Experimental Climate Monitoring and Prediction

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

5 January 2017

Highlights

- *The NCEP GFS model predicts no rainfall over Sri Lanka for next week.*
- *Between 28 Dec–3 Jan: highest rainfall of 70 mm was recorded on the 31st in Ratnapura town.*
- *From 27 Dec–2 Jan: minimum temperature of 15 ^{O}C was recorded from Nuwara Eliya district while many parts of the island recorded a maximum temperature between 30-35 ^{O}C.*
- *From 27 Dec–2 Jan: up to 28 km/h north easterly winds were experienced in the southern and central regions of the island and speeds less than 20 km/h in the northern regions.*

Monitoring

Rainfall

Weekly Monitoring: On December 28th Colombo district received up to 50 mm of rainfall; Gampaha district up to 40 mm; Kalutara, Galle, Kegalla, Ratnapura, Monaragala, Ampara and Kurunegala districts up to 30 mm; and Batticaloa, Polonnaruwa, Kandy, Matale and Badulla districts up to 20 mm of rainfall. No significant rainfalls were recorded within the island on 29th and 30th. On the 31st Ratnapura district received up to 70 mm of rainfall; Kalutara district up to 30 mm; and Kegalla, Kandy and Galle districts received up to 20 mm of rainfall. On the 1st of January adjacent south eastern sea received up to 50 mm of rainfall. On the 2nd Ampara and Batticaloa districts received up to 20 mm of rainfall. No significant rainfalls were recorded on the 3rd.

Total Rainfall for the Past Week: The RFE 2.0 tool shows total rainfall up to 100 mm for Ratnapura district; up to 50 mm for Gampaha, Colombo, Kalutara, Kegalla, Batticaloa, Ampara, Badulla, Kurunegala, Matale, Nuwara Eliya and Galle districts; and up to 25 mm for Puttalam, Kandy, Hambantota and Matara districts. It shows above average rainfall of 50-100 mm for Ratnapura district; 10-25 mm for Kurunegala, Gampaha, Colombo, Kalutara and Kegalla districts; below average rainfall of 25-50 mm for Batticaloa, Ampara and Anuradhapura districts; and 10-25 mm for many parts of the island.

Monthly Monitoring: During December – below average rainfall conditions were experienced by the entire island. Eastern regions of the island received up to 240 mm below average rainfall; and up to 150 mm in rest of the country. Monthly average rainfall for Colombo, Kalutara, Galle and Ratnapura amounted to 360 mm/month; and 180 mm/month for many parts of the island. The CPC Unified Precipitation Analysis tool shows ~200 mm of total rainfall in the coastal regions of Colombo district; ~100 mm in Kalutara, Galle, Ratnapura, Kegalla, Kandy, Matale, Ampara, Badulla and Monaragala districts; and ~50 mm in rest of the island.

Ocean State (*Text Courtesy IRI*)

Pacific sea state: December 15, 2016
During mid-December 2016 the tropical Pacific SST anomaly was near -0.5C, the threshold for weak La Niña. Also, most of the atmospheric variables across the tropical Pacific have been consistent with weak La Niña conditions, although sub-seasonal atmospheric variability weakened some of them in late November. The upper and lower atmospheric winds have been suggestive of a strengthened Walker circulation, and the cloudiness and rainfall have also been consistent with weak La Niña conditions. The collection of ENSO prediction models indicates SSTs near the threshold of La Niña persisting through mid-winter, then weakening to cool-neutral by later winter.

Indian Ocean State
0.5 ^{O}C above average sea surface temperature was observed in the southern seas of Sri Lanka.

Predictions

Rainfall

14-day prediction:

NOAA NCEP models:
From 4th – 10th Jan: No rainfall.
From 11th – 17th Jan: Total rainfall between 10-15 mm in Colombo, Kegalla and Ratnapura districts.

IMD WRF & IRI Model Forecast:
6th Jan: Up to 3 mm of rainfall in Kinniya and Agbopura in Trincomalee district.
7th Jan: Up to 3 mm of rainfall along the coastal regions of the Batticaloa district.

Seasonal Prediction: IRI Multi Model Probability Forecast
January to March: the total 3-month precipitation has 40-50% likelihood of being in the above-normal tercile for the whole island.
The 3-month temperature has more than 70-80% likelihood in the entire country of being in the above-normal tercile.

MJO based OLR predictions

For the next 15 days:
MJO shall enhance the rainfall in Sri Lanka for the next 10 days and shall not have a significant impact in the following 5 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.

Weekly Hydro- Meteorological Report for Sri Lanka

Inside This Issue

## Daily Rainfall Monitoring

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

28 Dec 2016

29 Dec 2016

30 Dec 2016

31 Dec 2016

1 Jan 2017

2 Jan 2017

3 Jan 2017

Estimated Precipitation [mm/day]
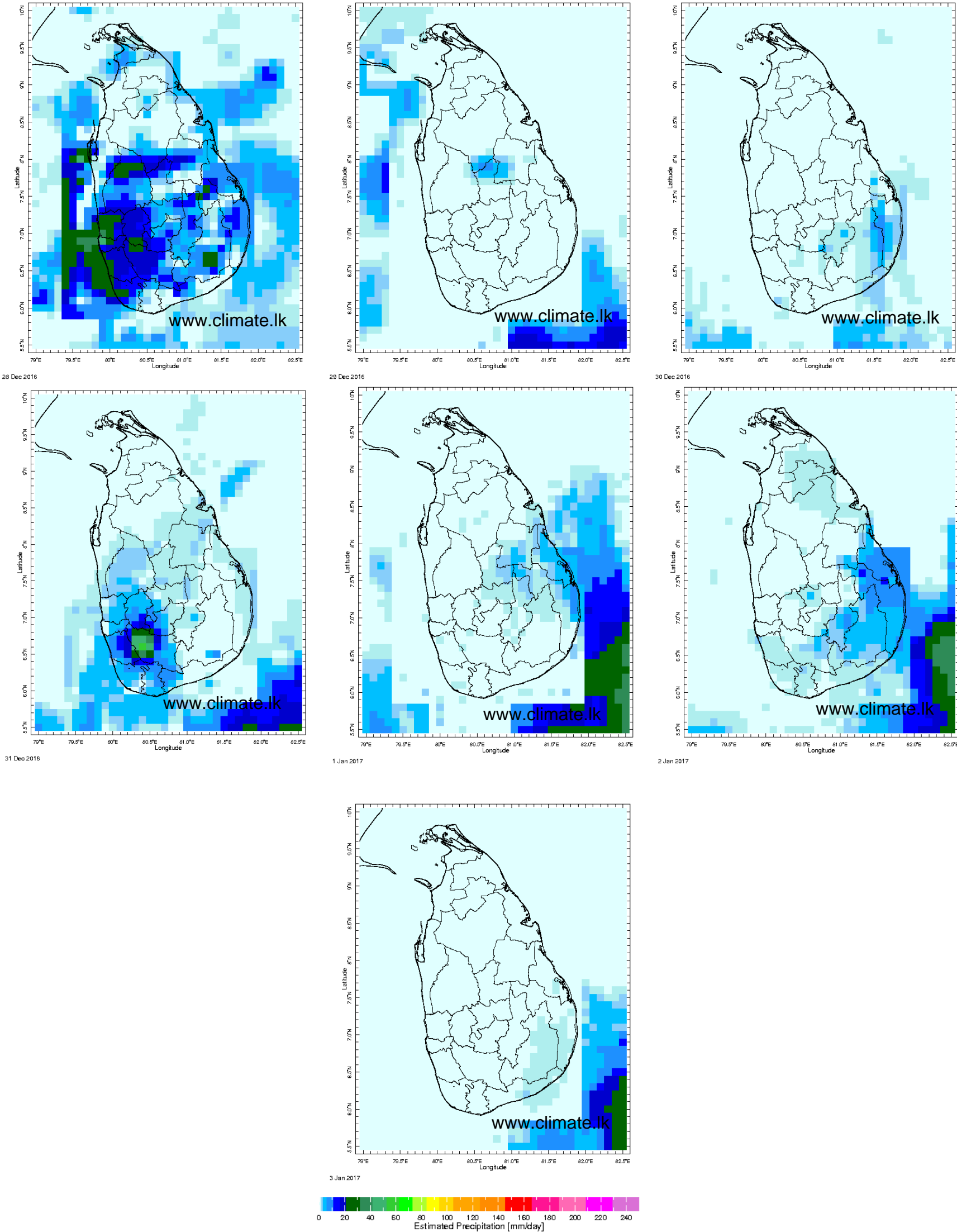
Monthly Rainfall Monitoring

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
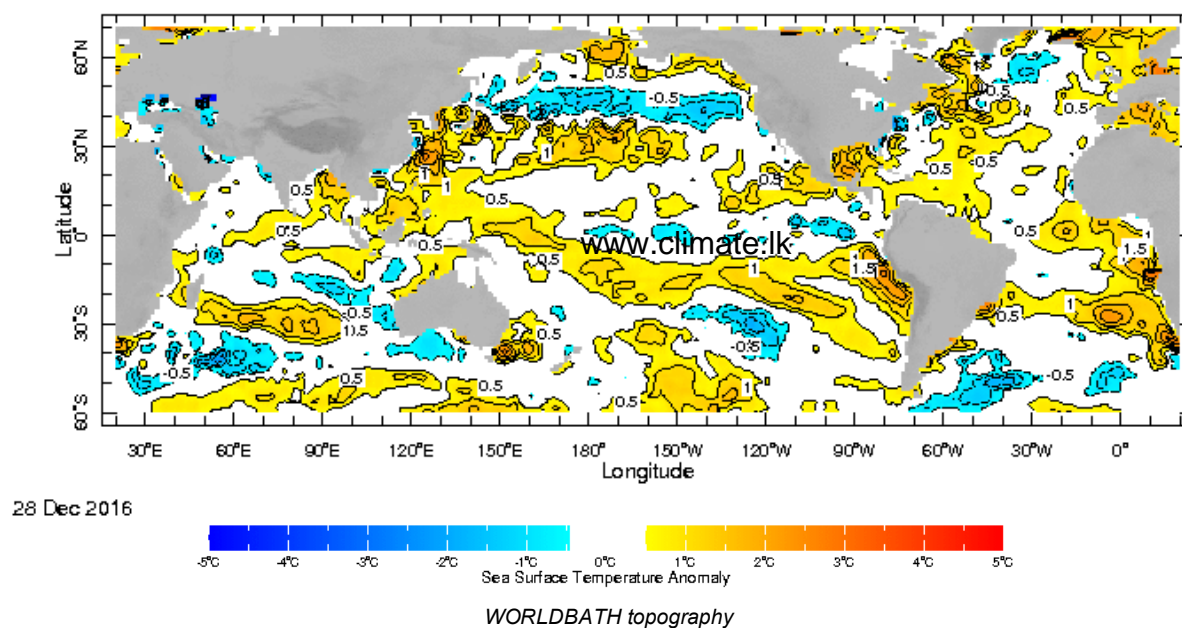

Dec 2016

Monthly Average

Dec 2016

Monthly Anomaly
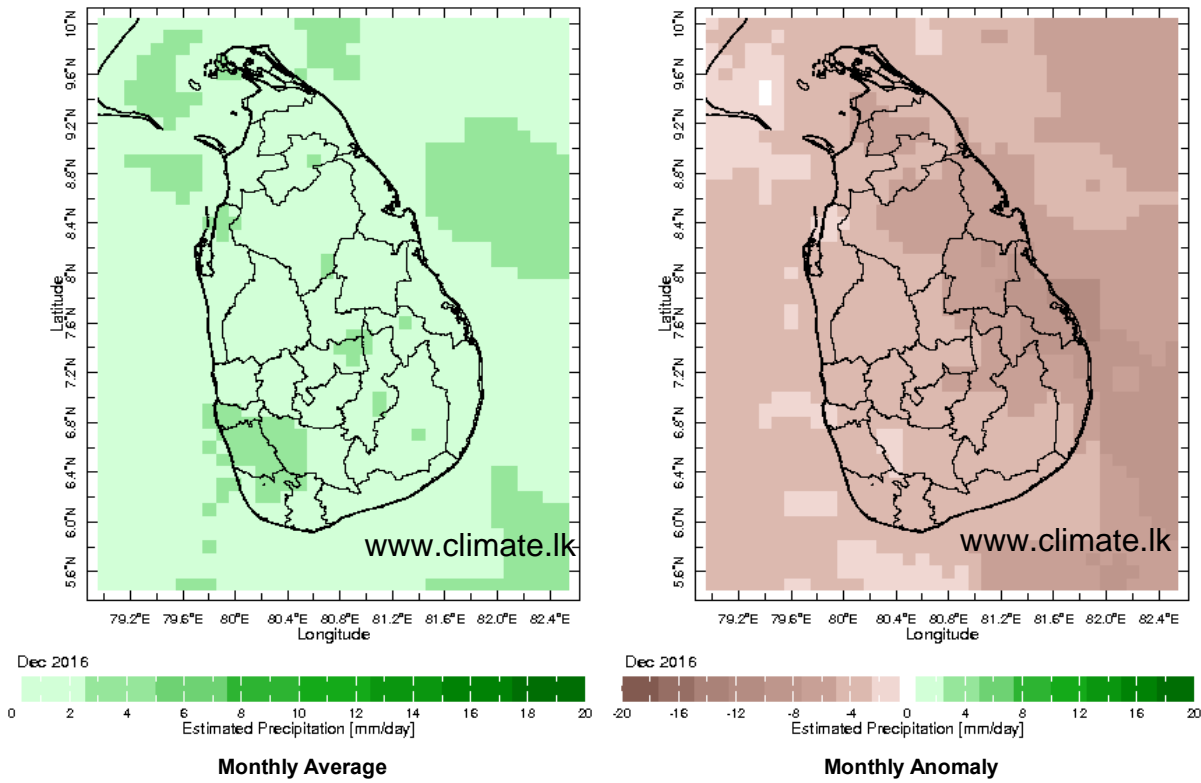
Dekadal (10 Day) Satellite Derived Rainfall Estimates

11-20 Dec 2016

21-31 Dec 2016
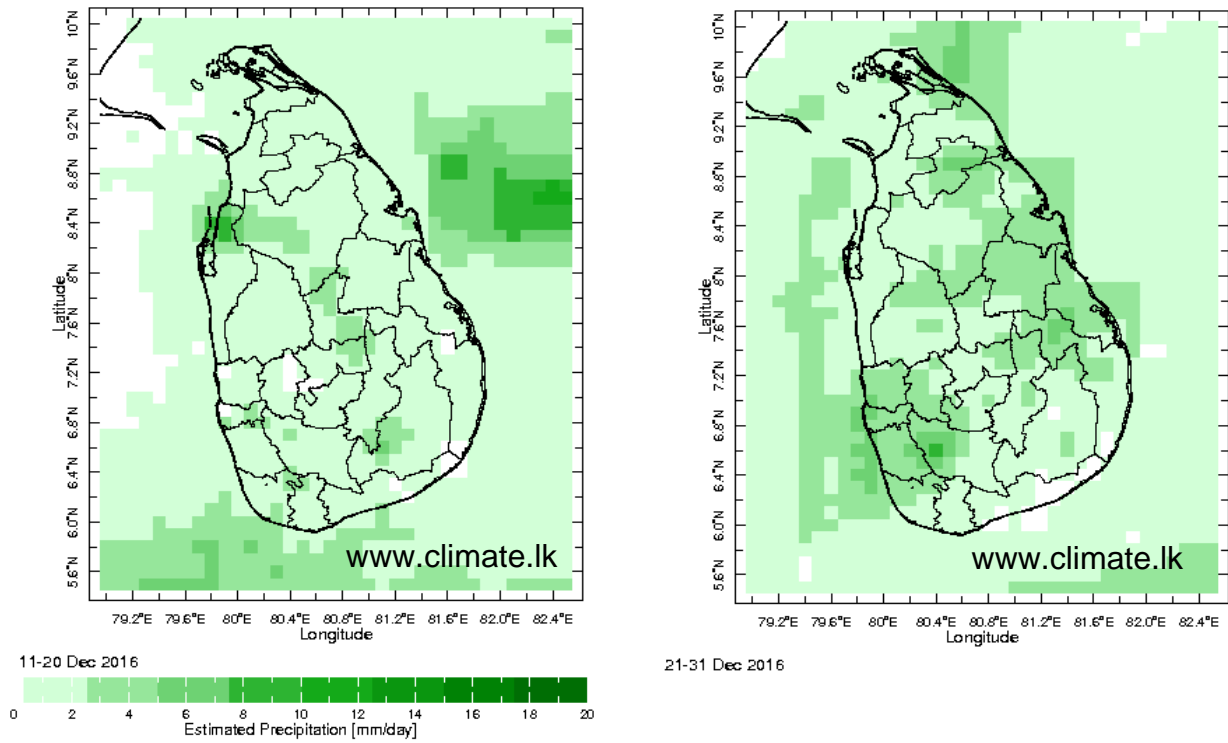
Weekly Average SST Anomalies

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

28 Dec 2016

WORLDBATH topography

NCEP GFS 1- 14 Day prediction

NCEP GFS Ensemble Forecast 1−7 Day Precipitation (mm)
from: 04Jan2017
04Jan2017−10Jan2017 Accumulation

Bias correction based on last 30−day forecast error

NCEP GFS Ensemble Forecast 8−14 Day Precipitation (mm)
from: 04Jan2017
11Jan2017−17Jan2017 Accumulation

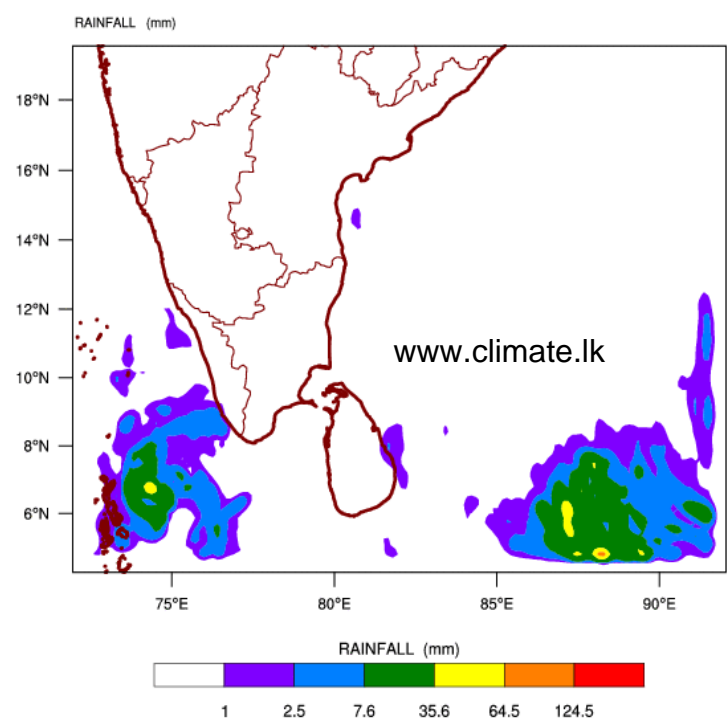Bias correction based on last 30−day forecast error
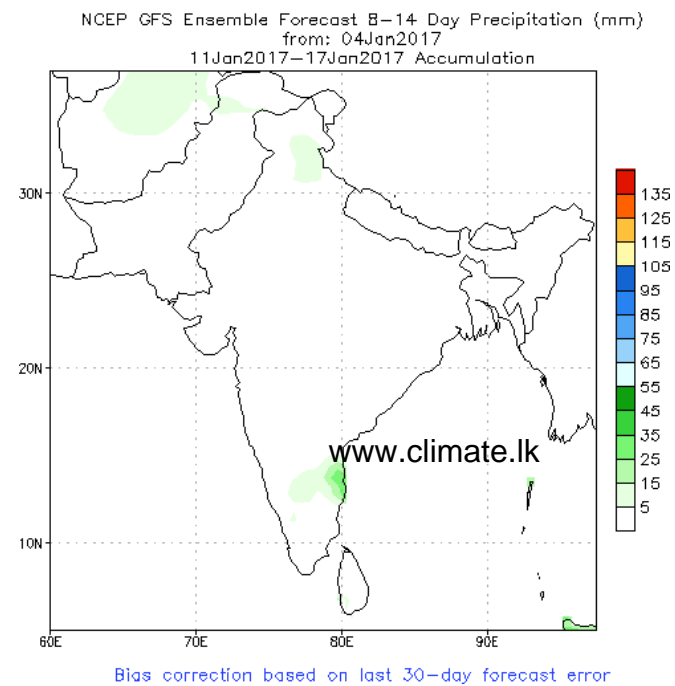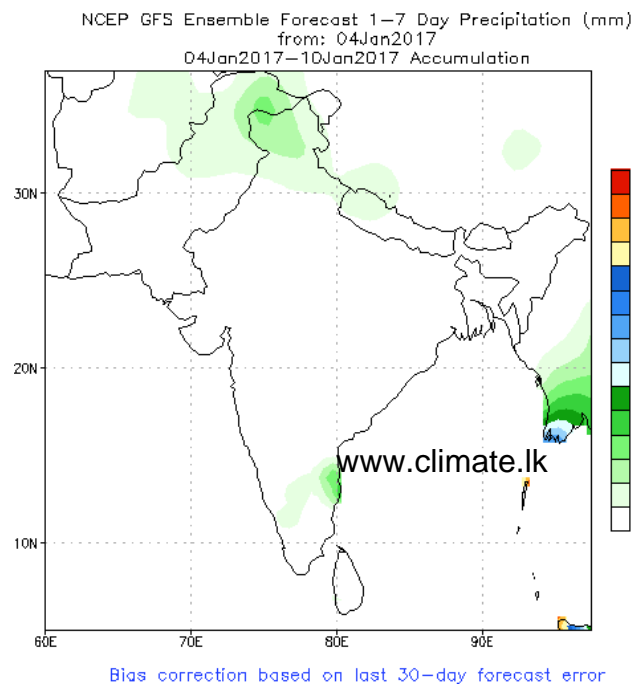
WRF Model Forecast (from IMD Chennai)

WRF MODEL FORECAST (48 HR.) RAINFALL(mm)\
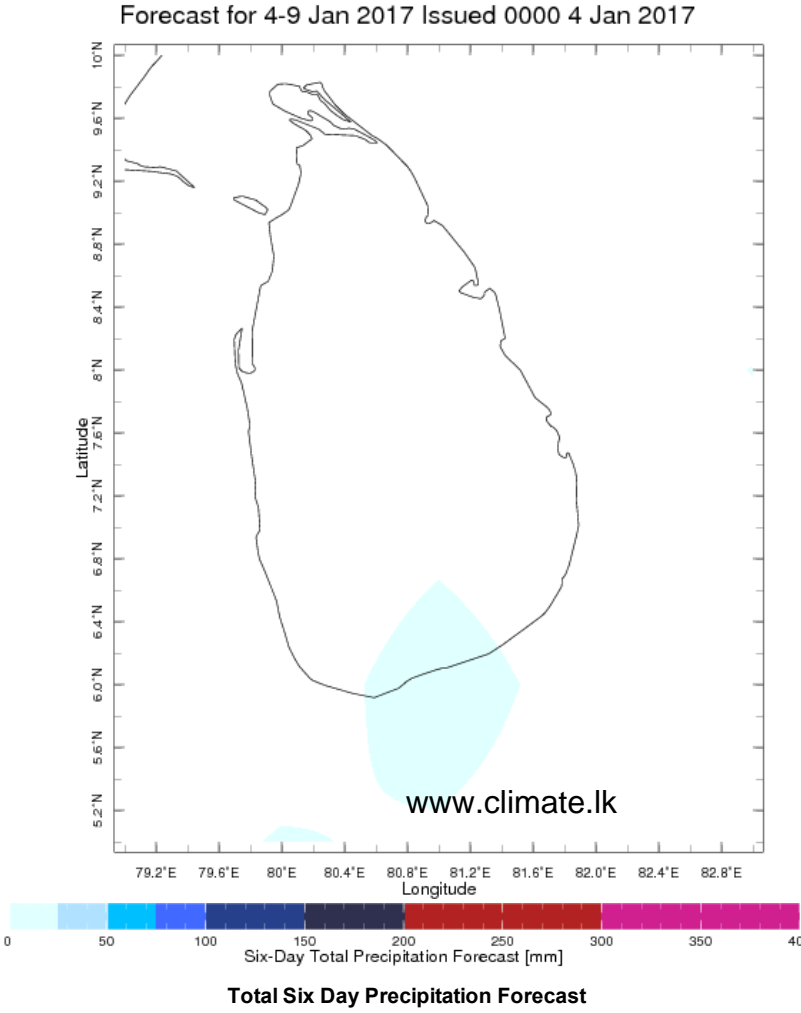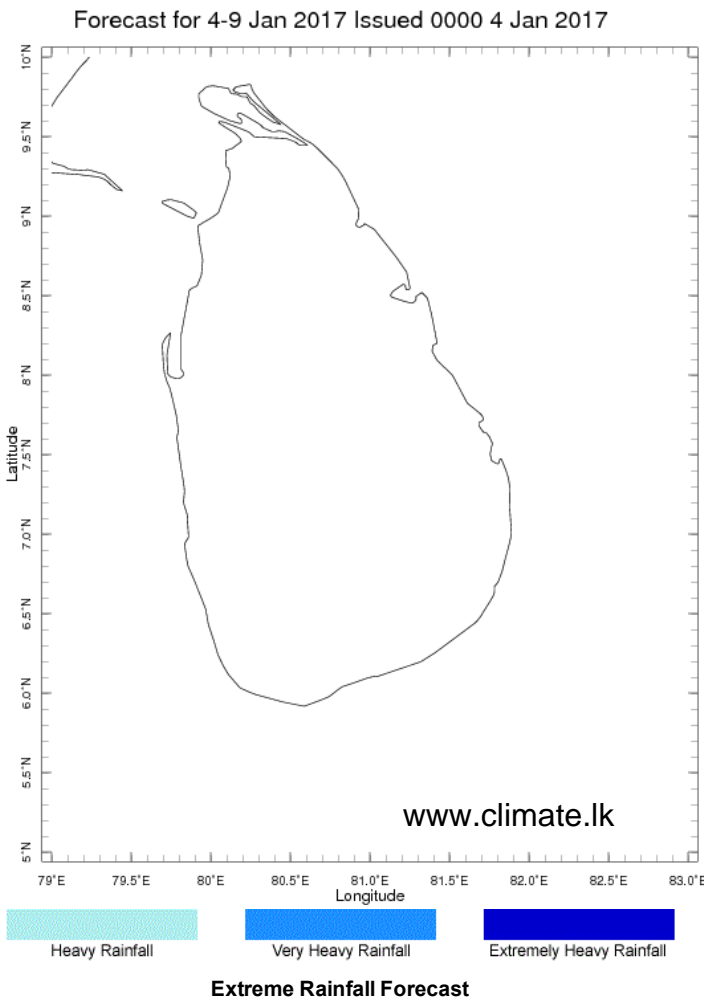based on 00 UTC of 04-01-2017 valid for 03 UTC of 06-01-2017
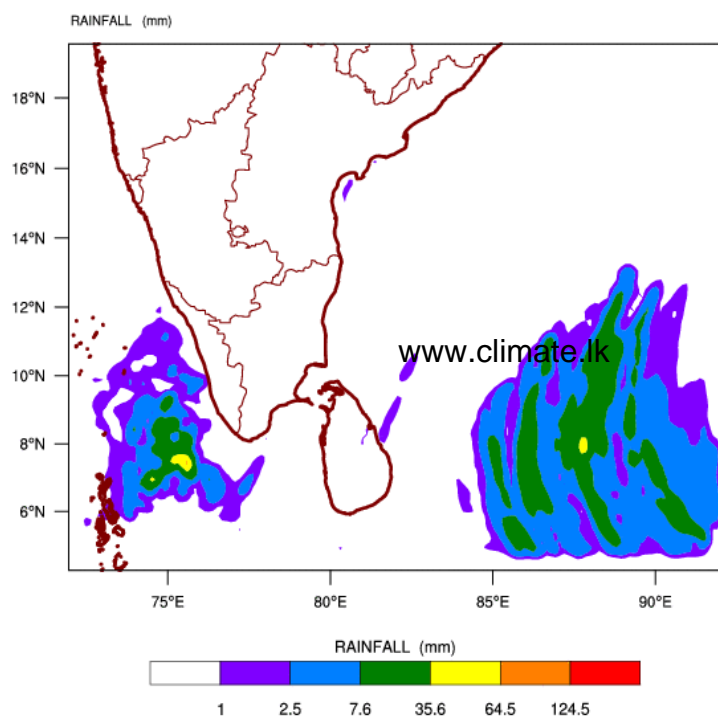
WRF MODEL FORECAST (72 HR.) RAINFALL(mm)\
based on 00 UTC of 04-01-2017 valid for 03 UTC of 07-01-2017

RAINFALL (mm)

1   2.5   7.6   35.6   64.5   124.5

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 4-9 Jan 2017 Issued 0000 4 Jan 2017

www.climate.lk

Heavy Rainfall   Very Heavy Rainfall   Extremely Heavy Rainfall

Extreme Rainfall Forecast

Forecast for 4-9 Jan 2017 Issued 0000 4 Jan 2017

www.climate.lk

0   50   100   150   200   250   300   350   400
Six-Day Total Precipitation Forecast [mm]

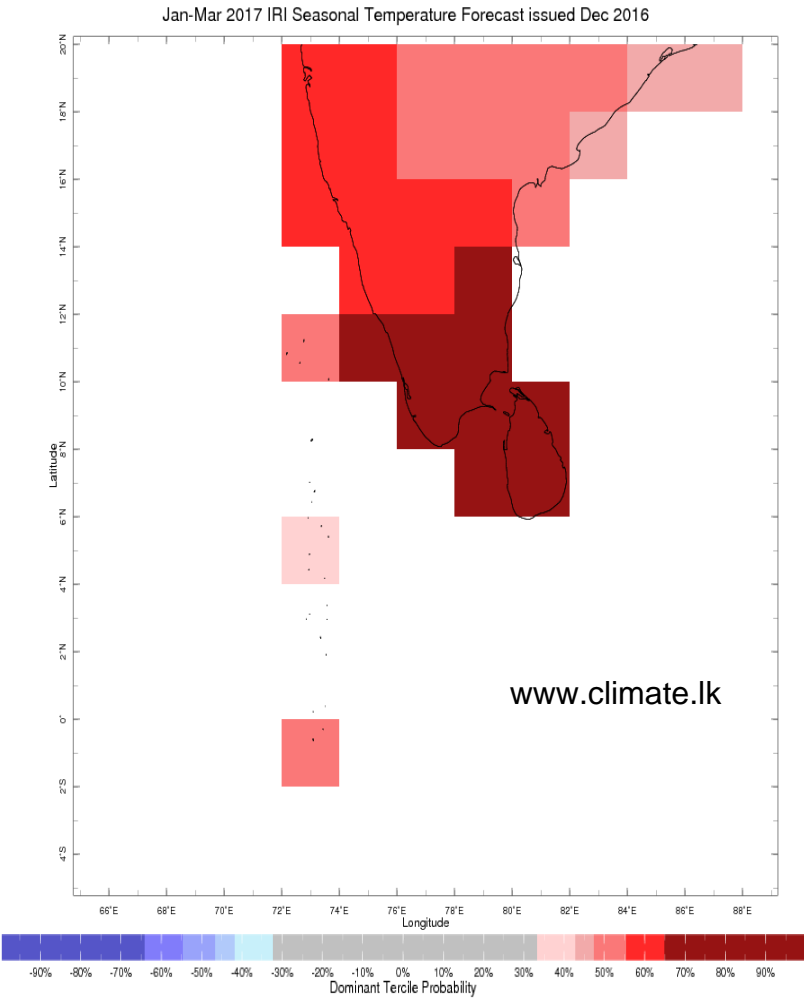**Total Six Day Precipitation Forecast**

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%).
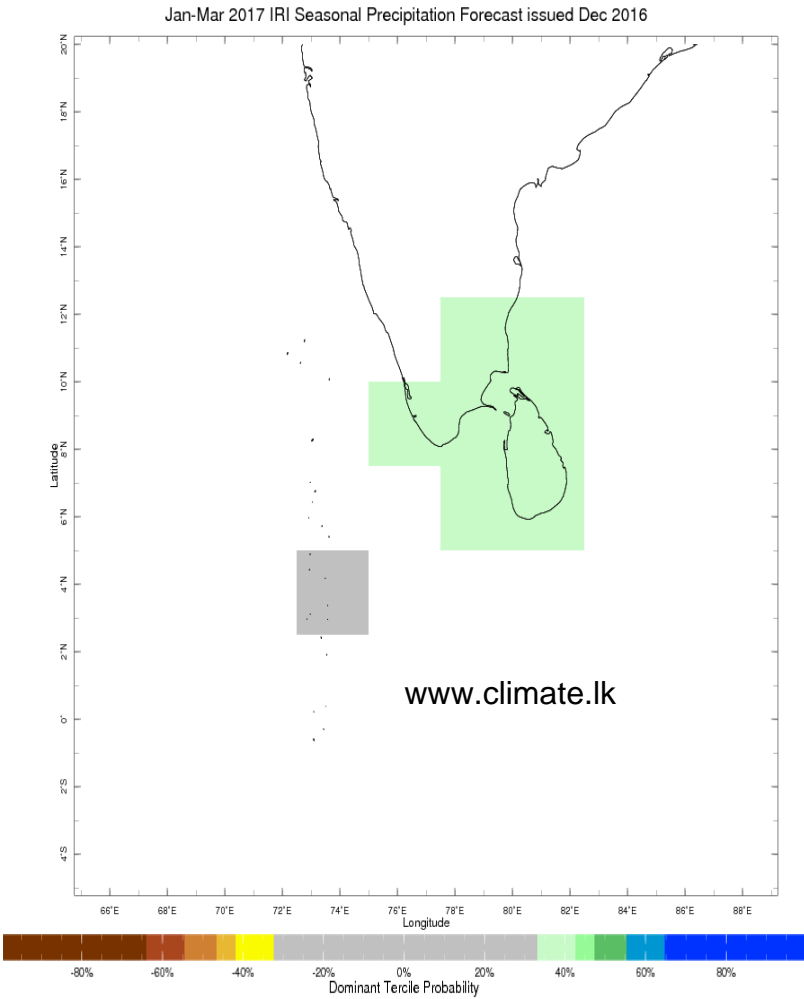
Precipitation Forecast

Temperature Forecast