



MAPROOM



Seasonal Climate Tool (rainfall seasonality) Training

**Training Module
Malawi
June 27, 2017
Version 1.0**



International Research Institute
for Climate and Society
EARTH INSTITUTE | COLUMBIA UNIVERSITY



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Acknowledgements

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SEASONAL CLIMATE TOOL (RAINFALL AND TEMPERATURE SEASONALITY) TRAINING - MALAWI

1.1 The Seasonal Climate of Southern Africa

The Climate of Southern Africa:

The climate of the SADC region ranges from arid to sub-humid. Droughts are common in the arid and semi-arid regions, and heavy rainfalls following periods of drought can cause severe flooding. Three primary wind systems affect the region:

- The Sub-Tropical Eastern Continental Moist Maritime System, which experiences regular cyclones;
- The Southeasterly Wind System, which brings rainfall from the Indian Ocean; and
- The Inter-tropical Convergence Zone, which contributes to the wet and dry seasons of tropical regions.

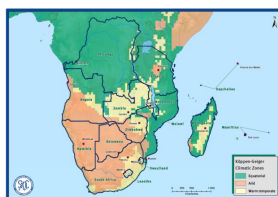


Fig. 1.1: Climate of Southern Africa

1.2 Why rainfall seasonality is important for health and well being?

Seasonality affects every aspect of life in both rural and urban areas - from food security, infectious disease, access to health facilities, disposable income, births, deaths, marriages etc.

According to Robert Chambers “seasonal hunger is the father of famine” and “any development professional serious about poverty has . . . to be serious about seasonality.”

Seasonal hunger may be the primary indicator of population vulnerability to climate change.

1.3 Overview

Why was it developed?:

- The Seasonal Climate tool was developed to enable rapid assessment of the average climatology of a region

What the Seasonal Climate tool can be used for:

- Visualizing the seasonal pattern of rainfall and temperature at point, district, and/or regional scale
- Visualizing the impact of spatial scale in analysis of seasonal climate
- Visualizing the timing of the onset and offset of the rainy season
- Visualizing the level of variability in the seasonal climate
- Providing information in support of seasonal agriculture, livelihoods and disease planning calendars

What can current Seasonal Climate Tool not be used for:

- Predicting epidemics

1.4 Definition

Seasonal climatologies were created from global products' rainfall time series (1983-2014) and temperature time series (1981-2014) were reconstructed from station observations, remote sensing and other proxies. This interface allows users to view rainfall, maximum and minimum temperature climatologies by month for a point, district, and/or region with associated confidence intervals.

1.5 Interpretation

The graphs provides information on the seasonality of rainfall, minimum temperature maximum temperature and year-to-year variability.

1.6 Access

The Seasonal Climate tool can be accessed from the Climate Analysis Maproom (See Figure 1.2 on the next page). http://datalib.metmalawi.com:8091/maproom/Climatology/Climate_Analysis/monthly.html

1.7 Case Study 1 - Ethiopia

The Ethiopian climate is extremely variable and complex. Here the annual rainfall characteristics are classified into three distinct rainy seasons. These are: (1) the dry season (Oct–Jan: ONDJ), (2) the shorter, secondary rainy season (Feb–May FMAM), and (3) the longer, primary rainy season (Jun–Sep: JJAS). The first two seasons correspond with the main East African seasons (OND and MAM) whereas the third season corresponds with the Sahelian rainy season (JAS). The seasons are locally defined as Bega, Belg and Kiremt, respectively. (Figure 1.3)

Precise delineation of distinct regions and rainy seasons are difficult, as different countries' climate vary significantly within a short distance owing to the most complex topography on the African continent. Because of this complexity, climatologies at the local (woreda) level may differ from those observed at larger spatial scales (e.g. zone or Province).

High resolution ENACTS data can be used to ascertain the climate at multiple spatial scales.

http://www.ethiometmaprooms.gov.et:8082/maproom/Climatology/Climate_Analysis/monthly.html?T=Feb&YearStart=1983&YearEnd=2014&seasonStart=Jan&seasonEnd=Mar&var=rfe_merged

By choosing the rainfall variable and the a grid point (woreda, zone or region), a new graph can be generated.

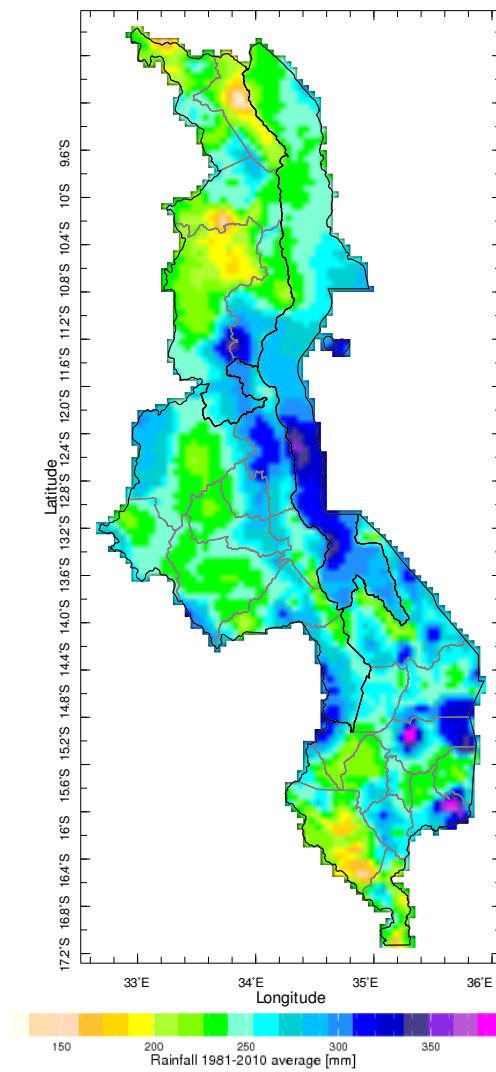


Fig. 1.2: Historical Monthly Rainfall Climate Analysis of Malawi

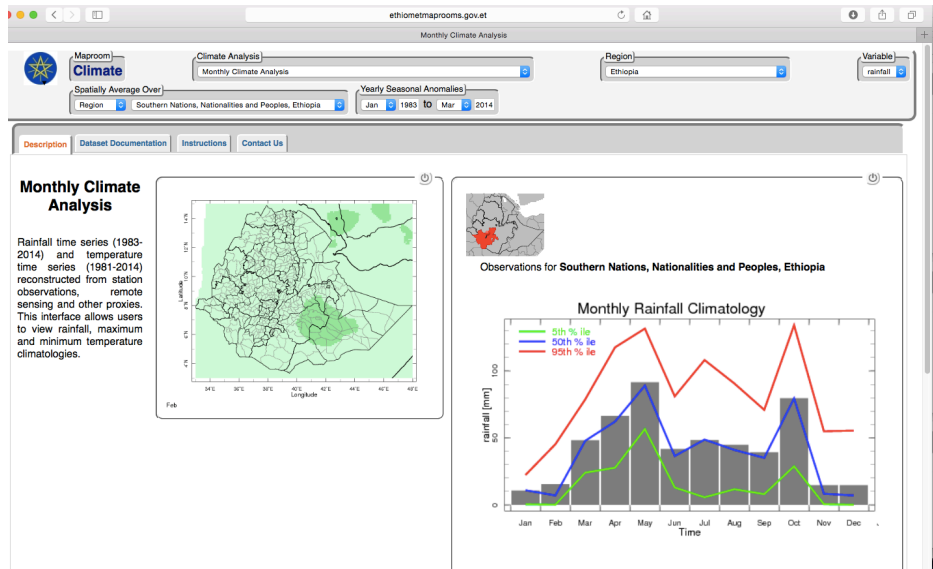


Fig. 1.3: Southern Nations Region Monthly Rainfall Climate Analysis in Ethiopia

The impact of spatial scale in determining the characteristics of the climatology can be readily observed by comparing results from zones (as seen below). In Ethiopia climatologies aggregated at large spatial scales may include areas with different climate characteristics. (Figure 1.4)

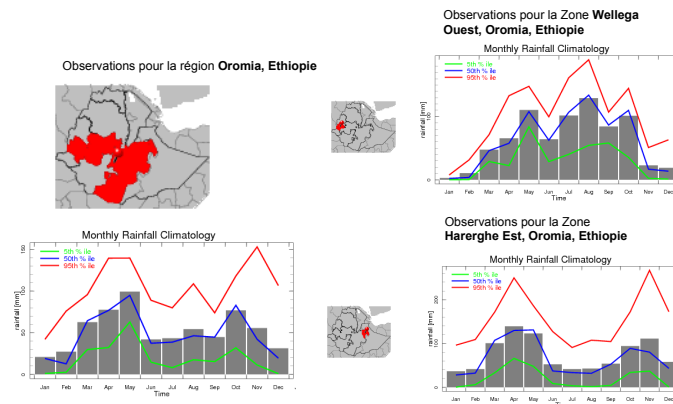


Fig. 1.4: Monthly Rainfall Climate Analysis or the Oromia Region (left) in Ethiopia and two Zones within the Oromia Region (right)

1.7.1 Example: Seasonal Health Related Events

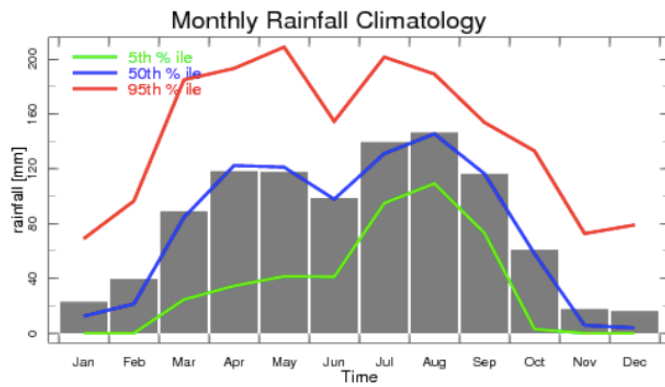
See Figure 1.5.

1.7.2 Conclusion

Choosing the right spatial scale for analysis is important in ensuring that the climatologies correctly represent the area of interest.



Observations for Alaba, Alaba SW, SNNPR, Ethiopia



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Main Harvest Season											X	X
Hungry season					X	X	X					
Floods						X	X	X				
Peak AWD							X	X				
Worms	X	X	X	X	X	X	X				X	X

Fig. 1.5: Seasonal Health Related Events in Alaba - Ethiopia

1.7.3 Summary

In Ethiopia, the seasonality of rainfall is important to many livelihood decisions and varies across the country. In these areas, analysis of the seasonality of climate and specific health outcomes, such as acute watery diarrhoea (AWD), must be undertaken at appropriate scales to account for local complexity.

1.7.4 Exercise 1 – Ethiopia

1. Looking at the seasonal rainfall averaged for all of Oromia, we can see that there are two clear peaks. Are these peaks clearly seen in the Oromia zone of West Wellegra? Explain your answer.
2. Using the graphs generated for West Wellegra – how long is the dry season?
3. In Alaba the hungry season is during the rains – why is this?

1.7.5 Exercise 1 – Ethiopia Answers

1. No – this is due to spatial averaging
2. 4 months
3. This is before the main harvest season when food stocks are low

1.7.6 Exercise 2 – Malawi

Malawi is located south of the equator, mostly hilly and mountainous, and has a tropical climate or sub-tropical at high altitudes. Malawi has a hot and rainy season from mid-November to April, and a relatively cool, dry winter season from mid-May to mid-August. Before the rainy season, from September to November, the temperature rises to the point of reaching the highest levels of the year. Temperatures vary with altitude: above a thousand metres (3,300 feet). However, in the far south there is a flat region, hot and humid due to the low altitude. In most of the country, annual precipitation is between 800 and 1,300 millimetres (31 and 51 inches), and is more abundant in the north, especially in March and April are very rainy, but also in the southern slopes of Mount Mulanje, where it even exceeds 2,000 mm (79 in) per year.

Follow the instructions:

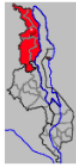
1. Generate and download Seasonal rainfall climate analysis graph for the Northern Region of Malawi (Figure 1.6)
2. Generate and download Seasonal rainfall climate analysis graph for Karonga district (Figure 1.7)
3. Complete table of seasonal health related events for Area Under National Administration district (Figure 1.8)

1.8 Quiz

Please answer the following questions:

- Q1. Seasonal climatologies are created from data aggregated in space and time (T/F)
- Q2. Seasonal health calendars can help with the timing of interventions (T/F)
- Q3. Name a district in Malawi with a bimodal season?
- Q4. Why does East Africa have the most complex climate in Africa?
- Q5. Who can access the ENACTS climate Maproom at the Meteo Malawi?**

1. MoH staff only



Observations for Northern Region, Malawi

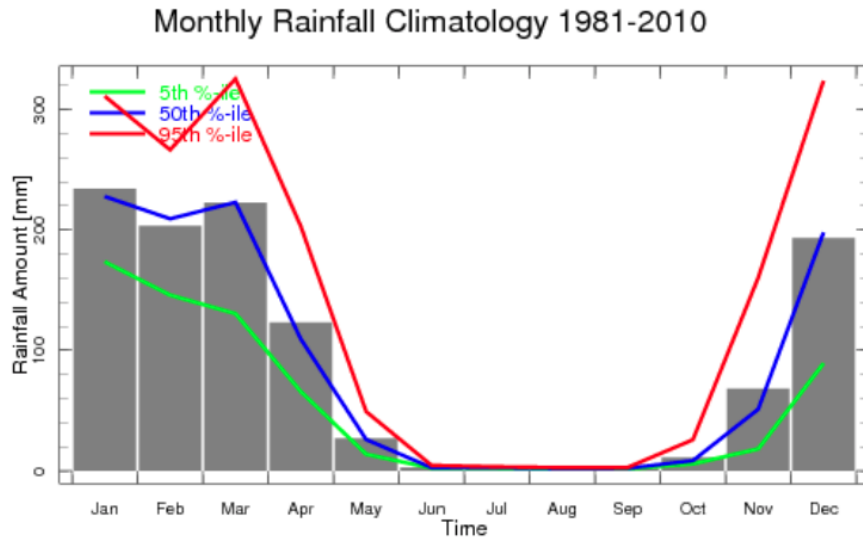


Fig. 1.6: Rainfall Climate analysis graph for the Northern region of Malawi



Observations for Karonga, Northern Region, Malawi

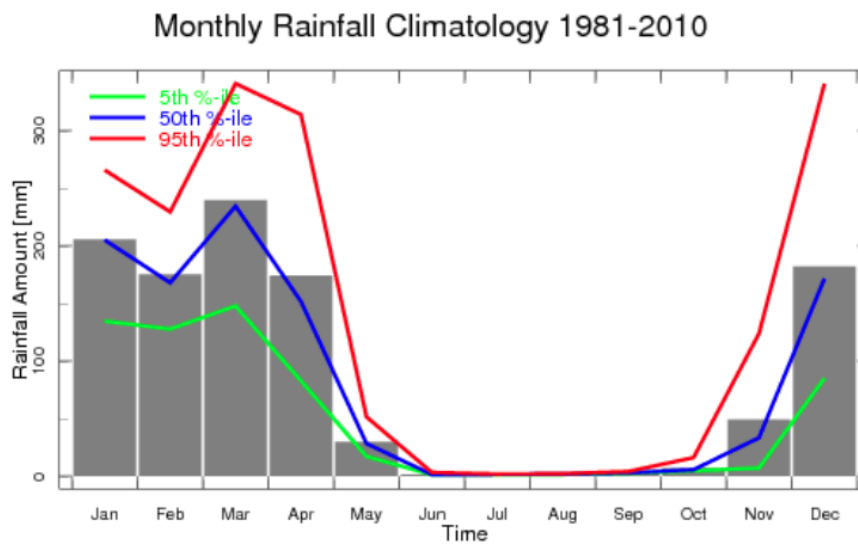
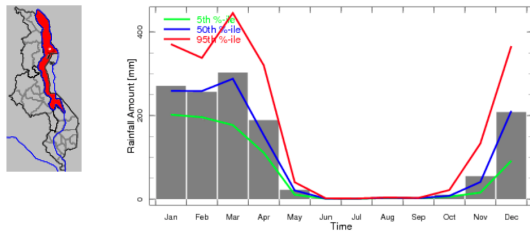


Fig. 1.7: Seasonal Rainfall Climate Analysis for Karonga District

Observations for Area under National Administration, Area under National Administration, Malawi



- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

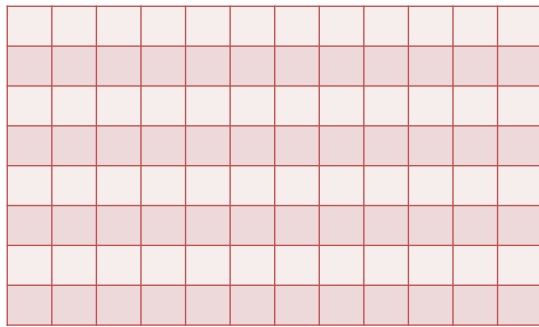


Fig. 1.8: Seasonal Health Related Events for Area Under National Administration district

2. everyone
3. climate specialists

1.8.1 Quiz - Responses

A1. T A2. T A3. Open ended and using the Seasonality Tool A4. Large-scale tropical climate drivers, inclusive of the Inter-Tropical Convergence Zone (ITCZ), are superimposed on region’s complex topography, large lakes, and the extensive coastline. A5. All the above

1.9 Summary

Many health outcomes are affected by seasonality. Seasonal calendars based on climate data can help characterize the timing of health events and improve the timing of interventions. Using data at the appropriate spatial scale is important.

1.10 References

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- Thomson, M. C., F. Zdravec, B. Lyon, G. Mantilla, D. Willis, P. Ceccato and T. Dinku (2012). “President’s Malaria Initiative-USAID Report: Development of Climate Analysis Section for the President’s Malaria Initiative Impact Evaluation: Reports for Ethiopia and Madagascar”. IRI. 62pp. Palisades, New York.

- Climate in Malawi: temperature, precipitation, when to go, what to pack

Climatestotravel.com, <http://www.climatestotravel.com/climate/malawi> * Meteorology & Climate, sadc.int, <http://www.sadc.int/themes/meteorology-climate/>