Ethiopian Meteorology Institute

Meteorological Data and Climatology Lead Executive

Climatology and Remote Sensing Desk

Ten Daily Satellite Rainfall Estimation and Vegetation Coverage Bulletin

3rd Dekad of April 2024

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Forward

As an entity responsible for monitoring local and country-wide climatic features and their day-to-day evolution, the National Meteorological Agency of Ethiopia strives hard to present useful information to different socio-economic activities. The production of satellite-based rainfall estimates and vegetation greenness bulletin is part of this effort.

The launch of meteorological satellites which happens as a result of technological advancement opens a new horizon in weather and climate monitoring. Unlike manned point observations, satellites collect data on clouds, vegetation, and other parameters from parts of the world that are not easily reachable or accessible. Satellite observation supplements ground manned observation and when it comes to vegetation cover, it is the only source of information.

The Ethiopian Meteorological Institute uses products from the TAMSATA group based in UK and Copernicus for producing dekadal rainfall estimates and vegetation greenness bulletins. 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 benefit most from 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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Introduction

Satellite remote sensing is often used to estimate vegetation distribution and productivity at large spatial scales. The normalized difference vegetation index (NDVI) is the most widely used surrogate for large-scale assessments of vegetation greenness and has been applied in a wide range of studies (Brandt et al. 2015, Chen et al. 1998; Santos and Negri, 1997; Zhang et al 2009). The spatial distribution of remotely sensed NDVI and consequently of terrestrial vegetation is a function of prevalent climatic conditions such as rainfall and temperature. The relationship between NDVI and rainfall is well established at various spatial and temporal scales (Davenport et al. 1993; Grist et al. 1997; Nicholson et al. 1990; Potter and Brooks 1999; Wang et al. 2001). The results of these studies, although varying, indicate that rainfall is an important predictor of the geographical distribution of vegetation in many environments, particularly in transitional zones, such as from humid to arid and semi-arid environments (Zhao et al. 2015) as found in the Sahel of Africa.

Rainfall is a crucial resource in many socioeconomic activities, particularly for those African countries relying predominantly on rain-fed agriculture. Many countries have been affected by rainfall variability and long-term changes in both rainfall amount and distribution over recent decades. However, the number of rain gauges throughout Africa is small and unevenly distributed, and the gauge network is deteriorating. Satellite rainfall estimates are being used widely in place of gauge observations or to supplement gauge observations. (Tufa Dinku et al).

In this bulletin, the 3rd Dekad of April 2024 satellite rainfall estimation and vegetation greenness were produced with the help of TAMESAT and METOSAT vegetation products. During this dekad, some parts of Belg rain-benefiting areas received moderate rainfall as a result of the strong relationship between rainfall and the Normalized vegetation index (NDVI) some Belg-benefiting areas (southern and central) as well as other parts of the country were covered by Vegetation. On the other hand, some pocket areas of Tigray, Amhara, Benishangul Gumuz, Oromia, and Afar regions receive minimum to no rainfall, and low to bare greens were observed in the country.

**Rainfall Estimation from Satellite Data**
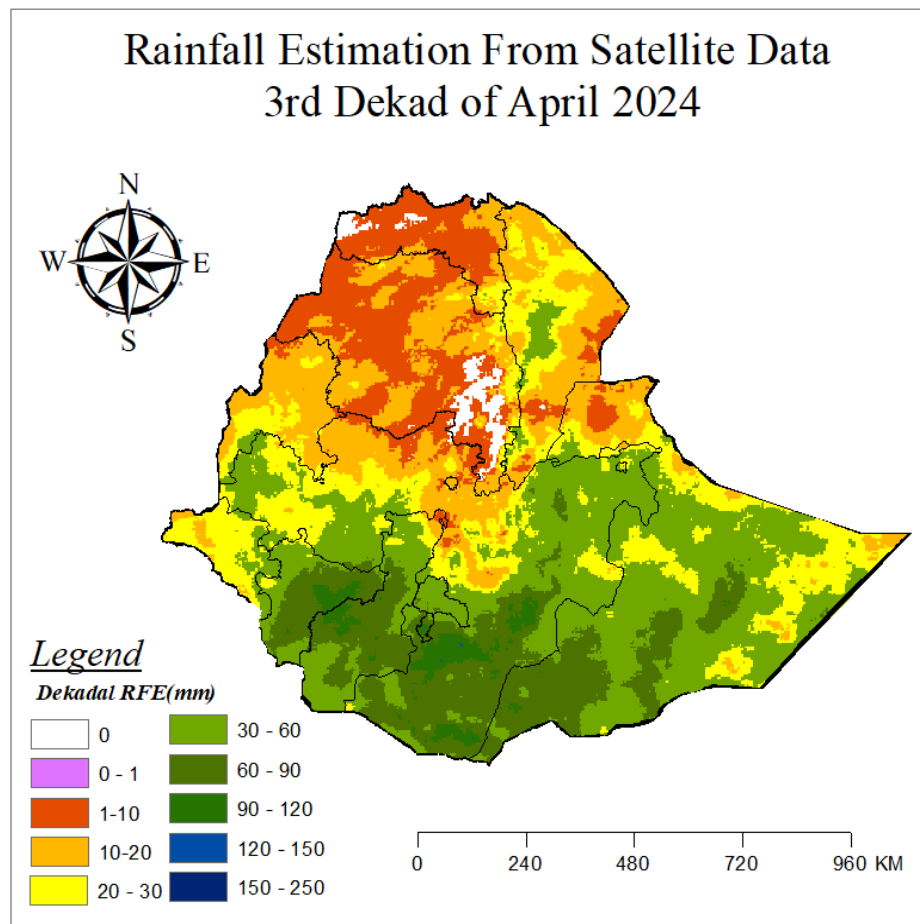
Rainfall distribution

The Belg season, spanning from February to May, marks the main rainy period for the southern, southwest, and southeast regions of the country. By the third dekad of April, rainfall has commenced in various parts of the country. Specifically, Rainfall has been observed in South Ethiopia, South West Ethiopia, Sidama, Central Ethiopia, Dire Dawa, Harari, and most of Oromia and Somali regions received between 30 – 90mm. Benishangul Gumuz, Afar, Amhara, Tigray, and some pocket areas of Somali and Oromia region received between 1 – 30 mm. Gambella region received between 10 to 60 mm of rainfall. Conversely, no rainfall has been recorded in the remaining areas of the country.

Comparison with climatological normal

In this dekad the comparison of satellite rainfall estimation and climatological average shows that was moderate to slight increase of rainfall was observed over South Ethiopia, Somali, South West Ethiopia, Afar, Oromia, and some pocket areas of Benishangul Gumuz regions. On the other hand, a slight decrease in rainfall was observed in Amhara, Central, and Western Oromia, and adjoining areas of Gambella and South West Ethiopia regions. No change in the rest part of the country.
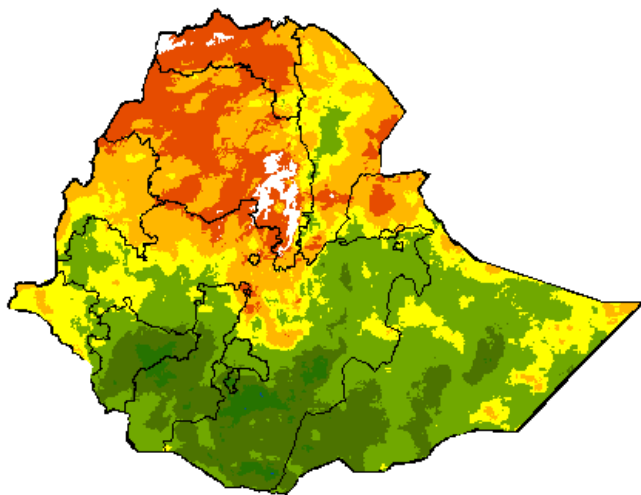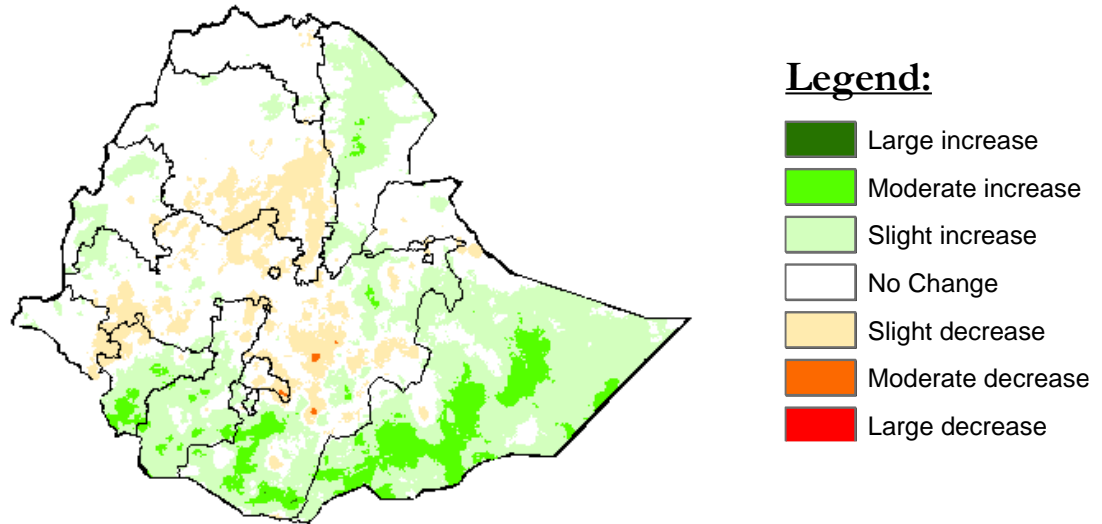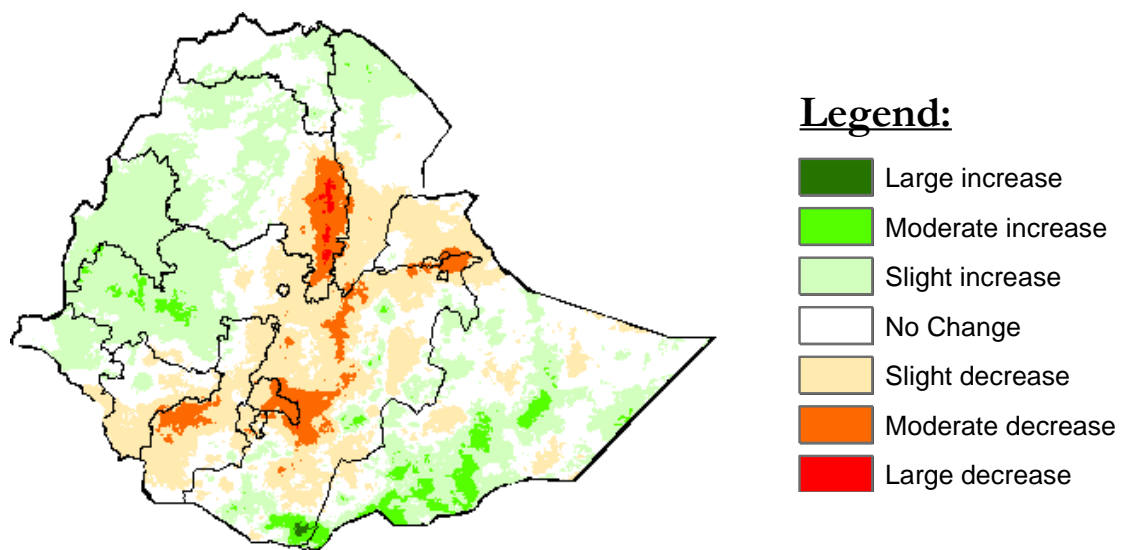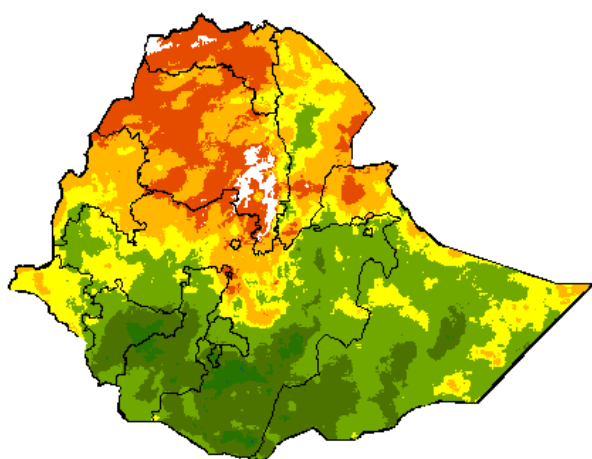

Current dekad
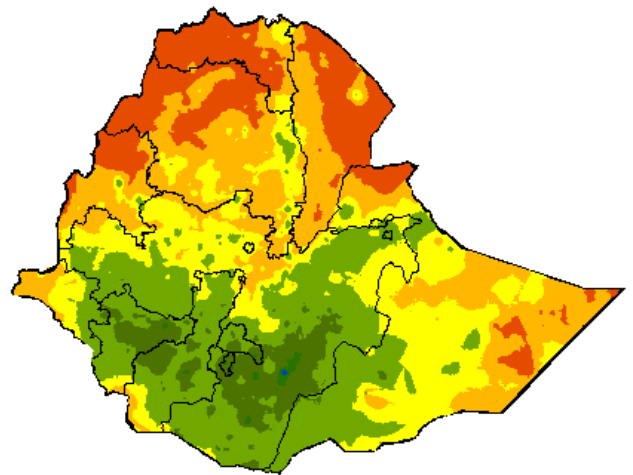
Climatological normal
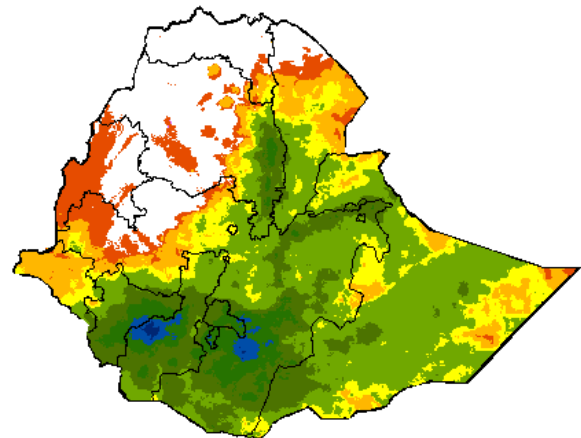
Comparison with the previous Dekad

The comparison of the 3rd dekad of April 2024 and the 2nd dekad of April 2024 shows that a slight increase of rainfall was observed in Benishangul Gumuz, Gambella, Afar, Amhara, Tigray, and Western Oromia regions. A moderate to slight increase in rainfall was observed in Somalia. On the other hand, a slight to moderate decrease in rainfall was observed in South West Ethiopia, Sidama, most of Oromia, some pocket areas of Amhara, and Somali regions. No change in the rest part of the country.

Legend:

🟩	Large increase
🟢	Moderate increase
🟩	Slight increase
⬜	No Change
🟧	Slight decrease
🟧	Moderate decrease
🟥	Large decrease

Difference of two Dekad
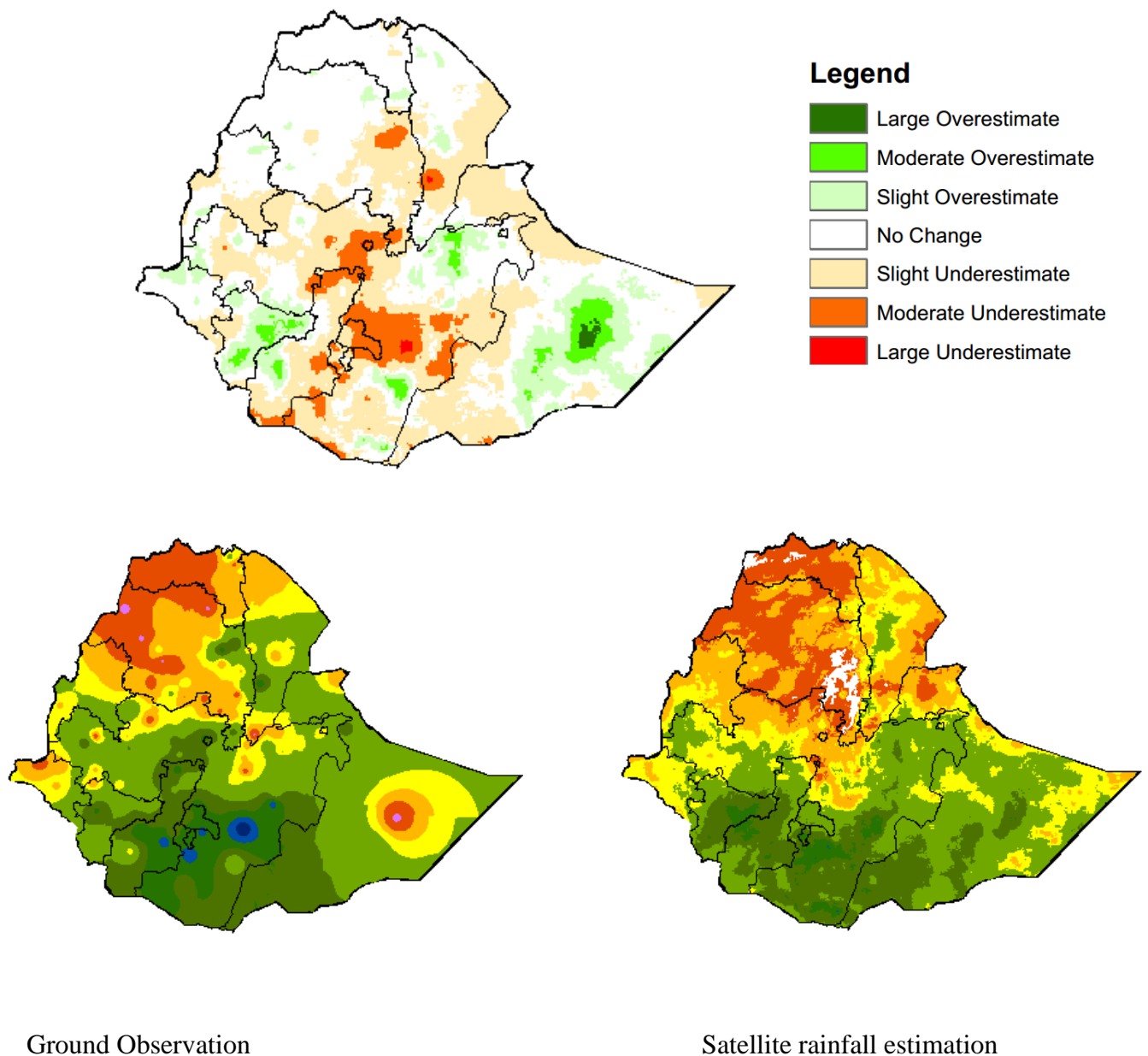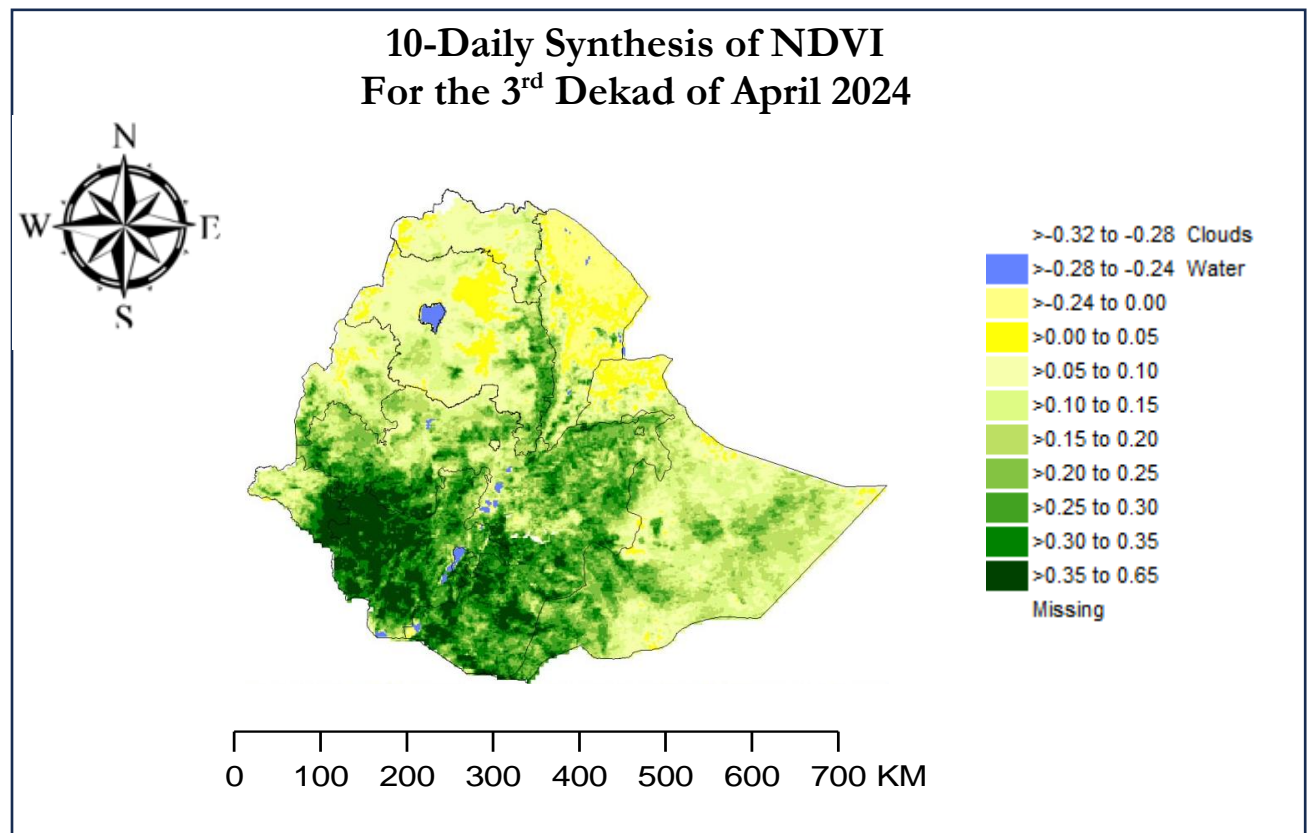
Current dekad   Previous dekad

4

Comparison with the ground observation

The satellite rainfall estimation shows that there was a large to slight overestimate observed in some pocket areas of Somali, and moderate to slight overestimate in South-West Ethiopia, pocket areas of Oromia, and South Ethiopia regions. On the other hand, a slight to moderate underestimate was observed in Oromia, South Ethiopia, Central Ethiopia, Sidama, Afar, and Amhara. There is no significant difference in the rest parts of the country, it shows the same pattern as compared with the Actual.

Ground Observation   Satellite rainfall estimation

10-Daily Synthesis of NDVI

10-Daily Synthesis of NDVI
For the 3rd Dekad of April 2024

Legend:
- >-0.32 to -0.28 Clouds
- >-0.28 to -0.24 Water
- >-0.24 to 0.00
- >0.00 to 0.05
- >0.05 to 0.10
- >0.10 to 0.15
- >0.15 to 0.20
- >0.20 to 0.25
- >0.25 to 0.30
- >0.30 to 0.35
- >0.35 to 0.65
- Missing

0 100 200 300 400 500 600 700 KM

Assessment of synthesis NDVI for the 3rd dekad of April 2024

NDVI distribution for this dekad declared high greenness over most parts of the country. Whereas low NDVI values have been observed over some parts of the country. Hence, South West Ethiopia, South Ethiopia, Sidama, Central Ethiopia, most parts of Oromia, few parts of Amhara and Somali and Gambella regions are covered by high to moderate greenness. Afar, most parts of Tigray, Amhara, Somali, Benishangul Gumuz, and some parts of Gambella and Oromia regions are covered by low to bare greenness. (Refer to the *actual* figure above).

Comparison with the Climatological Normal

The comparison of current dekad with climatological normal shows that a small to a large increase of greens was observed in Dire Dawa, Harari, Central Ethiopia, South West Ethiopia, South Ethiopia, Afar, some parts of Gambella, Oromia, some parts of Amhara, Somali and pocket areas of Tigray and Benishangul Gumuz regions. On the other hand, a small decrease in greenness was observed in some of the Oromia, Benishangul Gumuz, Amhara, Afar, and pocket areas of Somali regions.