Meteorological Data and Climatology Lead Excutive

Climatology and Remote Sensing Desk

Ten Daily Satellite Ranfall Estimation and Vegetation Coverage Bulletin

1st Dekad of February 2024

Date: Feb 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 useable 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 cloud, vegetation and other parameters from part 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 TAMSATA group based in UK and Copernicus for producing dekadal rainfall estimate and vegetation greenness bulletin. 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

Fetene Techome
Director General
Ethiopia Meteorology Institute
P.O. Box 1090
Tel: 0115-51 22 99
Fax 0115-51 70 66
E-mail: ethiomet.gov.et
Addis Ababa

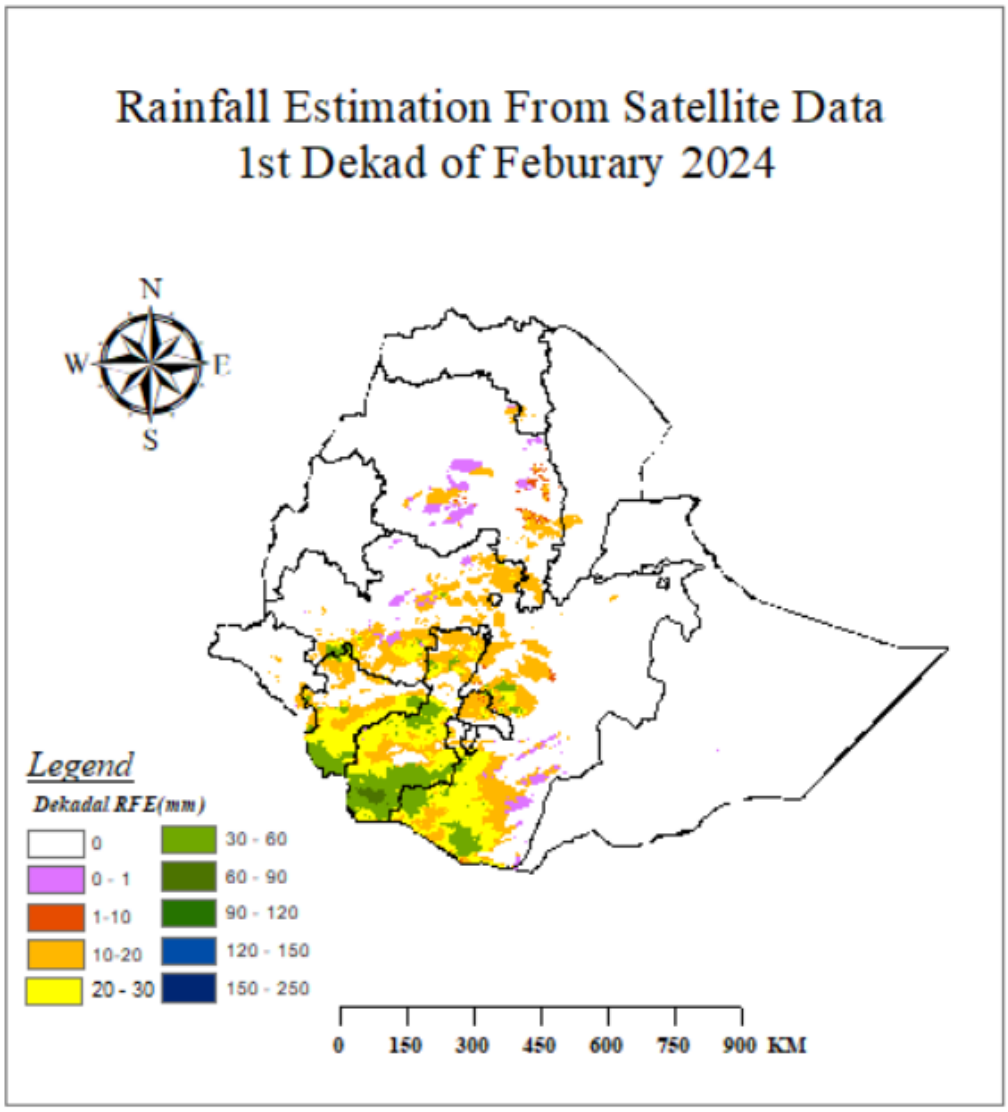
Introduction

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, and 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 etal).

In this bulletin, the 1st Dekad of February 2024 satellite rainfall estimation and vegetation greenness was produced with the help of TAMESAT and METOSAT vegetation product. During this dekad, some part of Belg rain benefiting areas receive moderate rainfall as result of strong relationship between rainfall and Normalized vegetation index (NDVI) some Belg rain benefiting areas (southern, southwest and southeast part) of the country was covered by Vegetation. On the other hand, southern, eastern and southeast part of the country receive minimum to no rainfall and the low to bare greens was observed in the country.

Rainfall Estimation from Satellite Data

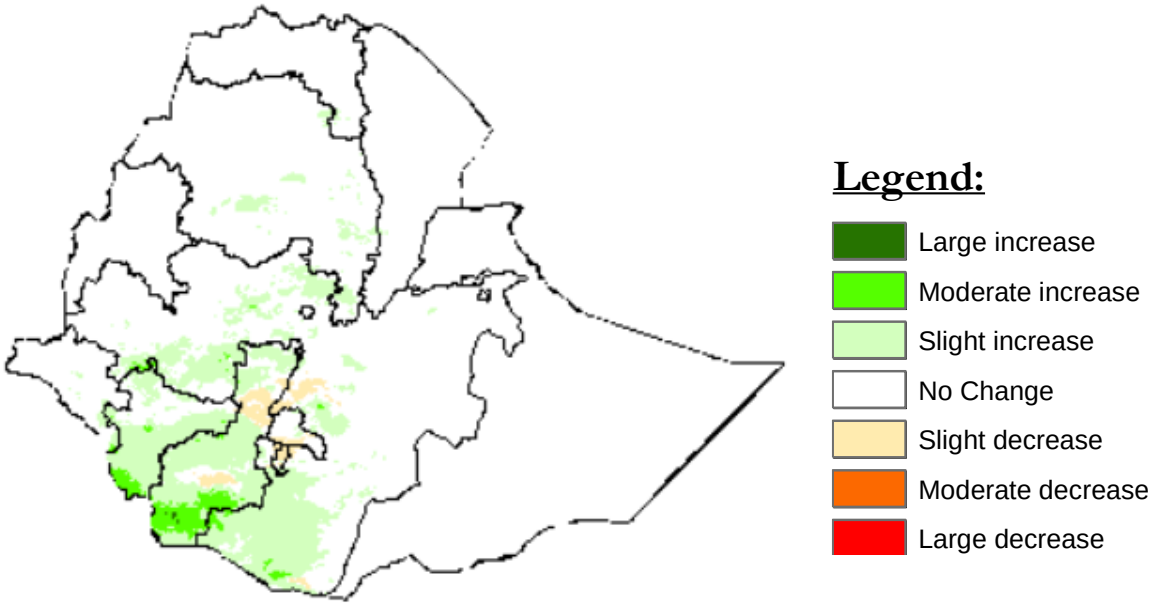


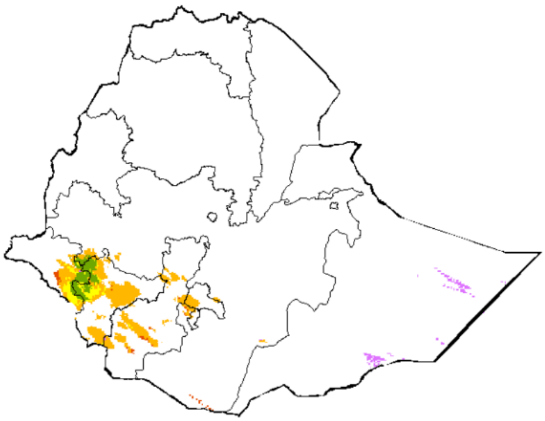
Rainfall distribution

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 February, rainfall has commenced in various parts of the country. Specifically, Rainfall has been observed in southwest Ethiopia, South Ethiopia, Central Ethiopia, Sidama, southern and central Oromia, with some areas in the Amhara region receiving between 10 to 90 mm of rainfall. Conversely, no rainfall has been recorded in the remaining areas of the country.

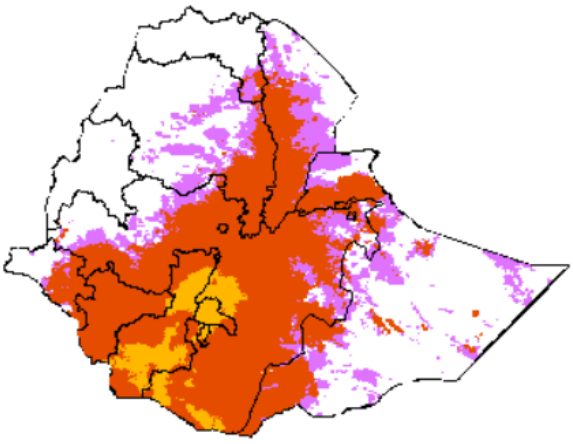
Comparison with climatological normal

In this dekad the comparison of satellite rainfall estimation and climatological average shows that there was moderate to slight increase of rainfall was observed in south-west Ethiopia, South Ethiopia, Central Ethiopia, south and central Oromia and few part of Amhara region. On the other hand, slight decrease of rainfall was observed in a few areas of adjoin areas of central Ethiopia and south Ethiopia regions.





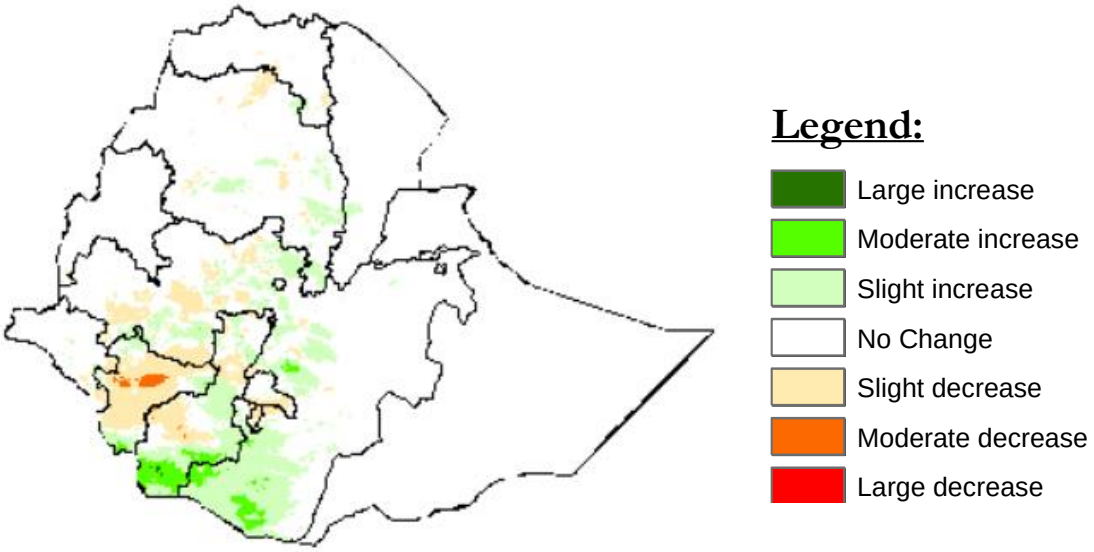
Current dekad



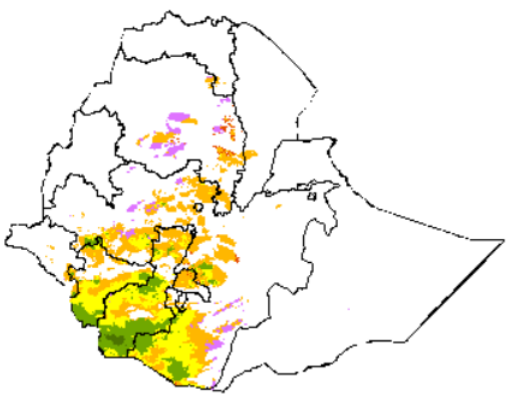
Climatological normal

Comparison with the previous Dekad

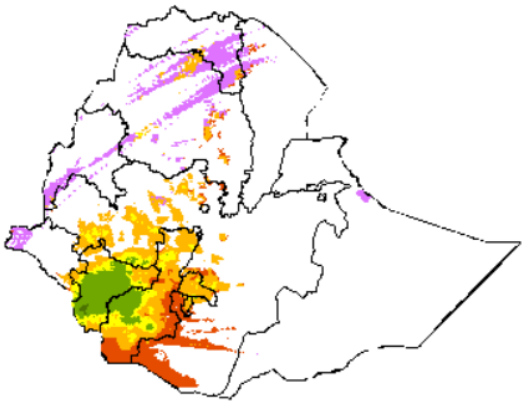
The comparison of 1st dekad of February 2024 and 3rd dekad January 2024 show that slight increase of rainfall was observed in some part of south Ethiopia, south and some part of Oromia, few part of central Ethiopia and pocket areas of Amhara regions. On the other hand, moderate to slight decrease of rainfall was observed over south west Ethiopia, south Ethiopia, and Sidama, some part of Oromia and pocket areas of Amhara region. No change on the rest part of the country.



Difference of two Dekad



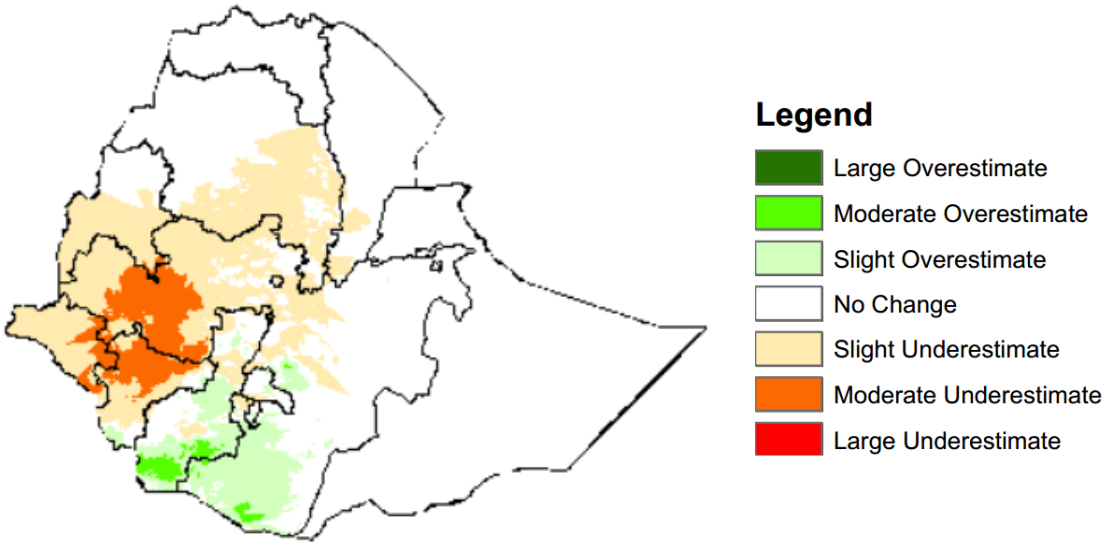
Current dekad

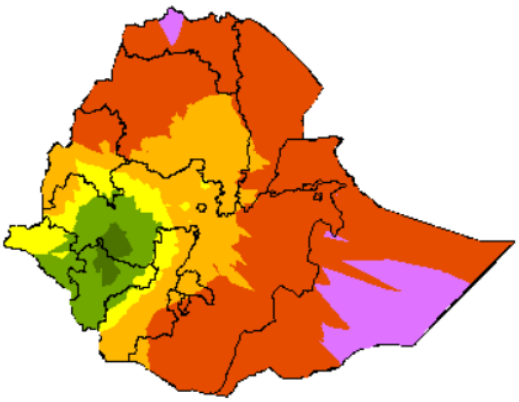


Previous dekad

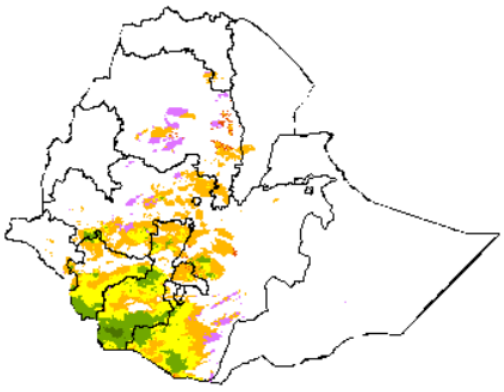
Comparison with the ground observation

The satellite rainfall estimation shows that there was an Overestimate over south Ethiopia and south Oromia regions. On the other hand, moderate to slight underestimate was observed over south-west Ethiopia, Gambella, western Oromia, most part of Benishangul Gumuz, Amhara and pocket areas of Afar regions. There is no significant difference on the rest parts of the country, it shows the same pattern as compared with the Actual.



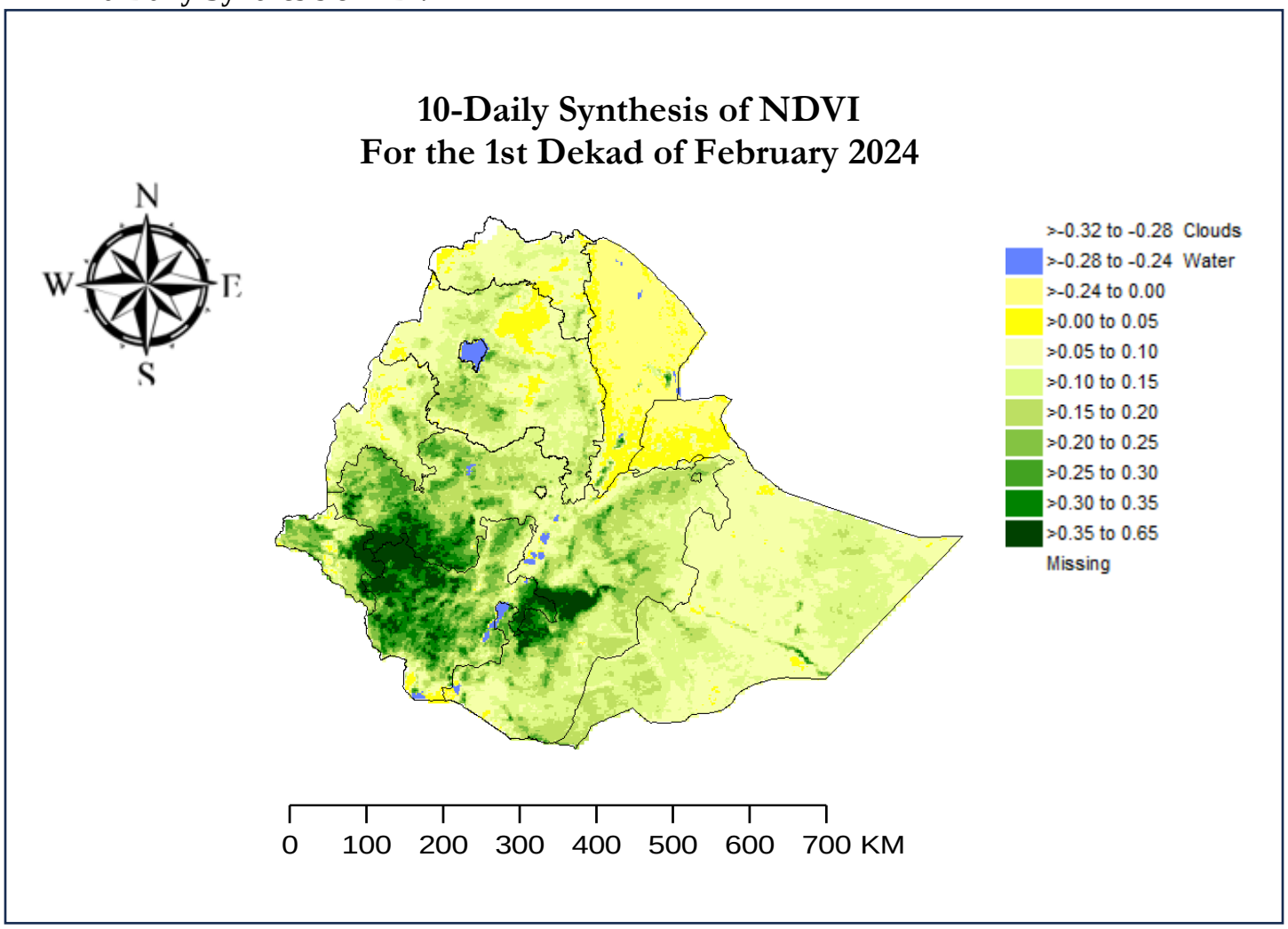


Ground Observation



Satellite rainfall estimation

10-Daily Synthesis of NDVI



Assessment of synthesis NDVI for the 1st dekad of February 2024

NDVI distribution for this dekad declared high greenness over some parts of the country. Whereas low NDVI value have been, observe over most parts of the country. Hence, South-west Ethiopia, Sidama, South Ethiopia, western Oromia, Adjoin areas of Oromia and Sidama and Gambella regions covered by high to moderate greenness. Afar, most part of Tigray, Amhara, Somali, Benishangul Gumuz and some part of Oromia regions covered by low to bare greenness. (Refer the *actual* figure above).

Comparison with the Climatological Normal

The comparison of current dekad with climatological normal show that large to small increase of greens was observed in South west Ethiopia, Gambella, South Ethiopia, most part of Oromia, Somali and few part of Benishangul Gumuz regions. On the other hand, small decrease of greenness was observed in most part of Afar, some part of Amhara, pocket areas of Somali and Tigray regions.