



Meteorological Data and Climatology Lead Executive

Climatology and Remote Sensing Desk

Ten Daily Satellite Rainfall Estimation and Vegetation Coverage Bulletin

1st Dekad of December 2025

Date: Dec 12, 2025

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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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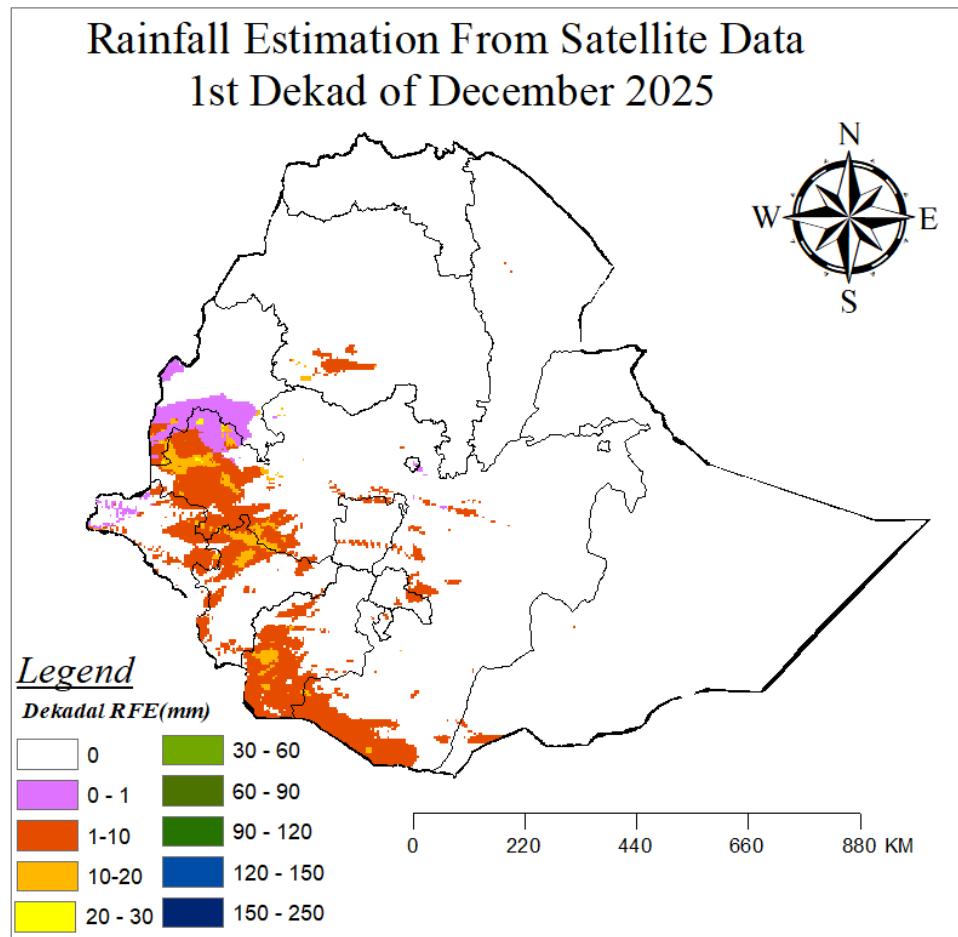
Introduction

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 1st Dekad of December 2025 satellite rainfall estimation and vegetation greenness were produced with the help of TAMESAT and METOSAT vegetation products. During this dekad, some parts of Bega rain-benefiting areas received moderate rainfall as a result of the strong relationship between rainfall and the Normalized vegetation index (NDVI) most Bega-benefiting areas (southern and southwest) as well as other parts of the country, were covered by Vegetation. On the other hand, the Afar, Somali and eastern Oromia regions received minimum to no rainfall, and low to bare greens were observed in the country.

Rainfall Estimation from Satellite Data

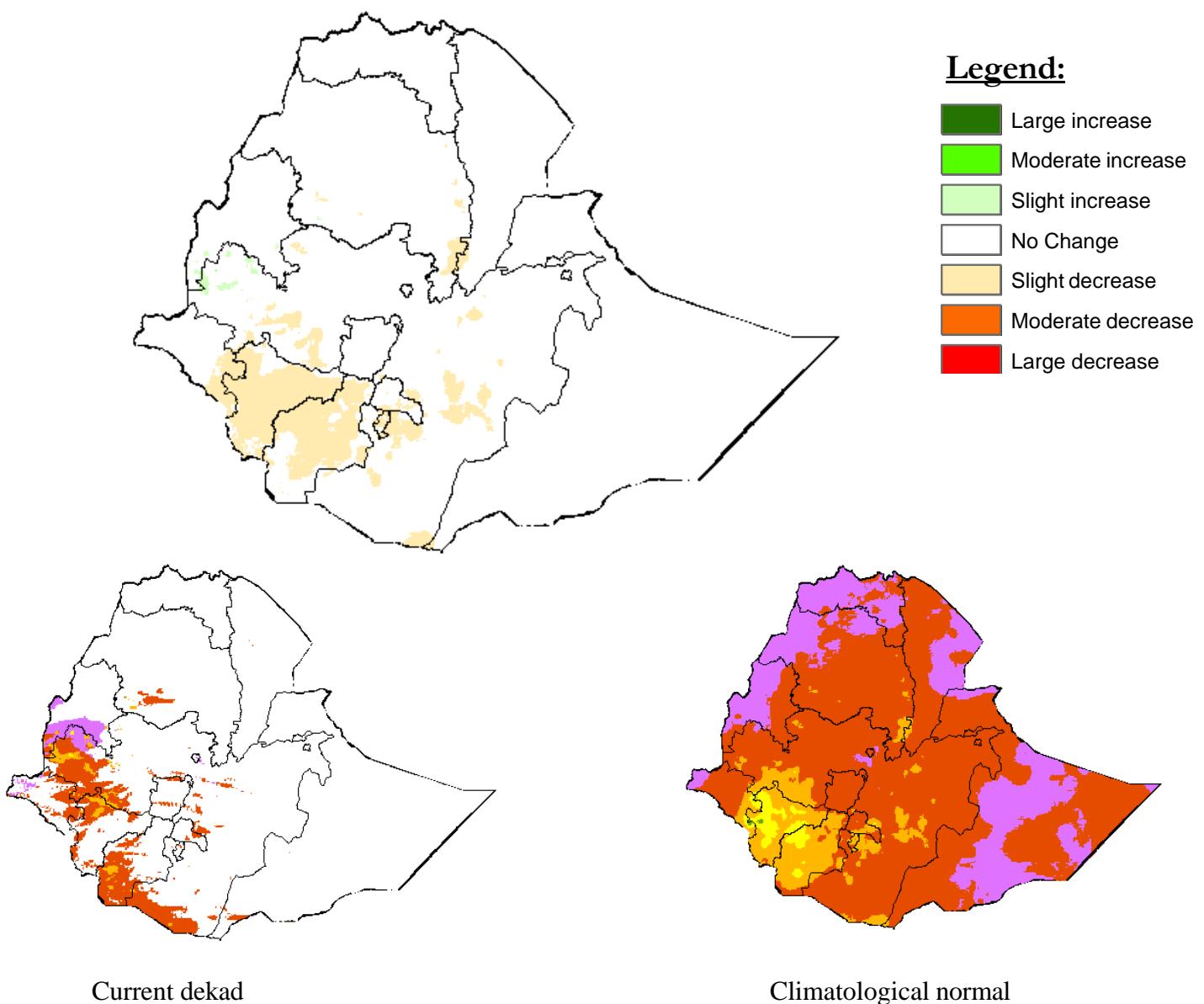


Rainfall distribution

The Bega season, which runs from October to January, is typically the dry period for most parts of the country. During this dekad, rainfall was observed in some areas. Parts of western Oromia, Southwest Ethiopia, southern Ethiopia, Gambella, and some sections of Amhara received between 1 and 20 mm. In contrast, the rest of the country recorded no rainfall.

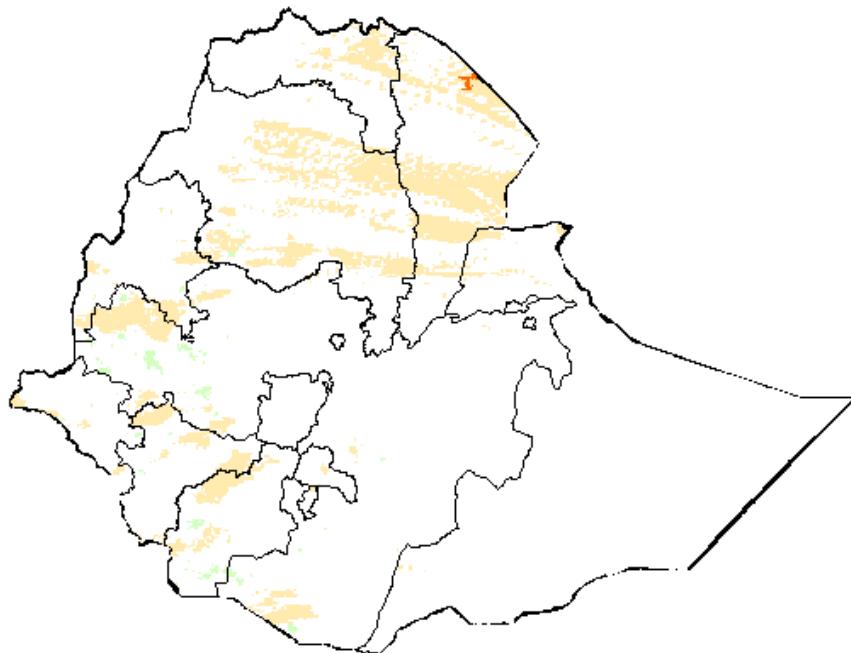
Comparison with climatological normal

In this dekad the comparison of satellite rainfall estimation and climatological average shows that there was a slight increase of rainfall was observed in some pocket areas of western Oromia region. On the other hand, slight decrease of rainfall was observed over Southwest Ethiopia, Southern Ethiopia, Gambella, Sidama, and south Oromia. No change in the rest of the country.

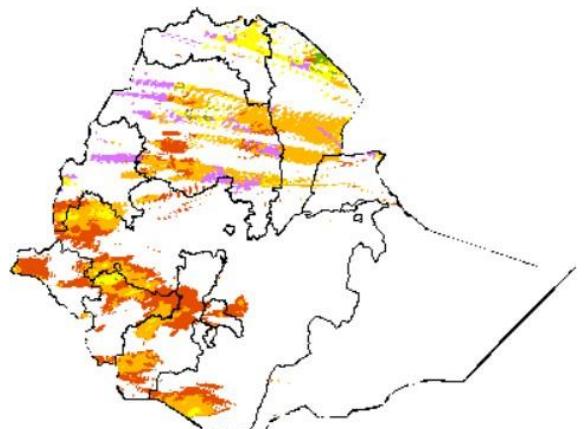
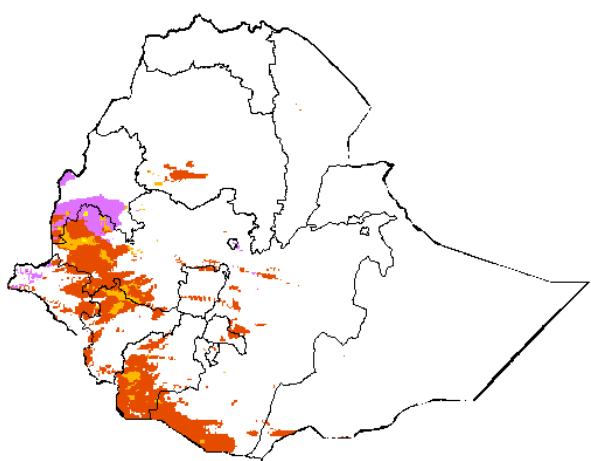


Comparison with the previous Dekad

The comparison of the 3rd dekad of November 2025 and the 1st dekad of December 2025 shows that a slight decrease of rainfall was observed in some part of Amhara, Afar, western Oromia and few areas of south Ethiopia regions. No change in the rest of the country.

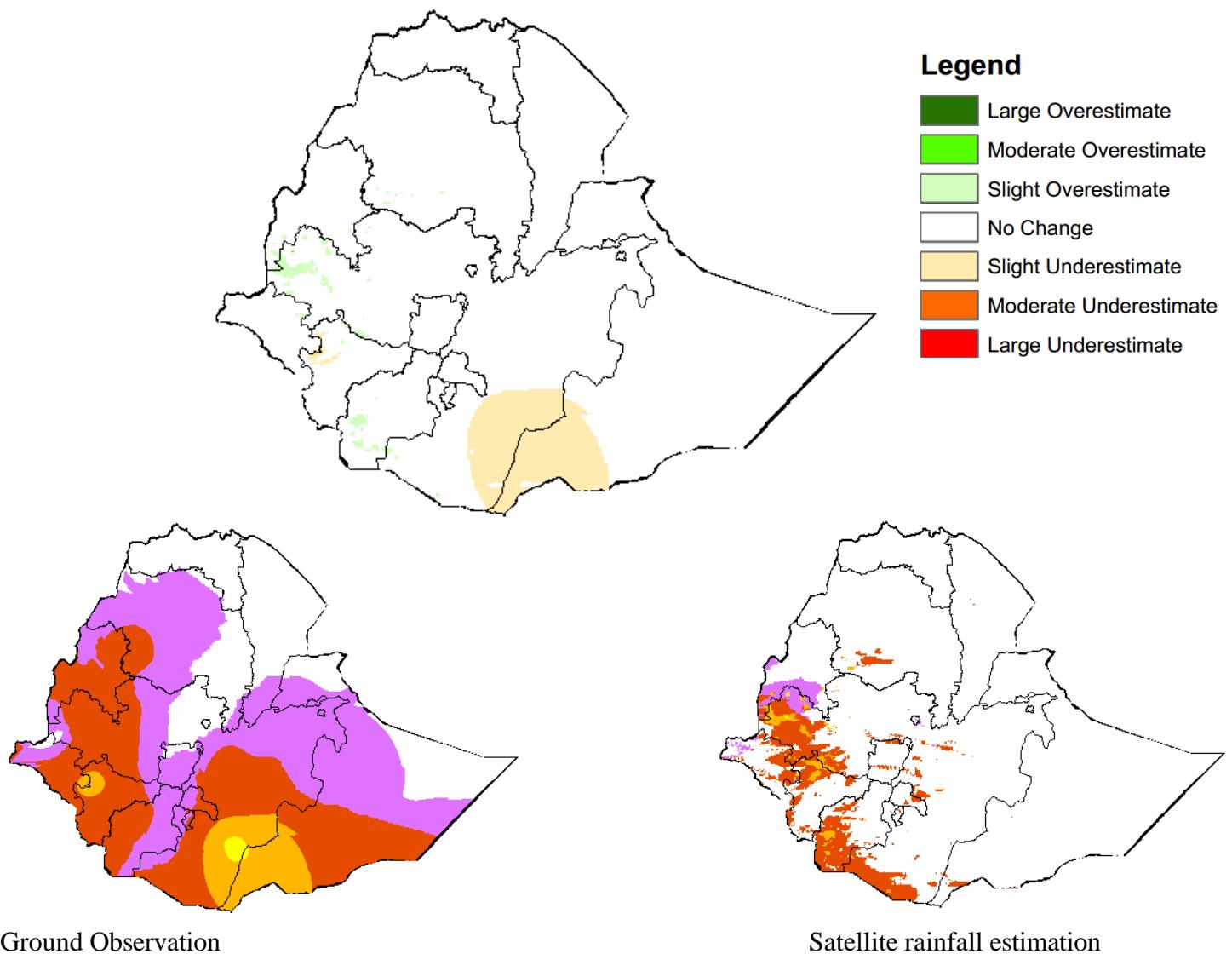


Difference of two Dekad



Comparison with the ground observation

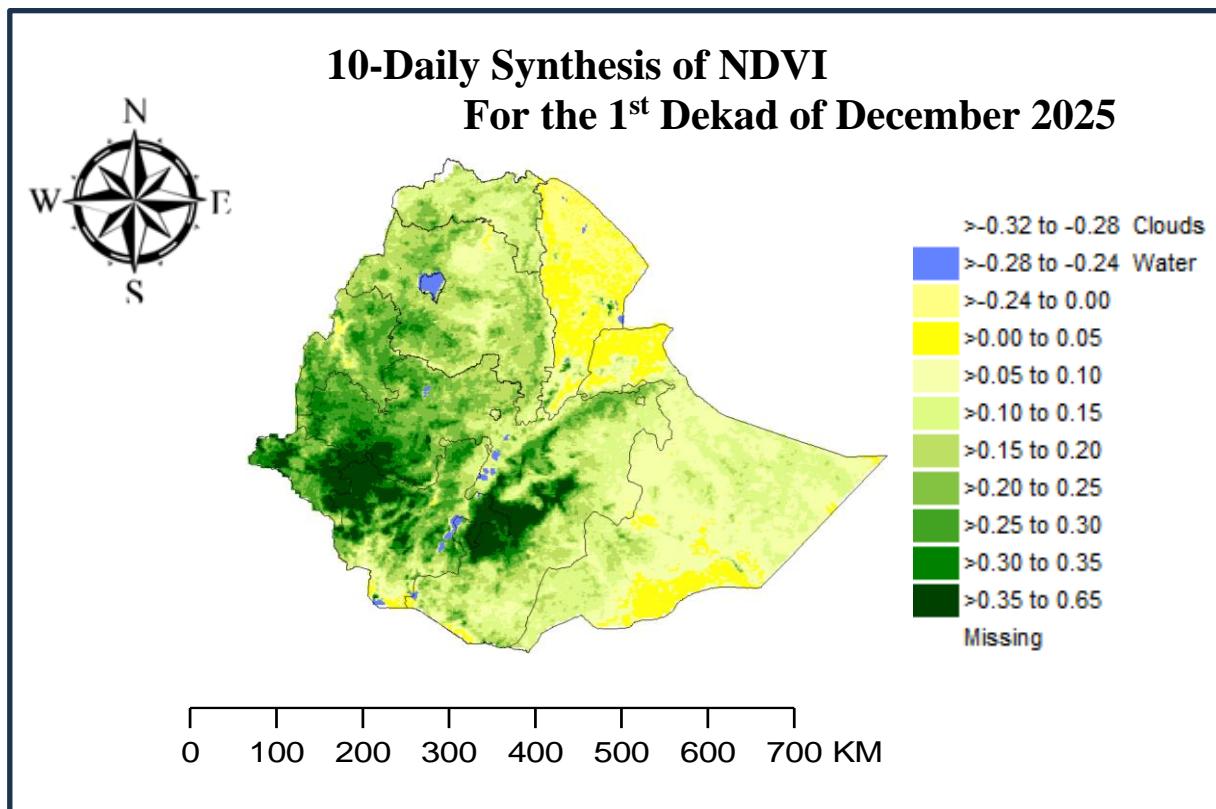
The satellite rainfall estimation shows that there was a slight overestimate observed in some pocket areas of western Oromia and South Ethiopia regions. On the other hand, a slight underestimate was observed in some part of South Oromia and Somali regions. There is no significant difference in the rest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



Ground Observation

Satellite rainfall estimation

10-Daily Synthesis of NDVI



Assessment of synthesis NDVI for the 1st dekad of December 2025

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, Gambella, South West Ethiopia, South Ethiopia, Benishangul Gumuz, western Oromia, Sidama, Central Ethiopia, and most parts of Amhara and Tigray regions are covered by moderate greenness. Somali and Afa, and southern Oromia regions are covered by low to bare greenness. (Refer to the *actual* figure above).

Comparison with the Climatological Normal

The comparison of the current dekad with climatological normal shows that a small increase of greens was observed in pocket areas of Tigray, western Amhara, Benishangul Gumuz, Gambella, few areas of Oromia regions. On the other hand, a small to large decrease in greenness was observed in Somali, Most part of Oromia, some part of Southern Ethiopia and Southwest Ethiopia regions.

