FECT Foundation for Environment Climate and Technology
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Experimental Climate Monitoring and Prediction

by: Ruchira Lokuhetti, Shashini Rathnayake, Prabodha Agalawatte, Zeenas Yahiya, Lareef Zubair and Michael Bell (FECT and IRI[1])

22 September 2016

Highlights

Mixed weather conditions were experienced in the previous week from 14th-20th September in the island. Eastern sea near the island received heavy rainfall on 15th with sea region near Batticaloa receiving up to 180 mm. The highest rainfall of 30 mm for the period was recorded close to Beligalla and Padiyathalawa near the Badulla Ampara district border. The minimum temperature of 20 ^{O}C was recorded from Nuwara Eliya district while the maximum temperature was recorded from the North Eastern coastal areas to be between 35-40 ^{O}C. Up to 35 km/h north westerly winds were recorded in the entire country. For the period from 22th-27th the NOAA NCEP model predicts dry weather conditions in the island. Up to 55 km/h north westerly wind is expected in the southern half of the country. In the central regions up to 55 km/h westerly wind is expected.

Monitoring

Rainfall

***Weekly Monitoring*:** On 14th up to 10 mm rainfall was observed in the nearby sea region of Trincomalee. On 15th heavy rainfall was observed in the eastern sea region near the island with sea nearby Batticaloa receiving up to 180 mm rainfall. Mutur and Trikonamadu region near the Batticaloa and Polonnaruwa district border received up to 20 mm rainfall. On 16th Punkudutivu, Karampan and Eluvitivu of Jaffna district received up to 10 mm rainfall. On 17th Weddagala area in the Ratnapura district received up to 10 mm rainfall. Rainfall up to 20 mm was observed in the surrounding areas of Hasalaka, Madugoda, Andaulpota, Hembarawa, Kanawegolla, Kehelula and Maha Oya on 18th. Neighboring regions of Beligalla and Batalayaya of Badulla district and Padiyathalawa and Ellegoda of Ampara district recived up to 30 mm rainfall. For the past week, the RFE 2.0 tool shows rainfall up to 5 mm for the most parts of the country with between 10-25 mm in surrounding areas of Batticaloa and Welikanda. The same amount of rainfall is also shown for Ampara, Maha Oya, Beligalla and Bibile areas of Uva and Northern provinces and Weddagala of Ratnapura district. A below average rainfall of 25-50 mm is shown for the Colombo district and adjacent areas of Gampaha and Kalutara districts. A below average rainfall of 10-25 mm is shown for the rest of the Western Province and Galle, Matara, Kegalla, Nuwara Eliya and Kandy districts including several areas of Kurunegala, Matale, Badulla and Hambantota districts.

***Monthly Monitoring*:** Below average rainfall conditions were experienced in the entire island in the month of August except in Jaffna. Monthly average amount to 7 mm/day in Jaffna peninsula and Ratnapura town while everywhere else the rainfall did not exceed 5 mm/day. The CPC Unified Precipitation Analysis tool shows ~75 mm of total rainfall in Jaffna, ~50 mm of rainfall in Kilinochchi, Ratnapura and Matara areas.

Temperature

For the period from 11th-17th September the lowest temperature of 15-20 ^{O}C was recorded in Nuwara Eliya. The maximum temperature to be recorded was between 35-40 ^{O}C in the North eastern coastal belt. The maximum temperature of Kandy, Kegalle, Ratanapura and Galle areas was 25-30 ^{O}C. The maximum temperature of rest of the country was between 30-35 ^{O}C. During this period an above average temperature of 0-1 ^{O}C was observed in Monaragala, Hambantota, Ampara, Gampaha and Kegalla districts including the North Western province. The temperature was 0-1 ^{O}C above average in the rest of the island.

Wind

At 850 mb level 20-35 km/h north westerly wind was experienced by the entire island. At 700 mb Jaffna and Kilinochchi districts experienced north westerly wind with 30-35 km/h speed while rest of the country experienced wind in the same direction with speed less than 30 km/h.

Ocean State

Pacific sea state: September 15, 2016

During mid-September 2016 the tropical Pacific SST anomaly was close to -0.5C, the weak La Niña threshold. However, not all of the atmospheric variables support weak La Niña conditions. Although the upper level winds in the tropical Pacific are somewhat suggestive of La Niña, the lower level winds remain near average. The Southern Oscillation index and the pattern of cloudiness and rainfall in the equatorial Pacific are somewhat suggestive of weak La Niña conditions, but could also be interpreted as being in the cool-neutral range. The collection of ENSO prediction models indicates SSTs hovering at levels near borderline La Niña during fall, then weakening to cool-neutral in late fall and into winter. (*Text Courtesy IRI*)

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Indian Ocean State

0.5 ^{O}C below average sea surface temperature was observed in the western sea of Sri Lanka

Predictions

Rainfall

14-day prediction: NOAA NCEP models predicts no rainfall in the entire island until 27th September. For the period 28th September to 4th October between 15-25 mm rainfall is expected for Jaffna and Kilinochchi districts while up to 15 mm rain is expected for Mullaitivu, Vavuniya and Mannar districts and the northern region of Anuradhapura district.

Weekly prediction: *IMD GFS model predicts dry weather conditions for the most parts of the island in the period from 22nd-28th September. South western region of the island and the adjacent sea area is expected to revive up to 10 mm rainfall on each day during this period. In addition, on 23rd,24th and 28th the surrounding areas of Mullaitivu and nearby north eastern sea area are also expected to receive rainfall up to 10 mm.*

IMD WRF & IRI Model Forecast*:* According to the IMD WRF model up to 35 mm of rainfall is expected in the Western province, Kegalle, Ratnapura, Galle and Chilaw areas during the period from 21st-23rd. During the same period less than 8 mm of rainfall is expected in rest of the North Western province, Matara and Ampara areas. On the 24th the rainfall that persisted in the Western province is shown to be expanded to Kurunegala and Kandy districts and the adjacent sea areas of the Western province. The IRI model predicts no extreme weather conditions for the period from 21st-24th.

Seasonal Prediction: As per IRI Multi Model Probability Forecast for October to December, the total 3-month precipitation shall be climatological in the northern half of the island. However, the southern half of the island has 30-40% likelihood of being in the below-normal tercile. The 3-month temperature has more than 70-80% likelihood in the entire country of being in the above-normal tercile during this period.

Temperature

NOAA CPC GFS model predicts 40-45 ^{O}C maximum temperature in the areas along the border of Eastern and Uva provinces. The maximum temperature along the coastal belt in the Eastern side of the country and in Anuradhapura, Polonnaruwa and Monaragala districts will be between 35-40 ^{O}C. The maximum temperature of Colombo, Kalutara and Ratnapura areas will be between 25-30 ^{O}C while in Kandy, Matale, Puttalam, Kurunegala, Galle and Matara districts the maximum temperature will be between 30-35 ^{O}C. For the same period minimum temperature is expected in Nuwara Eliya to be between 15-20 ^{O}C.

Wind

The 850 mb level predicts up to 54 km/h north westerly wind in the southern region of the country. Westerly wind with the same speed is expected in the central region including North Western province. Up to 36 km/h north westerly and westerly wind is expected for the northern region of the island including the southern part of Ampara district. The 700 mb level predicts up to 54 km/h north westerly wind in the southern and western regions of the country including Nuwara Eliya and Kandy districts. Up to 36 km/h wind in the same direction is expected for the rest of the island.

MJO based OLR predictions

MJO shall suppress the rainfall in Sri Lanka in next 15 days.

[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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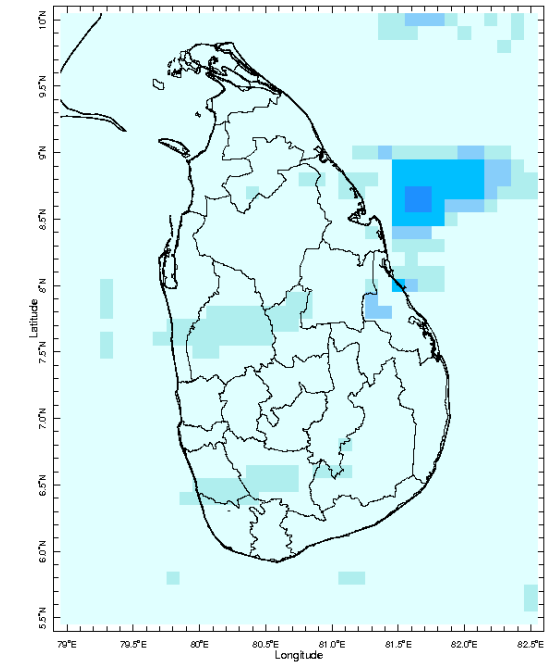
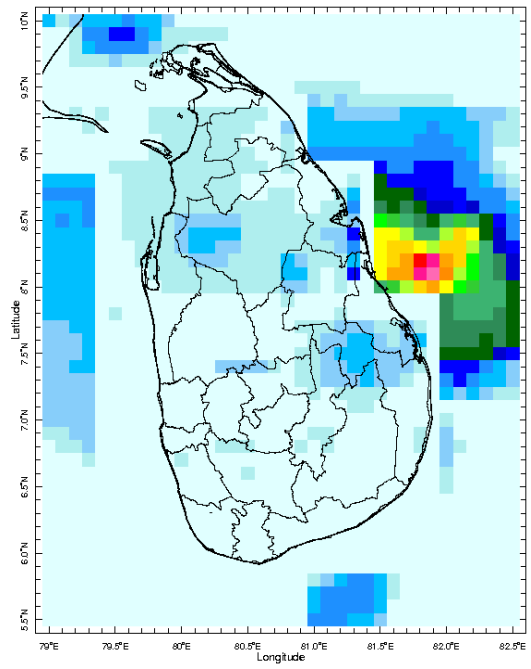
MONITORING

Daily Rainfall Monitoring

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



14 Sep 2016



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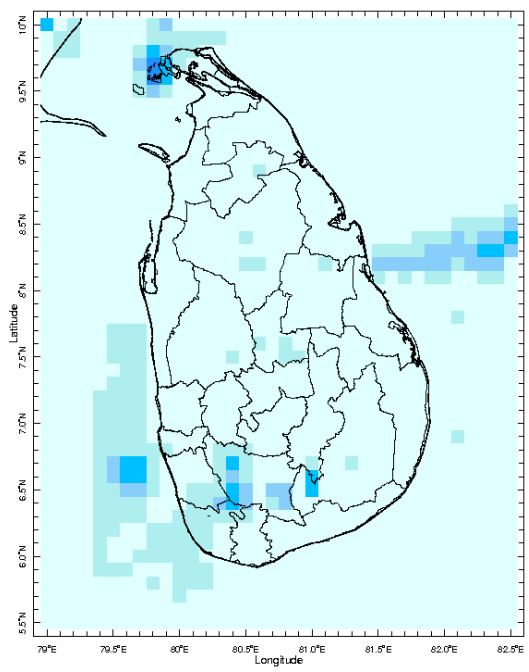

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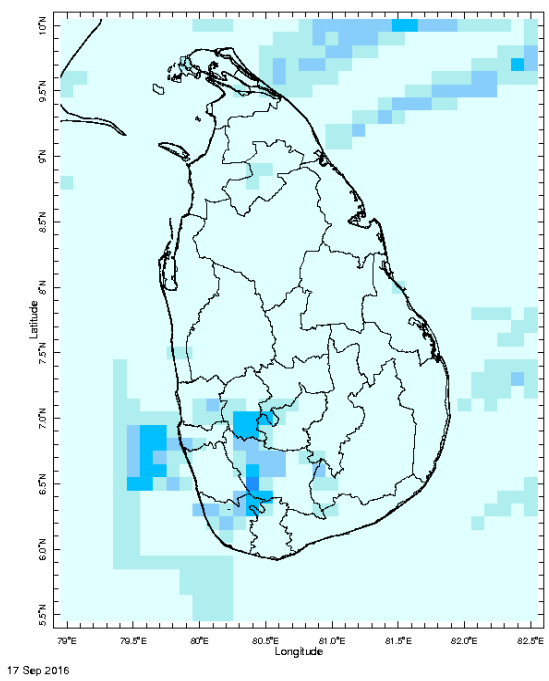

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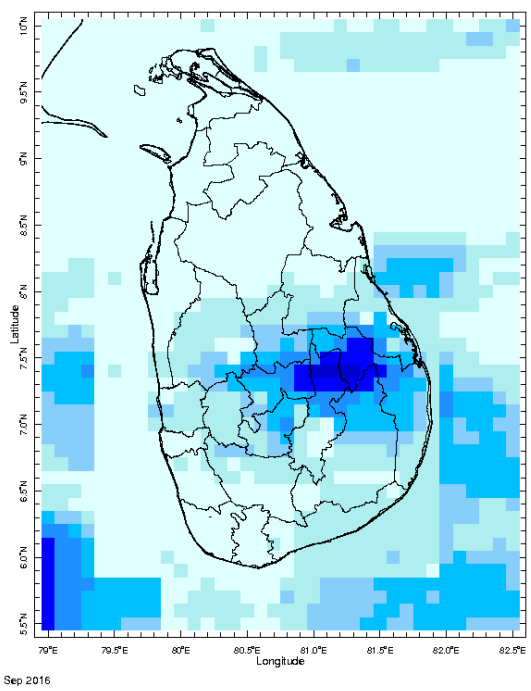

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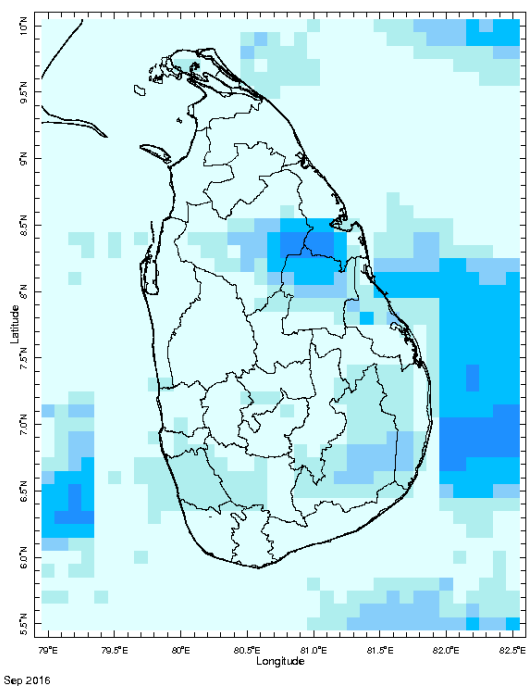

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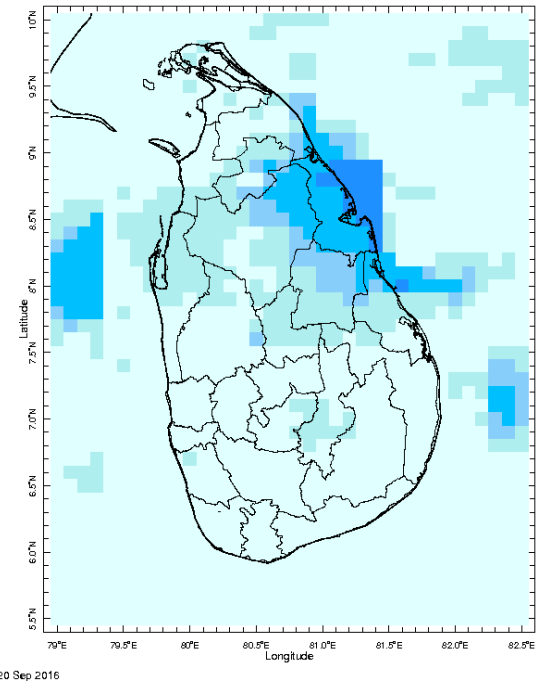

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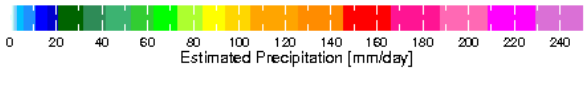
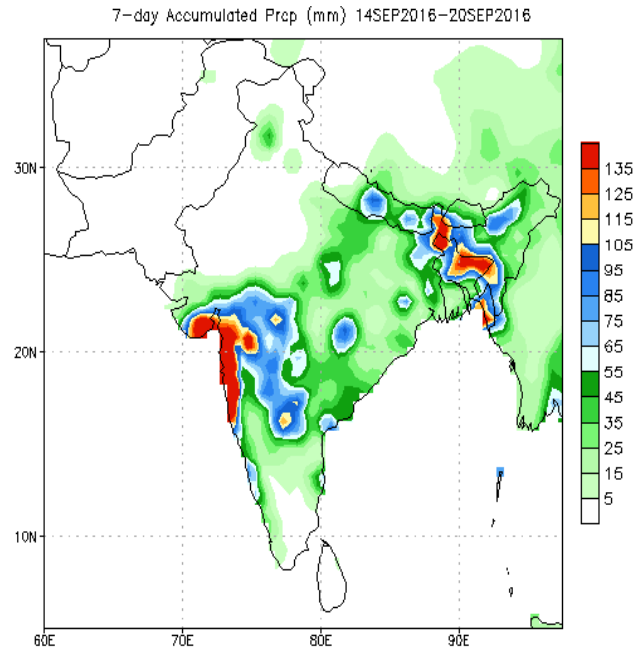
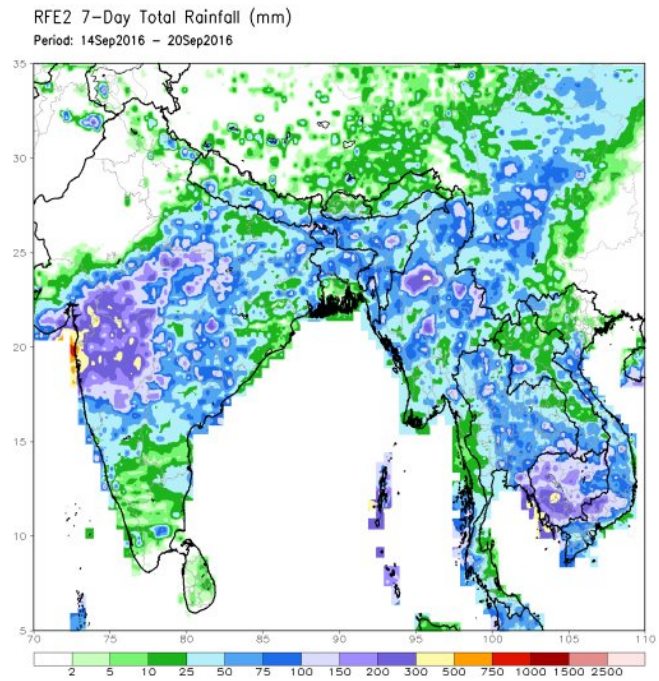


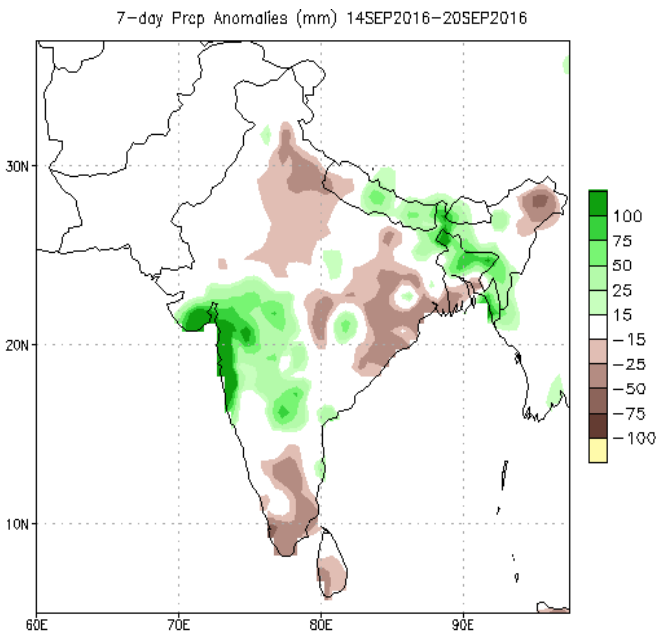
Weekly Rainfall Monitoring

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.

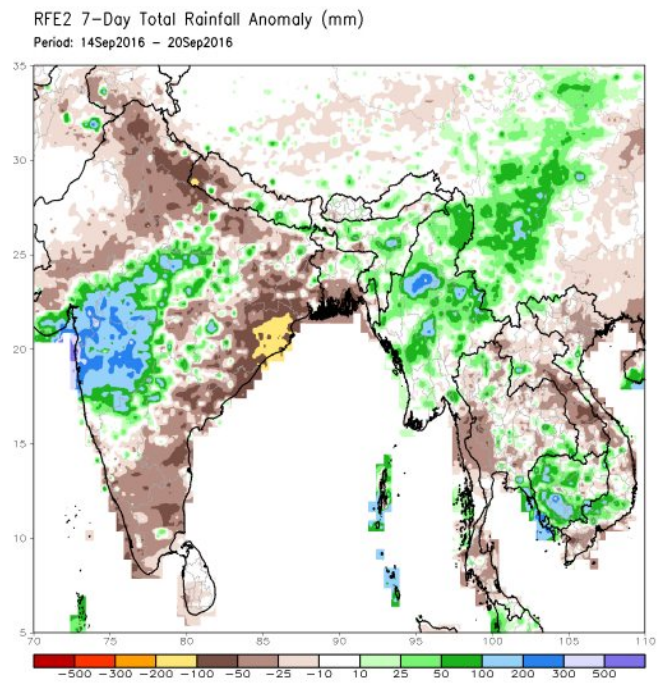


Data Source: CPC Unified (gauge-based & 0.5x0.5 deg resolution) Precipitation Analysis



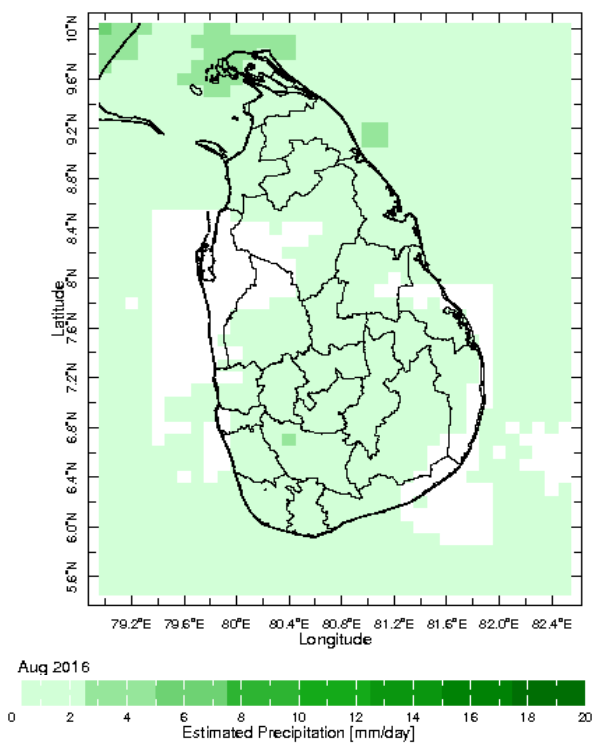


Data Source: CPC Unified (gauge-based & 0.5x0.5 deg resolution) Precipitation Analysis
Climatology (1981-2010)

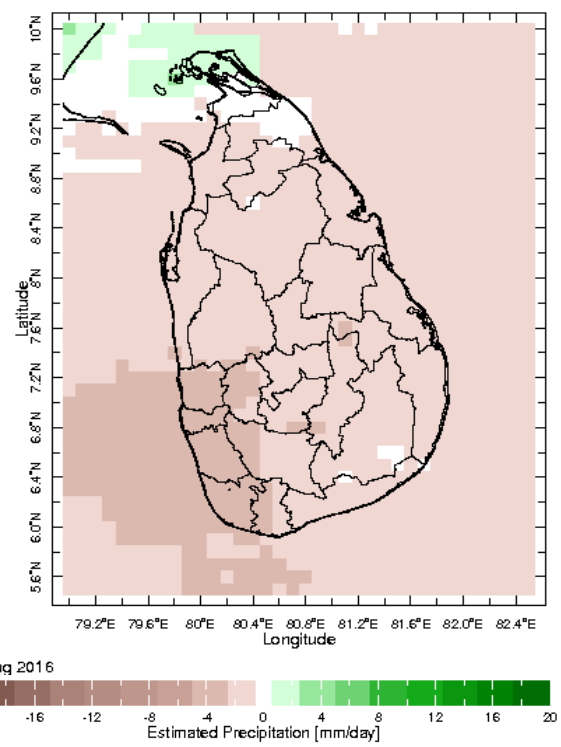


Monthly Rainfall Monitoring

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

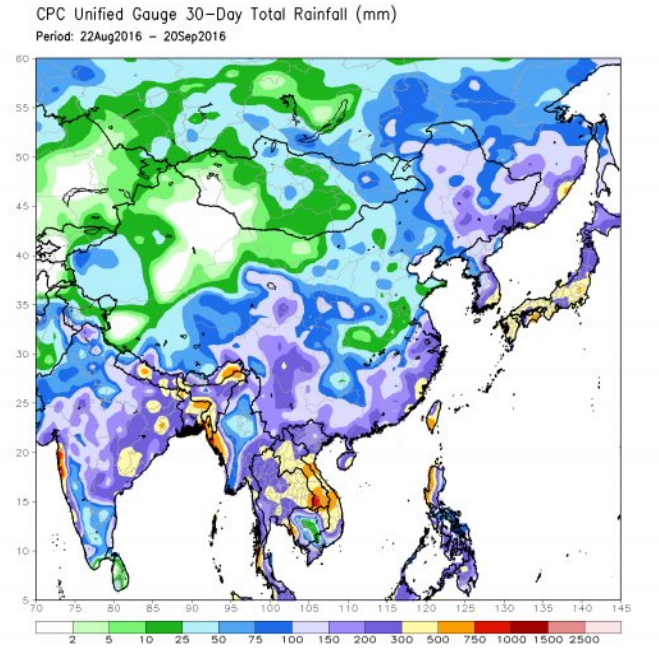


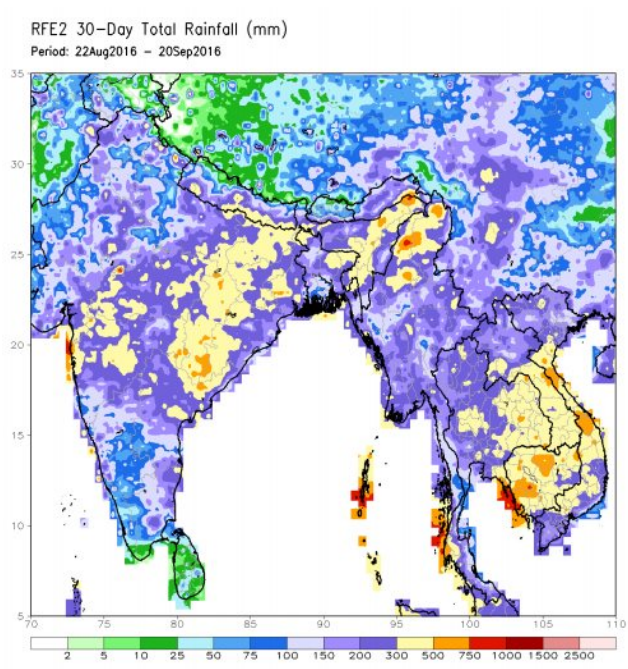
Monthly Average

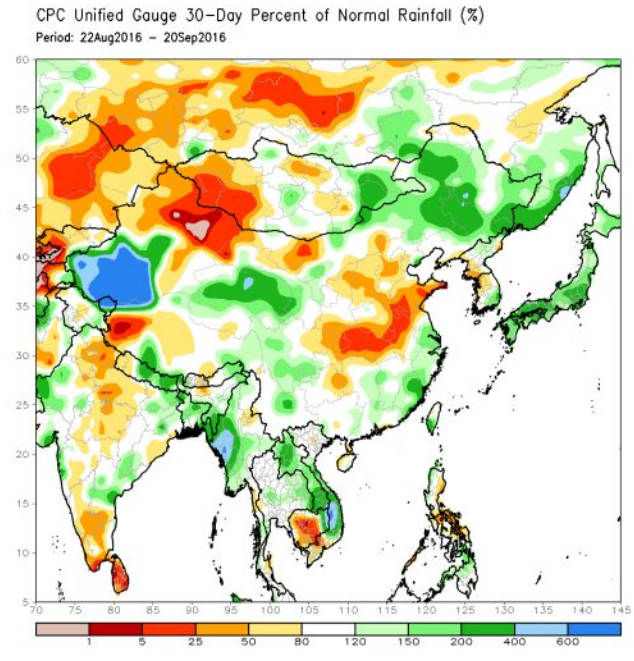


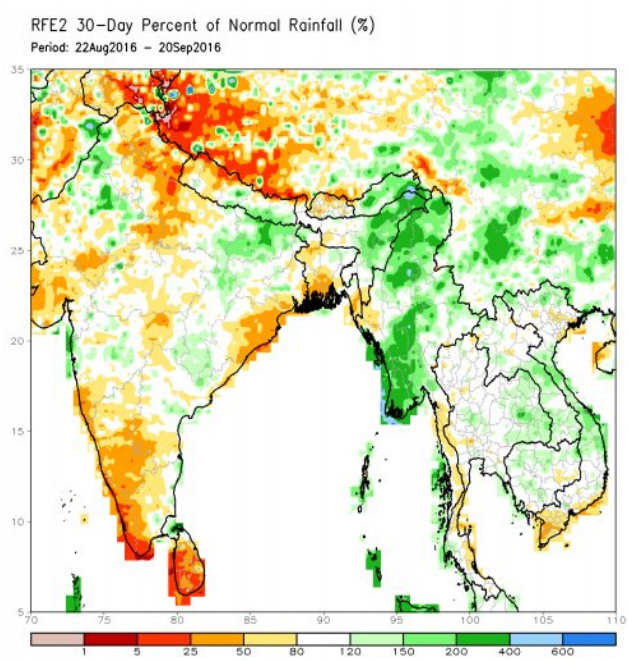
Monthly Anomaly

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.

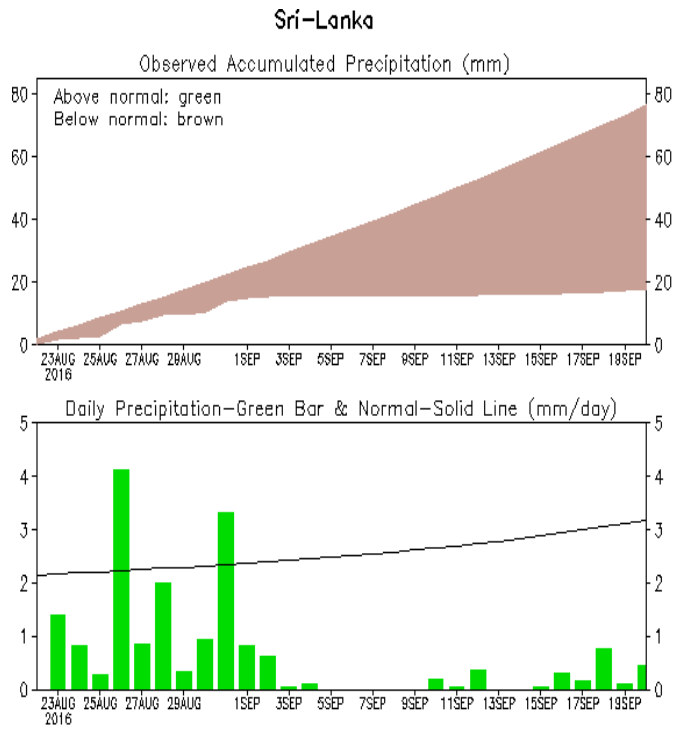








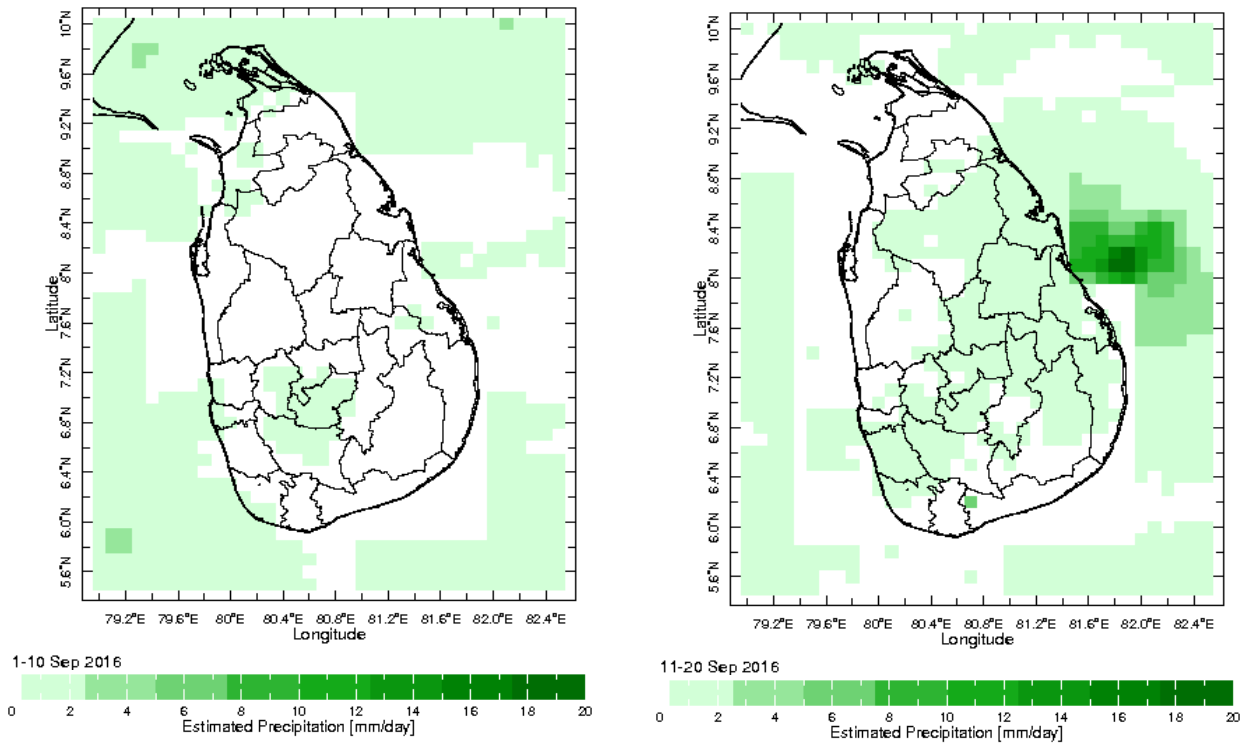
The following figure shows the observed accumulated rainfall (top) and daily observed rainfall (bottom) in Sri Lanka in the last 30 days.



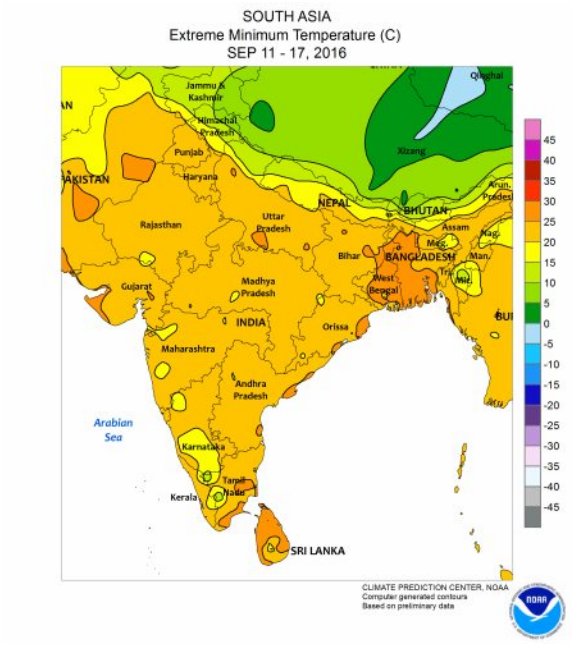
Data Source: CPC (Gauge-Based) Unified Precipitation (Climatology 1981-2010)

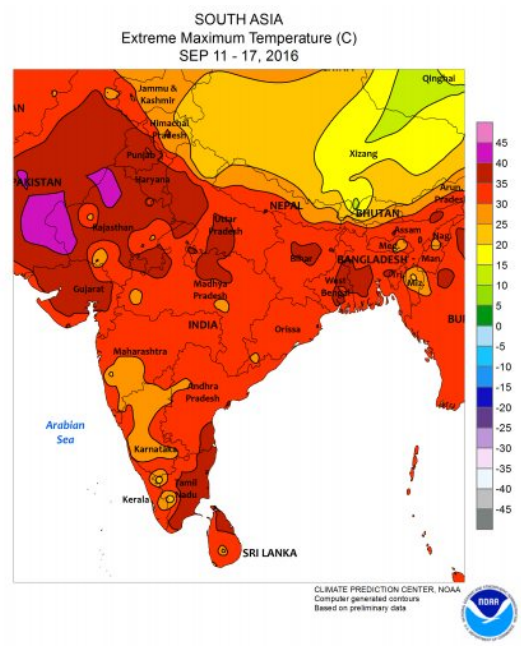
(updated on 00Z20SEP2016)

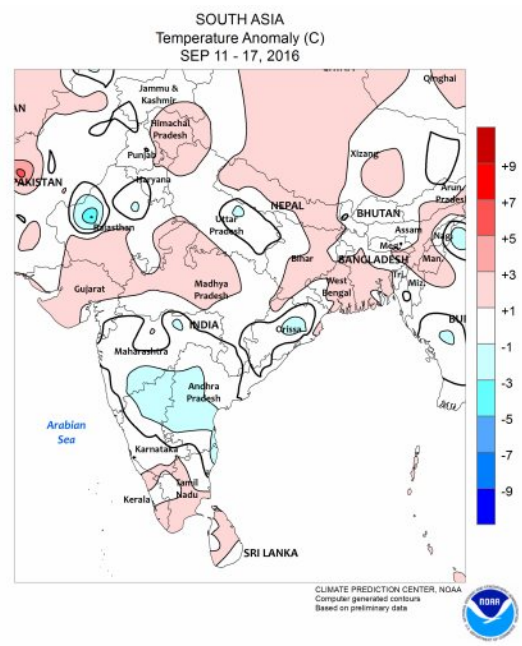
Dekadal (10 Day) Satellite Derived Rainfall Estimates



Weekly Temperature Monitoring

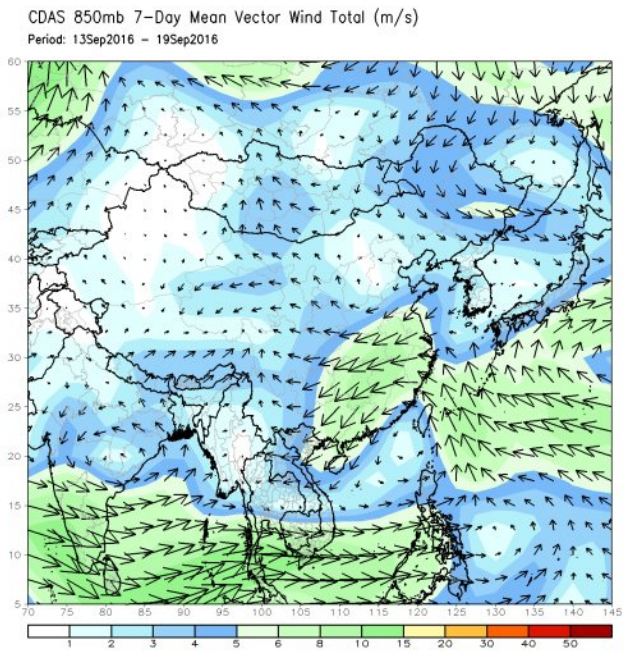


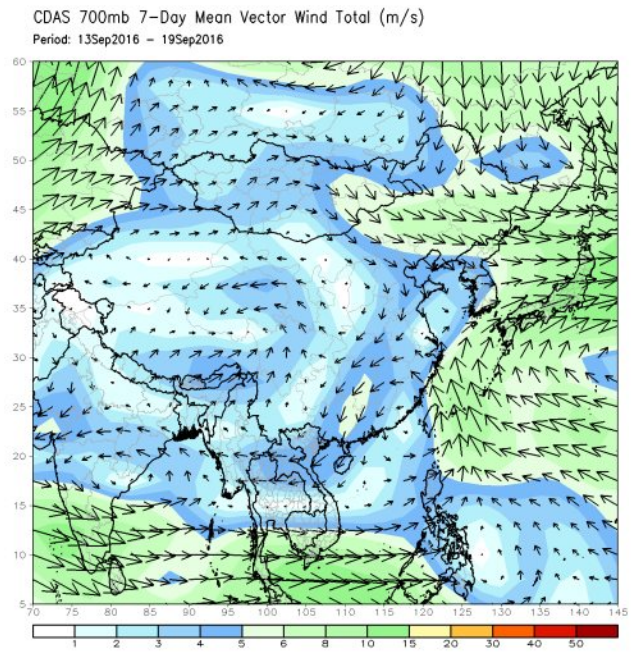




Weekly Wind Monitoring

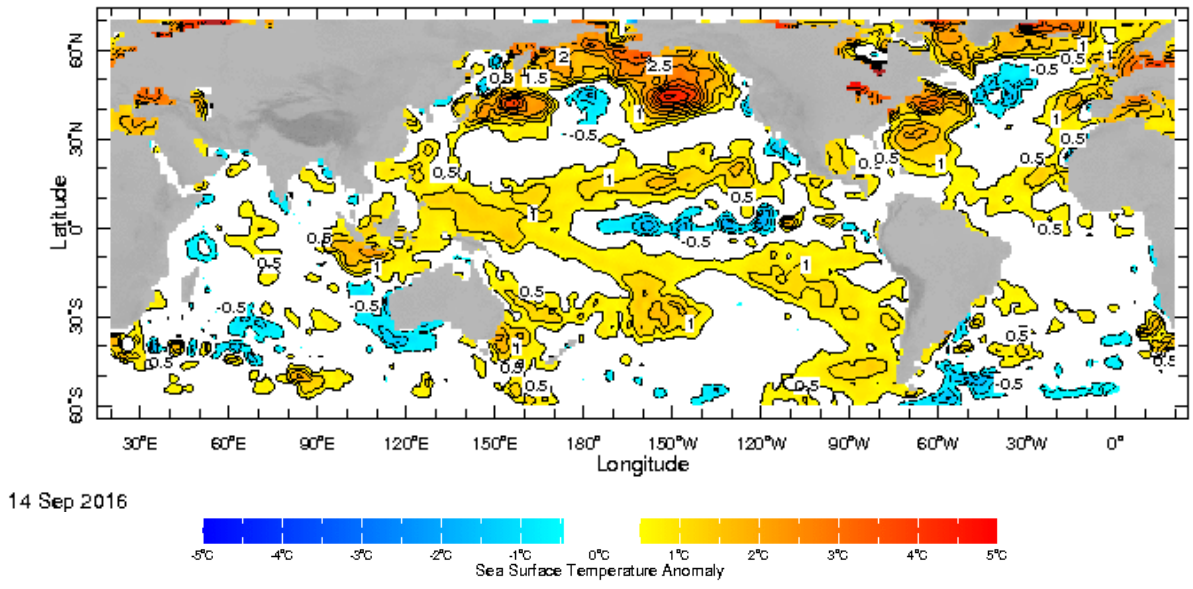
The following figures show the mean vector wind total of the past 7 days near Sri Lanka at two levels. The figure on the left shows 850 mb (~1500 m) level and the figure on the right shows 700 mb (~3000 m) level.



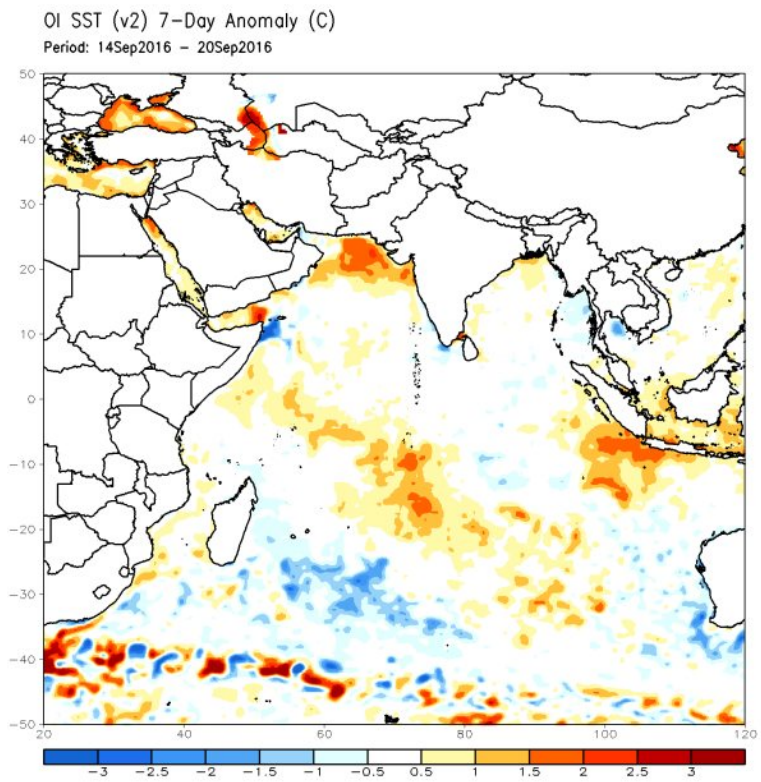


Weekly Average SST Anomalies

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

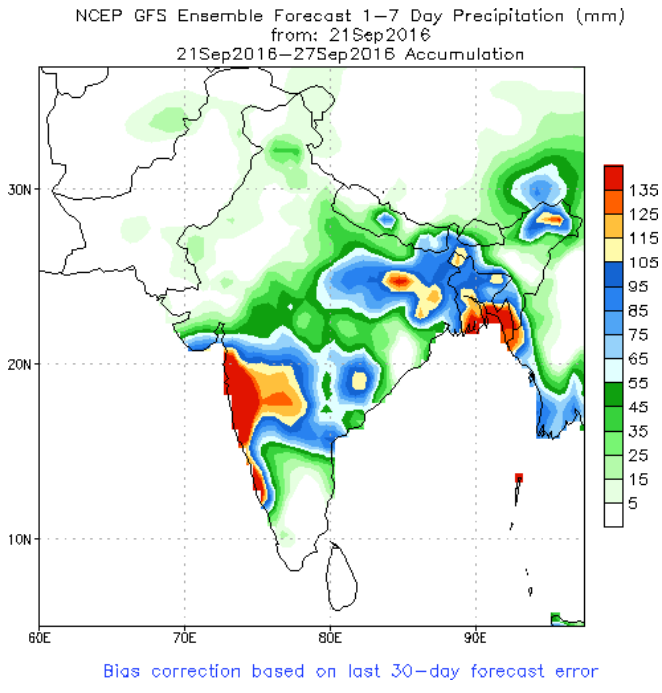


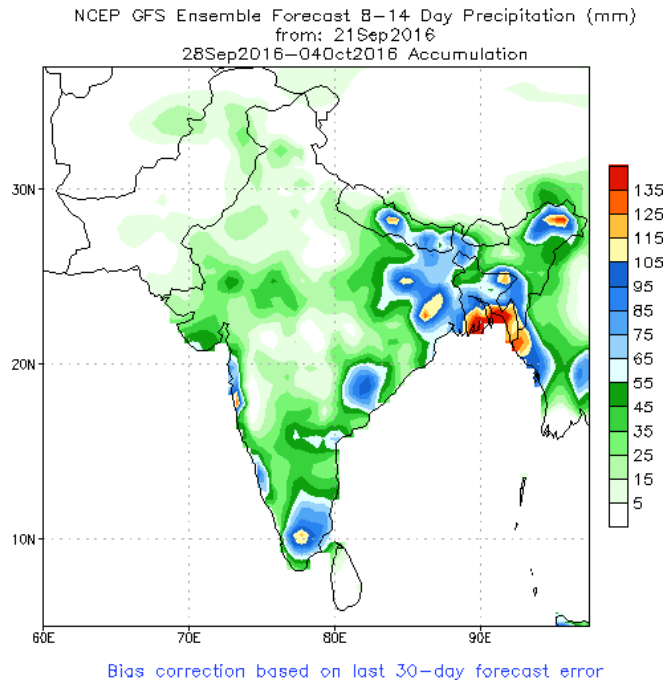
Optimum Interpolated Sea Surface Temperature Anomaly in the Indian Ocean from NOAA CPC



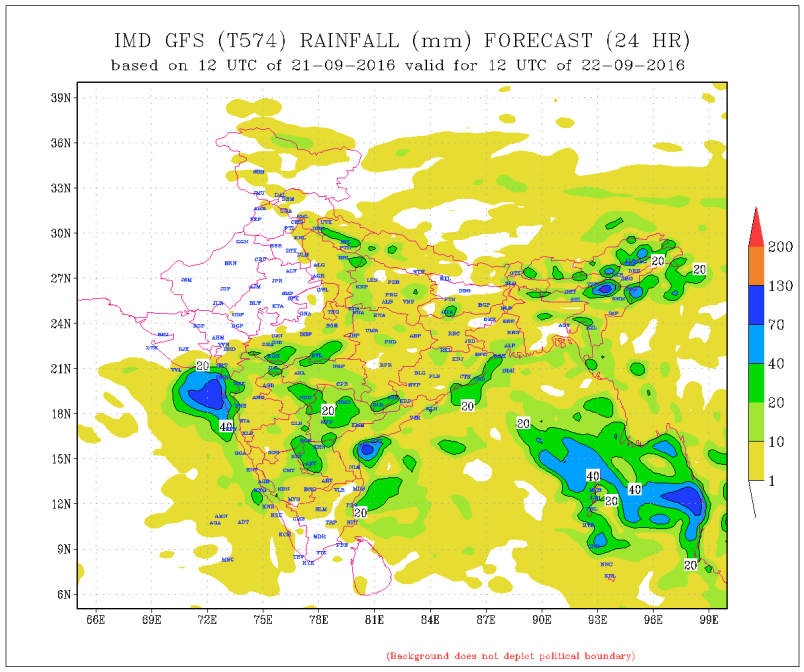
PREDICTIONS

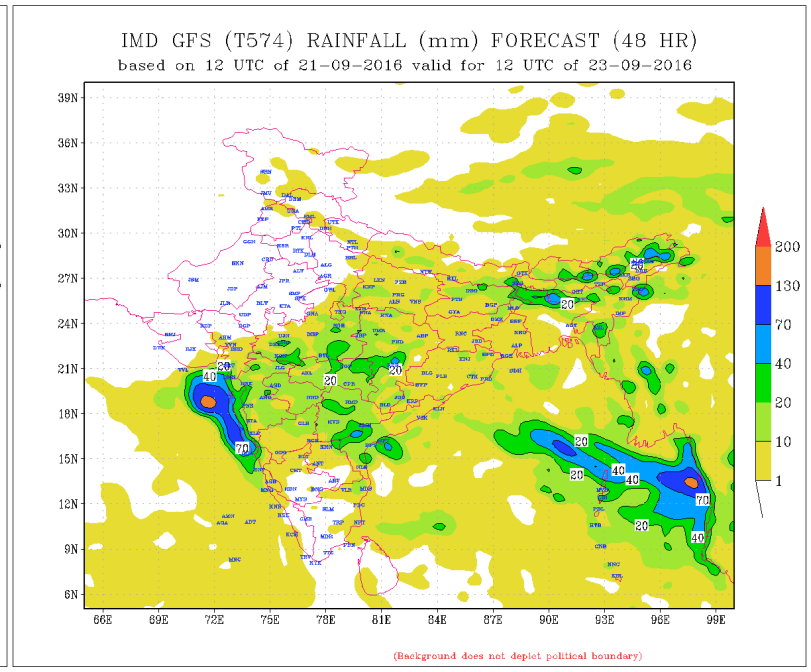
NCEP GFS 1- 14 Day prediction

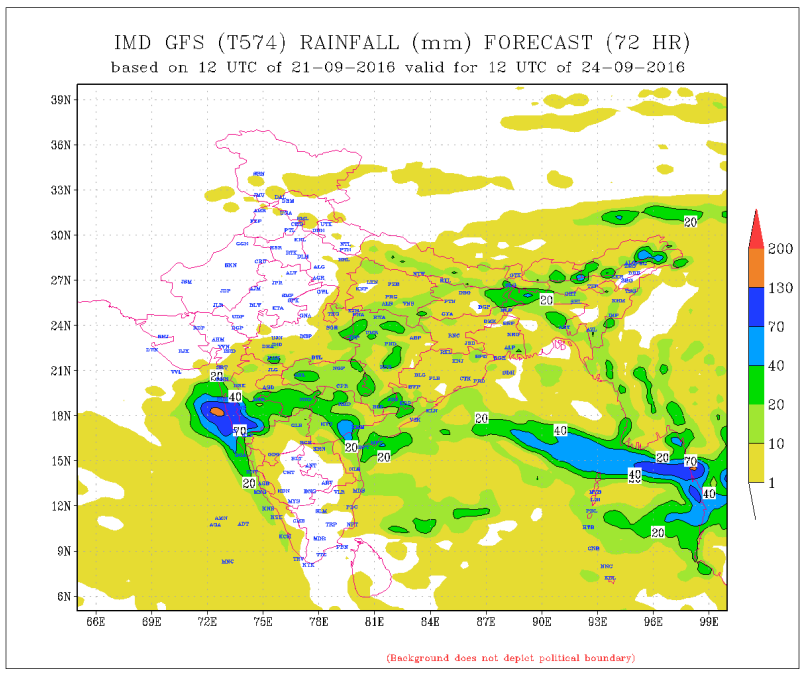


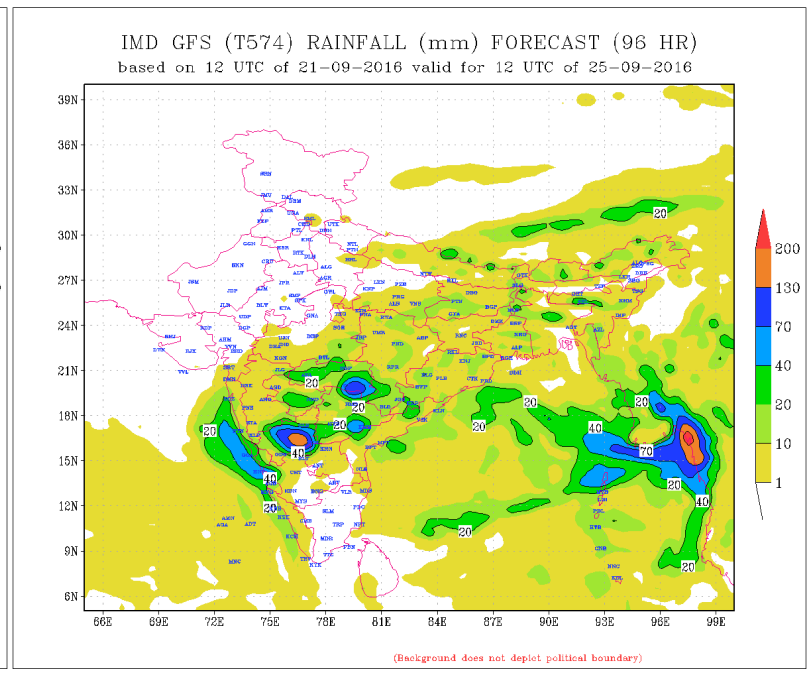


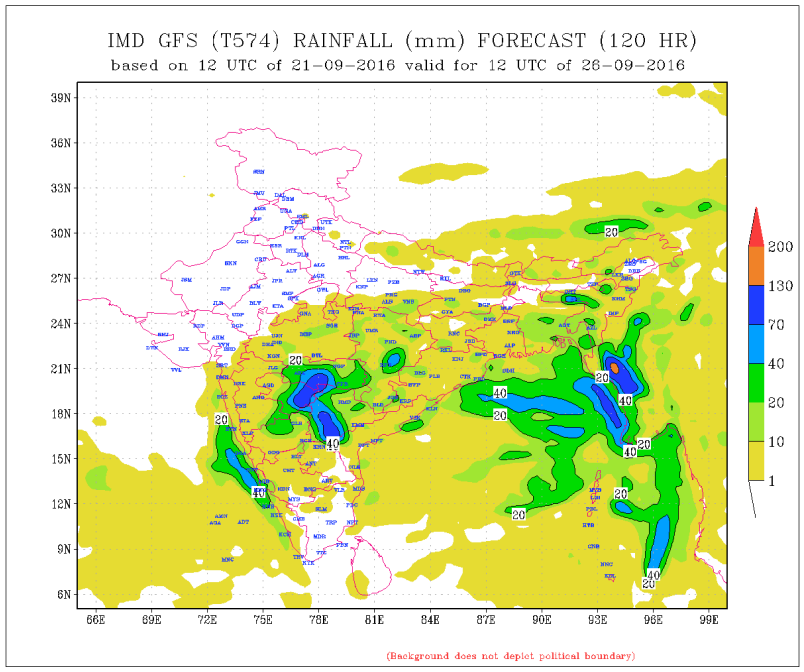
IMD GFS (T574) Model Rainfall Forecast from RMSC New Delhi, India

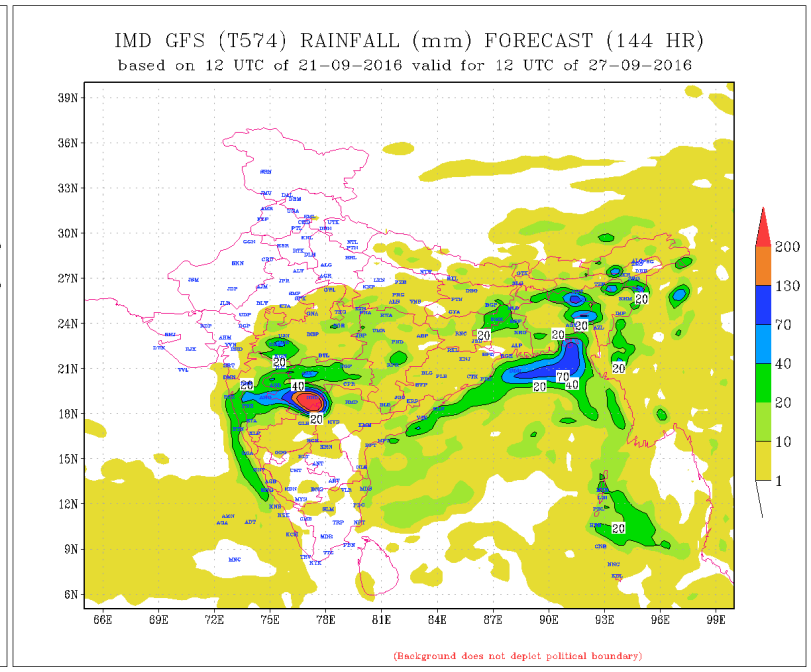


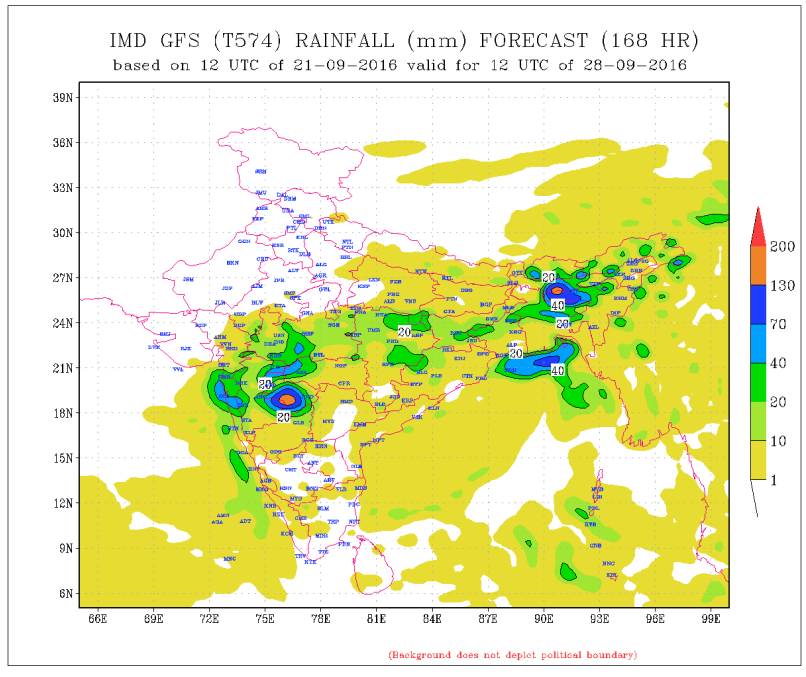




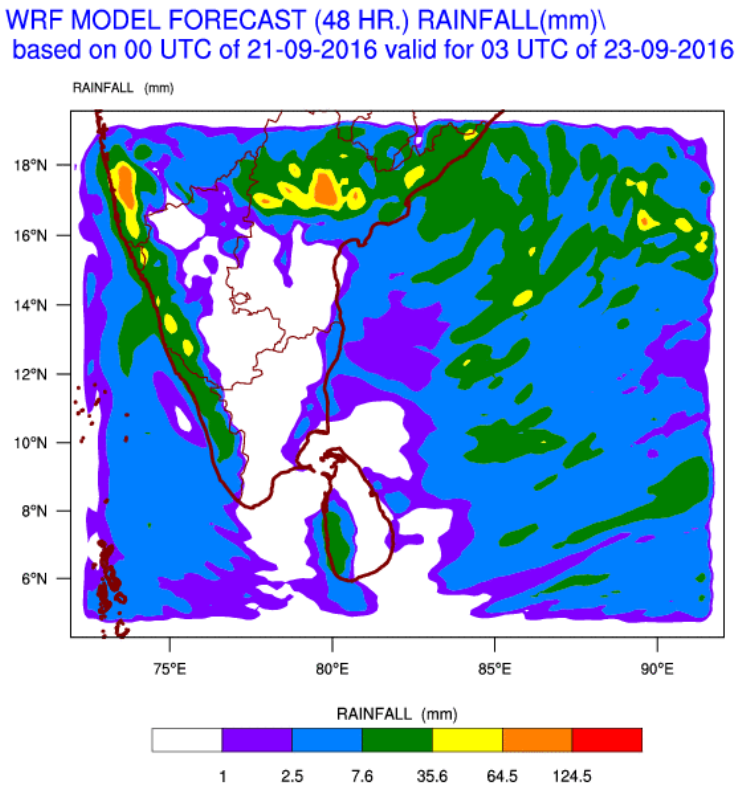


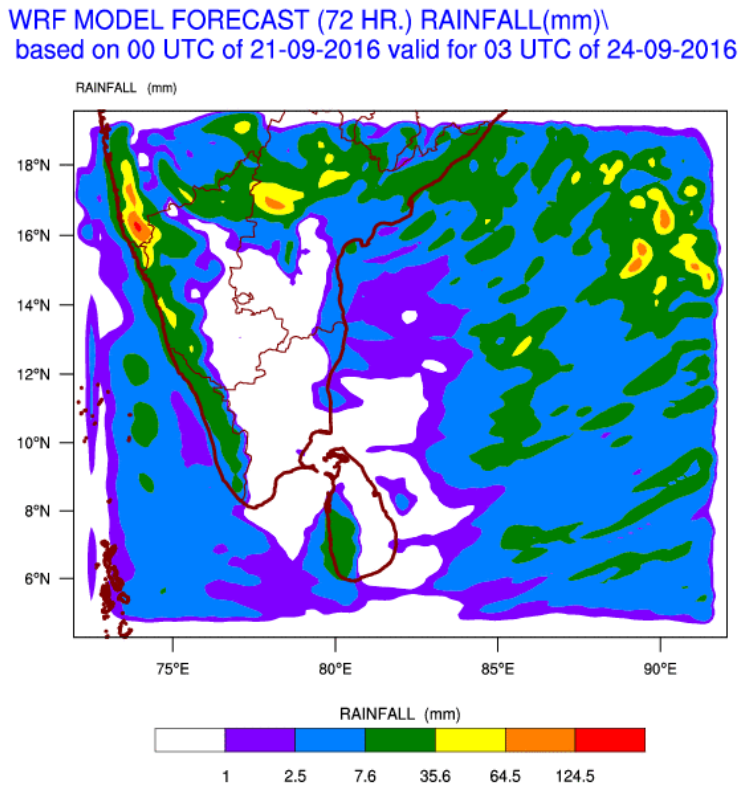





IMD GFS (T574) RAINFALL (mm) FORECAST (168 HR)
based on 12 UTC of 21-09-2016 valid for 12 UTC of 28-09-2016
39N
36N
33N
30N
27N
24N
21N
18N
15N
12N
9N
6N
66E
69E
72E
75E
78E
81E
84E
87E
90E
93E
96E
99E
200
130
70
40
20
10
1
(Background does not deplict political boundary)

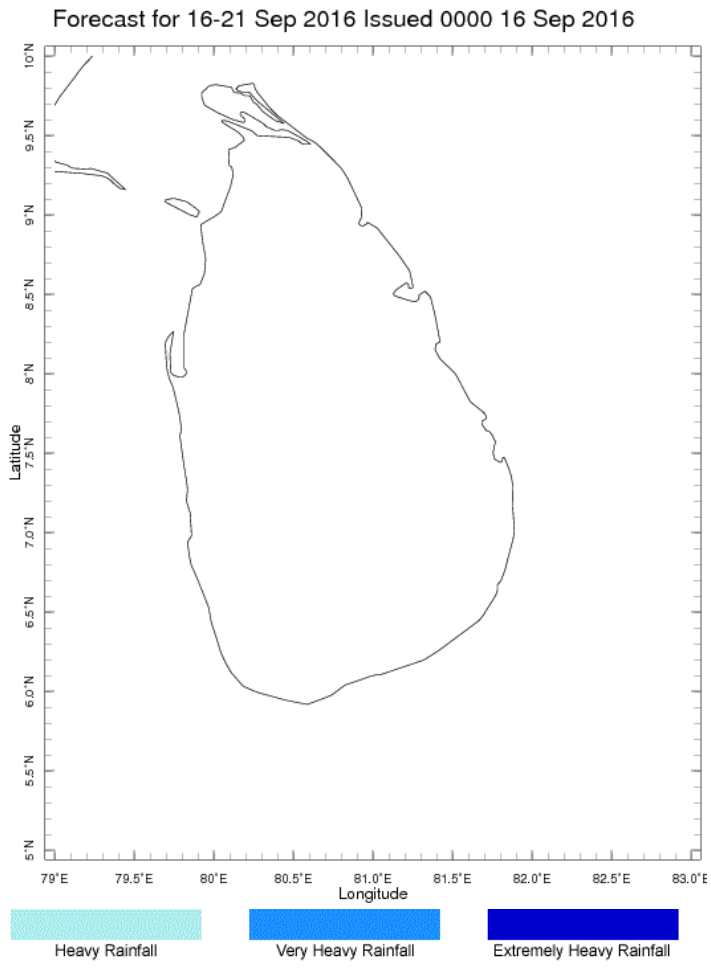
WRF Model Forecast (from IMD Chennai)



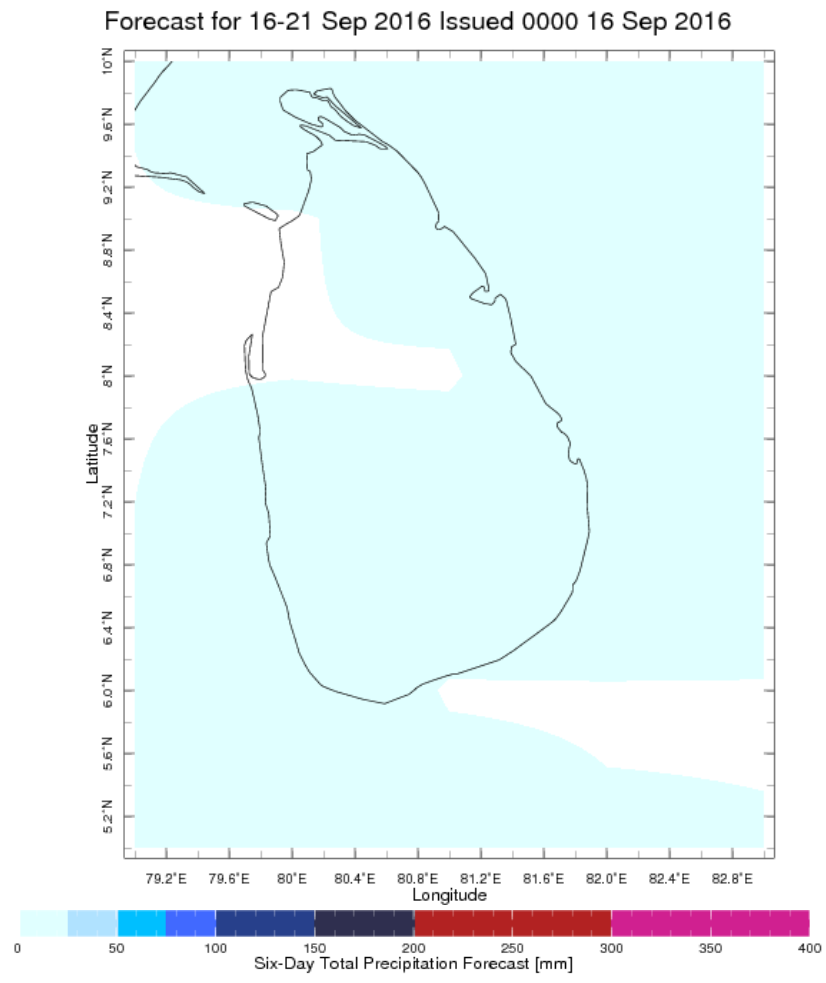


Weekly Rainfall Forecast from IRI

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.



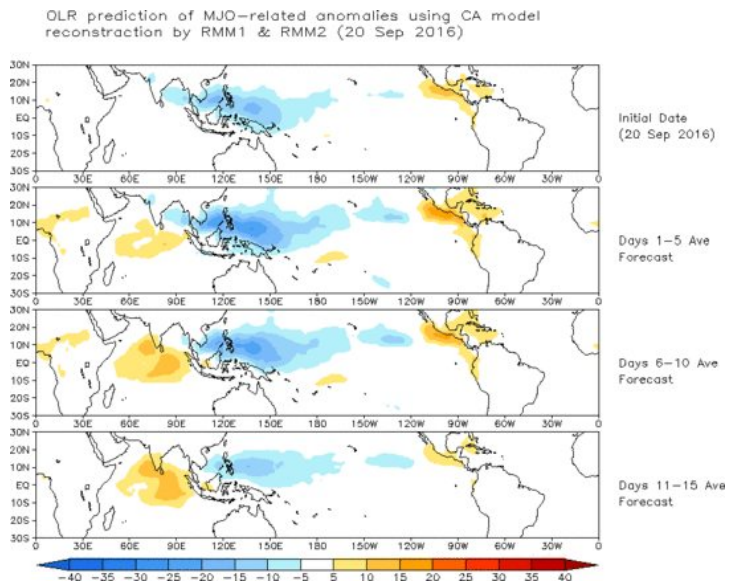
Extreme Rainfall Forecast



Total Six Day Precipitation Forecast

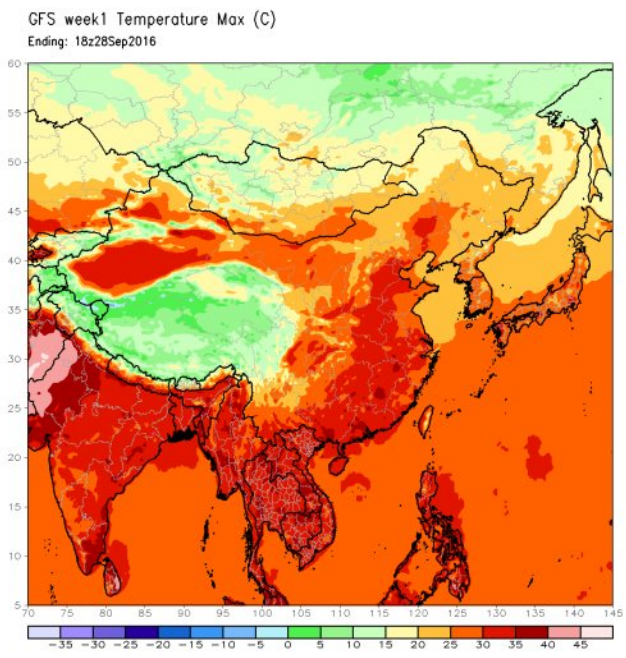
Madden Julian Oscillation (MJO) related Outgoing Longwave Radiation (OLR) Forecast

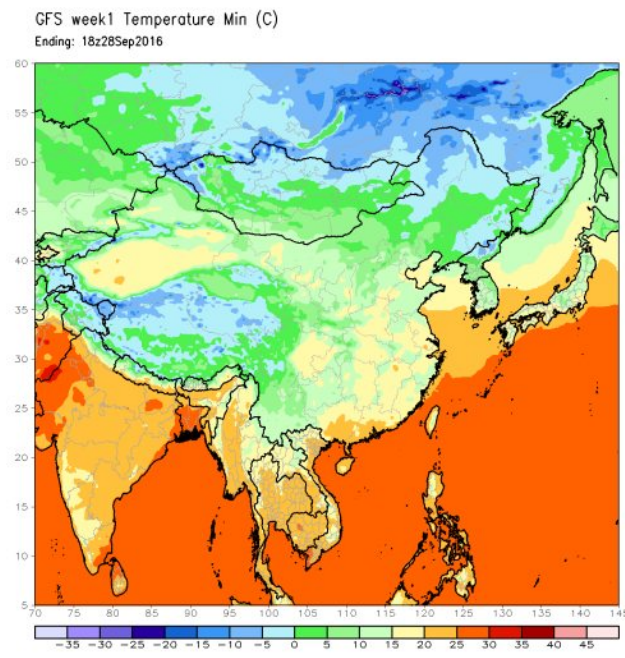
The Outgoing Longwave Radiation (OLR) is a proxy for rainfall. This can be used to identify convective rain clouds based on the MJO phase. Violet and Blue shading indicates enhanced tropical weather and Orange shading indicates suppressed conditions. The following figure shows the forecasts of MJO associated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



Weekly Temperature Forecast

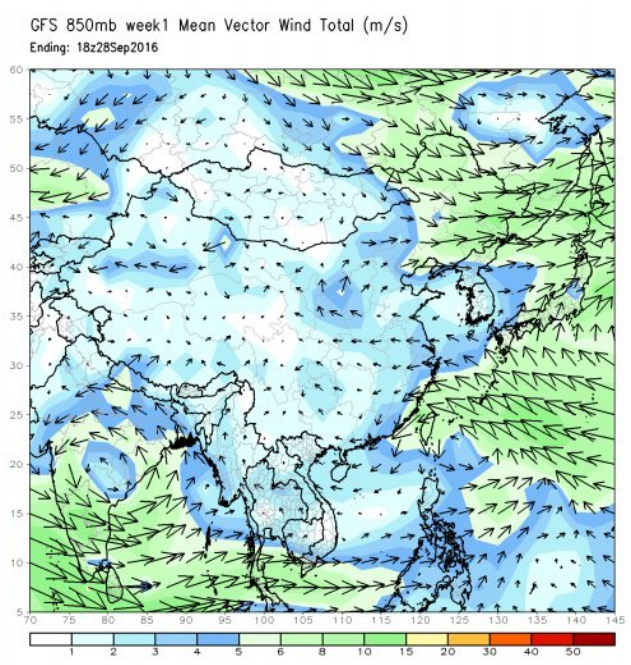
Weekly Minimum and Maximum Temperature prediction from the GFS model (from NOAA CPC)

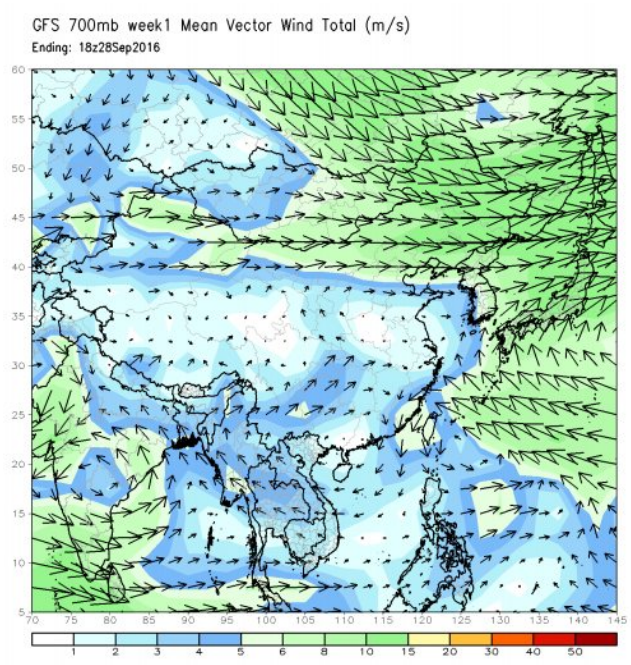




Weekly Wind Forecast

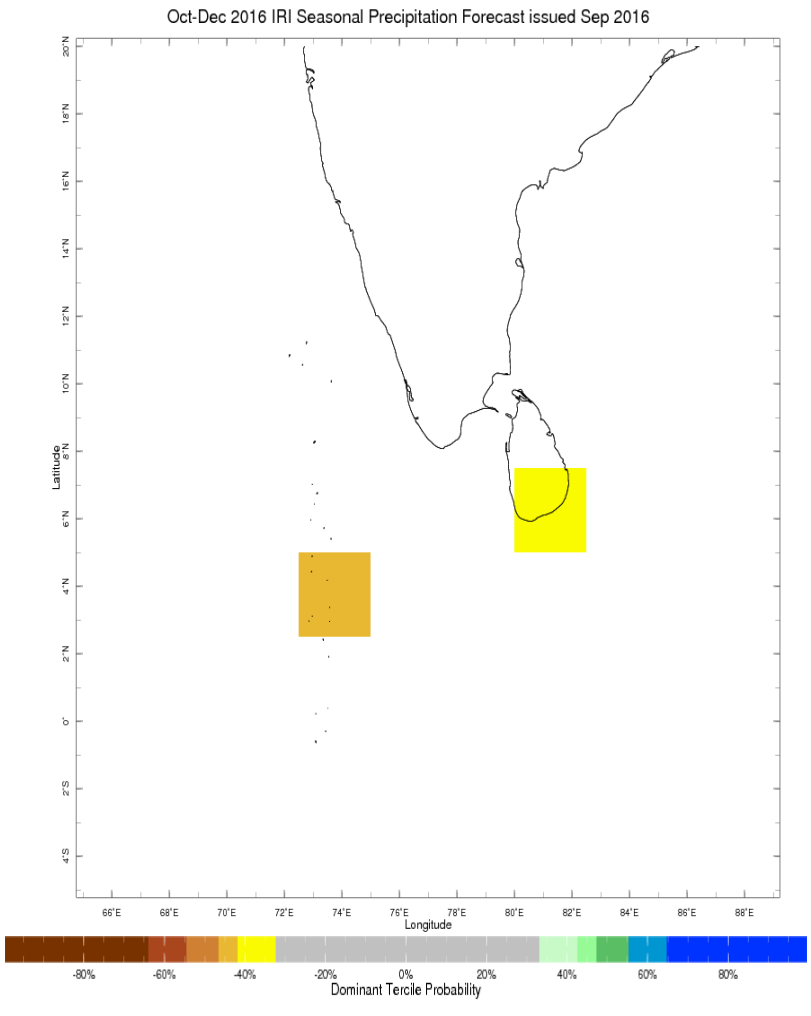
Weekly mean vector wind total prediction from the GFS model at 850 mb (left) and 700 mb (right) levels. (from NOAA CPC)



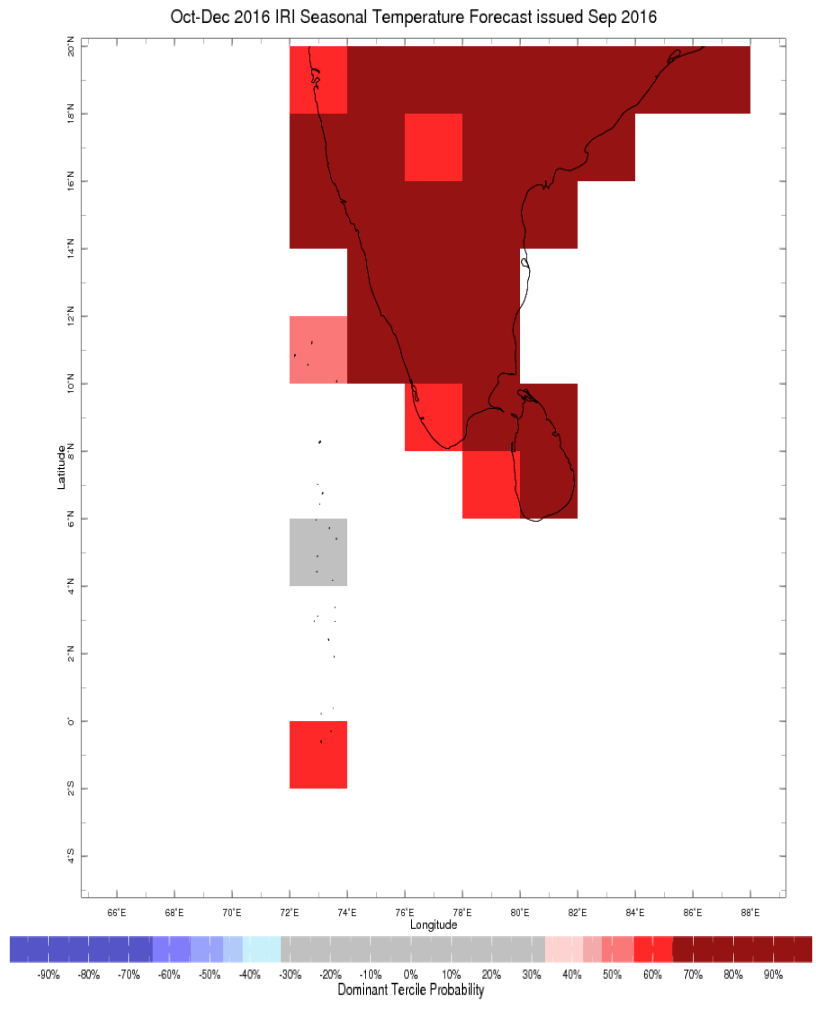


Seasonal Rainfall and Temperature Forecast

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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