



# Meteorological Data and Climatology Lead Executive

## **Climatology and Remote Sensing Desk**

### **Ten Daily Satellite Rainfall Estimation and Vegetation Coverage Bulletin**

1<sup>st</sup> Dekad of March 2024

Date: Mar 12, 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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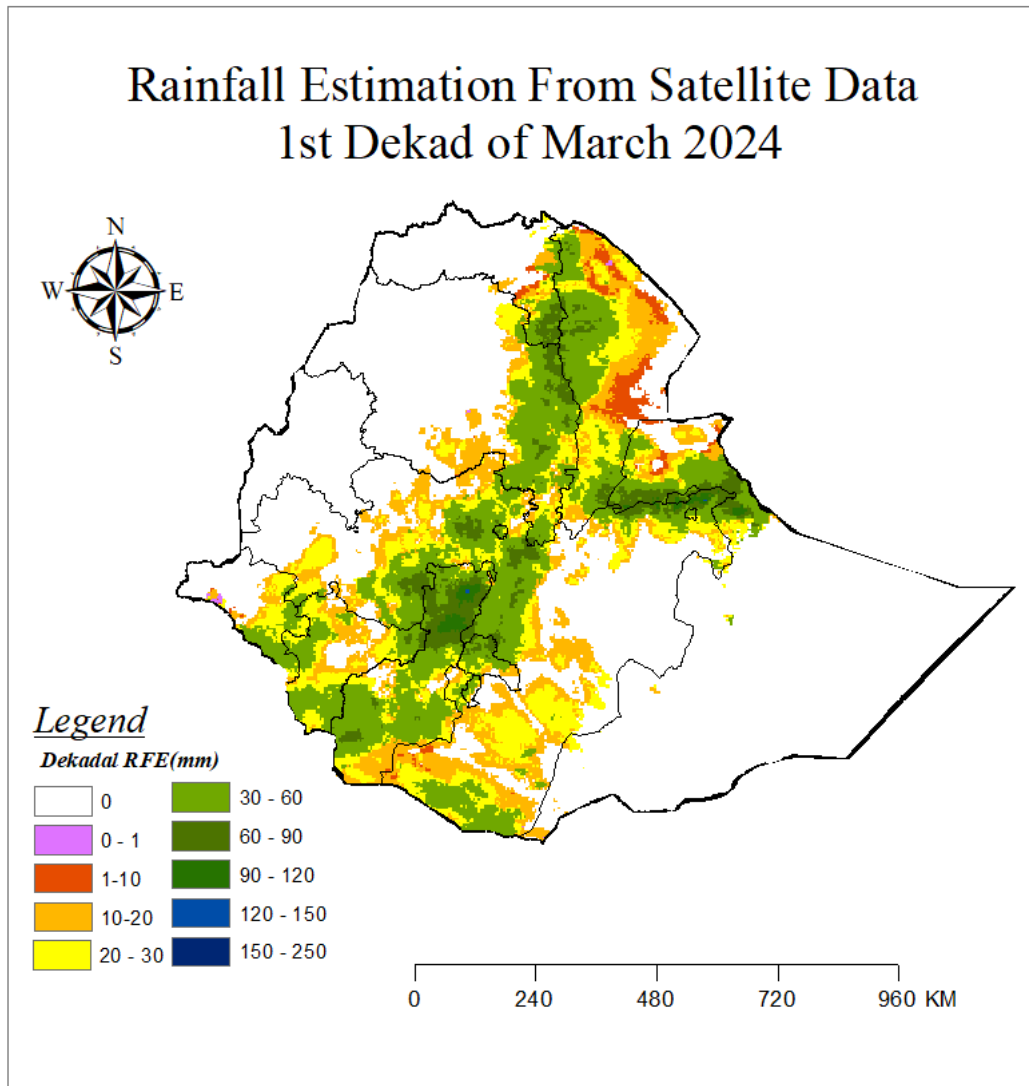
## **Introduction**

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 1<sup>st</sup> Dekad of March 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 rain benefiting areas (southern, southwest, and central) part of the country was covered by Vegetation. On the other hand, the Northern, northwest and southeast parts of the country receive minimum to no rainfall, and low to bare greens were observed in the country.

## Rainfall Estimation from Satellite Data

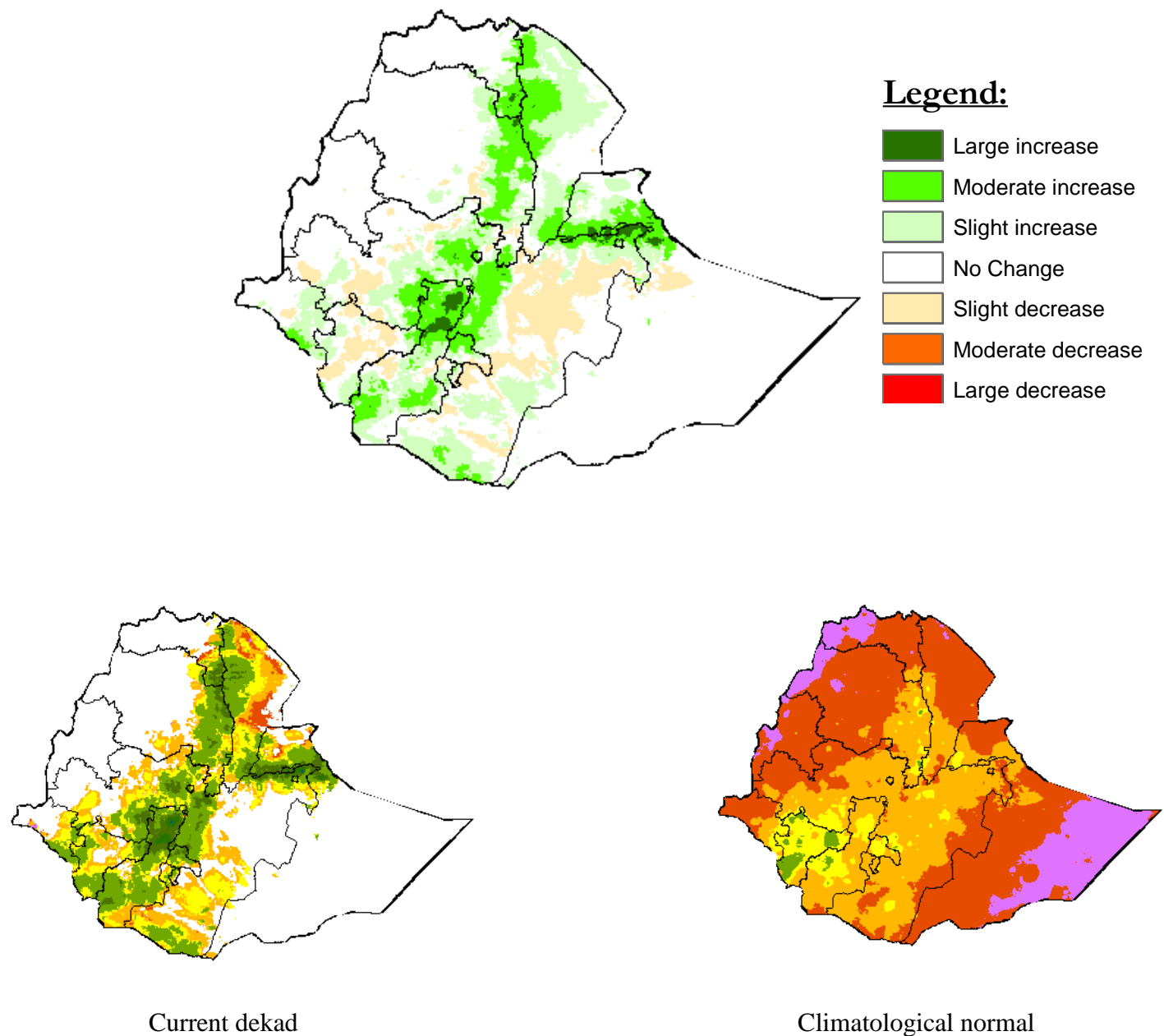


### Rainfall distribution

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 first dekad of March, rainfall has commenced in various parts of the country. Specifically, Rainfall has been observed in Central Ethiopia, Central and Southern Oromia, South Ethiopia, South West Ethiopia Afar, eastern Amhara, Harari, Dire Dawa, Sidama, some parts Tigray and Gambella regions received between 1 to 120 mm of rainfall. Conversely, no rainfall has been recorded in the remaining areas of the country.

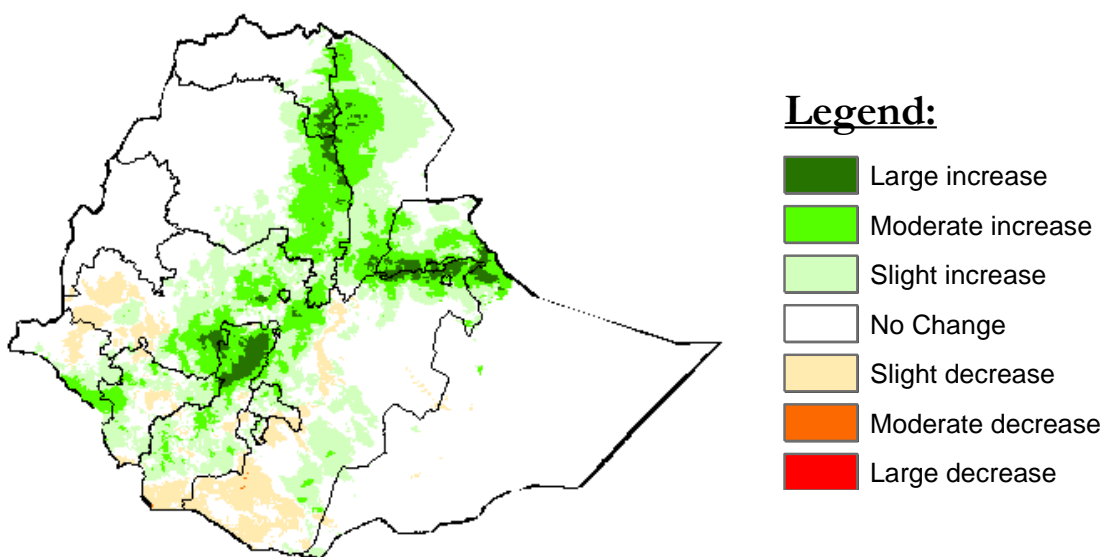
## Comparison with climatological normal

In this dekad the comparison of satellite rainfall estimation and climatological average shows that was large to a slight increase of rainfall was observed in Central Ethiopia, Dire Dawa, some pocket areas of Somali, Afar, some parts of Gambella, some pocket areas of Tigray, the eastern part of Amhara, South Ethiopia region. On the other hand, a slight decrease in rainfall was observed in South-West Ethiopia, most parts of Oromia, some pocket areas of Amhara and Somali region.

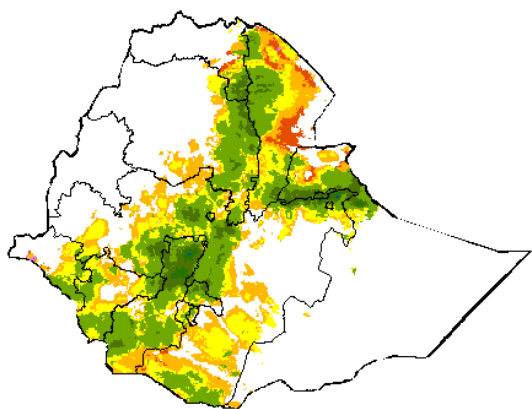


### Comparison with the previous Dekad

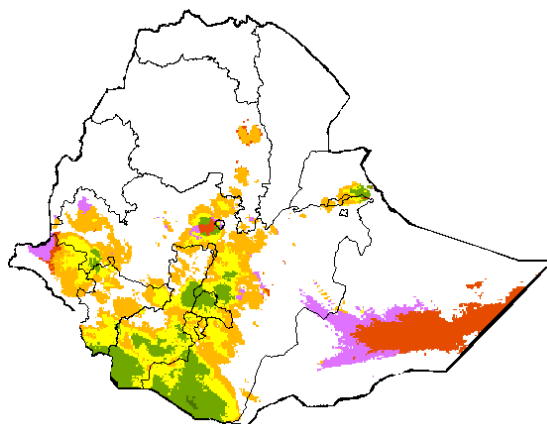
The comparison of the 1<sup>st</sup> dekad of March 2024 and the 3<sup>rd</sup> dekad of February 2024 shows that a large to a slight increase of rainfall was observed in Central Ethiopia, Dire Dawa, Harari, Afar, adjoin areas of Amhara, Afar and Tigray, Oromia, some pocket areas of Somali, South West Ethiopia, south part of Gambella, South Ethiopia region. On the other hand, a slight decrease in rainfall was observed in western and southern Oromia, some pocket areas of South Ethiopia, South West Ethiopia, Sidama, and Gambella region. No change in the rest part of the country.



### Difference of two Dekad



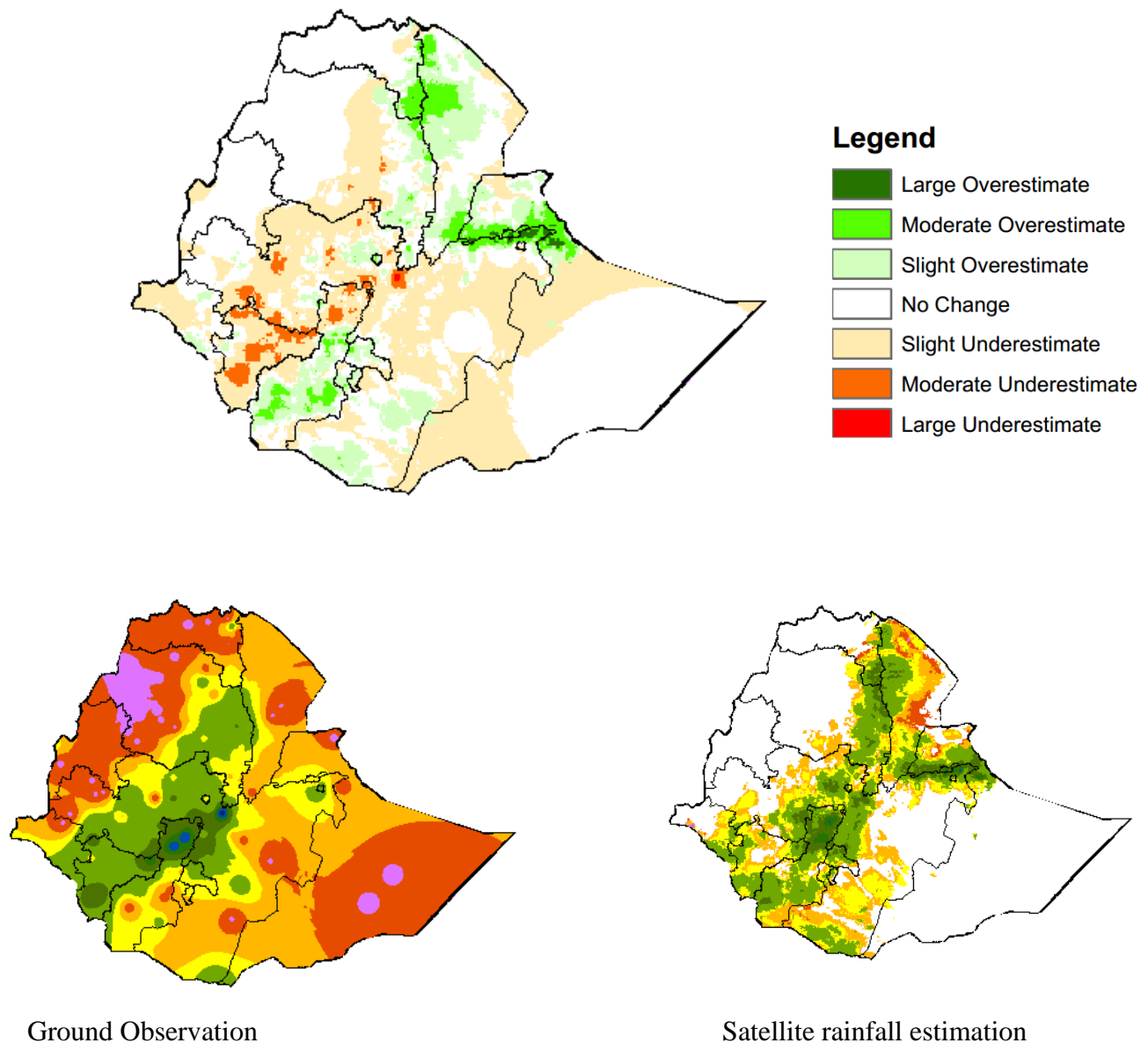
Current dekad



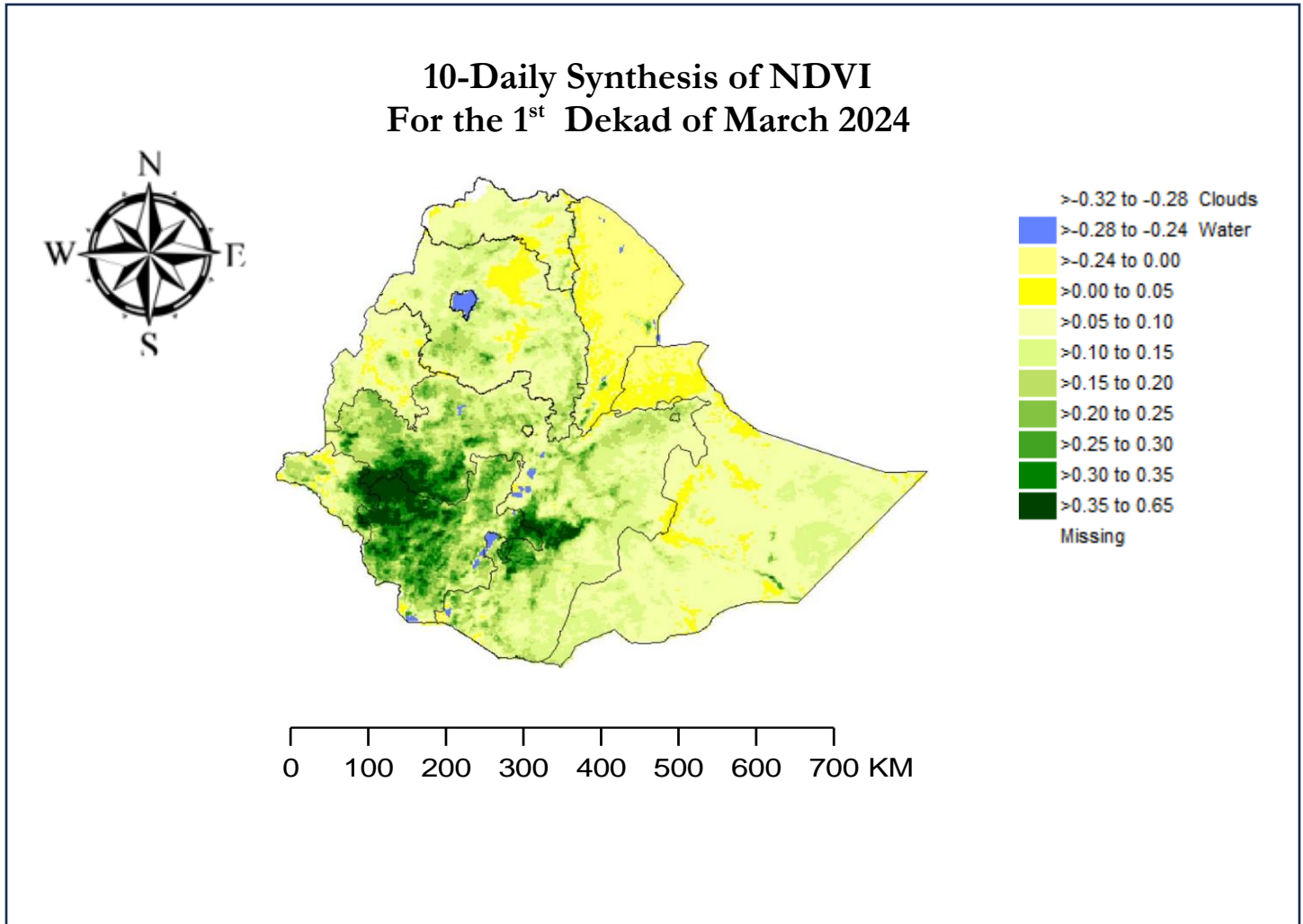
Previous dekad

## Comparison with the ground observation

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



## 10-Daily Synthesis of NDVI



### Assessment of synthesis NDVI for the 1<sup>st</sup> dekad of March 2024

NDVI distribution for this dekad declared high greenness over some parts of the country. Whereas low NDVI values have been observed over most parts of the country. Hence, South West Ethiopia, Sidama, South Ethiopia, western Oromia, Gambella, Adjoin areas of Oromia and Sidama regions are covered by high to moderate greenness. Afar, most parts of Tigray, Amhara, Somali, Benishangul Gumuz, and some parts of 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 normals shows that a large to a small increase of greens was observed in South West Ethiopia, South Ethiopia, Gambella, some parts of Oromia, some parts of Somali, a few parts of Benishangul Gumuz and Amhara regions. On the other hand, a small decrease in greenness was observed in most of Amhara, Afar, Oromia, and pocket areas of Somali regions.

