

# FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA

## NATIONAL METEOROLOGICAL AGENCY

### METEOROLOGICAL DATA AND CLIMATOLOGY DIRECTORATE

## ANNUAL CLIMATE BULLETIN

For the year 2020

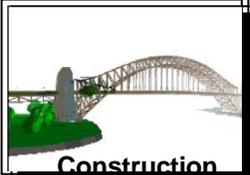
Some Applications of  
Climate Information



Disaster Management



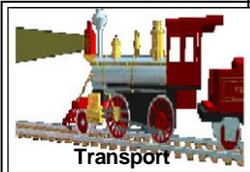
Water Resources  
Management



Construction



Environment & Health



Transport

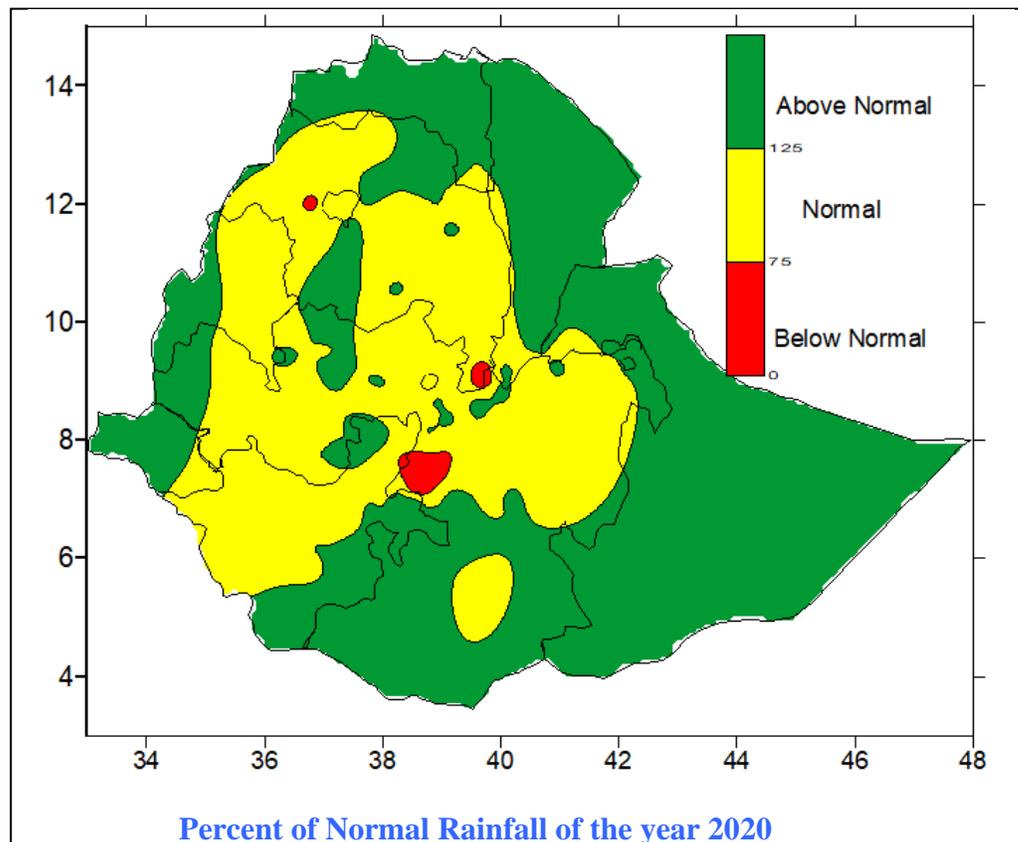


Recreation & Tourism

### HIGHLIGHTS

The rainfall activity of the year 2020 was near normal over most parts of the central parts of the country. However, southeast and eastern portions of SNNPR, much of Somali and Afar region, portions of southern Oromiya, pocket areas of Amhara and Oromiya had experienced above normal rainfall.

Higher values of extreme maximum temperature values were recorded mostly during the hot season (Belg 2020) and in particular, the extreme maximum temperature values had exceeded 40°C over Gambela, Gewane, Aisha, Dubti, Semera and Elidar. On the other hand, nights and early mornings were cold over the highlands of northeast, central and southern Ethiopia during the dry season (Bega). In association with this, minimum temperature values below the freezing point (0°C) were recorded over Debre Brehan, Wegeltena, Haromaya, Mehal Meda, Bati and Alettu.



## **Foreword**

This climate bulletin is prepared and disseminated by the National Meteorological Agency (NMA). 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 Agency, 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 Agency 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 2020 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 also 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

The rainfall activity of the year 2020 was near normal over most parts of the central parts of the country. However, southeast and eastern portions of SNNPR, much of Somali and Afar region, portions of southern Oromiya, pocket areas of Amhara and Oromiya had experienced above normal rainfall (Fig 3.2.2).

*Higher values of extreme maximum temperature values were recorded mostly during the hot season (Belg 2020), refer to table 3.1.1 an. in particular, the extreme maximum temperature values had exceeded 40°C over Gambela, Gewane, Aisha, Dubti, Semera and Elidar. On the other hand, nights and early mornings were cold over the highlands of northeast, central and southern Ethiopia during the dry season (Bega). See the table 3.1.2. In association with this, minimum temperature values below the freezing point (0°C) were recorded over Debre Brehan, Wegeltena, Haromaya, Mehal Meda, Bati and Gugufu*

## **2.1. Surface**

- The mean central pressure value of the Mascarine High was ranging from about 1022hPa to 1024hPa and it was centered between 27°S to 37°S latitudes and 45°E to 105°E longitudes.
- The mean central pressure value of the Azores High was ranging from about 1022hPa to 1032hPa and it was centered between 27° to 40°N and 15°W to 55°W.
- The mean central pressure value of the St. Helena High was ranging from about 1020hPa to 1024hPa and it was centered between 23°S to 35°S and 27°W to 15°E

## **2.2. Lower Troposphere (850 hPa Vector Wind)**

Towards the end of the Belg season, weak cross equatorial flow was observed over the Horn of Africa, Arabian Sea and the adjoining areas of northern and south Indian Ocean. The cross-equatorial flow further intensified during the Kiremt season and the speed of the average wind exceeded 15m/sec during the peak of the season. This cross-equatorial flow weakened in the succeeding months and replaced by northeasterly flow during Bega 2020/2021 the first month January.

## **2.3. Middle Troposphere (500 hPa Geopotential Height)**

The geopotential height values were dominantly Above normal over much of the Mediterranean Sea and the adjoining areas.

## **2.4. Maximum Wind at 200 hPa level**

Strong upper tropospheric easterly flow, associated with the Tropical Easterly Jet (TEJ), was dominant over the tropical areas between West Africa and India during Kiremt, while strong westerly flow (more than 25 meters per second), associated with the Subtropical Westerly Jet prevailed over the subtropical areas during the rest of the year 2020.

## **2.5. ENSO conditions**

The oceanic and sub-surface oceanic conditions across the Tropical Pacific showed near average to a moderate-strength La Niña condition during the year 2020. Further strengthening of mature cold episode (La Niña) conditions throughout the tropical Pacific towards end of the year, While Tahiti – Darwin remained strongly positive and the equatorial SOI remains positive during the season.

**Reference:** Climate Diagnostics Bulletins published during the year 2020.

## **3. Weather**

### **3.1. Temperature**

Higher values of extreme maximum temperature values were recorded mostly during the hot season (Belg 2020), refer to table 3.1.1 and in particular, the extreme maximum temperature values had exceeded 40°C over Gambela, Gewane, Aisha, Dubti, Semera and Elidar. On the other hand, nights and early mornings were cold over the highlands of northeast, central and southern Ethiopia during the dry season (Bega). See the table 3.1.2. In association with this, minimum temperature values below the freezing point (0°C) were recorded over Debre Brehan, Wegeltena, Haromaya, Mehal Meda, Bati and Gugufu.

**Table 3.1.1 Annual Extreme Maximum Temperature Values Greater Than or equal to 38°C during the year 2020**

<b>Station</b>	<b>Maximum Temperature</b>	<b>Date</b>	<b>Month</b>
Moyale	38	29	Jun
Maji	38	25	Mar
Koka	38.5	20	Apr
Tsitsika	38.6	09	Jun
Tibe	38.6	06	Mar
Diredawa	38.6	09	Apr
Gambela	42.2	06	Mar
Aisha	43.5	12	May
Dubti	43.5	28	Jun
Semera	44.8	15	May
Elidar	44.8	27	Jun

**Table 3.1.2. Annual Extreme Minimum Temperature Values less than 0°C during the year 2020**

<b>Stations</b>	<b>Minimum Temperature</b>	<b>Dates</b>	<b>Month</b>
Debrebrihan	-4.2	16	Dec
Mehalmeda	-1	15	Dec
Bati	-3.6	16	Dec
Wegeltena	-2.6	16	Dec
Aleltu	0.1	20	Dec
Guguftu	-1.4	27	Oct
Jijiga	-1	15	Dec
Haromaya	-2	14	Dec

### 3.2. Rainfall

The rainfall activity of the year 2020 was near normal over most parts of the central parts of the country. However, southeast and eastern portions of SNNPR, much of Somali and Afar region, portions of southern Oromiya, pocket areas of Amhara and Oromiya had experienced above normal rainfall. (Fig 3.2.2).

The annual total rainfall amount of the year 2020 exceeded 1250 mm over western and the highland of Amhara, Benishangul-Gumuz, Eastern Oromiya and most part of SNNPR and the central and western Oromiya. In association with this, the annual total rainfall amount reported over **Nekemte** was as high as 2243.7 mm. On the other hand, the annual total rainfall amount was below 750 mm over southern portions of Afar and southern and eastern portions of Somali. Refer to Figure 3.2.1 and Table 3.2.2.

**Table 3.2.1. Heavy fall of greater than 70 mm within 24 hrs during the year 2020**

<b>Stations</b>	<b>Heavy Fall</b>	<b>Dates</b>	<b>Month</b>
Mayokote	109	13	Feb
Sawula	76.3	17	Oct
Debark	76.5	02	Jun
Ayekel	84	06	Aug
Bahirdar	124.6	08	Sep
Fiche	70	15	Sep
Hosaina	73.5	12	Apr
Bore	85	27	Nov
Hageremariam	144.9	08	May
Moyale	83	06	May
Neghele	77.8	29	Apr
Nekemte	119	11	Jul

**Table 3.2.2 Annual total Rainfall Amount in excess of 1700mm during the year 2020**

<b>Stations</b>	<b>Amount</b>
Mayokote	1925.5
Chagni	1849.3
Dangla	1817.1
Yirgalem	2036.1
Bilboshe	1761.2
Combolcha	2076.5
Bahirdar	1931.5
Gore	1778.1
Jimma	2043.1
Bore	1969.4
Hageremari	1718.23
Wolaita	1790.436
Nekemte	2243.7

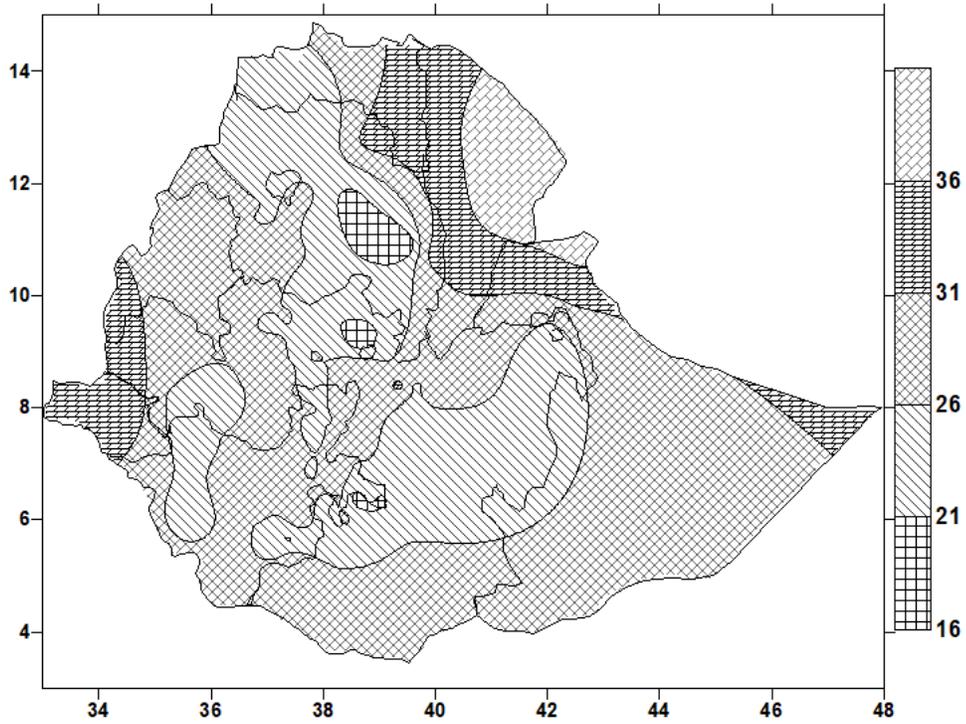


Figure 3.1.1. Mean Maximum temperature in °C for the year 2020

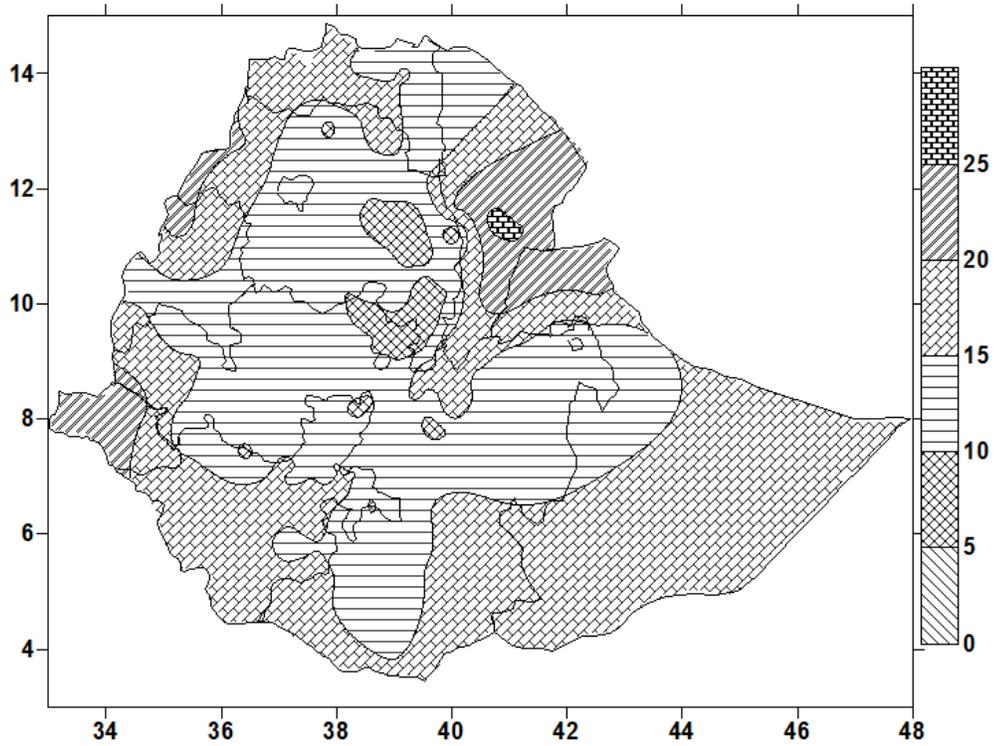


Figure 3.1.2. Mean minimum temperature in °C for the year 2020

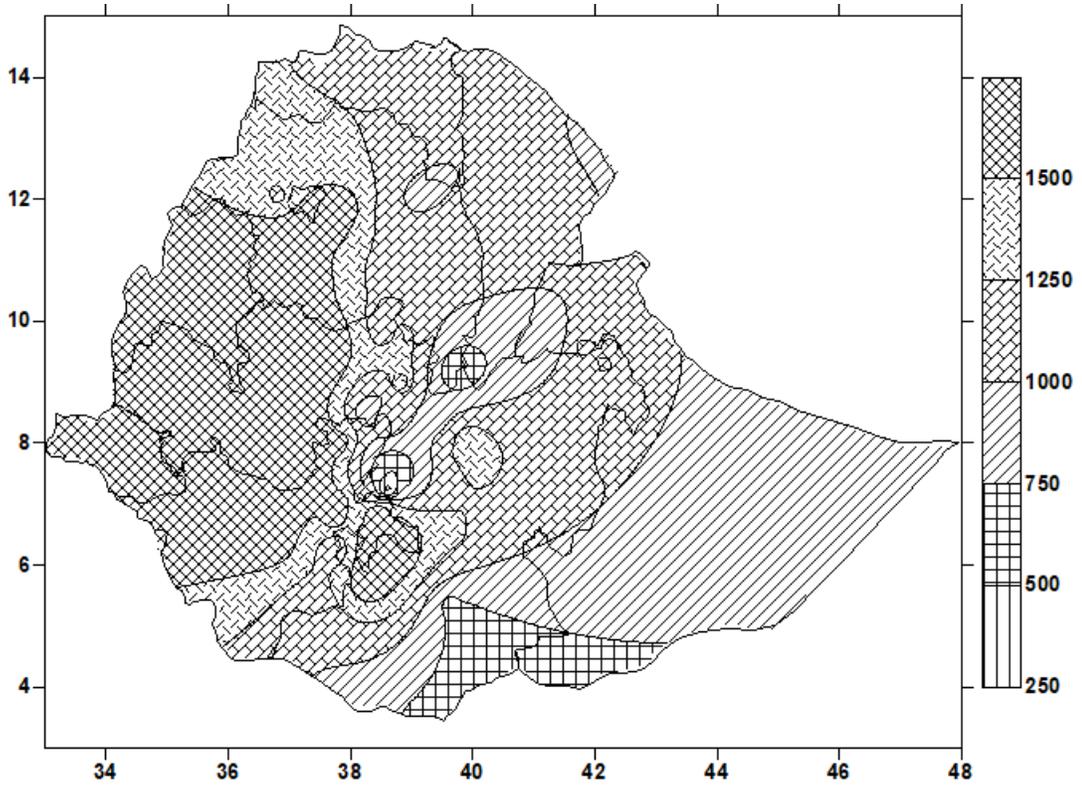


Figure 3.2.1. Annual total Rainfall amount in mm of the year 2020

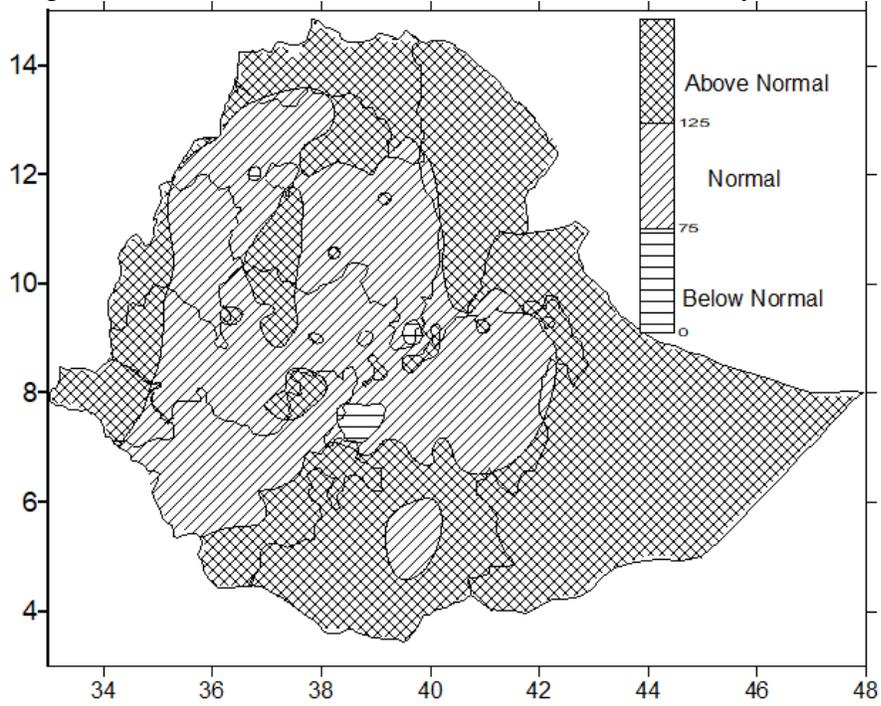


Figure 3.2.2. Percent of normal rainfall for the year 2020

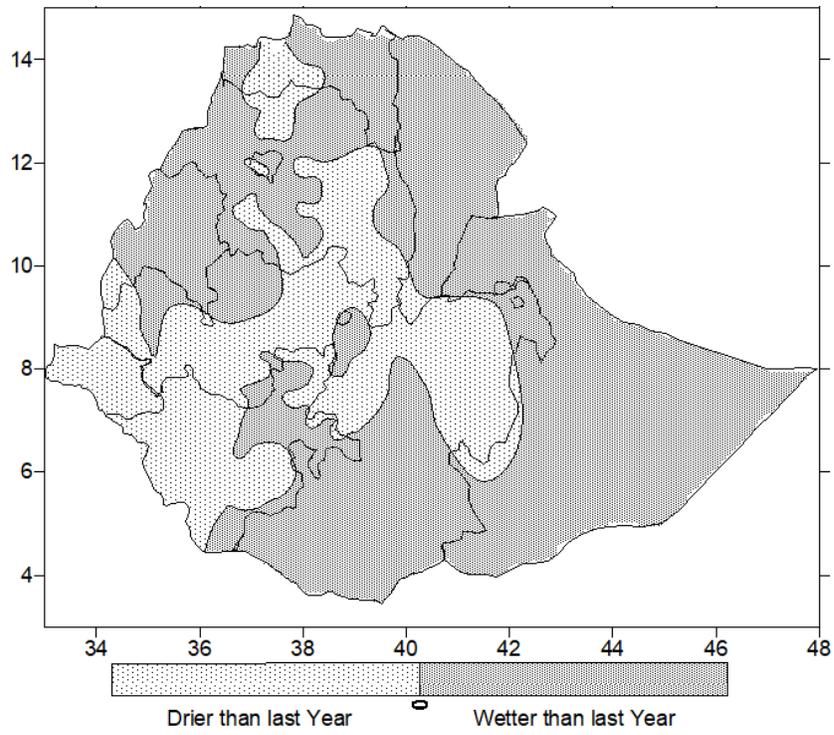


Figure 3.2.3. Annual Total Rainfall Amount of 2020 *minus* Annual Total Rainfall Amount of 2019

### 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 the Addis Ababa Observatory, Mekele, Bahir Dar and Awassa. respectively.

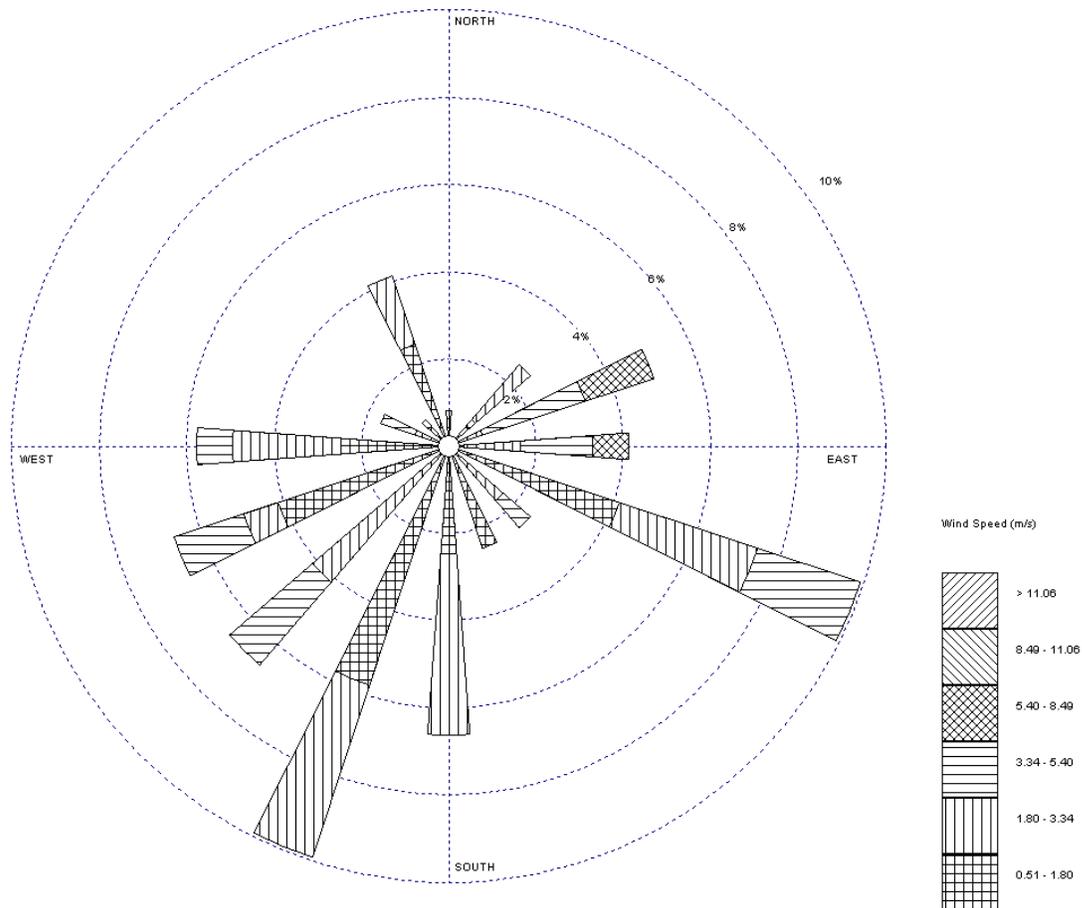
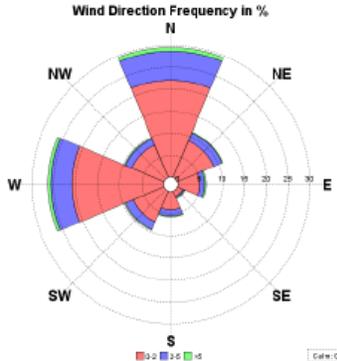
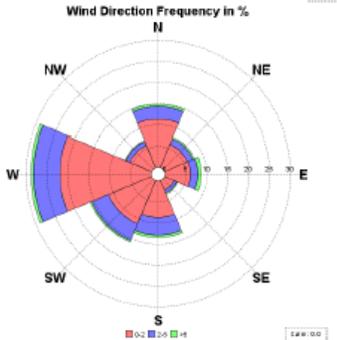
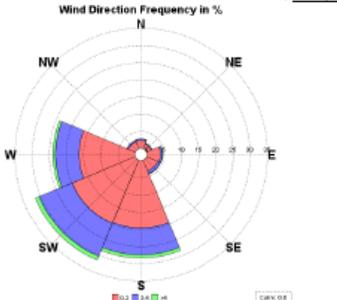


Figure 3.3.1 Sample wind rose diagram. The center on the diagram (where the head of each bar ends) represents a meteorological station into which the wind blows, while its tail shows where the wind comes from. The length of the bar is proportional to the frequency of the wind having a specific direction 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.

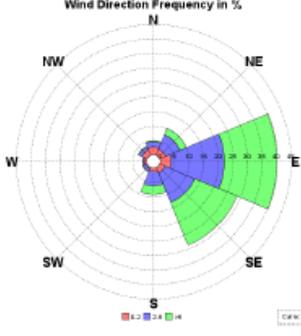
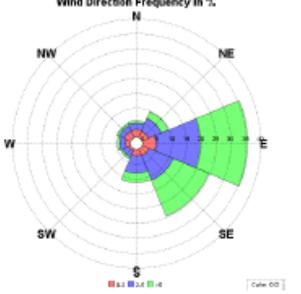
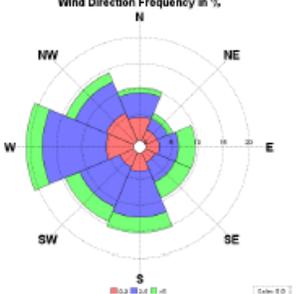
**Table 3.3.1 WIND ROSE diagrams over selected stations showing the prevalent wind in the three seasons:**

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

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)	<p>Wind Direction Frequency in %</p> <p>Legend: 0-2, 2-4, 4-6</p> <p>Scale: 0, 5, 10, 15, 20, 25</p>
Bahir Dar (Belg)	<p>Wind Direction Frequency in %</p> <p>Legend: 0-2, 2-4, 4-6</p> <p>Scale: 0, 5, 10, 15, 20, 25</p>
Bahir Dar (Kiremt)	<p>Wind Direction Frequency in %</p> <p>Legend: 0-2, 2-4, 4-6</p> <p>Scale: 0, 5, 10, 15, 20, 25</p>



Station (Season) (d)	Based on long term data (1981-2010)
Addis Ababa Bole (Bega)	 <p>Wind Direction Frequency in %</p> <p>This wind rose chart shows the frequency of wind blowing from various directions. The cardinal directions are labeled: N (North), NE (Northeast), E (East), SE (Southeast), S (South), SW (Southwest), W (West), and NW (Northwest). The chart features concentric circles representing frequency percentages from 0 to 40. The dominant wind direction is from the East (E), with a frequency of approximately 35%. Other significant directions include East-Northeast (ENE) at about 25% and East-Southeast (ESE) at about 20%. There is also a small frequency from the West (W) at about 10%. A legend at the bottom indicates wind speed ranges: 0-2 m/s (red), 2-4 m/s (blue), 4-6 m/s (green), and 6-8 m/s (yellow). A scale of 0.5 m/s is provided.</p>
Addis Ababa Bole (Belg)	 <p>Wind Direction Frequency in %</p> <p>This wind rose chart shows the frequency of wind blowing from various directions. The cardinal directions are labeled: N (North), NE (Northeast), E (East), SE (Southeast), S (South), SW (Southwest), W (West), and NW (Northwest). The chart features concentric circles representing frequency percentages from 0 to 40. The dominant wind direction is from the East (E), with a frequency of approximately 30%. Other significant directions include East-Northeast (ENE) at about 20% and East-Southeast (ESE) at about 15%. There is also a small frequency from the West (W) at about 10%. A legend at the bottom indicates wind speed ranges: 0-2 m/s (red), 2-4 m/s (blue), 4-6 m/s (green), and 6-8 m/s (yellow). A scale of 0.5 m/s is provided.</p>
Addis Ababa Bole (Kiremt)	 <p>Wind Direction Frequency in %</p> <p>This wind rose chart shows the frequency of wind blowing from various directions. The cardinal directions are labeled: N (North), NE (Northeast), E (East), SE (Southeast), S (South), SW (Southwest), W (West), and NW (Northwest). The chart features concentric circles representing frequency percentages from 0 to 40. The dominant wind direction is from the West (W), with a frequency of approximately 35%. Other significant directions include West-Northwest (WNW) at about 25% and West-Southwest (WSW) at about 20%. There is also a small frequency from the East (E) at about 10%. A legend at the bottom indicates wind speed ranges: 0-2 m/s (red), 2-4 m/s (blue), 4-6 m/s (green), and 6-8 m/s (yellow). A scale of 0.5 m/s is provided.</p>