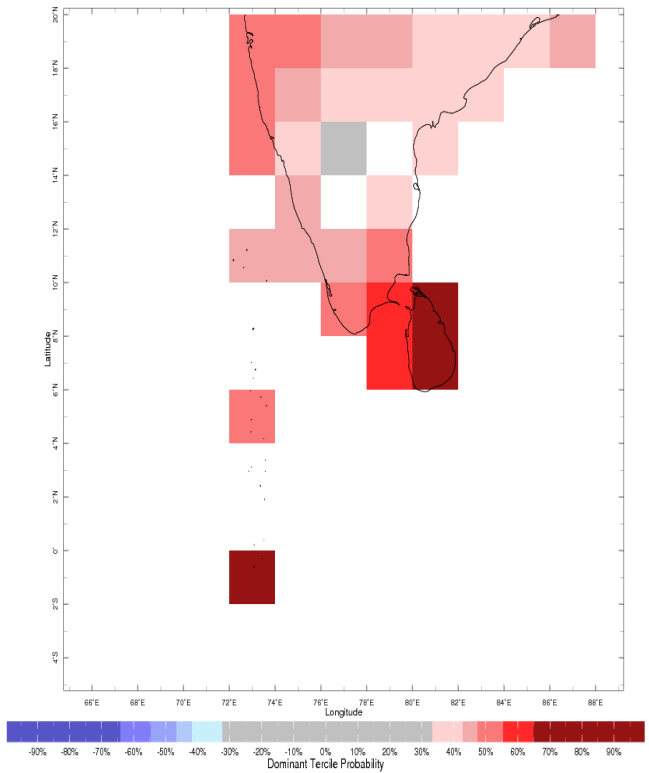
Following is the latest seasonal precipitation and temperature prediction for the next 3 months by the IRI. The color shading indicates the probability of the most dominant tercile -- that is, the tercile having the highest forecast probability. The color bar alongside the map defines these dominant 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%).

Apr-Jun 2017 IRI Seasonal Precipitation Forecast issued Mar 2017



Precipitation Forecast

Apr-Jun 2017 IRI Seasonal Temperature Forecast issued Mar 2017



Temperature Forecast

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