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

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Noah-MP International Workshop
June 4, 2024
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: Noah-MP 4.0.1, HyMAP2 (In Development)
Resolution: 0.1 degree (~10 km), monthly
Latency: Prelim: ~5th of next month
Final: ~20th of next month
Forcings: 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)
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FLDAS-Global

- Models: Noah-MP 4.0.1
- Resolution: 0.01 degree (~1 km), daily
- Latency: Near real-time (~ next day)
- Forcings: GDAS

FLDAS-Central Asia

https://ldas.gsfc.nasa.gov/fldas; McNally et al. 2033, ESSD
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FLDAS-Global

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


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FLDAS-Central Asia

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FLDAS-Forecast

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[Images of maps and graphs related to FLDAS]
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
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/flux

https://ldas.gsfc.nasa.gov/flux
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Support of the Famine Early Warning Systems Network

Analysis from FLDAS Modeling and S2S Forecasts

Food Security Analysis

FEWS NET Outlooks, Alerts, and IPC Acute Food Insecurity Phase Classification

https://fews.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

“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.”

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

https://fews.net/southern-africa/alert/november-2023
February 2024 FEWS NET Outlook: 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.”

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

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

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.

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

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
“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.”
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Links and Contact Information

● FEWS NET Land Data Assimilation System: https://ldas.gsfc.nasa.gov/fldas

● Latest model products:
  – FLDAS-Global: https://ldas.gsfc.nasa.gov/fldas/models/global
  – FLDAS-Central Asia: https://ldas.gsfc.nasa.gov/fldas/models/central-asia
  – FLDAS-Forecast: https://ldas.gsfc.nasa.gov/fldas/models/forecast
  – FLDAS on GES DISC: https://disc.gsfc.nasa.gov/datasets?keywords=FLDAS

● Famine Early Warning Systems Network: https://fews.net/


● NASA Center for Climate Simulation High Performance Computing Resources: https://www.nccs.nasa.gov/

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