Meteorological Data and Climatology Lead Executive

Climatology and Remote Sensing Desk

Ten Daily Satellite Rainfall Estimation and Vegetation Coverage Bulletin

2nd Dekad of June 2025

Date: June 23, 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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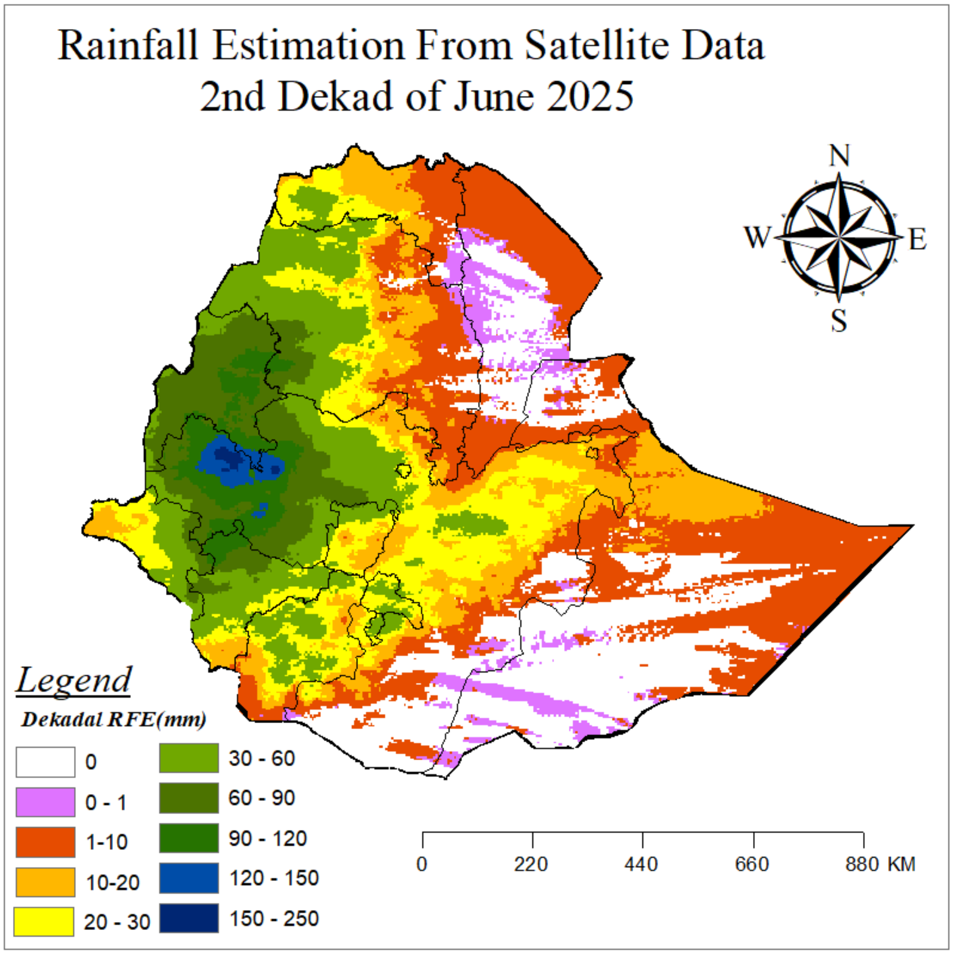
Introduction

Satellite remote sensing is a valuable tool for estimating vegetation distribution and productivity across large spatial scales. Among the various indices used, the Normalized Difference Vegetation Index (NDVI) is the most widely applied for assessing vegetation greenness and has been utilized in numerous studies (Brandt et al., 2015; Chen et al., 1998; Santos & Negri, 1997; Zhang et al., 2009). The spatial distribution of NDVI, and consequently of terrestrial vegetation, is largely influenced by climatic factors such as rainfall and temperature. A well-documented relationship between NDVI and rainfall exists across various spatial and temporal scales (Davenport et al., 1993; Grist et al., 1997; Nicholson et al., 1990; Potter & Brooks, 1999; Wang et al., 2001). While results vary, these studies consistently highlight rainfall as a key predictor of vegetation distribution, particularly in transitional zones where ecosystems shift from humid to arid or semi-arid conditions. This relationship is especially evident in regions like the Sahel of Africa, where rainfall patterns significantly impact vegetation cover (Zhao et al., 2015).

Rainfall is a critical resource for many socioeconomic activities, particularly in African countries that rely heavily on rain-fed agriculture. Over recent decades, these countries have experienced significant challenges due to rainfall variability and long-term changes in both the amount and distribution of rainfall. However, the network of rain gauges across Africa is sparse, unevenly distributed, and deteriorating, limiting the accuracy and reliability of ground-based rainfall measurements. To address this gap, satellite-based rainfall estimates are increasingly being used as a substitute for, or to supplement, gauge observations, providing broader spatial coverage and more consistent monitoring of rainfall patterns (Tufa Dinku et al.).

In this bulletin, the 2nd Dekad of June 2025 satellite rainfall estimation and vegetation greenness were produced with the help of TAMESAT and METOSAT vegetation products. During this dekad, some parts of Kiremt rain-benefiting areas received moderate rainfall as a result of the strong relationship between rainfall and the Normalized vegetation index (NDVI) most Kiremt-benefiting areas (northern, north western and central) as well as other parts of the country were covered by Vegetation. On the other hand, Afar, Somali, southern Oromia and some pocket areas of Amhara and Tigray regions receive minimum to no rainfall, and low to bare greens were observed in the country.

Rainfall Estimation from Satellite Data

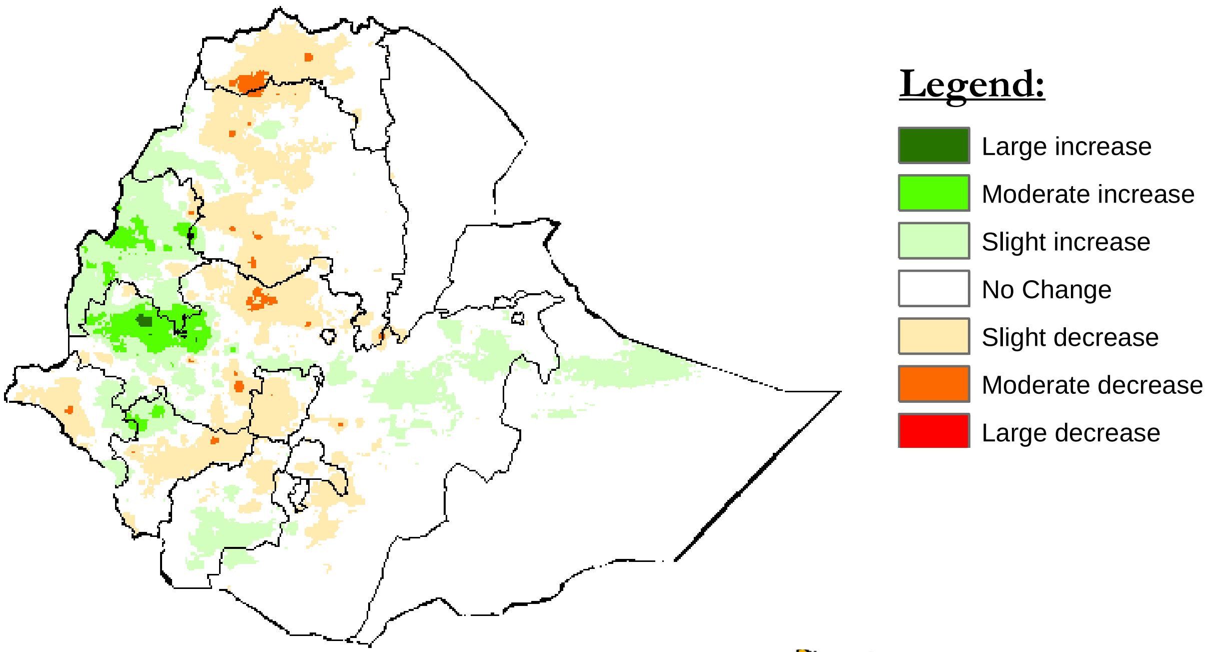


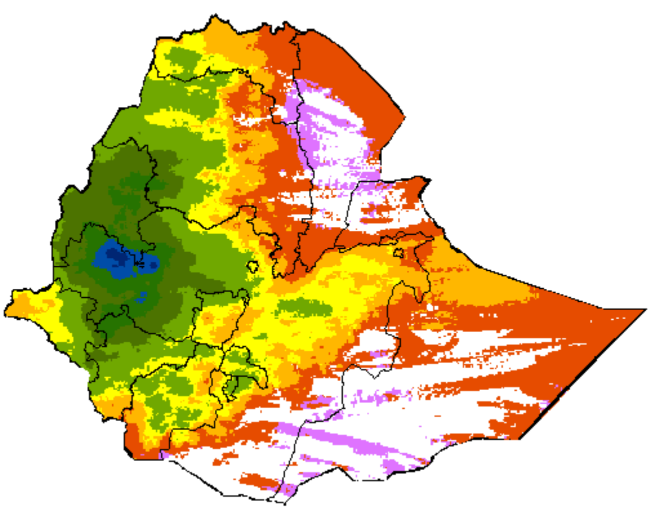
Rainfall distribution

The Kiremt season, spanning from June to September, marks the main rainy period for the most part of the country (northern, north western and central). By the second dekad of June, rainfall has commenced in various parts of the country. Specifically, Rainfall has been observed in Benishangul Gumuz, Western Oromia, Gambella, South West Ethiopia, Sidama, some of South Ethiopia, Amhara, Tigray and Central Ethiopia regions received between 20 – 120mm. Conversely, no rainfall has been recorded in the other parts of the country.

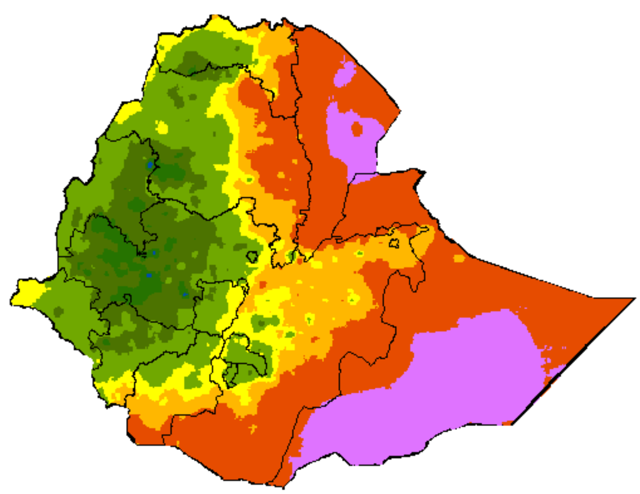
Comparison with climatological normal

During this dekad, a comparison between satellite rainfall estimates and the climatological average revealed a slight to moderate increase in rainfall was observed in Benishangul Gumiz, Western and central Oromia, Gambella, South Ethiopia, and some pocket areas of South West and Gambella regions. On the other hand, a slight to moderate decrease in rainfall was observed in Sidama, Amhara, Tigray, and Central Ethiopia regions. No significant changes were recorded in the rest of the country.





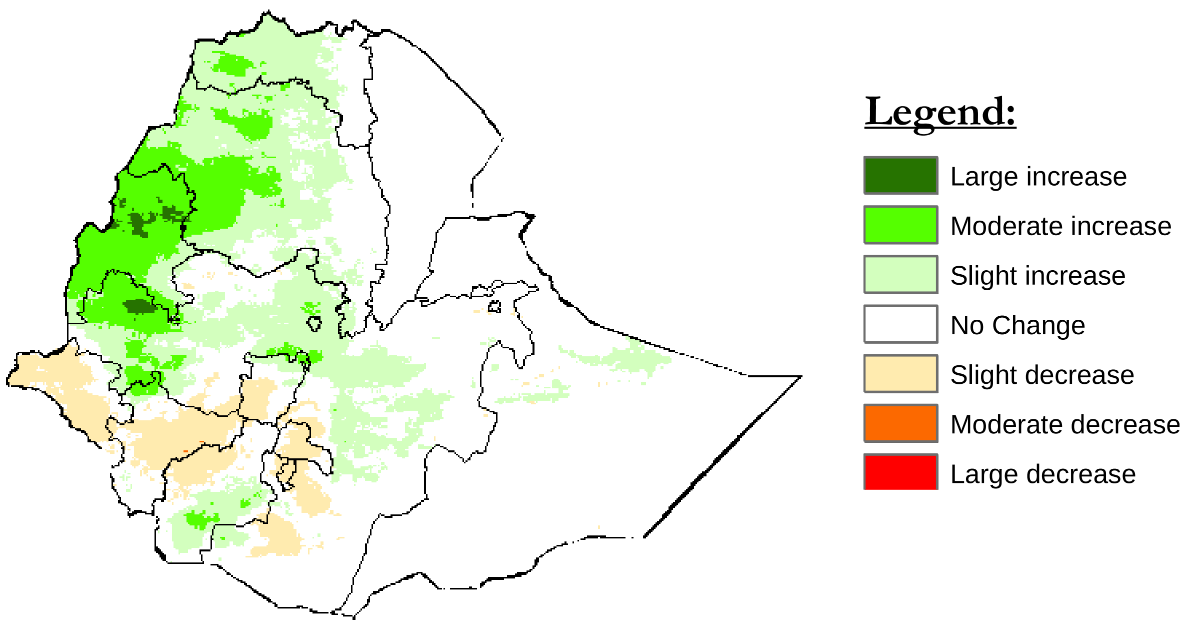
Current dekad



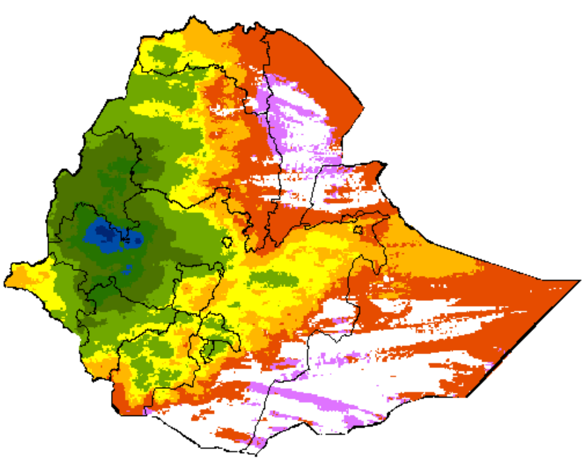
Climatological normal

Comparison with the previous Dekad

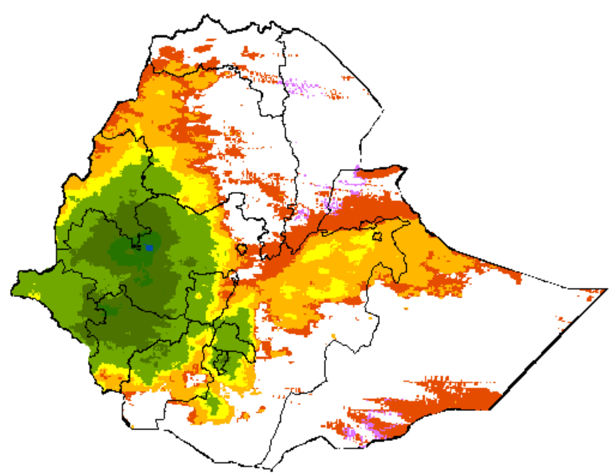
A comparison between the 2nd dekad of June 2025 and the 1st dekad of June 2025 shows a slight to a large increase of rainfall was observed in Benishangul Gumiz, Gambella, Amhara, Tigray, and western and central Oromia regions. On the other hand, a slight decrease of rainfall was observed in Gambella, Sidama, South Western Ethiopia, and Central Ethiopia regions. For the rest of the country, there was no significant change, as the satellite estimates closely matched the actual rainfall patterns.



Difference of two Dekad



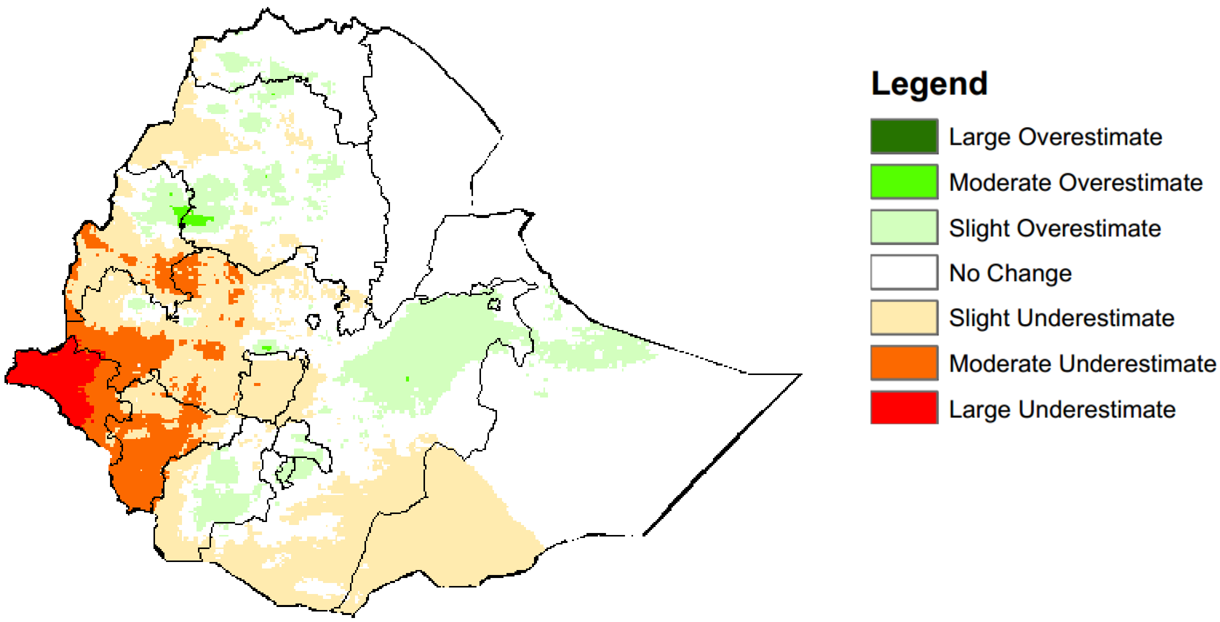
Current dekad

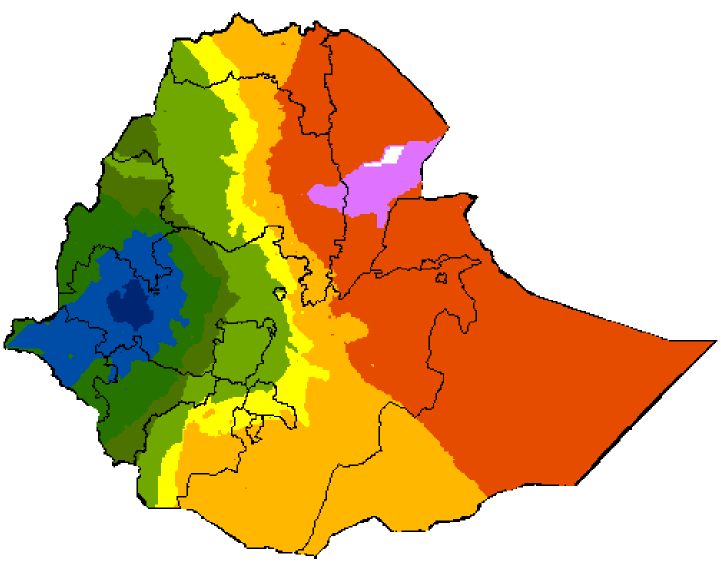


Previous dekad

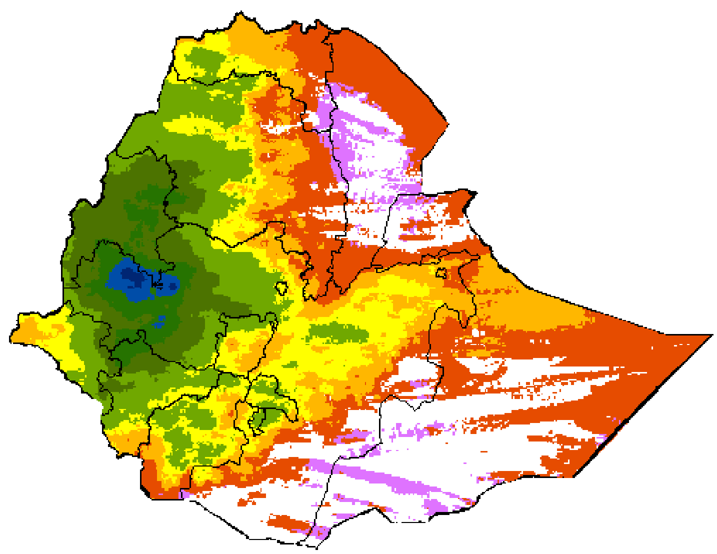
Comparison with the ground observation

The satellite rainfall estimation indicates there was a slight overestimate observed in some pocket areas of Sidama, Amahara, Oromia and Tigray regions. On the other hand, a slight to large underestimate was observed in Gambella, South West Ethiopia, Benishangul Gumiz, and western Oromia regions. For the rest of the country, no significant change, as the satellite estimates closely matched the actual rainfall patterns. South Ethiopia Somali and eastern Oromia



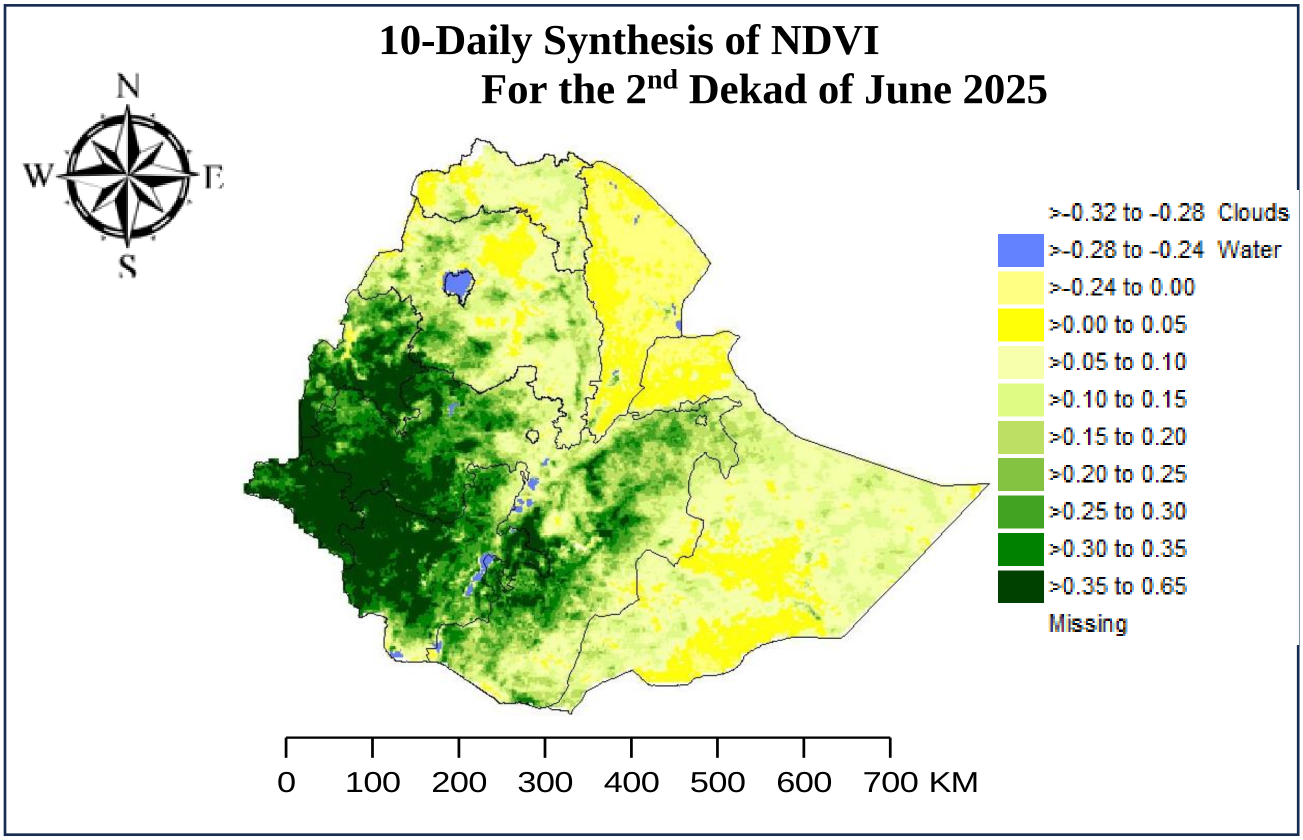


Ground Observation



Satellite rainfall estimation

10-Daily Synthesis of NDVI



Assessment of synthesis NDVI for the 2nd dekad of June 2025

The NDVI distribution for this dekad shows high greenness over most parts of the country. However, low NDVI values were observed in certain areas. Specifically, South West Ethiopia**,** South Ethiopia**,** Sidama**,** Gambella**,** Central Ethiopia**,** Benishangul Gumiz and Oromia regions exhibit high to moderate greenness. In contrast, Somali, Afar, Amhara and Tigray region show low to bare greenness. (Refer to the actual figure above for detailed visualization.)

Comparison with the Climatological Normal

A comparison between the current dekad and the climatological normal shows a small to large decrease in greenness in most of the country except some pocket areas of Amhara, Benshangul Gumiz, Oromia, South West Ethiopia**,** Afar and Somali regions.