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MARYLAND



FEWS NET Land Data Assimilation System System (FLDAS): Noah-MP Applications in Food Security Analysis

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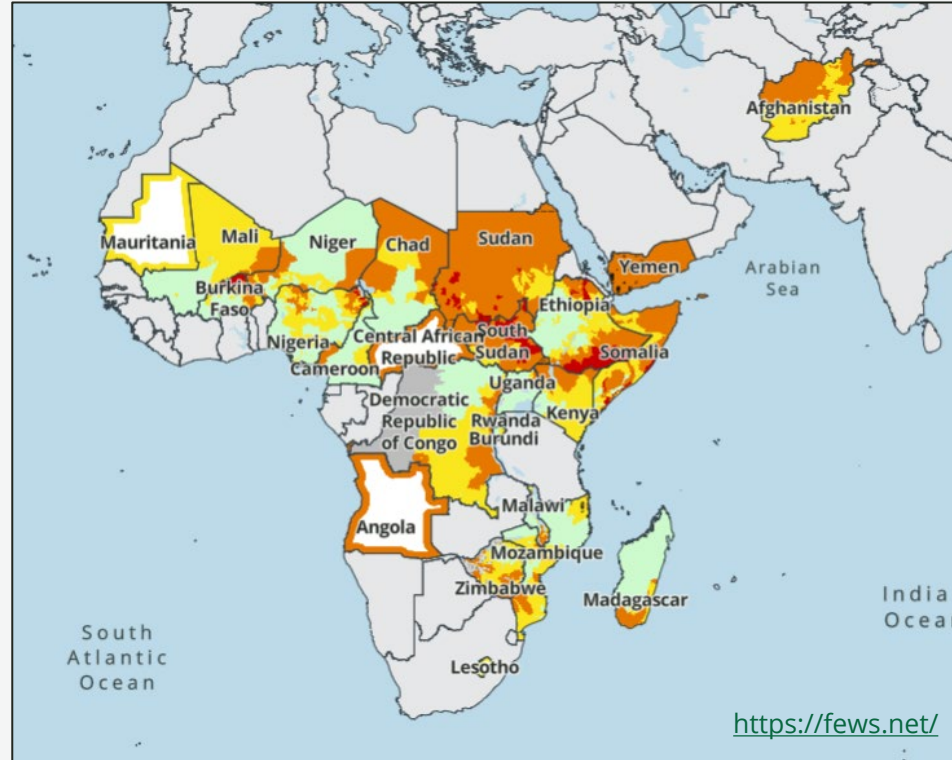
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Noah-MP International Workshop
June 4, 2024

Acute Food Insecurity Area Classification

October 2023 - January 2024 Near Term Projection

USAID's Famine Early Warning Systems Network (FEWS NET)



IPC 3.1 ACUTE FOOD INSECURITY CLASSIFICATION
Click on a country for more information

The Integrated Phase Classification (IPC) acute food insecurity scale classifies areas according to a five-phase scale of increasing severity.

Presence Countries

- 1: Minimal
- 2: Stressed
- 3: Crisis
- 4: Emergency
- 5: Famine

Not mapped

National Parks/Reserves

Remote Monitoring Countries

Highest IPC classification in areas of concern within the country

- 1: Minimal
- 2: Stressed
- 3+: Crisis or higher

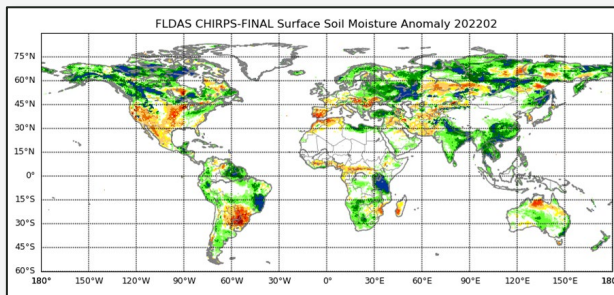
Symbols

! Would likely be at least one phase worse without current or programmed humanitarian assistance

FEWS NET is a leading provider of early warning and analysis on acute food insecurity around the world. FEWS NET relies on a global network of partners to report and provide insightful information on the severity of food insecurity in 30 countries.

FEWS NET Land Data Assimilation System

FLDAS-Global



Models:
Resolution:
Latency:
Forcings:

Noah-MP 4.0.1, HyMAP2 (In Development)

0.1 degree (~10 km), monthly

Prelim: ~5th of next month

Final: ~20th of next month

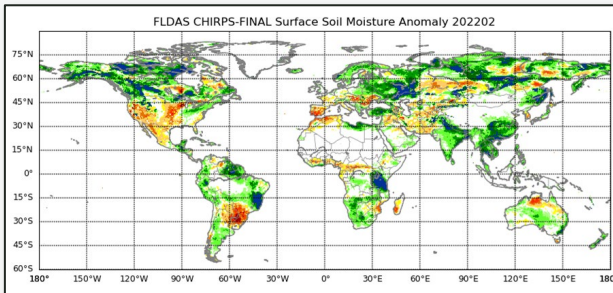
Prelim: CHIRPS-prelim (precipitation); GDAS (non-precipitation)

Final: CHIRPS-final (precipitation); MERRA2 (non-precipitation)

<https://ldas.gsfc.nasa.gov/fldas>; McNally et al. 2017, *Nature*; Sarmiento et al. (in preparation)

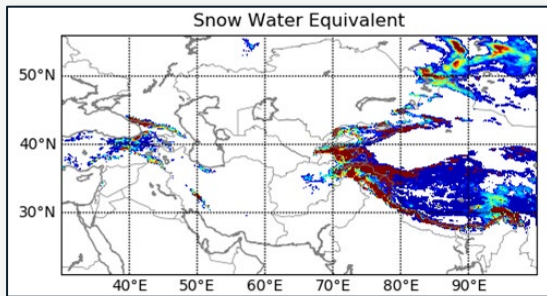
FEWS NET Land Data Assimilation System

FLDAS-Global



Models:
Resolution:
Latency:
Forcings:

FLDAS-Central Asia

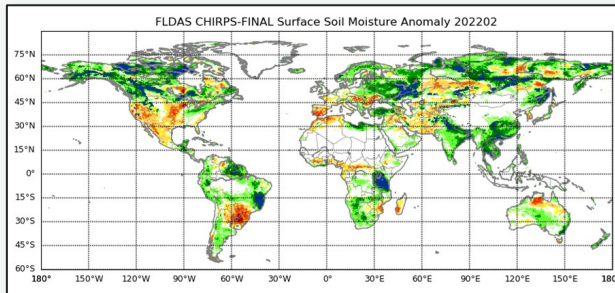


Noah-MP 4.0.1
0.01 degree (~1 km), daily
Near real-time (~ next day)
GDAS

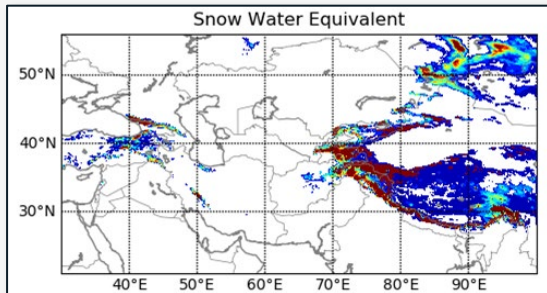
<https://ldas.gsfc.nasa.gov/fldas/>; McNally et al. 2033, ESSD

FEWS NET Land Data Assimilation System

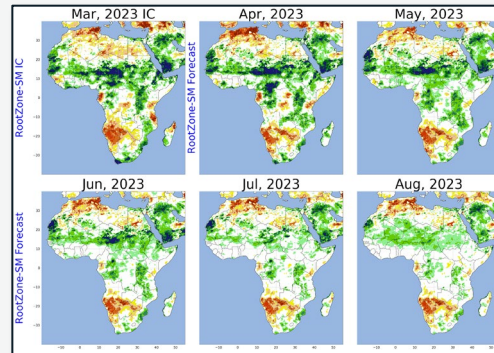
FLDAS-Global



FLDAS-Central Asia



FLDAS-Forecast



Models:
Resolution:
Latency:
Forcings:

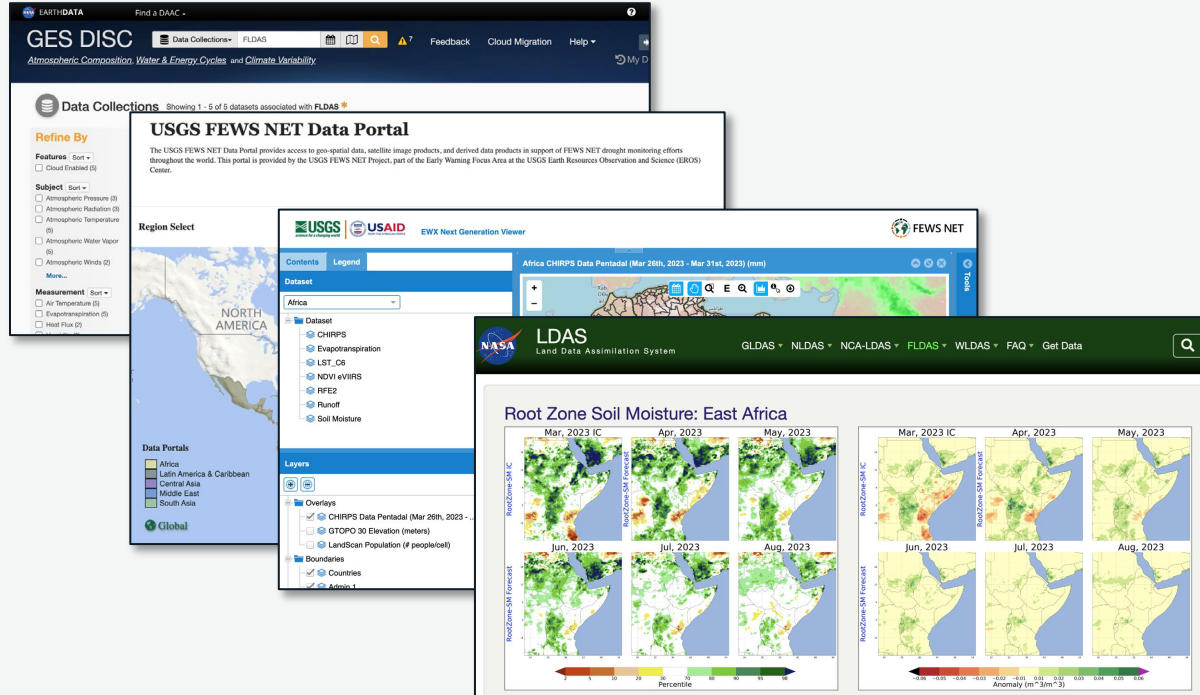
Forecasts:

Noah-MP 3.6, HyMAP2
0.25 degree (~25 km), monthly
~15th of first forecast month
Initial Conditions: CHIRPS (precip.); MERRA2 (non-precipitation)
Forecasts: North American Multi-Model Ensemble (NMME;
precipitation); GEOS (non-precipitation)
Out to 5 months

<https://ldas.gsfc.nasa.gov/fldas>; Hazra et al, 2023, J. of Hydr.; Arsenault et al. 2020, BAMS

FLDAS Data Access

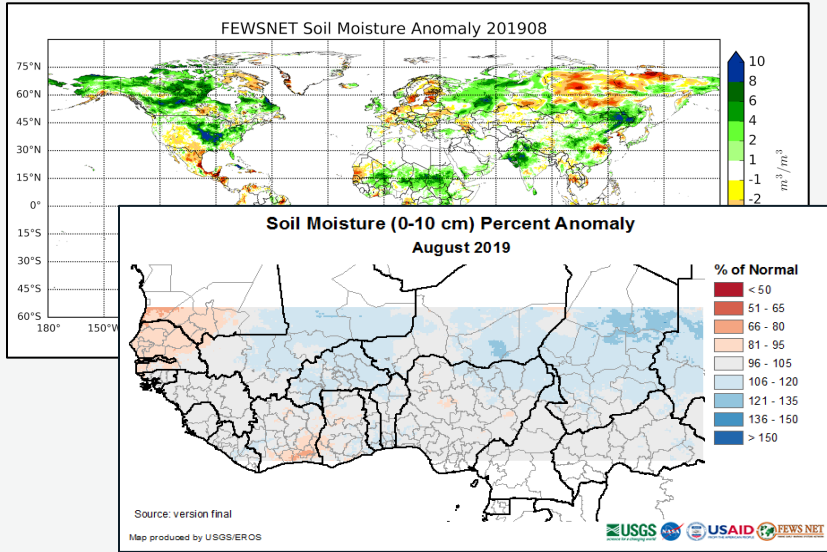
Many Sources



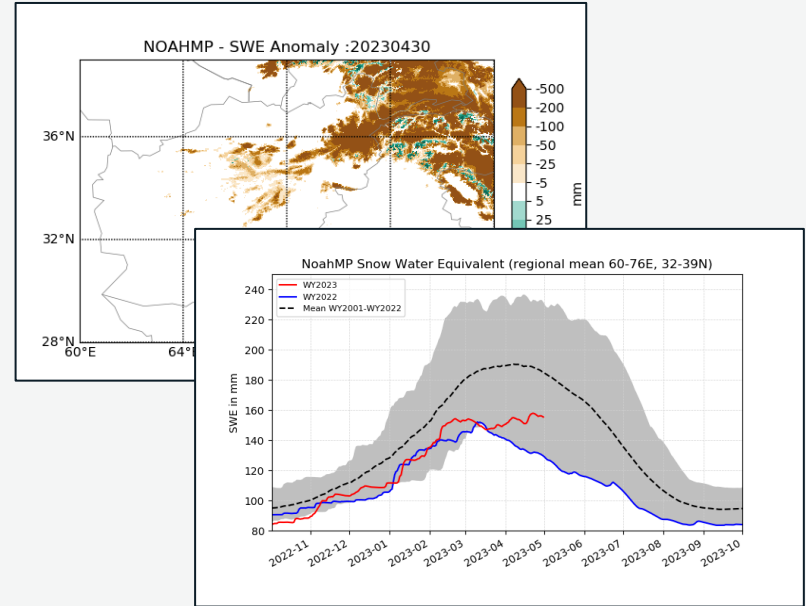
- FLDAS Website (<https://ldas.gsfc.nasa.gov/fldas>)
- Cloud (Google Earth Engine, Climate Engine)
- Partner Websites (USGS FEWS NET Website, UCSB EWX)
- GES DISC (<https://disc.gsfc.nasa.gov/datasets?keywords=FLDAS>)
- NCCS Discover and CSS

Derived Products: “Quick-Look” Indices

Soil Moisture Anomalies and Percent Anomalies



Snowpack Development and Depletion

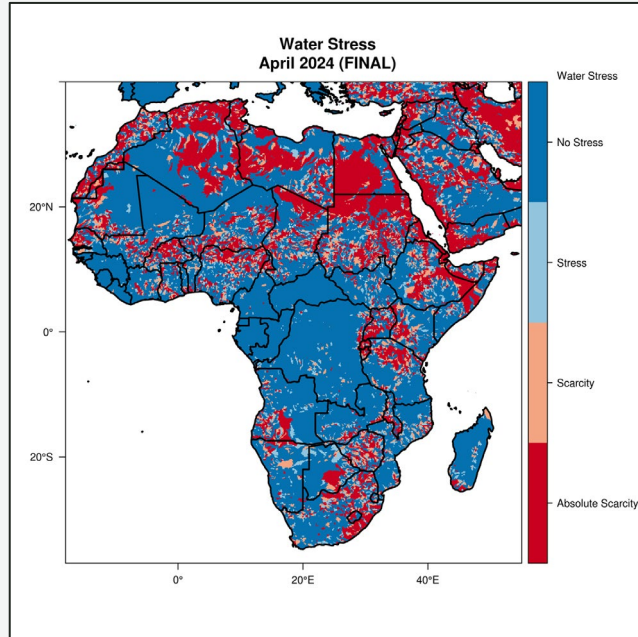


<https://ldas.gsfc.nasa.gov/fldas>, <https://earlywarning.usgs.gov/fews>

<https://ldas.gsfc.nasa.gov/fldas>

Derived Products: “Quick-Look” Indices

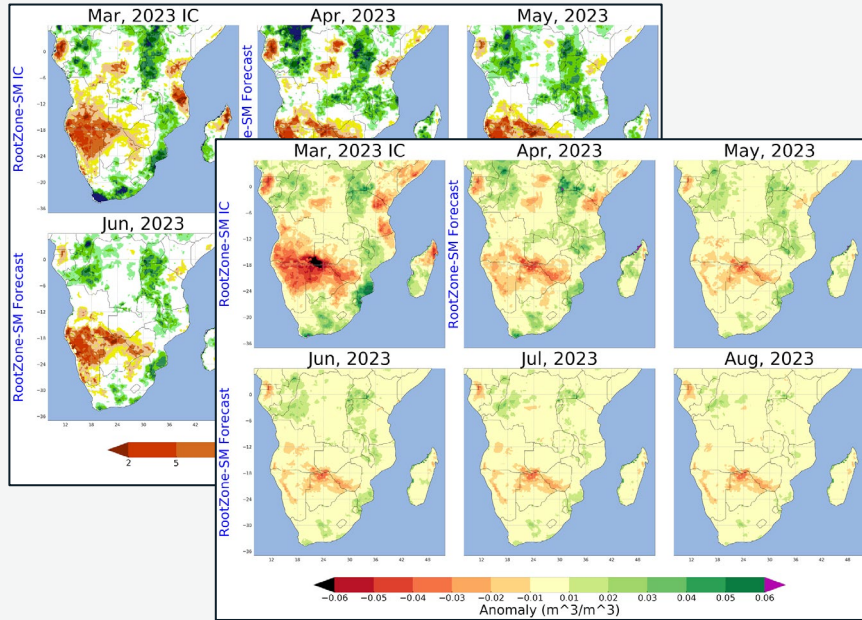
Water Stress (Falkenmark Index categories)



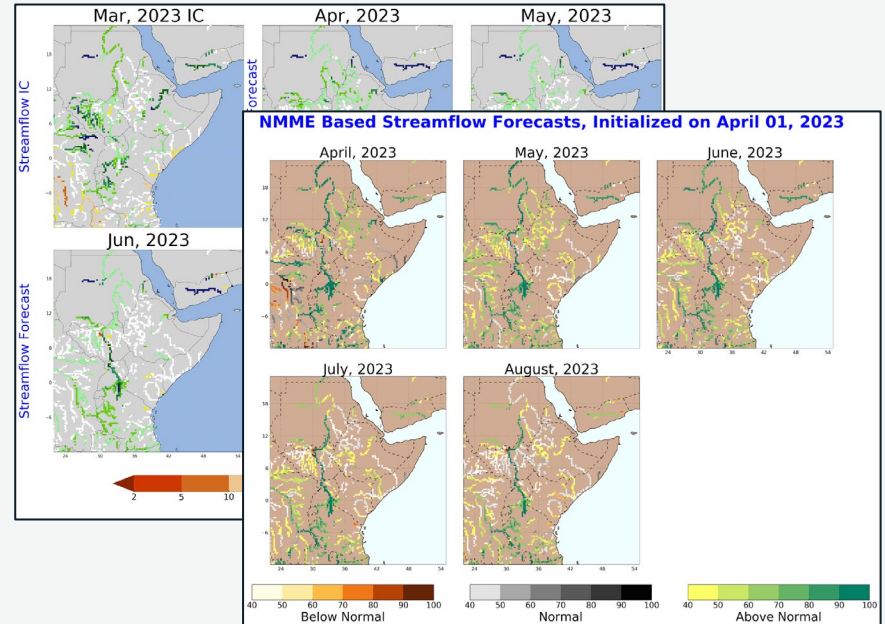
<https://ldas.gsfc.nasa.gov/fldas/>; McNally et al. 2019, Water

Derived Products: “Quick-Look” Indices

Soil Moisture Forecasts



Streamflow Forecasts

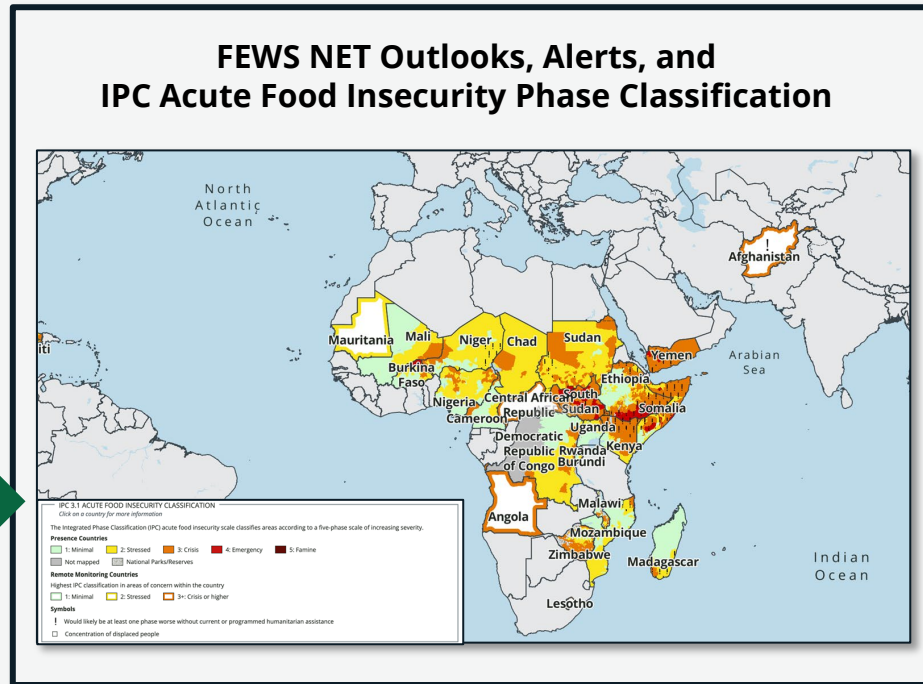
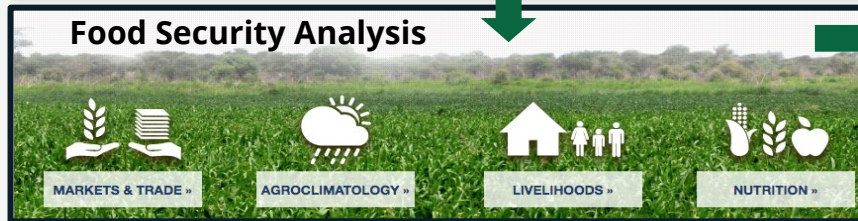
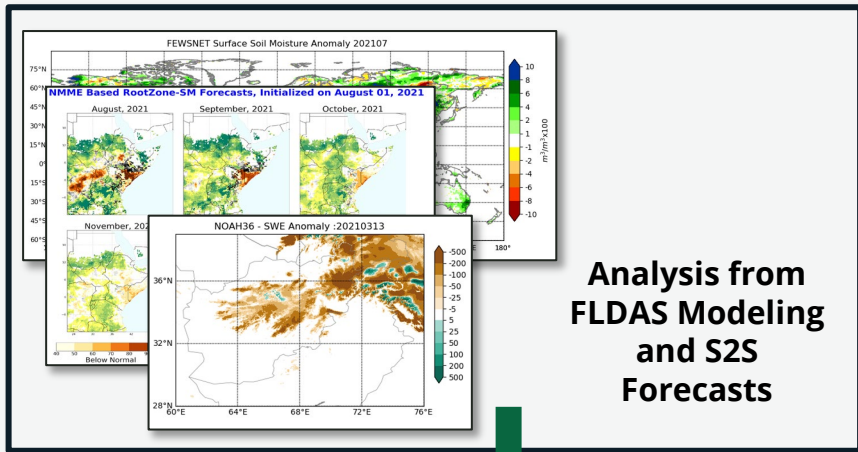


<https://ldas.gsfc.nasa.gov/fldas>

<https://ldas.gsfc.nasa.gov/fldas>

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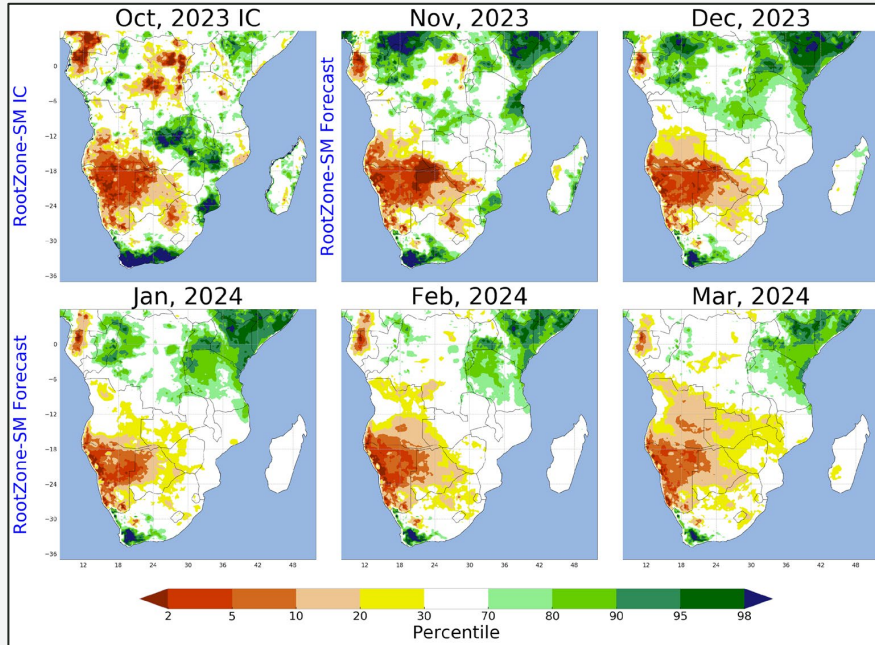
Support of the Famine Early Warning Systems Network



<https://fewsn.net/>

FLDAS Case Studies: Southern Africa Drought

November 2023 FEWS NET and SADC Food Security Alert: Strong El Niño will drive high needs across Southern Africa early 2025



Data from: <https://ldas.gsfc.nasa.gov/fldas>



Southern Africa Food Security Alert

November 8, 2023

Strong El Niño will drive high needs across Southern Africa through early 2025

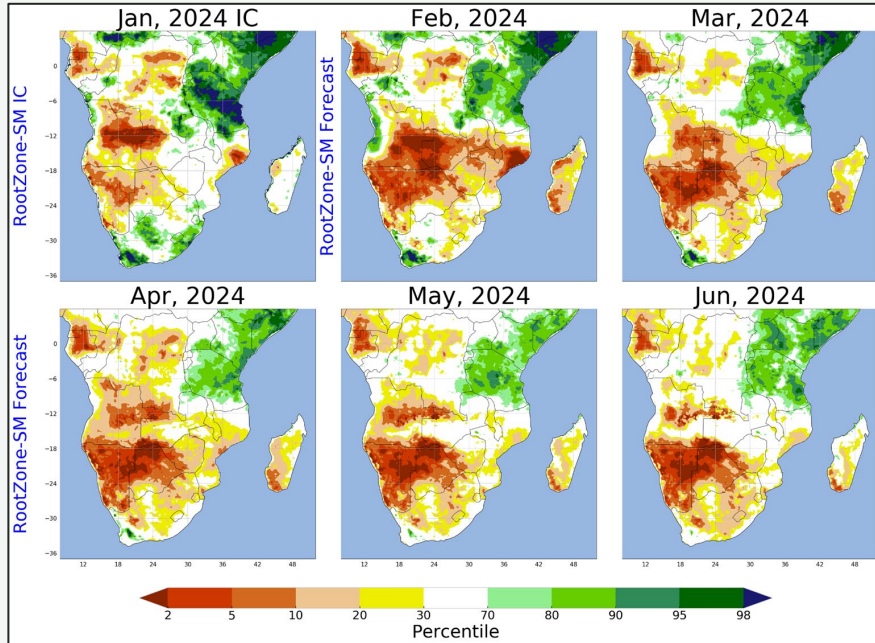
“The rainfall deficits will likely result in below-average 2024 harvests, including in surplus producing South Africa and Zambia... low labor opportunities and high food prices”

“Governments, donors, humanitarian partners, and other stakeholders should prepare for high food assistance needs through early 2025.”

<https://fews.net/southern-africa/alert/november-2023>

FLDAS Case Studies: Southern Africa Drought

February 2024 FEWS NET Outlook: Record dryness in February significantly lowers harvest prospects across the region



Data from: <https://ldas.gsfc.nasa.gov/fldas>



Southern Africa - Food Security Outlook

February - September 2024

Record dryness in February significantly lowers harvest prospects across the region

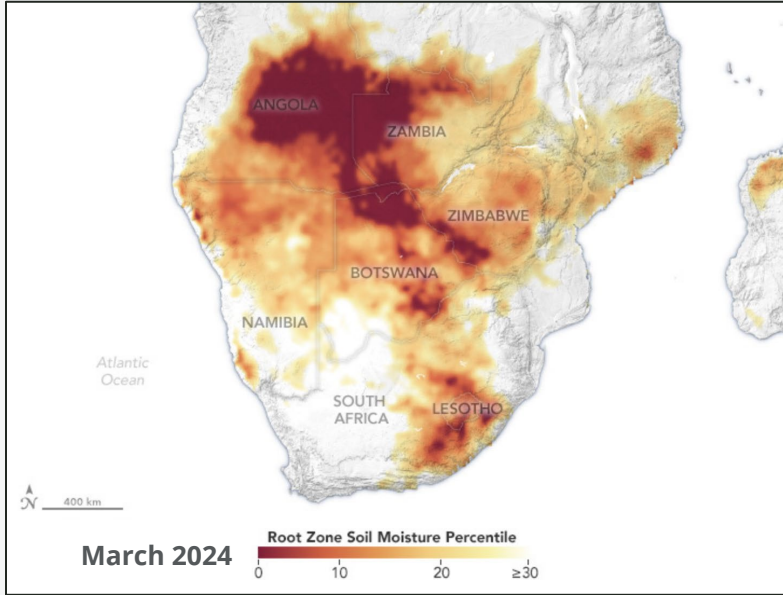
“February was characterized by record dryness and high temperatures, resulting in severe moisture stress, reduced harvest potential, and crop failure for food and some cash crops...”

“Significantly below-average harvests are expected across the region, which is expected to negatively impact food access... through the post-harvest period.”

<https://fews.net/node/31743/print/download>

FLDAS Case Studies: Southern Africa Drought

April 2024: El Niño-Driven Drought Disaster Declarations



Data from: <https://ldas.gsfc.nasa.gov/fldas>

Image credit: Wanmei Liang, NASA Earth Observatory

ALJAZEERA News ▾ Israel War on Gaza Features Opinion Sport

News | Climate Crisis

Zambia declares national disaster after drought devastates agriculture

Drought crisis brought on by El Niño and climate change will affect more than a million households, President Hakainde Hichilema says.

AP WORLD U.S. ELECTION 2024 POLITICS SPORTS ENTERTAINMENT BUSINESS SCIENCE FACT CHECK ODDITIES

• Trump guilty verdict Israel-Hamas war Mexico election D-Day Ohio shooting

WORLD NEWS

Malawi follows Zambia in declaring drought disaster as El Niño brings hunger to southern Africa

The New Humanitarian |

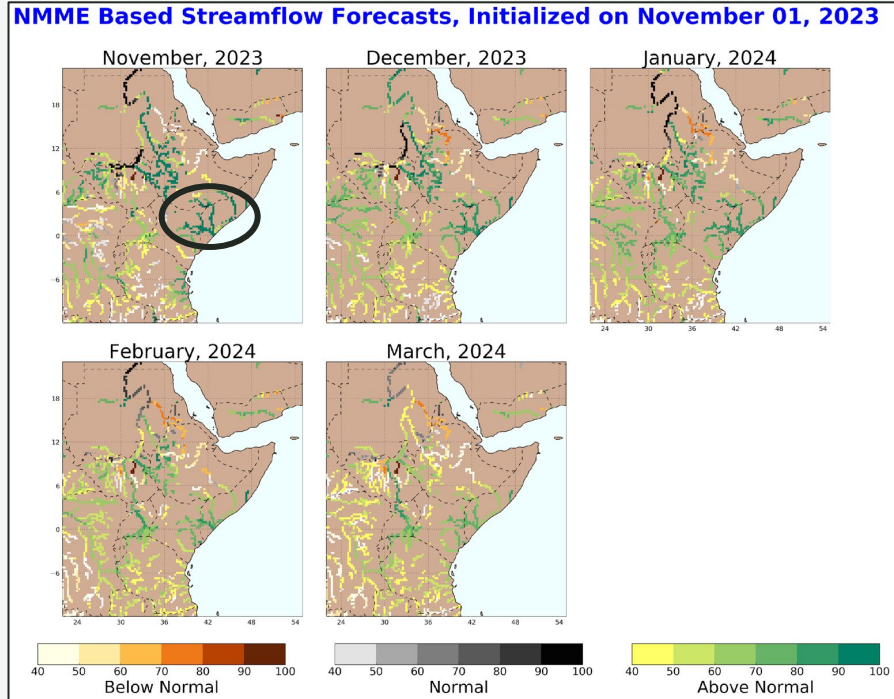
Environment and Disasters In the news 3 April 2024

Zimbabwe declares drought a national disaster

Zimbabwe has **declared** an El Niño-linked drought disaster, appealing for \$2 billion to help feed millions of people threatened with hunger.

FLDAS Case Studies: East Africa Floods

2023: East Africa Flooding



Data from: <https://ldas.gsfc.nasa.gov/fldas>



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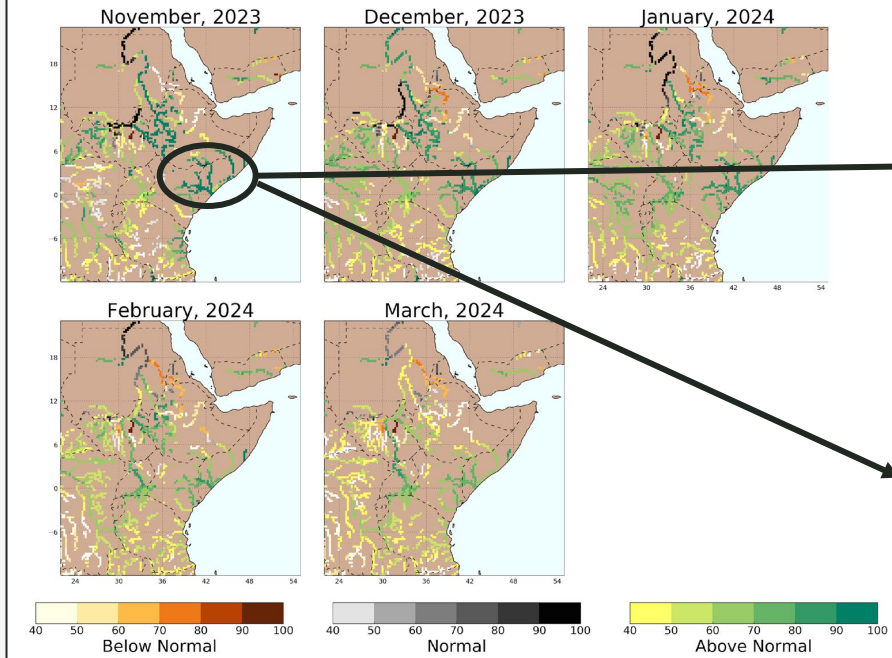
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FLDAS Case Studies: East Africa Floods

2023: East Africa Flooding

NMME Based Streamflow Forecasts, Initialized on November 01, 2023



Data from: <https://ldas.gsfc.nasa.gov/fldas>



SOMALIA Food Security Outlook

October 2023 to May 2024

Deyr flooding drives elevated needs, though rain will aid drought recovery

“The flooding has caused population displacement and damage to standing crops, in addition to disrupting agricultural activities for the deyr season.”



SOMALIA: 2023 Deyr Season Floods

Weekly Situation Report No. 4

As of 10 December 2023

This report is produced by OCHA Somalia in collaboration with humanitarian partners. It provides information on the flood emergency as of 10 December 2023.

*“The number of people affected by the heavy rains and floods has reached **2.48 million**, according to the Somalia Disaster Management Agency (SoDMA), with **899,000 displaced (PRMN)** and **118 killed** across the country.”*

FEWS NET Land Data Assimilation System

Links and Contact Information

- FEWS NET Land Data Assimilation System: <https://ldas.gsfc.nasa.gov/ldas>
- Latest model products:
 - FLDAS-Global: <https://ldas.gsfc.nasa.gov/ldas/models/global>
 - FLDAS-Central Asia: <https://ldas.gsfc.nasa.gov/ldas/models/central-asia>
 - FLDAS-Forecast: <https://ldas.gsfc.nasa.gov/ldas/models/forecast>
 - FLDAS on GES DISC: <https://disc.gsfc.nasa.gov/datasets?keywords=FLDAS>
- Famine Early Warning Systems Network: <https://fews.net/>
- NASA Land Information System Software Suite: <https://lis.gsfc.nasa.gov/>
- NASA Center for Climate Simulation High Performance Computing Resources: <https://www.nccs.nasa.gov/>

For more information: kimberly.slinski@nasa.gov



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