FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA

MINISTRY OF WATER AND ENERGY

Ethiopian Meteorological Institute

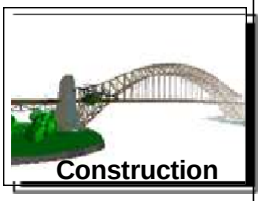
DATA AND CLIMATOLOGY LEAD EXECUTIVE

ANNUAL CLIMATE BULLETIN
For the year 2024

Some Applications of Climate Information

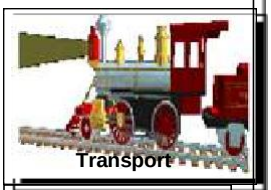
Disaster Management

Water Resources Management



Construction

Environment & Health



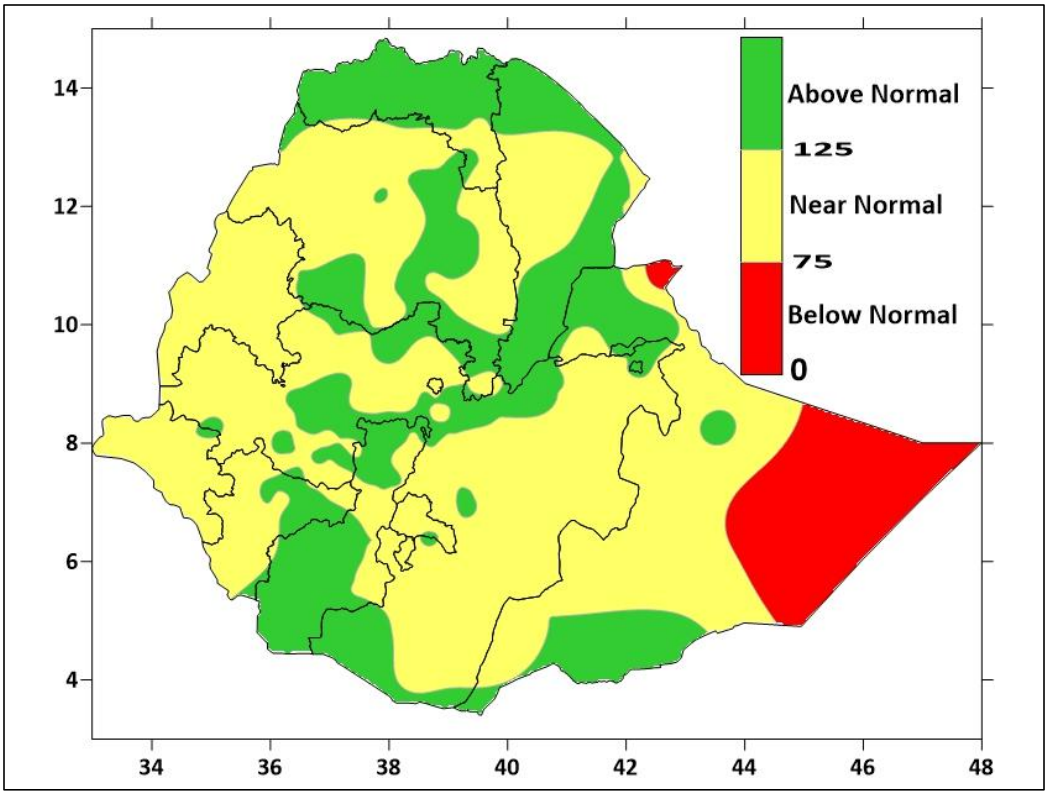
Transport

Recreation & Tourism

HIGHLIGHTS

Apart from some small area in Somali, the rainfall activity was normal to above normal over the other areas for the year 2024. Much of Central and South Ethiopia, small portion of Southwest Ethiopia, some central parts of Oromia, pocket area of Amhara, much of Afar and Tigray, and adjoining parts of Somali had recorded above normal rainfall. Benishangul Gumuz, Gambela, most of Oromia, most portion of Amhara and much portion of Somali experienced near normal rainfall.

The Belg and Kiremt seasons of the year 2024 were the seasons with higher values of extreme maximum temperature. Days remained hot at some low land places and the extreme maximum temperature values had exceeded 42^{o}C. In particular, Abobo, Awah Arba, Aleiya, Elidar, Fugnido, Gambella, Gewane, Gode, Metema and Semera reported extreme maximum temperature in excess of 42^{o}C. On the other hand, nights and early mornings were cold over the highlands of Ethiopia mostly during the dry season (Bega) and in Belg and Kiremt at some places. In connection with this, minimum temperature values below 2^{o}C were recorded over Debrezeit, Jimma, Alemaya, Bui, Debrehana, Jijiga, Mehalmeda, Shola Gebeya and Wegeltena.



Percent of Normal Rainfall of the year 2024

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Foreword

This climate bulletin is prepared and disseminated by Ethiopian Meteorological Institute (EMI). It is aimed at providing climatological information to different services of the community involved in various socio-economic activities and giving some highlights about major synoptic situations.

The information contained in the bulletin is believed to assist planners, decision-makers and the community at large by providing details of the climatic conditions of the nation in a given period.

This bulletin differs from the other real time and near real time bulletins issued by the Institute, which for their input depend only on meteorological stations equipped with single side band radio for data transmission. Though this bulletin is not real time, published with a delay of at least two months, the information contained in this bulletin is based on data coming from a much larger number of meteorological stations. Moreover, the information contained in this bulletin is not sector-specific and a wide range of users can benefit from it.

The Institute disseminates monthly, seasonal and annual climatological bulletins in which all- necessary climatological information and significant climatic anomalies are highlighted.

We have a strong belief that various socio-economic activities related to planning disaster mitigation, water resources management, construction, environmental protection, transportation, recreation, tourism and others will be benefited most by the careful and continuous use of this bulletin. Meanwhile, your comments and constructive suggestions are highly appreciated to make the objectives of this bulletin a success.

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1. Introduction

1.1 General

In this bulletin, the annual climate summary of the country for the year 2024 is presented. For convenience the climate summary of the year is done on seasonal basis.

From meteorological point of view, there are three seasons in Ethiopia; ***Belg, Kiremt*** and ***Bega***.

Belg is a short rainy period from **February to May** over much of the Belg-growing areas, whereas over the southwestern parts of the country it denotes the start of the long rainy season. Over the western parts of the country as well the rainy season starts during March/April. However over the northwestern parts of the country, this season is predominantly dry except for the month of May. Southern and southeastern parts of the country are expected to get their long rainy season during this time starting in March and peaking in April. The climate of the season is mostly hot and moist.

Kiremt is the period from **June to September.** It is the main rainy season in which the major food crops of the country are produced. The magnitude of rainfall is higher as compared to the other seasons for many parts of the country. Normally, the southern and the southeastern lowlands of the country receive little or no rain during this season, except for little amount of rainfall that occurs towards the end of the season.

Bega is the period from **October to January**. It is a harvesting season for various parts of Ethiopia. *Bega* is normally a dry season characterized by cool nights and early mornings over the highlands of northern, northeastern, central and eastern Ethiopia and by hot days over various parts of the country. It is also a short rainy season for places over southern, southeastern and southwestern parts of the country. Depending on the influences from mid-latitude rain-bearing systems, some places over central, northern and northeastern Ethiopia also receive occasional showers.

1.2 Summary

Apart from some small area in Somali, the rainfall activity was normal to above normal over the other areas for the year 2024. Much of Central and South Ethiopia, small portion of Southwest Ethiopia, some central parts of Oromia, pocket area of Amhara, much of Afar and Tigray, and adjoining parts of Somali had recorded above normal rainfall. Benishangul Gumuz, Gambela, most of Oromia, most portion of Amhara and much portion of Somali experienced near normal rainfall.

The Belg and Kiremt seasons of the year 2024 were the season with higher values of extreme maximum temperature. Days remained hot at some low land places and the extreme maximum temperature values had exceeded 42^{o}C. In particular, Abobo, Awah Arba, Aleiya, Elidar, Fugnido, Gambella, Gewane, Gode, Metema and Semera reported extreme maximum temperature in excess of 42^{o}C. On the other hand, nights and early mornings were cold over the highlands of Ethiopia mostly during the dry season (Bega) and in Belg and Kiremt at some places. In connection with this, minimum temperature values below 2^{o}C were recorded over Debrezeit, Jimma, Alemaya, Bui, Debrehana, Jijiga, Mehalmeda, Shola Gebeya and Wegeltena (Table 3.1.1 and Table 3.1.2).

2. Synoptic Situation

2.1 Surface

- The mean central pressure value of the Mascarene High remained 1025 hPa and it was centered between 27°S to 34°S latitudes and 45°E to 105°E longitudes.
- The mean central pressure value of the Azores High was ranging from 1020 hPa to 1025 hPa and it was centered between 25° to 40°N and 15°W to 45°W.
- The mean central pressure value of the St. Helena High was ranging from about 1020 hPa to 1025 hPa and it was centered between 25°S to 38°S and 12°E to 30°W

2.2 Lower Troposphere (850 hPa Vector Wind)

In the year 2024, the wind at 850 hPa shifts its direction from southwesterly in January to northeasterly & southeasterly during *Kiremt* and finally to northwesterly in December. In terms of speed the lowest observed speed is less than 4 m/s and the highest is 14 m/s. The lowest occurred in June, July, October and November and the highest in January and December.

2.3 Middle Troposphere (500 hPa Geopotential Height)

The geopotential heights were above normal to near normal over Mediterranean and Red Sea during January to December. Below-average heights over southern latitudes and above-average heights over the middle latitudes recorded. Anomalous above-average heights observed over Greenland, extending across Russia and Canada, and below-average heights over the North Atlantic Ocean.

2.4 Upper Troposphere (200 hPa wind vector)

The upper-level westerly flow associated with the tropical westerly jet weakened and strong equatorial easterly wind 10 - 12.5 m/s were dominate in most part of the east Africa. On the other hand, the southwesterly and westerly wind associated with the subtropical northwesterly jet, had dominated over the year, December and the *Belg* season; while the upper level easterly flow associated with the tropical easterly jet weakened. Westerly wind with a speed of 15m/s -30m/s observed along the 15^{o}N parallel in Belg season.

2.5 ENSO conditions

Weak El Niño prevailed and the oceanic and sub-surface oceanic conditions across the central and eastern equatorial Pacific were above-average in January, February and March. Near average sea surface temperature began to appear in April and continued for the rest of the month. In April, May,

June, July, August, September, October, November and December the SST anomalies over Niño 3.4 region were 0.8, 0.3, 0.2, 0.2, -0.1, -0.2, -0.3, -0.1, -0.6, -0.7 and -0.4^{o}C respectively.

Reference: January to December 2023 Climate Diagnostics Bulletins. (https://www.cpc.ncep.noaa.gov/products/CDB/CDB_Archive_pdf/pdf_CDB_archive.shtml)

3. Weather

3.1 Temperature

The *Belg* and *Kiremt* seasons of the year 2024 were the season with higher values of extreme maximum temperature. Days remained hot at some low land places and the extreme maximum temperature values had exceeded 42^{o}C. In particular, Abobo, Awah Arba, Aleiya, Elidar, Fugnido, Gambella, Gewane, Gode, Metema and Semera reported extreme maximum temperature in excess of 42^{o}C.

On the other hand, nights and early mornings were cold over the highlands of Ethiopia mostly during the dry season (*Bega*) and in *Belg* and *Kiremt* at some places. In connection with this, minimum temperature values below 2^{o}C were recorded over Debrezeit, Jimma, Alemaya, Bui, Debrehana, Jijiga, Mehalmeda, Shola Gebeya and Wegeltena (Table 3.1.1 and Table 3.1.2).

Table 3.1.1 Annual Extreme Maximum Temperature Values in excess of 42^{o}C in the year 2024

Station Name	Maximum Temperature	Month	Date
Gode	43.8	Apr	17
ABOBO	43.6	Apr	11
Aleiya	42.6	Mar	19
AWASHARBA	43	Jun	07
ELIDAR	45.8	Jun	10
FUGNUIDO	44	Mar	12
GAMBELLA	43.8	Mar	21
Gewane	44	Jun	06
METEMA	43.2	Mar	14
Semera	45.2	Jun	17

Table 3.1.2 Annual Extreme Minimum Temperature Values less than 2^{o}C during the year 2024

Stations	Extreme minimum temperature	Month	Date
DEBREZEIT	1	Dec	19
JIMMA	1.4	Dec	31
ALEMAYA	0.2	Dec	21
Bui	1	Dec	30
DBREHAN	-2.8	Dec	31
JIJIGA	0	Dec	19
MEHALMEDA	-2	Dec	31
SHOLAGEBAYA	1	Dec	11
WEGELTENA	-0.4	Dec	31

3.2. Rainfall

Apart from some small area in Somali, the rainfall activity was normal to above normal over the other areas for the year 2024. Much of Central and South Ethiopia, small portion of Southwest Ethiopia, some central parts of Oromia, pocket area of Amhara, much of Afar and Tigray, and adjoining parts of Somali had recorded above normal rainfall. Benishangul Gumuz, Gambela, most of Oromia, most portion of Amhara and much portion of Somali experienced near normal rainfall (Fig. 3.2.2).

The annual total rainfall amount of the year 2024 exceeded 1600 mm over northwestern, western; and was more than 2000 mm over western and southwestern parts of the country. In association with this, the annual total rainfall amount reported over Gatira was as high as 3088.7mm.

On the other hand, the annual total rainfall amount was below 500 mm over most of Somali and the northeastern portions of Afar. Refer to Figure 3.2.1 and Table 3.2.2. The annual rainfall amount of 2024 is lower than the one for 2023 over parts of Gambela, Somali. South and east Oromia and pocket area of Amhara and Afar (Fig. 3.2.3).

Table 3.2.1 Heavy fall in excess of 70 mm within 24 hours in the year 2024

Station Name	Rainfall in mm	Month	Date
Nefas mewucha	70	Apr	7
Dalifagi	70	Aug	20
MASHA	70.2	Oct	27
Gimbi	70.3	Jul	26
DUBTI	71	Mar	12
D/Tabor	71.9	Aug	1
Gelemso	72	May	25
Wereilu	72	May	28
Gore	72	Jun	16
D/BREHAN	72	Sep	15
LIMUGENET	72	Nov	4
GIDAAYANA	72	Dec	14
SHERKOLE	72.5	Jul	30
Limugenet	72.6	Oct	27
Jinka	72.8	Apr	16
GIDAAYANA	74	Sep	10
BORE	75	Apr	5
Ginir	75	Oct	12

Station Name	Rainfall in mm	Month	Date
DEBREZEITAF	73	4	9
MeteharaNMSA	75.8	11	22
Nekemte	76.1	6	8
Abomsa	96	3	25
AAObs	81.4	4	29
ADET	69.4	7	24
ALGIE	80	7	18
ARISEROBE	74.2	7	21
ATSEBI	74	8	22
Bati	78	9	17
Bedelle	70.7	3	18
Bui	78.8	10	30
BULLEN	84.6	8	24
BURE	77.5	11	2
CHEFA	75.6	8	5
CHIFRA	84.4	8	5
CHIRA	83	6	27
DALIFAGI	117.3	7	16
DANGLA	72	7	13
DEBARK	87.2	6	25
DEBRAWREK	86.6	9	1
DOLOMENA	80	10	1
Enewari	118.2	7	28
Fiche	80.8	8	19
FUGNUIDO	73.6	10	1
GAMBELLA	75.6	7	27
Gelemso	95	10	31
Gewane	96	8	13
GHION	72	7	20
GIDAAYANA	80.4	7	30
GINIR	75.6	10	1
GUNDOMESKEL	86	9	29
HAGEREMARIAM	86	8	25
HARER	80.3	8	20
Jinka	79.8	5	18
LALIBELA	86	7	21
LARE	78	7	6

Station Name	Rainfall in mm	Month	Date
LAIBER	76	5	27
LIMUGENET	87.7	6	27
MAICHEW	80	8	30
MAJETE	79.4	2	1
MAJJI	84.3	10	5
MANKUSH	84.6	10	9
MASHA	78	5	26
MEHALMEDA	74	10	22
METEMA	73.6	8	11
MOYALE	85.4	5	3
NURAERA	72.6	3	25
TEPI	84.8	8	8
WEGELTENA	96	8	9
WERABE	96	4	28
Ziway	74	7	5

Table 3.2.2 Annual total rainfall amount in excess of 1500 mm during the year 2024

Station Name	Annual rainfall amount in mm
BAHIRDAR	1724.2
GORE	1764.1
JIMMA	1950.6
NEKEMTE	2158.2
AYIRA	1673.7
AMAN	2577.7
AMBAMARIAM	1719.3
ARJO	2907.7
BEDELE	2071.1
BORE	1724.3
BURE	2024.5
CHAGNI	2086.4
CHIRA	2124.8
DANGLA	1710.2
DEBRBIRHAN	1561.2
DILLA	1711.5
GATIRA	3088.7
GELEMSO	1548.8
GIDA AYANA	2096.5
GIMBI	1918.1
HOSAINA	1632.3
IMDIBIR1	2240
JINKA	1687.5
KACHISE	1847.9
LIMUGENET	2197.9
MAJI	1859.8
MASHA	1759
SAWULA	1852.2
SHAMBU	1617.8
TEPI	1919.2
TERCHA	1767.1
WOLAITA	1623.8

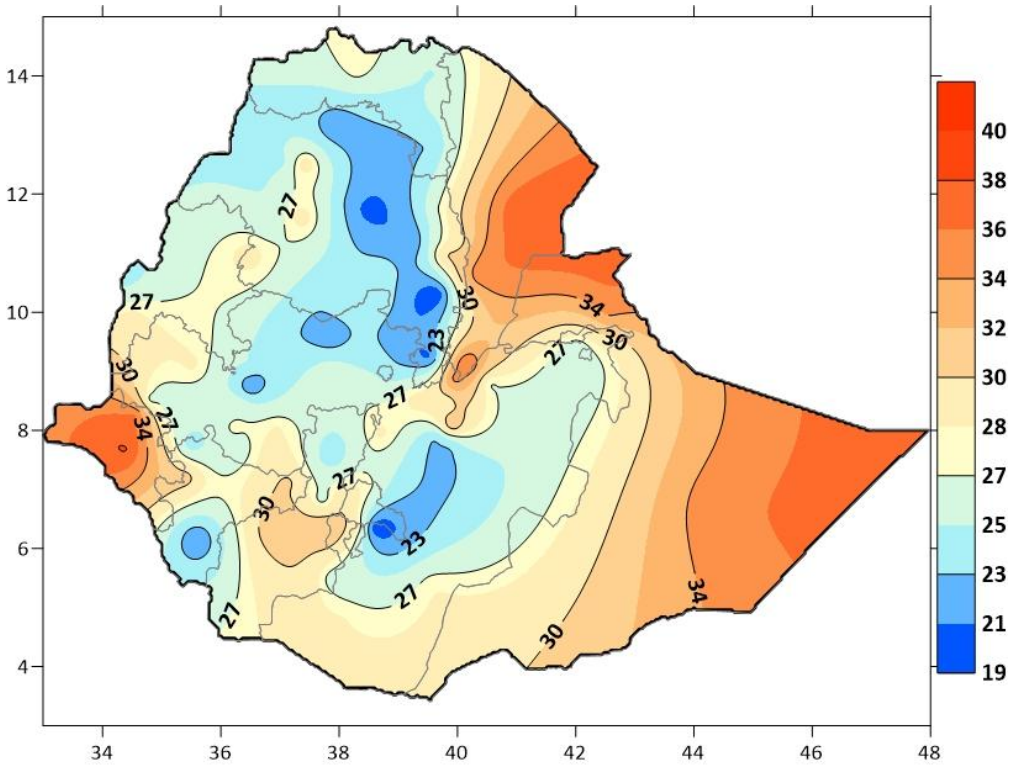


Figure 3.1.1 Mean Maximum temperature in ^{o}C for the year 2024

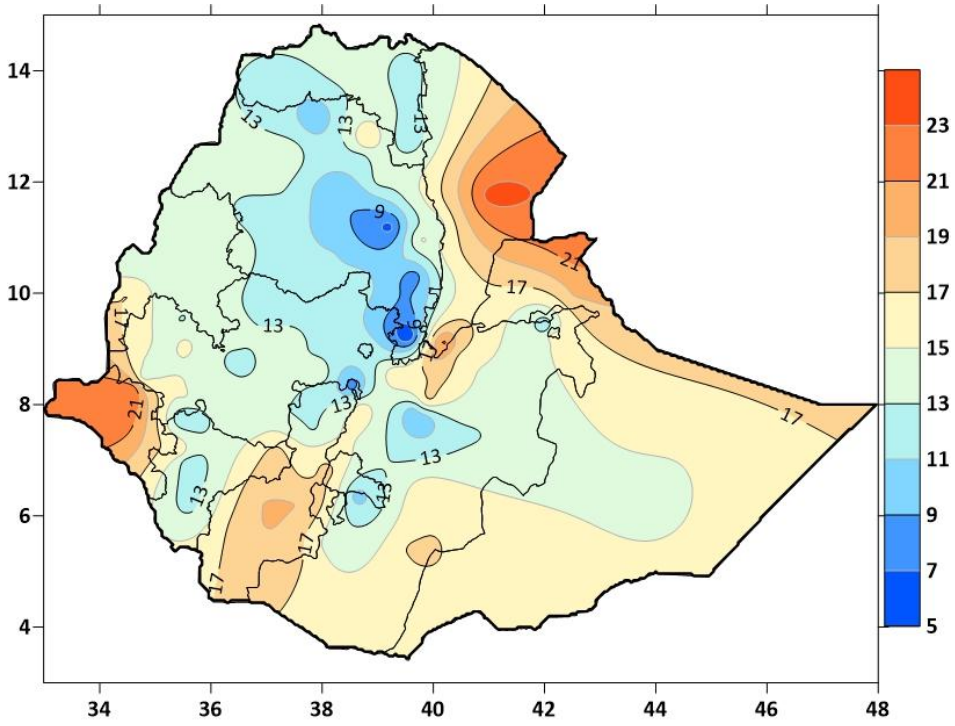


Figure 3.1.2 Mean minimum temperature in ^{o}C for the year 2024

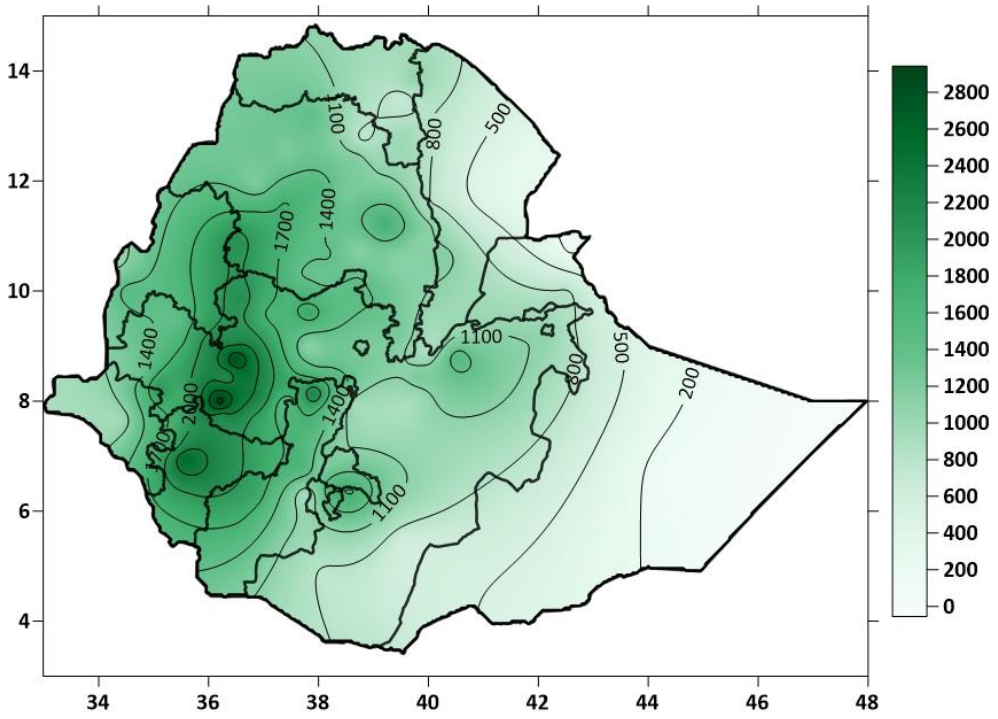


Figure 3.2.1 Annual total Rainfall amount in mm of the year 2024

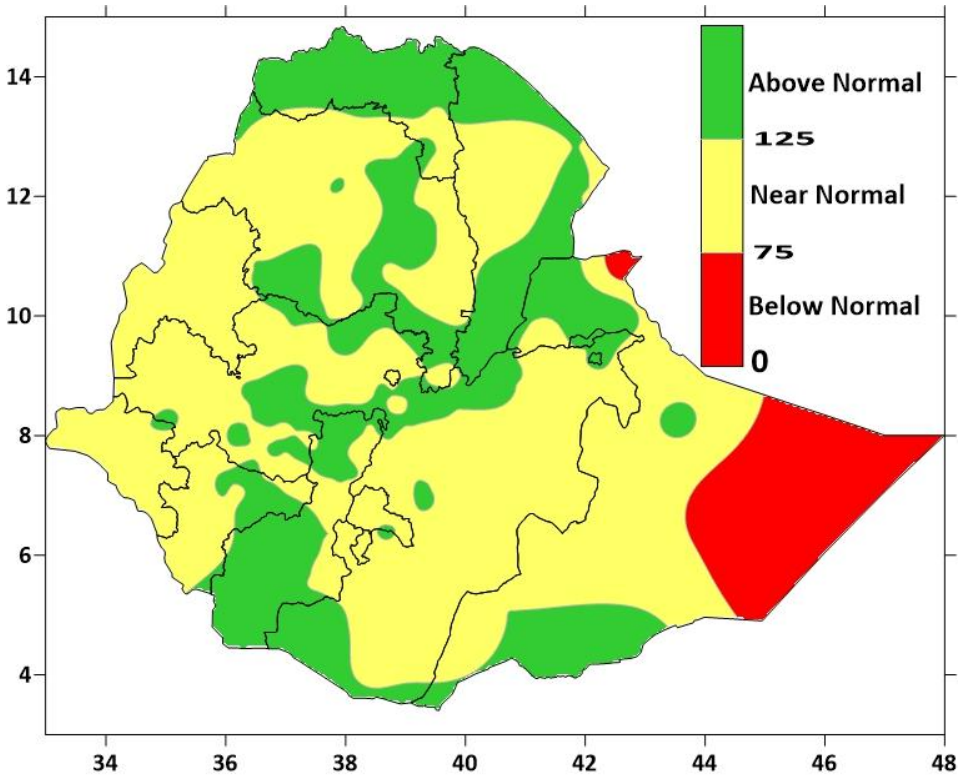


Figure3.2.2. Percent of normal rainfall for the year 2024

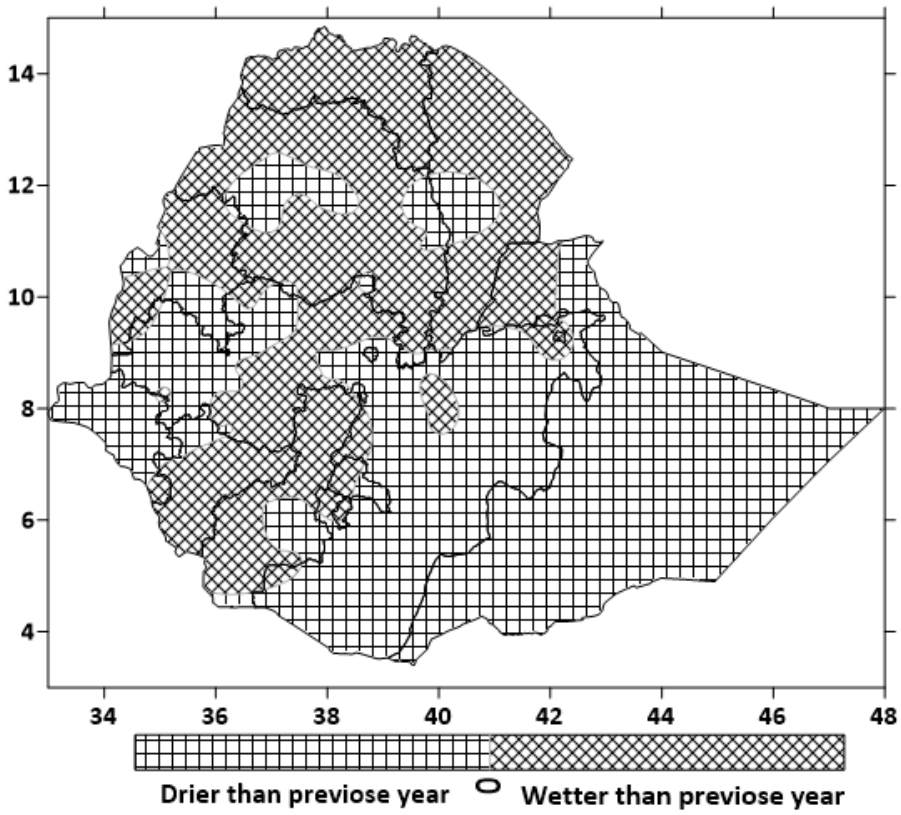


Figure 3.2.3 Annual Total Rainfall Amount of 2024 minus Annual Total Rainfall Amount of 2023

3.3 Wind

The ***WIND ROSE*** diagrams presented in table 3.3.1a to 3.3.1d show the wind conditions that prevailed during the three seasons for Awassa, Bahir Dar, Mekele and Addis Ababa Bole.

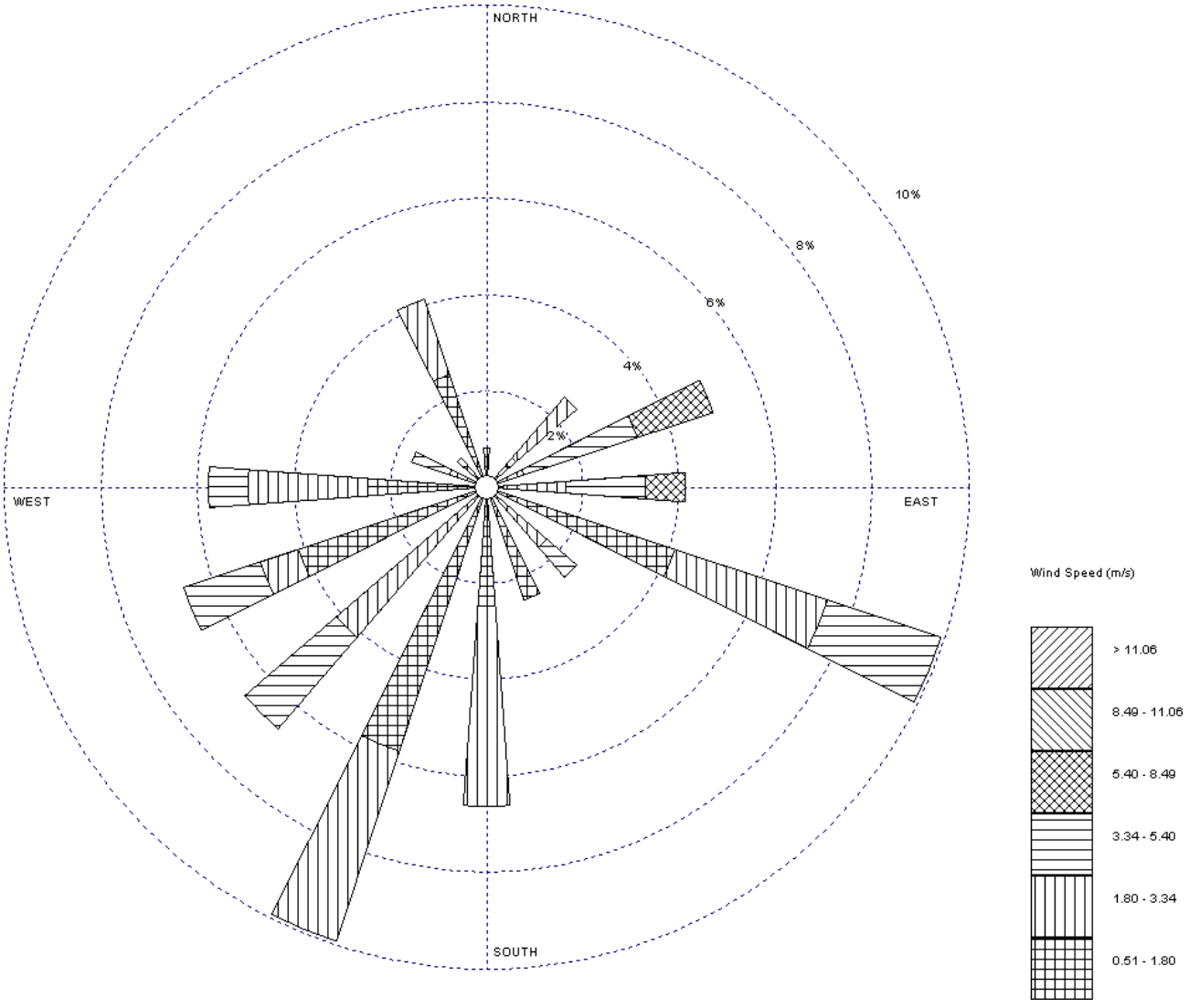
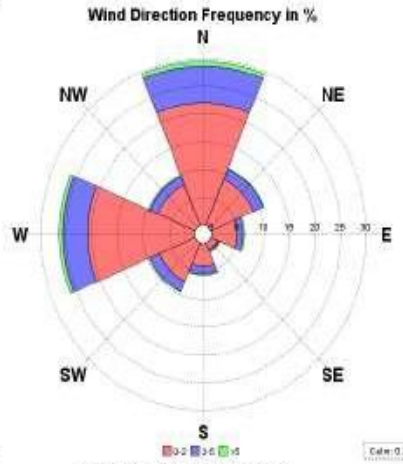
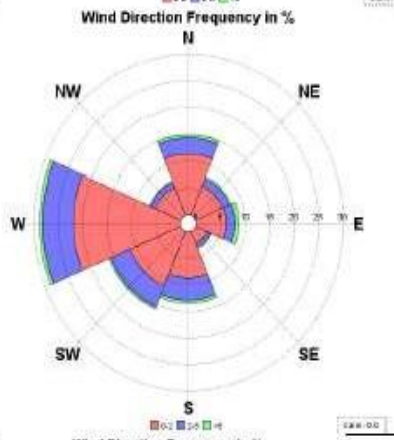
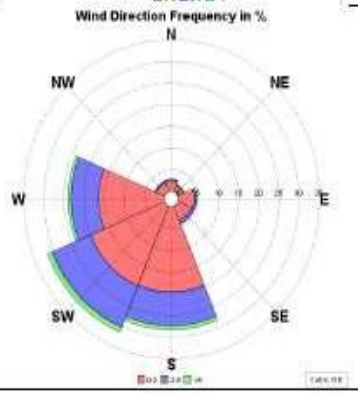
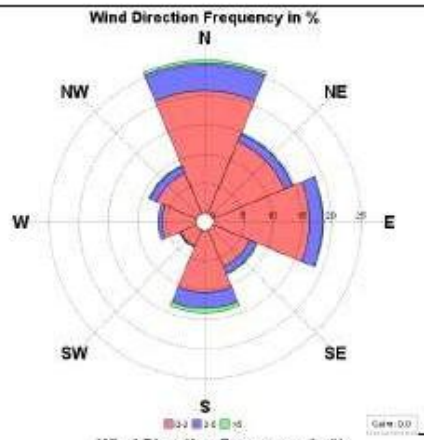
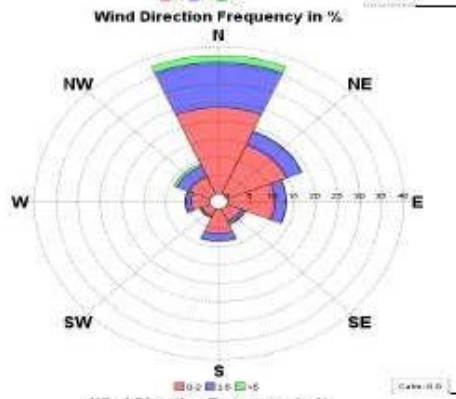
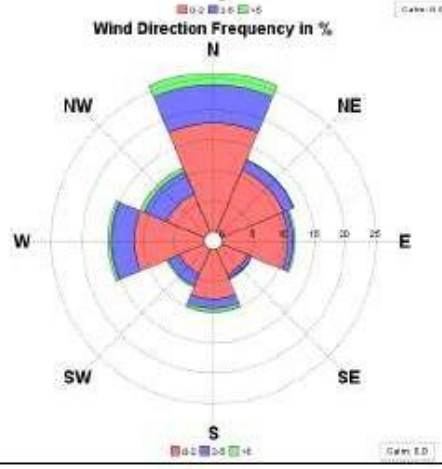


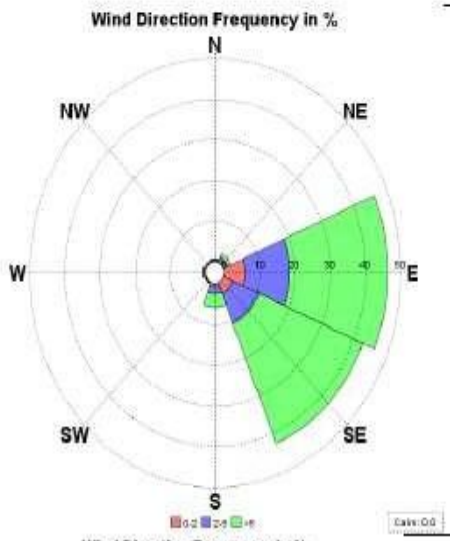
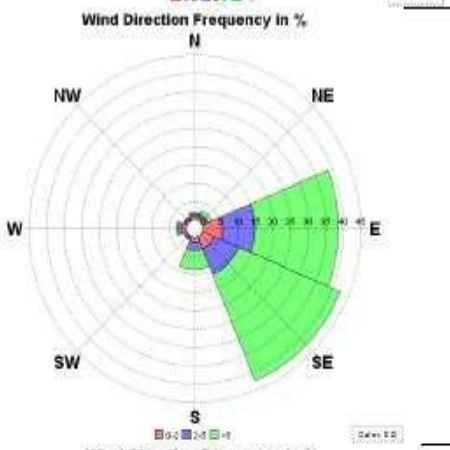
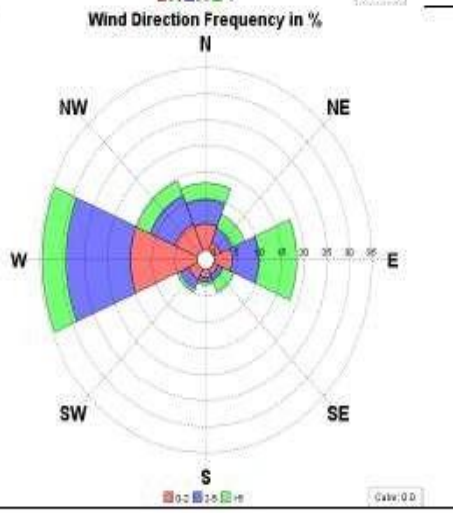
Figure 3.3.1 Sample wind rose diagram. The center on the diagram (where the head of each bar ends) represents a meteorological station into which the wind blows, while its tail shows where the wind comes from. The length of the bar is proportional to the frequency of the wind having a specific direction and speed range. The percentage points on the concentric circles can be used to make comparisons among the lengths of the bars and so as to easily identify the more prevalent direction. The shadings on the bar represent a specific speed range in meters per second as shown on the key.

Table 3.3.1 WIND ROSE diagrams over selected stations showing the prevalent wind in the three seasons:

a. Awassa, b. Bahir Dar, c. Mekele and d. Addis Ababa Bole

Station (Season) (a)	Based on long term data (1981-2010)
Awassa (Bega)	
Awassa (Belg)	
Awassa (Kiremt)	

Station (Season) (b)	Based on long term data (1981-2010)
Bahir Dar (Bega)	
Bahir Dar (Belg)	
Bahir Dar (Kiremt)	

Station (Season) (c)	Based on long term data (1981-2010)
Mekele (Bega)	
Mekele (Belg)	
Mekele (Kiremt)	

Station (Season) (d)	Based on long term data (1981-2010)
Addis Ababa Bole (Bega)	
Addis Ababa Bole (Belg)	
Addis Ababa Bole (Kiremt)