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ASIS 2 (2018) vs. ASIS (2014)

Major improvements and extensions

September 2018

Part 1: summary

Major drought indicators, already in ASIS 1:

- ASI: % of (crop/grass) pixels with Mean VHI < 35% (major drought indicator) per GAUL 2 region.
- Mean VHI: Per pixel, VHI accumulated over the growing season.

$$\text{M-VHI} = \sum_1^n VHI\ d$$

New drought indicators in ASIS 2:

- Drought Intensity:
  - » Characterize drought intensity (Mild, Moderate, Severe, Extreme) by:
  - » Per region, aggregated weighted mean of pixel-based μVHI with Kc introduced.

$$\mu\text{VHI} = \sum_1^n Kc * VHI\ d$$

- Drought probabilistic forecast: probability to have drought at EOS.
- Historic Drought Frequency: Historical frequency and recurrence of droughts on an annual basis.

Part 2: summary

Phenology:

- Per pixel, add **MOS** to SOS and EOS
- Separately for cropland (shorter seasons) and other land (including grassland – longer seasons).

Land cover maps:

- From ESA's GLOBCOVER to FAO's GLC-SHARE.

Administrative regions:

- From GAUL 2008+Sudan to GAUL 2014

Updated long-term statistics (basis for anomaly computations): add 3 years

- NDVI/BT4:   31 years   1984-2014   Global
- ECWMF-Rainfall: 27 years   1989-2015   Global
- RFE-Rainfall   20 years   1996-2015   Africa

Enhanced QuickLook maps and website (global + countries):

- New layouts, colour legends, logos, texts, etc.
- Compliant to FAO new web standards.

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New drought indicators in ASIS 2:

Drought Intensity

Aggregated weighted (by crop coefficient, Kc) mean of pixel-based µVHI per GAUL 2 region:

$$\mu\text{VHI} = \sum_1^n Kc * VHI\ d$$
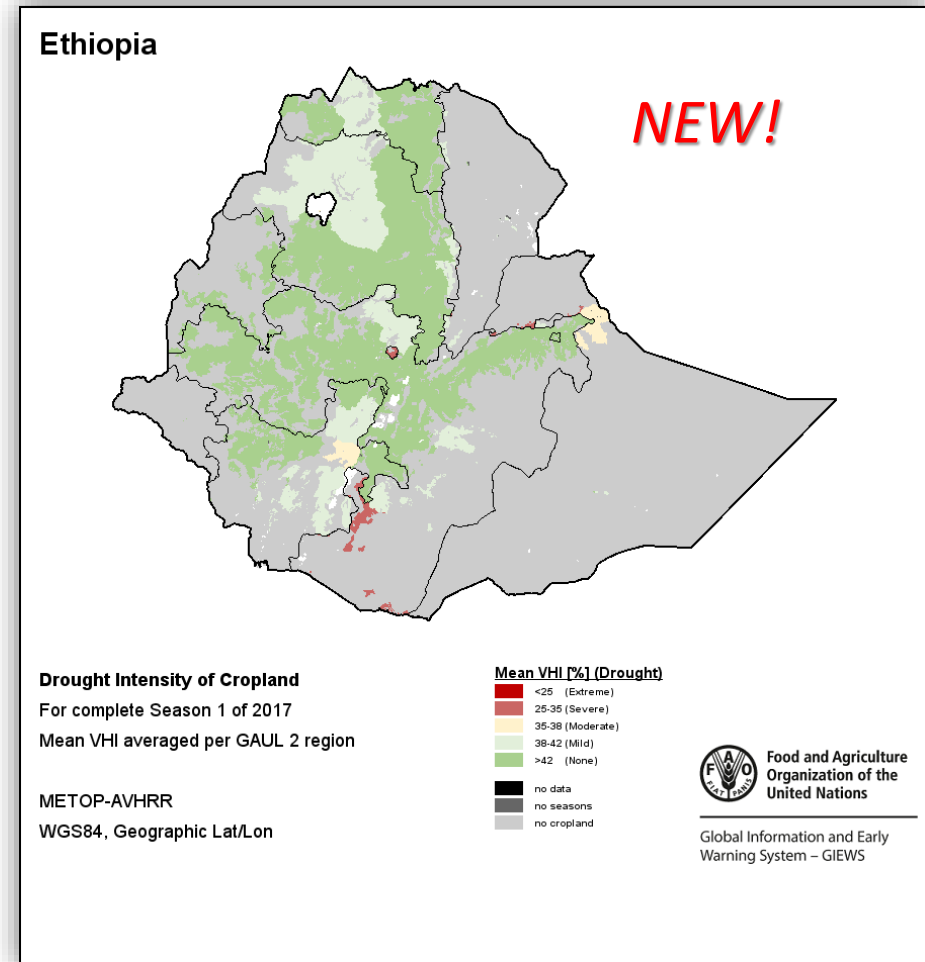
Classify the intensity of a drought as:

Mean VHI [%] (Drought)

🟥	<25 (Extreme)
🟥	25-35 (Severe)
🟨	35-38 (Moderate)
🟩	38-42 (Mild)
🟩	>42 (None)

ASIS 1:

Mean VHI: Per pixel, VHI accumulated over the growing season.

$$\text{Mean VHI} = \sum_1^n VHI\ d$$

NEW!

Ethiopia

Drought Intensity of Cropland
For complete Season 1 of 2017
Mean VHI averaged per GAUL 2 region

METOP-AVHRR
WGS84, Geographic Lat/Lon

Mean VHI [%] (Drought)
<25 (Extreme)
25-35 (Severe)
35-38 (Moderate)
38-42 (Mild)
>42 (None)
no data
no seasons
no cropland

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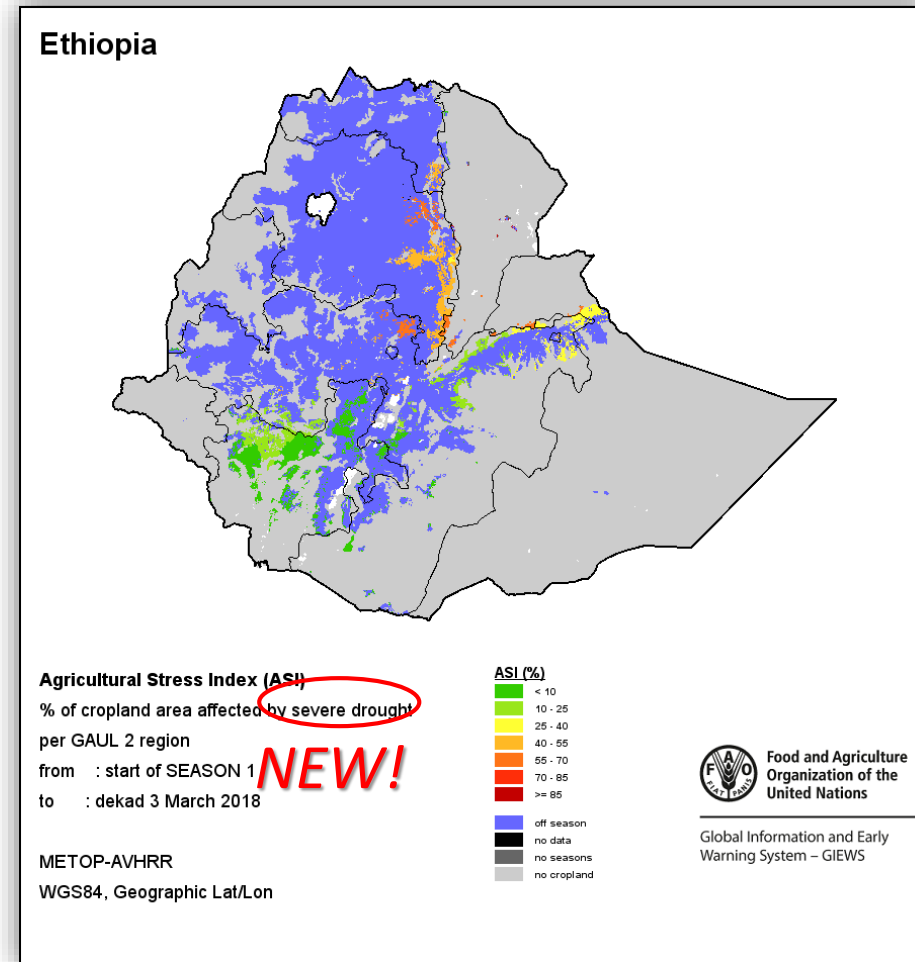Global Information and Early
Warning System – GIEWS

New drought indicators in ASIS 2:

ASI is now referred to <u>severe</u> drought conditions. (μVHI<35%)

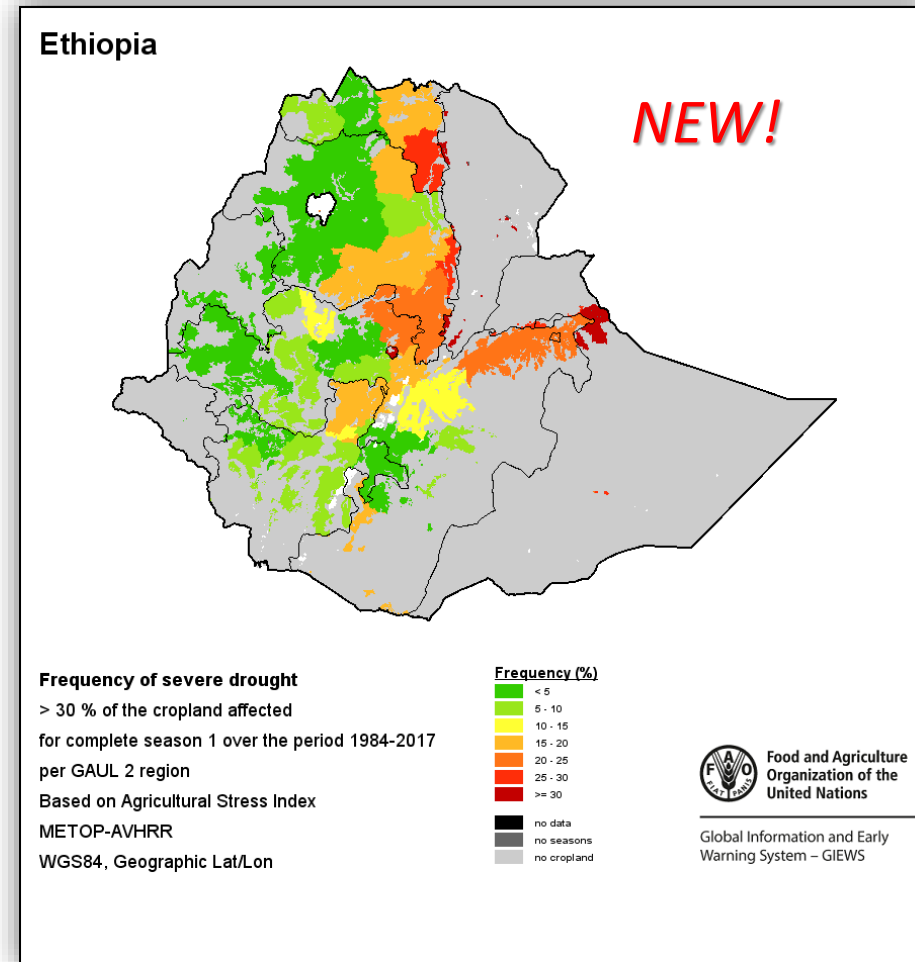Due to the introduction of the drought intensity category

Mean VHI [%] (Drought)

▇ (red)	<25 (Extreme)
▇ (dark red)	25-35 (Severe)
▇ (light)	35-38 (Moderate)
▇	38-42 (Mild)
▇ (green)	>42 (None)
▇ (blue)	off season
▇ (black)	no data
▇ (dark grey)	no seasons
▇ (grey)	no cropland

Ethiopia

Agricultural Stress Index (ASI)
% of cropland area affected by severe drought
per GAUL 2 region
from   : start of SEASON 1
to   : dekad 3 March 2018

NEW!

METOP-AVHRR
WGS84, Geographic Lat/Lon

ASI (%)
- < 10
- 10 - 25
- 25 - 40
- 40 - 55
- 55 - 70
- 70 - 85
- >= 85
- off season
- no data
- no seasons
- no cropland

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Global Information and Early
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New drought indicators in ASIS 2:

Historic Drought Frequency

ASIS 2 shows the frequency of severe drought in areas where:

- o 30 percent of the cropland;

or

- o 50 percent

has been affected.

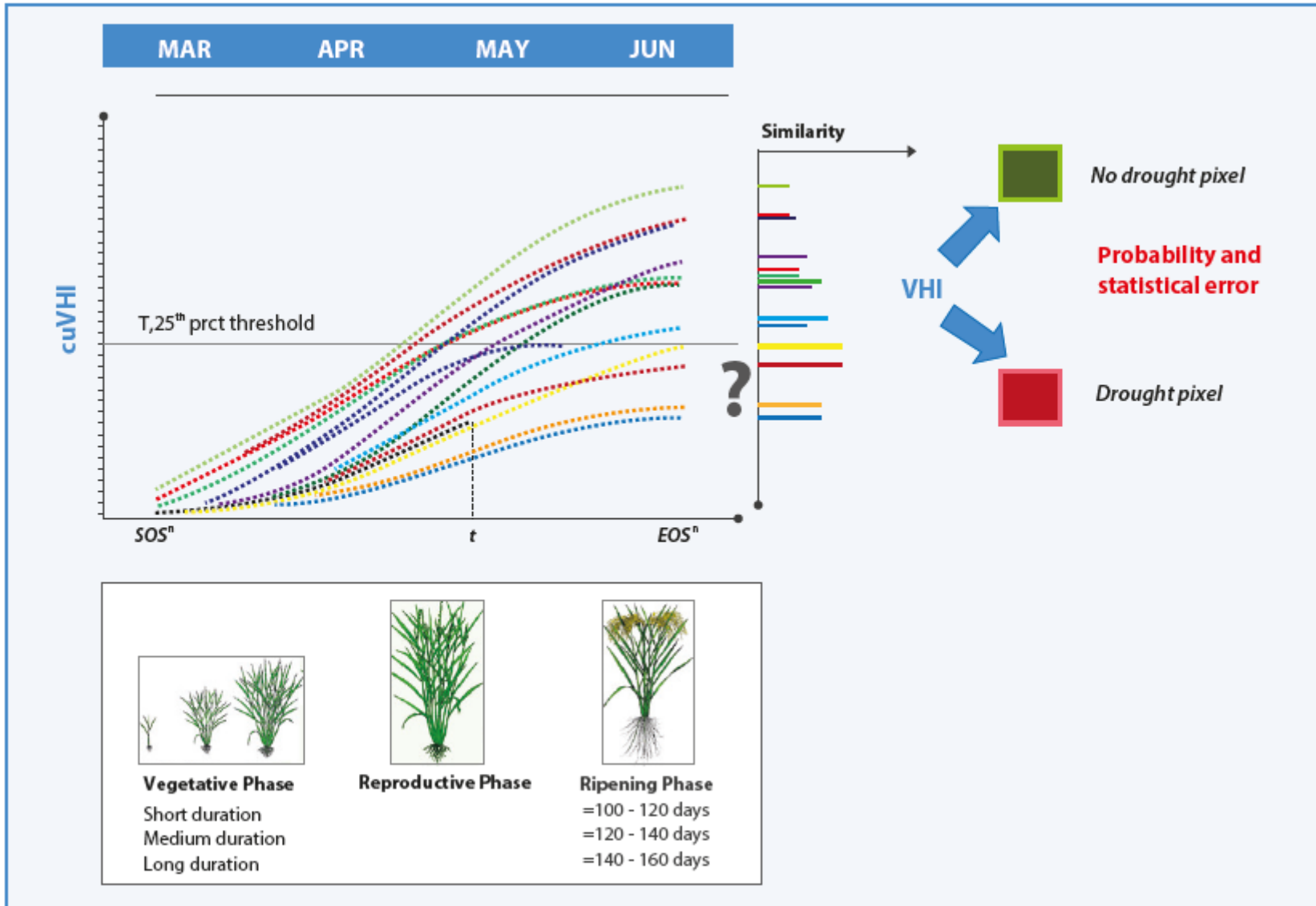- The historical frequency of severe droughts is based on the entire times series (1984-2017).

Ethiopia

NEW!

Frequency of severe drought
> 30 % of the cropland affected
for complete season 1 over the period 1984–2017
per GAUL 2 region
Based on Agricultural Stress Index
METOP-AVHRR
WGS84, Geographic Lat/Lon

Frequency (%)
- < 5
- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- 25 - 30
- >= 30
- no data
- no seasons
- no cropland

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Global Information and Early Warning System – GIEWS

New drought indicators in ASIS 2:

Drought Probabilistic Forecast (internal use only)

- The probability of drought conditions occurring **by the end of the growing season.**
- The reliability of the forecast will increase **as the season progresses** (more observations incorporated in the calculation).
- This indicator is provided at country level only.

Ethiopia

NEW!

Probability of Drought at the End of Season
Estimated at dekad 3 of August 2018
Per GAUL2 region: Cropland Pixels with One Season
Based on full archive of VHI images (1984-present)
METOP-AVHRR
WGS84, Geographic Lat/Lon

Drought Prob. [%]
- 00 - 20
- 20 - 40
- 40 - 60
- 60 - 80
- 80 - 100
- off season
- other land

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Drought probabilistic forecast (internal use only)

At the beginning of the season, the probability is based on the **historical probability frequency** at GAUL 2 level.

As the agricultural season proceeds, adjust the probability on the basis of recent data.

Once **at least half of the crop cycle has elapsed**, the omission error is reduced and the probability of correctly classifying the area as drought-affected **increases.**

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PHENOLOGY

The days corresponding to certain levels of NDVI development are called SOS, MOS and EOS (respectively Start, Maximum and End of Season), and they are always fixed (per pixel) over the years (for 1 or 2 annual cycles).

SOS/MOS/EOS are different for cropland (shorter seasons) and other land types (including grassland – longer seasons):

Growing season for cropland

SOS	MOS	EOS
25 percent	100 percent	**75** percent

Growing season for grassland

SOS	MOS	EOS
25 percent	100 percent	**25** percent

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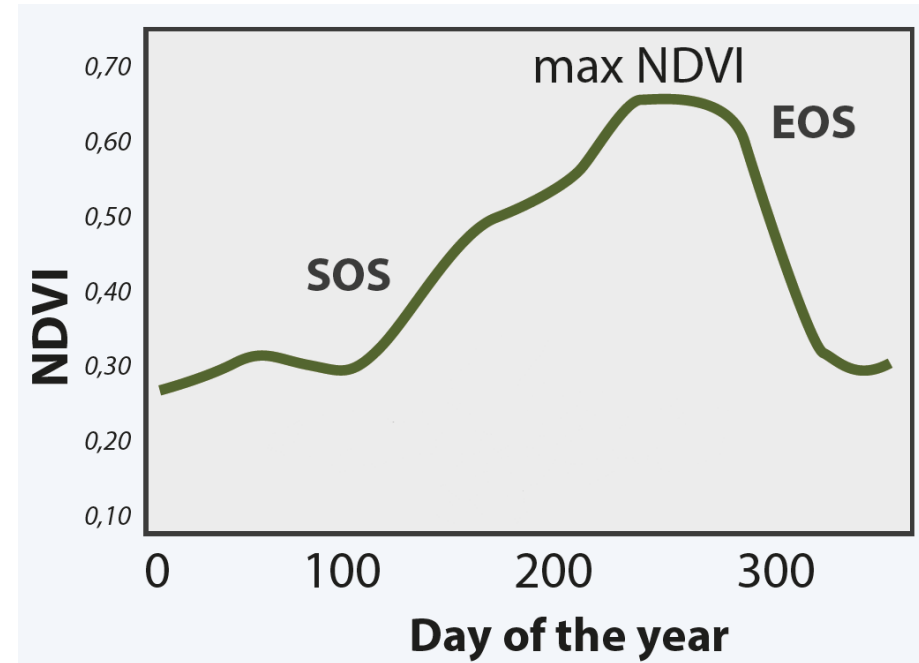
LAND COVER (1)

ASIS 1 Cropland mask

ASIS 2 Cropland mask

Cropland Mask

Pixels with Cropland Area >= 5%

Derived from GLC-Share V1.0

WGS84, Geographic Lat/Lon
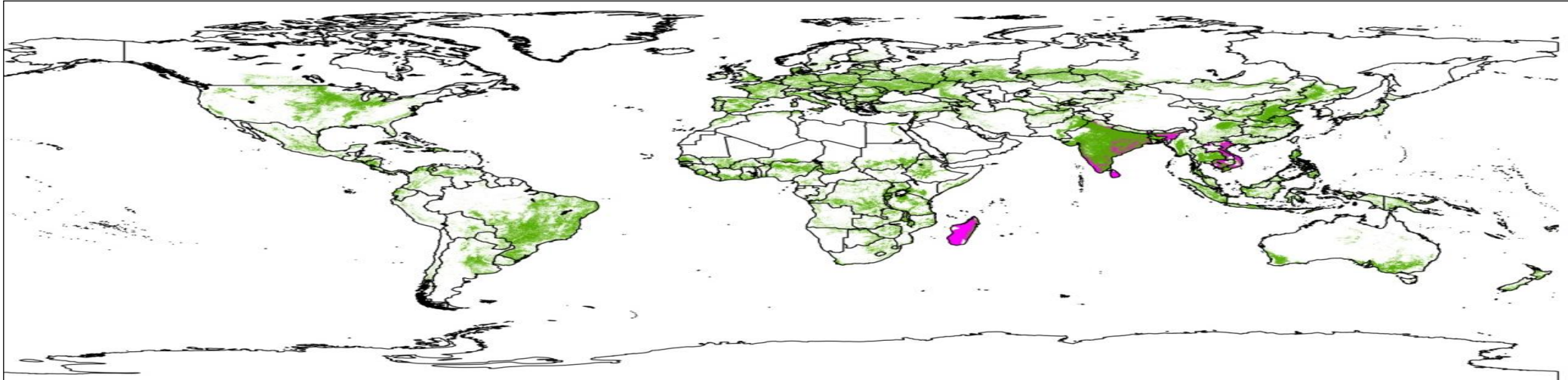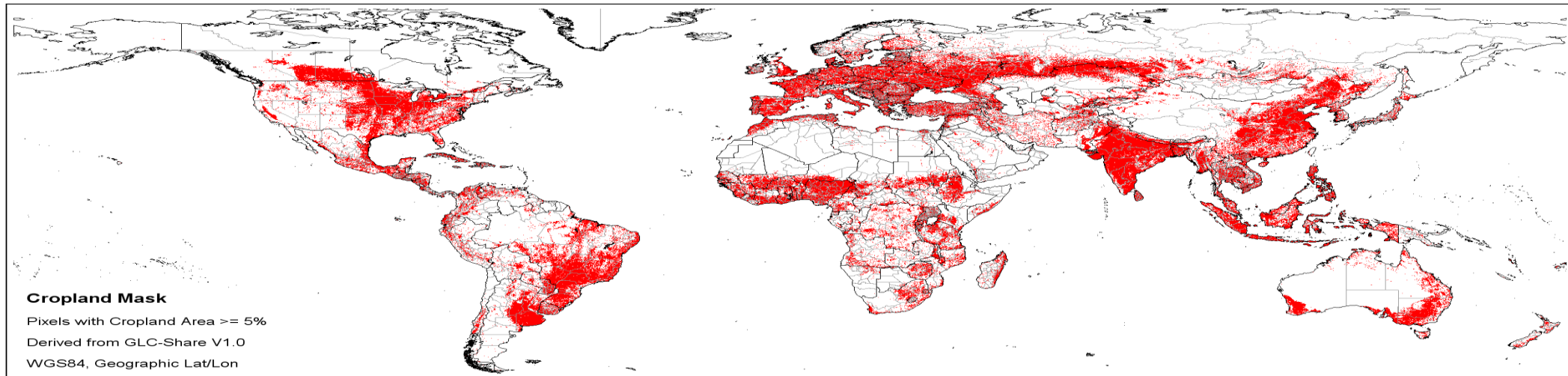
LAND COVER (2)

In addition to cropland, ASIS 2 now also produces all results for grassland.
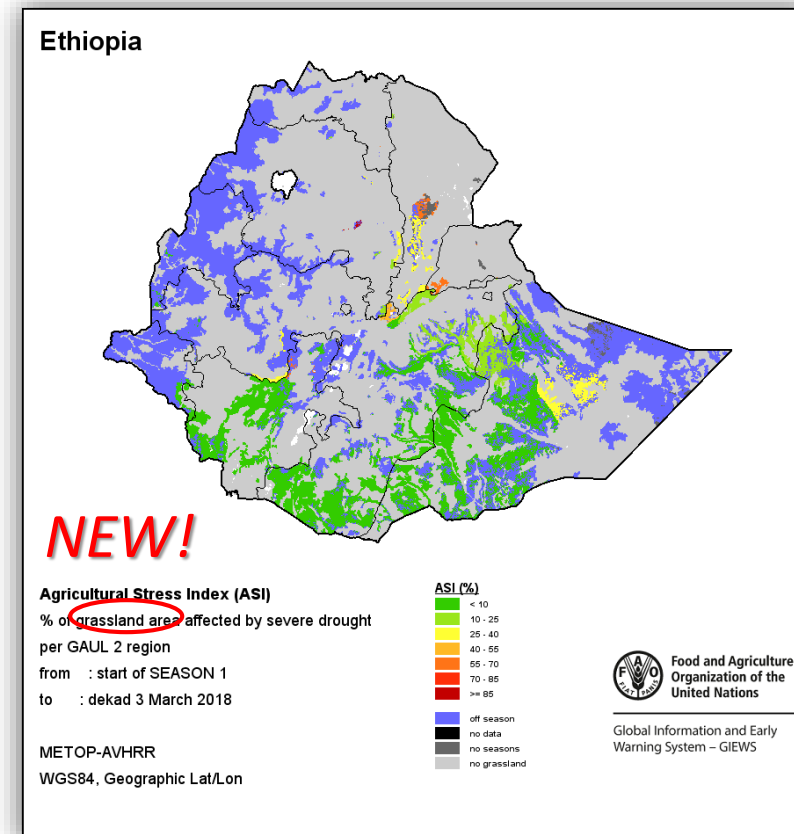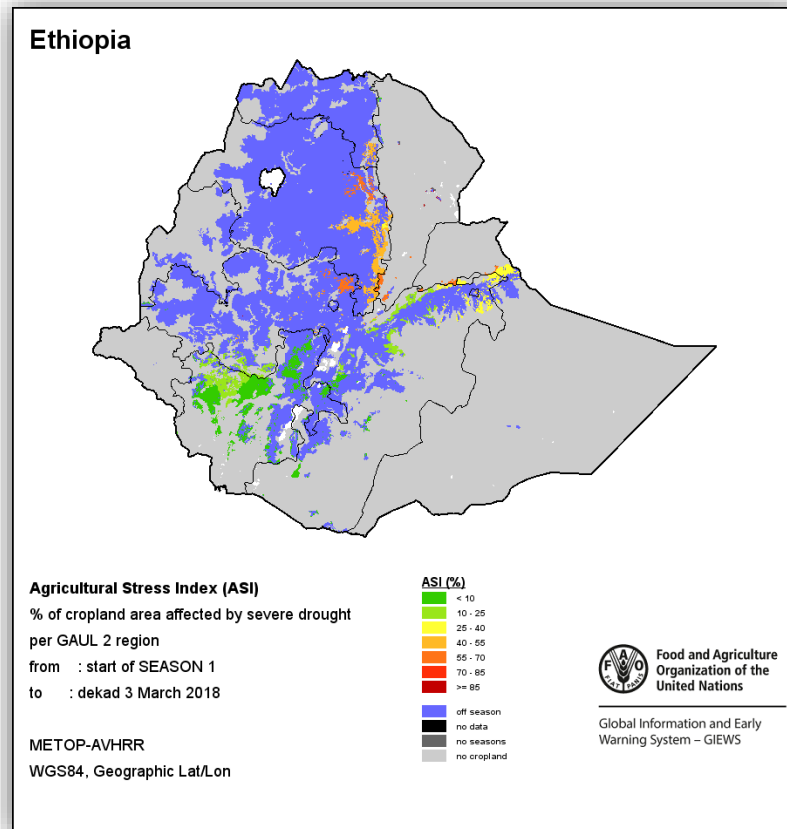
ADMINISTRATIVE REGIONS

From GAUL 2008+split of Sudan to GAUL 2014

- Level 0: Abyei (new added)

- Level 1: major countries: Uganda, Senegal, United Republic of Tanzania,
  Côte d'Ivoire, Egypt, Mozambique.
- Level 2: Argentina, Australia, Canada, Estonia, Mauritania, Mongolia, Mozambique, Panama, Sierra Leone, Sudan, USA etc.

- Disputed areas remain unchanged.

UPDATED LONG-TERM STATISTICS - BASIS FOR ANOMALY COMPUTATIONS (NDVI, VCI, TCI, VHI, RAINFALL...)

- NDVI/BT4:   31 years   1984-2014   Global
- ECWMF-Rainfall: 27 years   1989-2015   Global
- RFE-Rainfall: 20 years   1996-2015   Africa

Enhanced Quick-look maps and website (1)

New colour legends and logos
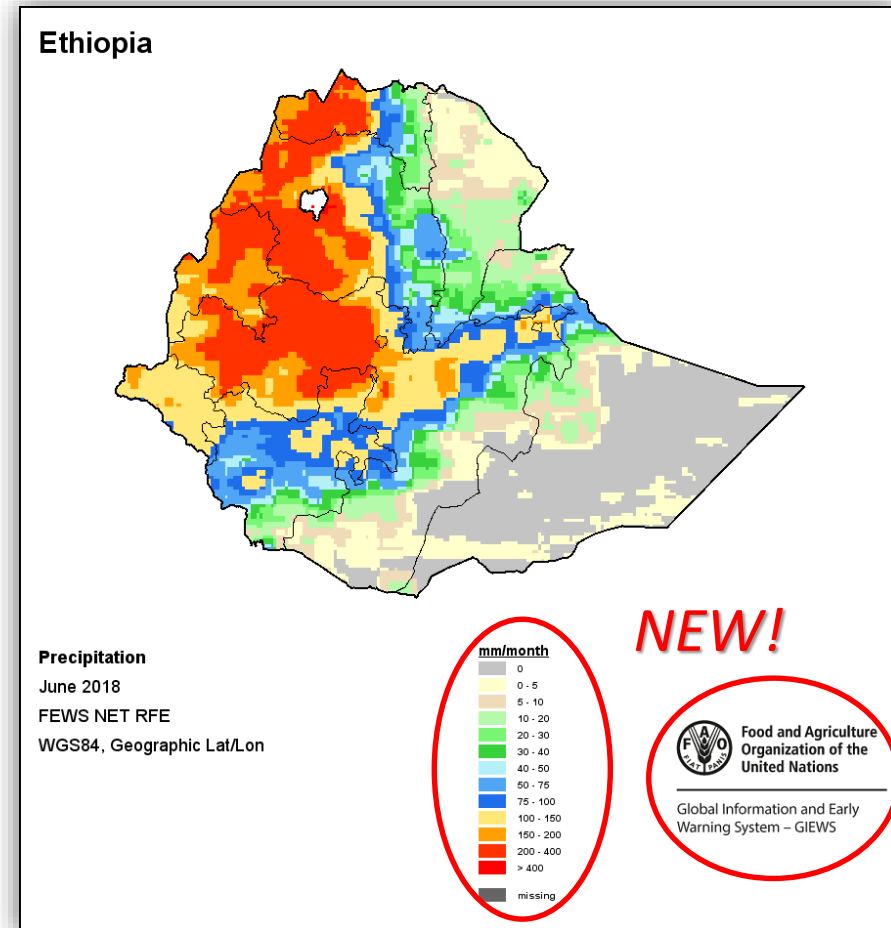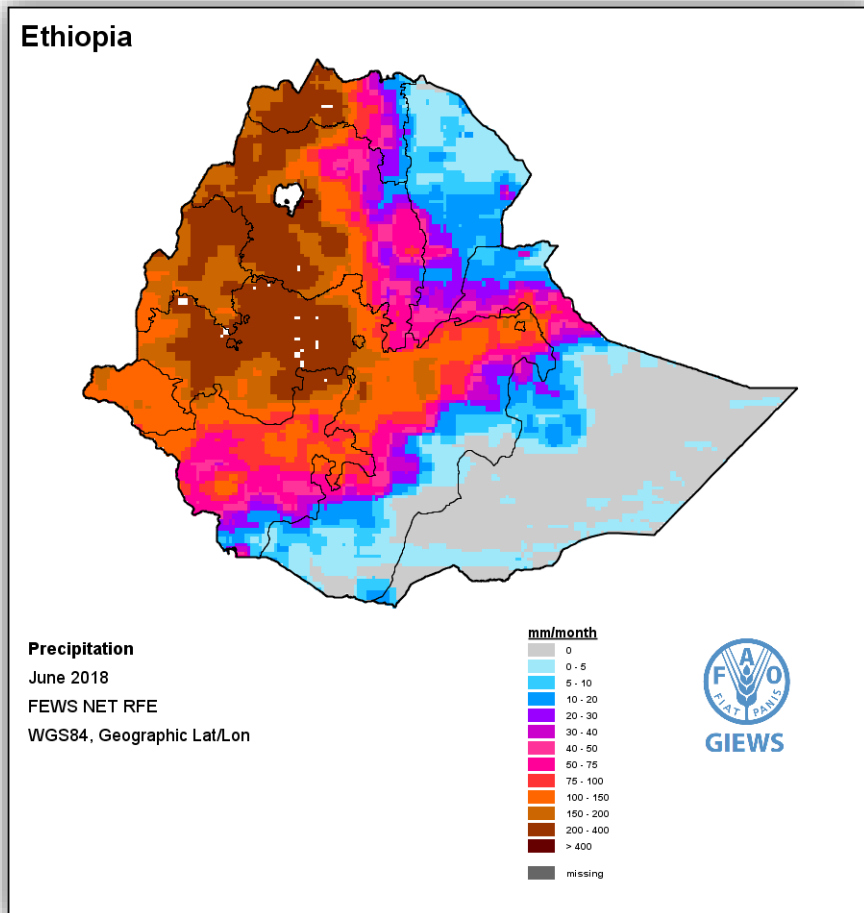
Enhanced Quick-look maps and website (2)

New texts: succinct summaries

Vegetation Health Index ⊟ **More**

The Vegetation Health Index (VHI) is a composite index and the elementary indicator used to compute the ASI. It combines both the VCI and the Temperature Condition Index (TCI). The TCI is calculated using a similar equation to the VCI, but relates the current temperature to the long-term maximum, as it is assumed that higher temperatures tend to cause a deterioration in vegetation conditions. A decrease in the VHI following, for example, a decline in the VCI (relatively poor green vegetation) and an increasing TCI (warmer temperatures) would signify stressed vegetation conditions, and over a longer period would be indicative of drought. The VHI components (VCI and TCI) are given equal weights when computing the index. The VHI images are computed for the two main seasons and in three modalities: dekadal, monthly and annual.

Country level: ▼
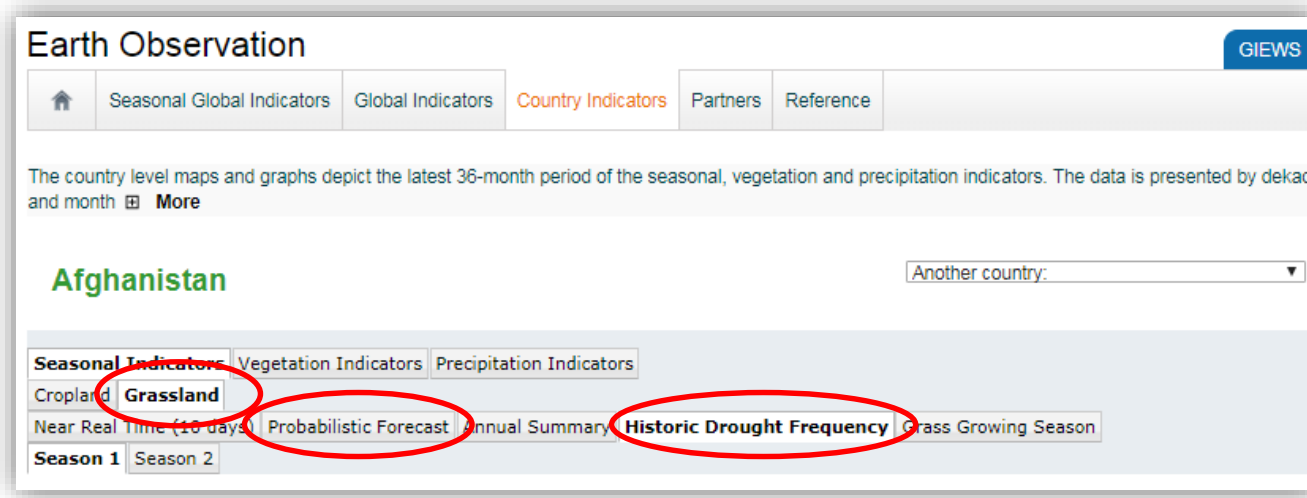
VHI
< 0.15

NEW!
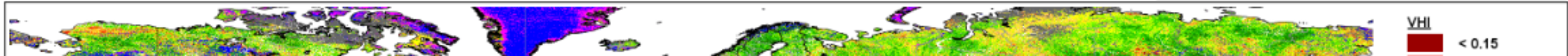
Vegetation Health Index ⊟ **More**

The Vegetation Health Index (VHI) illustrates the severity of drought based on the vegetation health and the influence of temperature on plant conditions. The VHI is a composite index and the elementary indicator used to compute the ASI. It combines both the Vegetation Condition Index (VCI) and the Temperature Condition Index (TCI). The TCI is calculated using a similar equation to the VCI, but relates the current temperature to the long-term maximum and minimum , as it is assumed that higher temperatures tend to cause a deterioration in vegetation conditions. A decrease in the VHI would, for example, indicate relatively poor vegetation conditions and warmer temperatures, signifying stressed vegetation conditions, and over a longer period would be indicative of drought. The VHI images are computed for the two main seasons and in three modalities: dekadal, monthly and annual.

Country level: ▼

VHI
< 0.15

15

Enhanced Quick-look maps and website (3)

New Tabs

Graph Tab moves to the respective indicator sections

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Enhanced Quick-look maps and website (3)

User manual and training materials

New section on
Reference page

Video: FAO Agricultural Stress Index System - ASIS

GIEWS Earth Observation website: A brief user guide

Country-Level ASIS: an agriculture drought monitoring system