

INTRODUCTION TO HAZARDS OUTLOOKS AT NOAA- CPC INTERNATIONAL DESKS

Zewdu Segele, Li Xu, Wassila Thiaw, Endalkachew Bekele, Miliaritiana Robjhon
NOAA/NCEP/CPC/International Desks

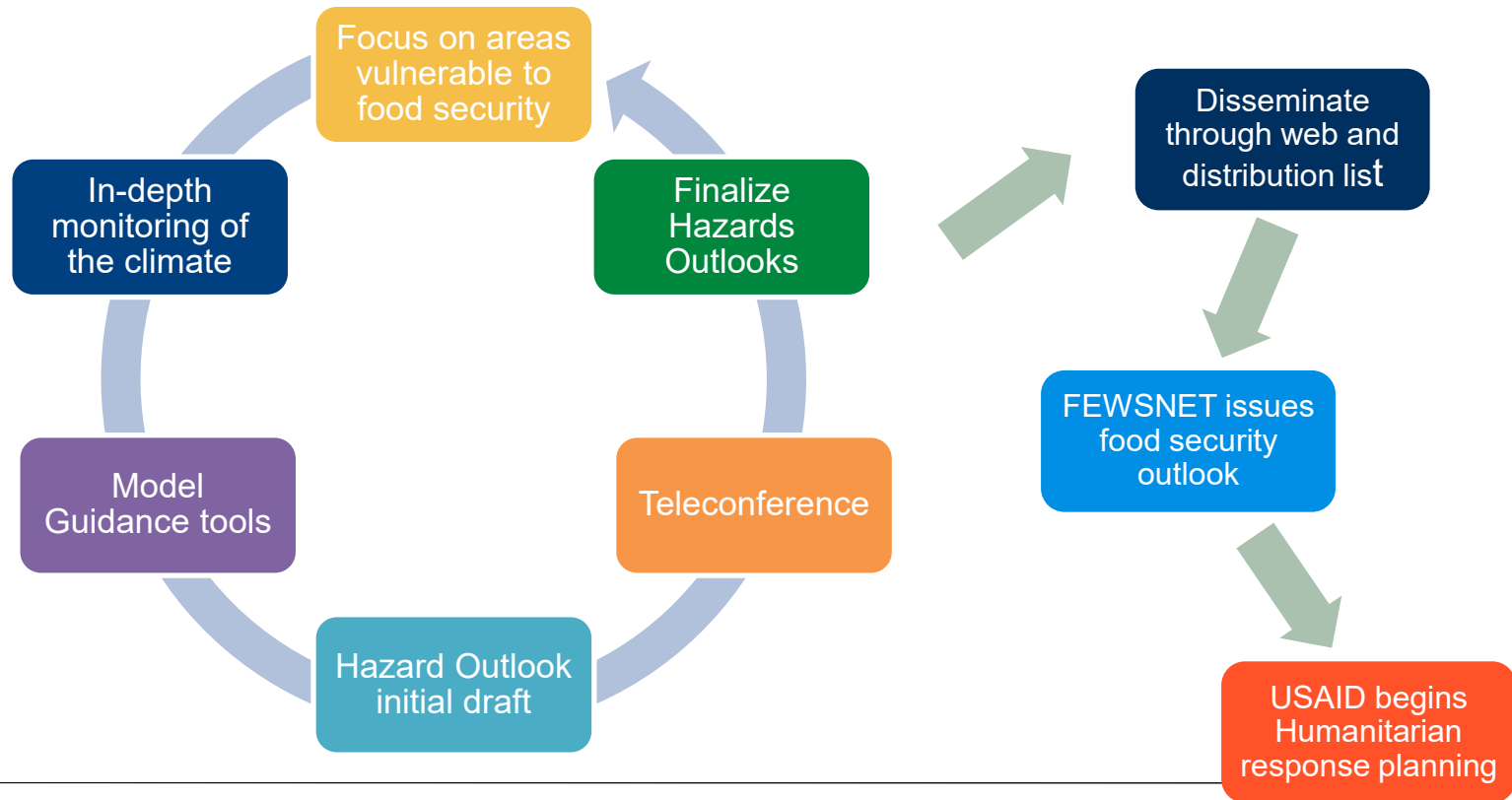
**PREPARE Drought and Flood Early Warning for for the Pacific Small Islands
Developing States**

Fiji, Nadi, 22-23 July 2024

Hydrometeorological hazards

- National, regional and global centers contribute to the four phases of Early Warning Systems (WMO, 1999)
 - Climatological and hydrological analysis and knowledge for risk assessment – **contributes to disaster mitigation or prevention**
 - Forecasting and early warning services of severe weather and extremes including droughts & floods – **contributing to preparedness**
 - Updated warnings, forecasts and observations, and **consultation** with emergency and relief agencies – **contributing to the Response phase**
 - Special forecasts and other advice during operations – **to assist recovery operations**

FEWS NET regional hazards outlook process



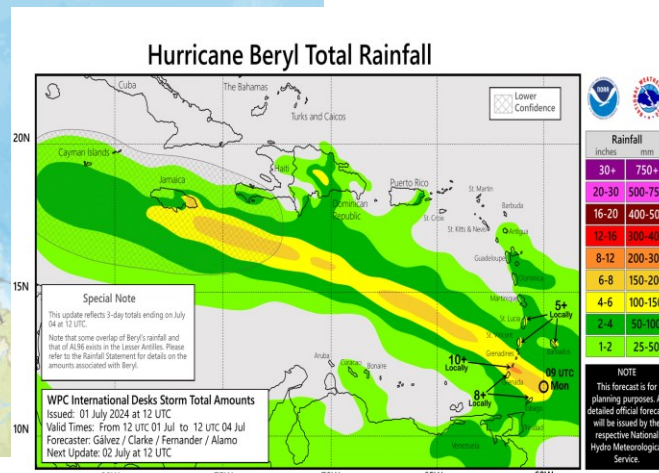
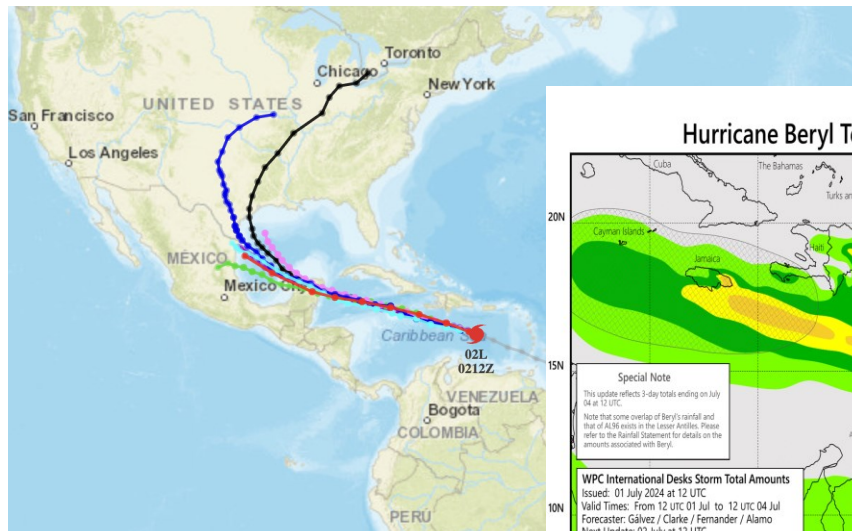
Hydrometeorological hazards

- The International Desks at the NOAA/NCEP-CPC focusses on the following hazards:
 - Tropical cyclones
 - Flood/Extreme rainfall
 - Drought
 - Abnormal heat
 - Abnormal cold
 - Heavy snow
 - Locust outbreaks

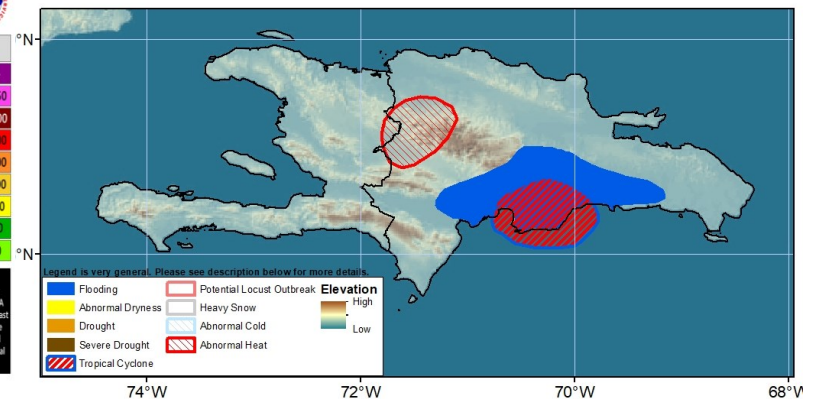
Tropical Cyclone

- Tropical Cyclone (TC) hazards are identified based on the National Hurricane Center and the Joint Typhoon Warning Center (JTWC)
- Hazard polygon is drawn when TC is observed, or the area is under a tropical cyclone watch or warning

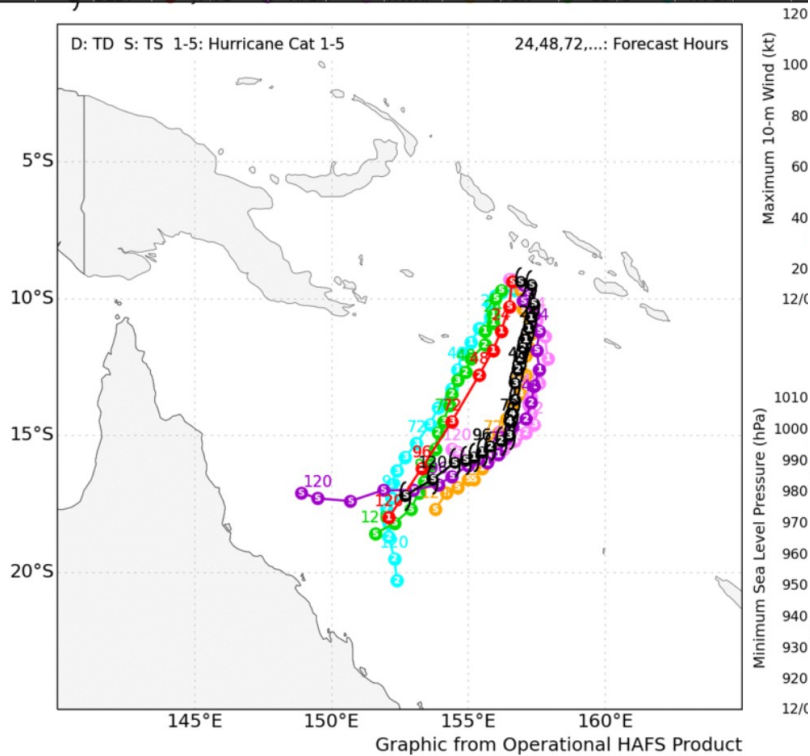
NHC Hurricane Forecast in early July 2024



Tropical Cyclone hazards outlook for Hispaniola for 4-10 July 2024: Heavy rainfall and strong winds expected in association with tropical cyclone BERYL.

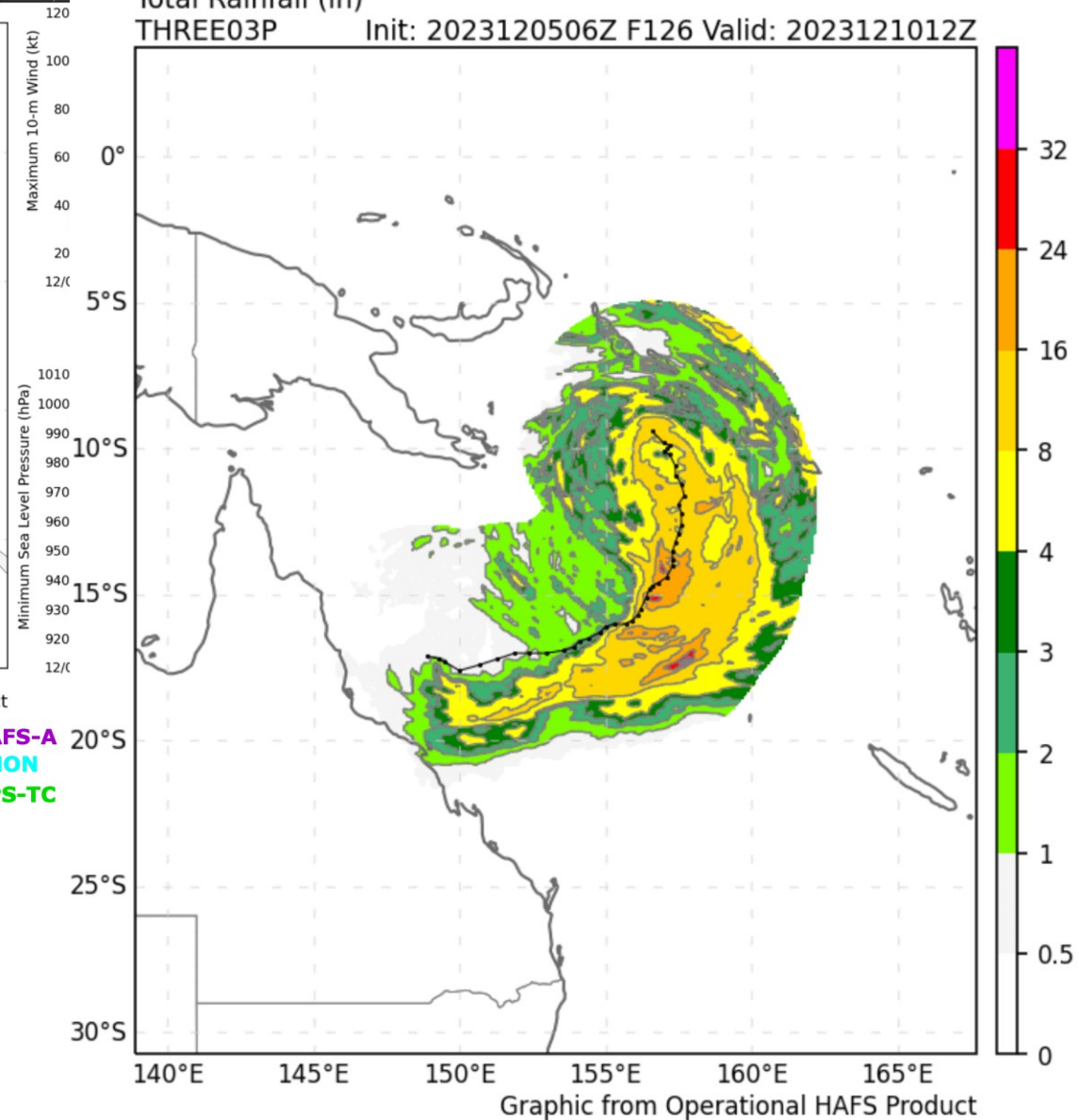


Hurricane Analysis and Forecast System (HAFS): A Collaborative Project in UFS Framework









- BEST: Best Track - OFCL/JTWC: Official Fcst. - HFSA: Oper. HAFS-A
Oper. HMON
- AVNO: Oper. GFS - CTCX: COAMPS-TC w/GFS - COTC: COAMPS-TC

Total Rainfall (in)
THREE03P Init: 2023120506Z F126 Valid: 2023121012Z



Hurricane Analysis and Forecast System (HAFS): A Collaborative Project in UFS Framework

EMC Hurricane Modeling
Operational Implementation
Documentation
People
Collaborators
Links

Hurricane Analysis and Forecast System
News
UTC Time: Friday, July 19, 2024 21:37 GMT

HFSA Forecast Guidance for Current Active Storms

Current Forecast

Forecast on
Year | Month | Day
at Hour UTC

2024 | 7 | 19

-6 | 18 | +6

Submit

Forecast as of
2024071918Z

● INVEST92W
● INVEST91W

All Archived Forecast

Year:
2024

Basin:
North Atlantic

Storm:
THREE03L

Submit

TC List for Years

Operational HFSA

Operational HFSB

Legacy HWRF

Legacy HMON

Parallel HAFSv1.1A

Parallel HAFSv1.1B

Parallel HAFS Ensemble

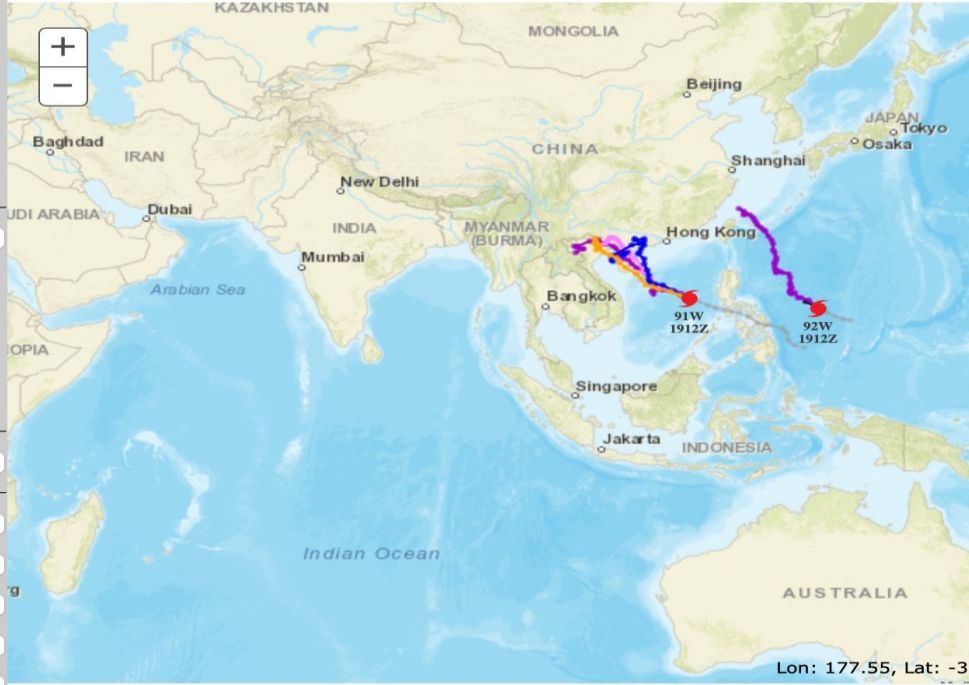
Hurricane Model Viewer

Useful Links

NHC | CPHC | JTWC
ATCF | HFIP and more

-- Best Track
 - Official Forecast
 - HFSA: Oper. HFSA
 - HFSB: Oper. HFSB Oper. GFS
 - HWRF: Oper. HWRF
 - HMON: Oper. HMON
 - AVNO:

- CTCX: COAMPS-TC w/GFS
 - COTC: COAMPS-TC
 - NVGM: NVGM Model
 - EGRR: UK Met Model
 - CMC: CMC Model



● INVEST92W ● INVEST91W

North Atlantic: (0) active

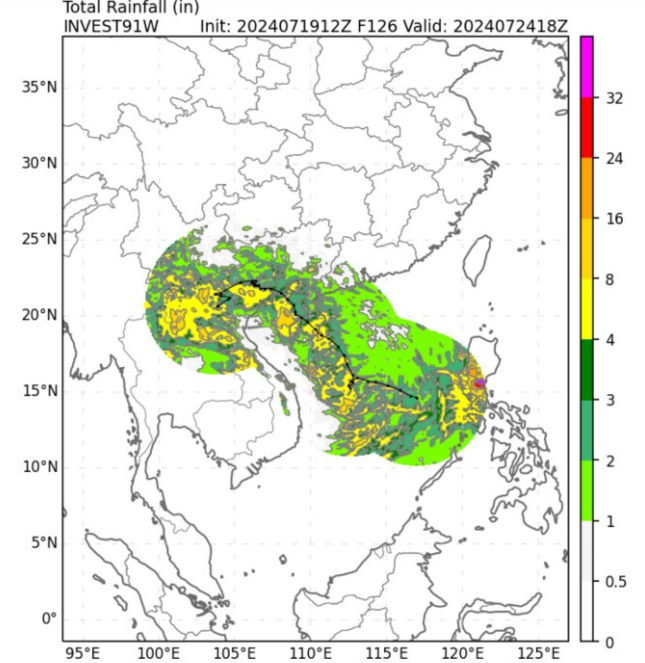
Central North Pacific: (0) active

Ea:

We

Total Rainfall (in)

INVEST91W Init: 2024071912Z F126 Valid: 2024072418Z



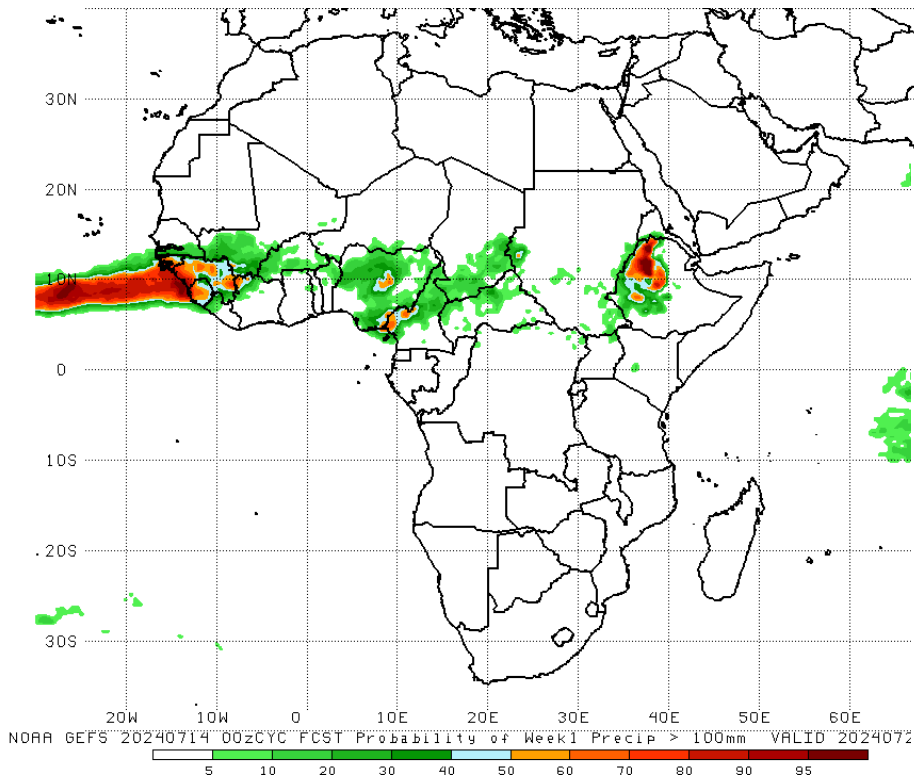
Graphic from Oper HAFS Product

Flood Hazards

- A flooding polygon is drawn when one of the following conditions is satisfied:
 - Extremely heavy rainfall led to flooding; high potential for crop impacts;
 - Moderate to heavy rainfall that saturated soil moisture leading to gradual flooding; high potential for crop impacts;
 - High chance for extremely heavy rainfall in the next few days; high potential for crop impacts
 - High chance for substantial rainfall leading to soil saturation and gradual flooding; high potential for crop impacts;
 - Poor drainage systems, elevated river levels, and/or increased dam discharges, are predicted to result in flooding, or are known to have caused flooding;

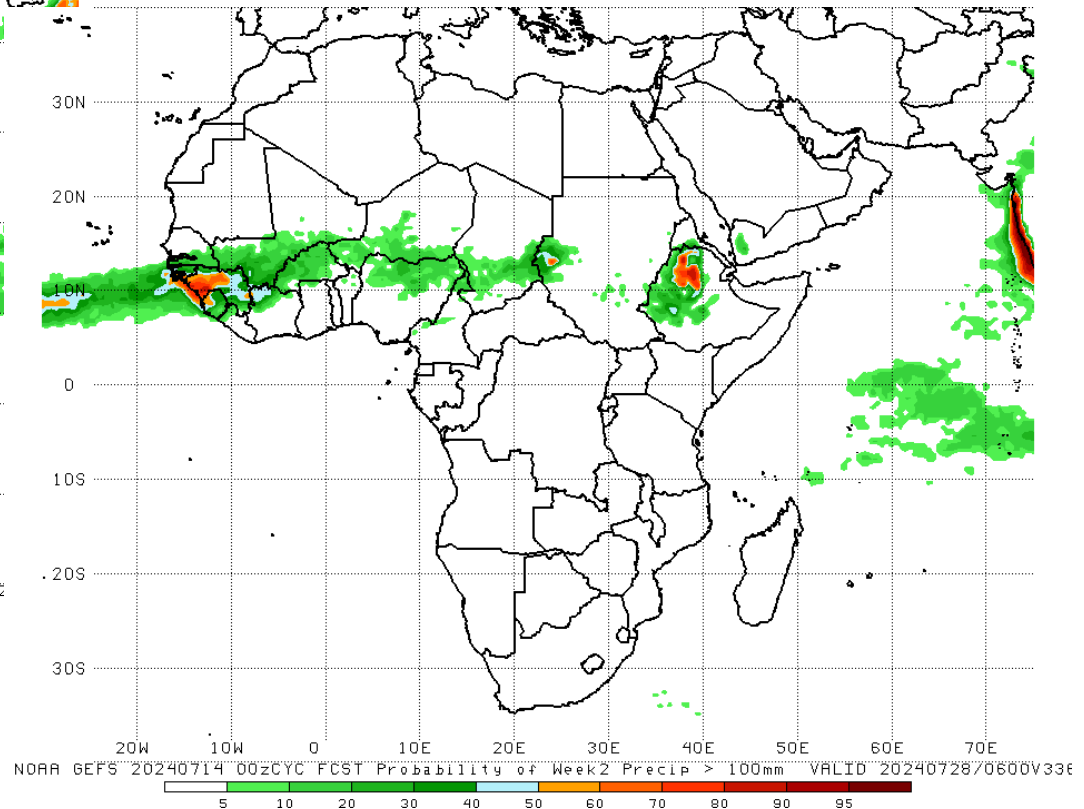
Flood Hazards (Cont'd)

- Probabilities of extreme rainfall assessed based on Qualitative/Quantitative precipitation Forecast guidance



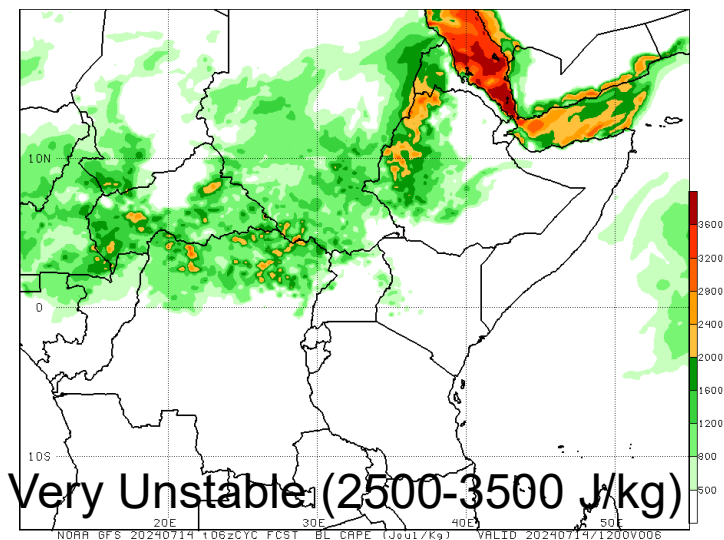
High probability for heavy rainfall in Week 1; flooding likely at places

High probability for heavy rainfall in Week 2; flooding likely at places

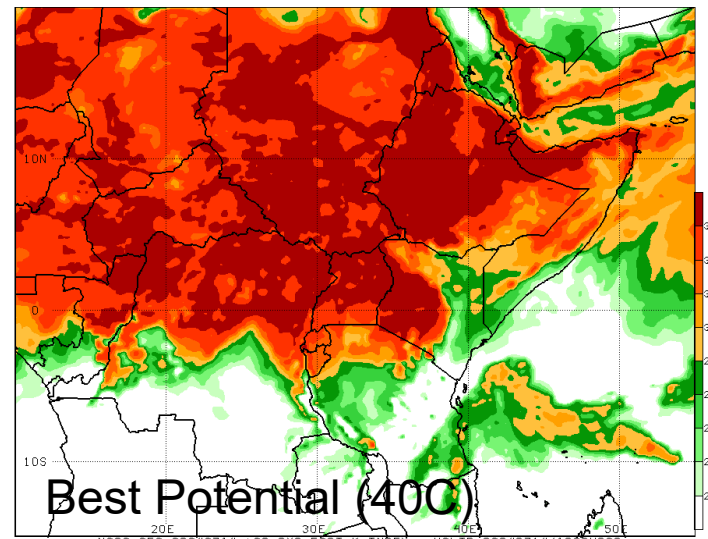


Severe Weather: Useful tools for severe weather forecasting

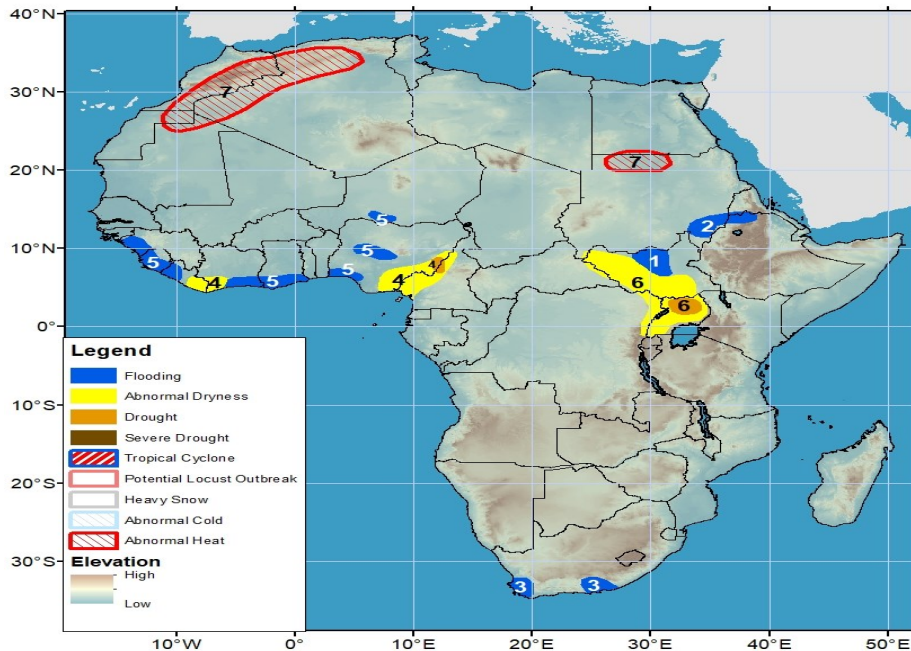
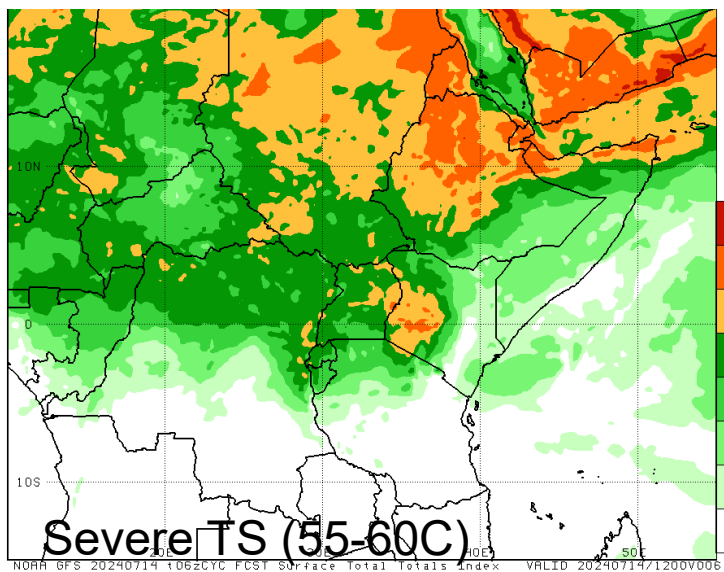
CAPE



K-Index

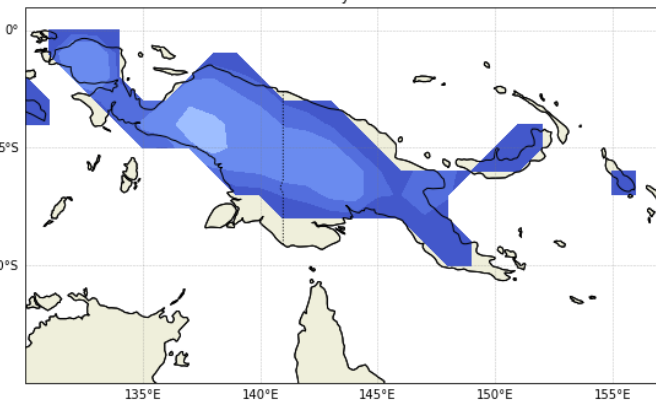


Total Totals Index

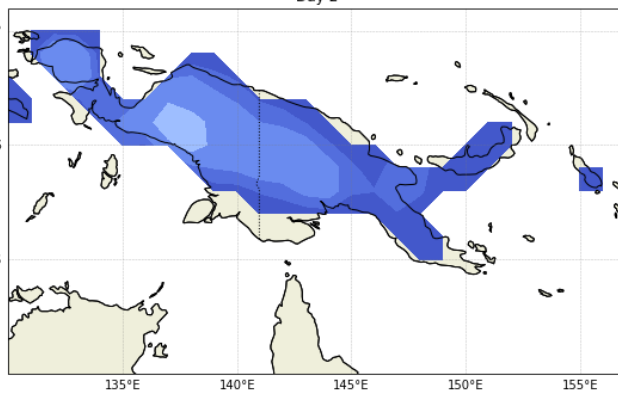


AI-BASED RUNOFF FORECASTING (EXPERIMENTAL)

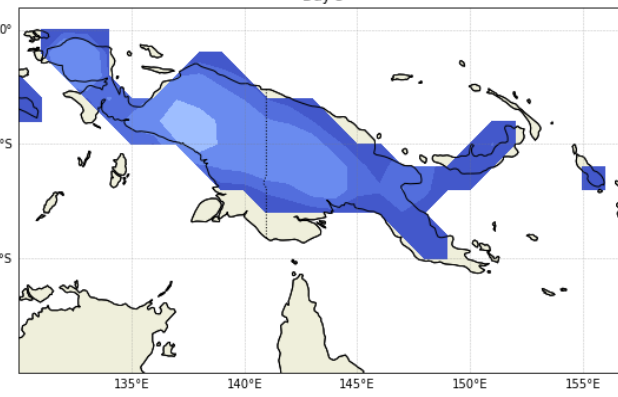
Day 1



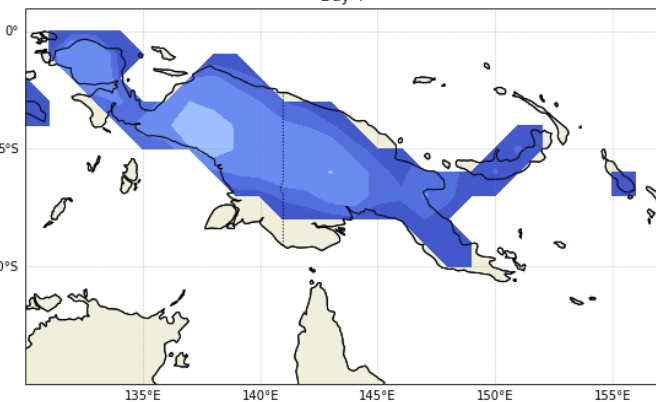
Day 2



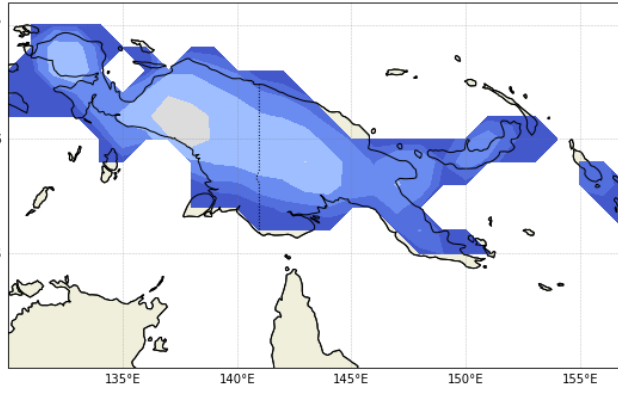
Day 3



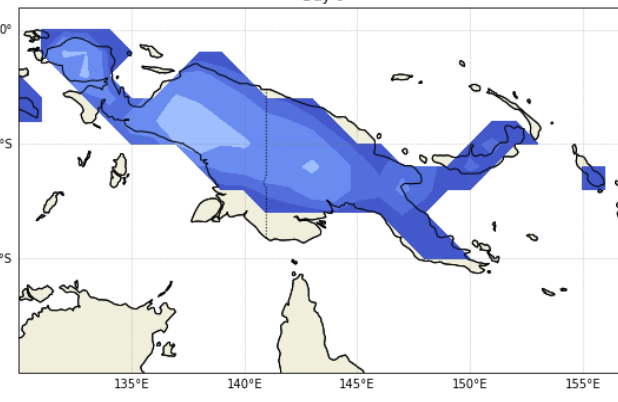
Day 4



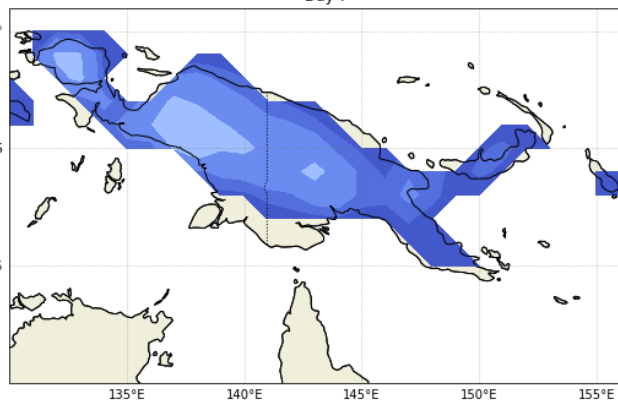
Day 5



Day 6



Day 7

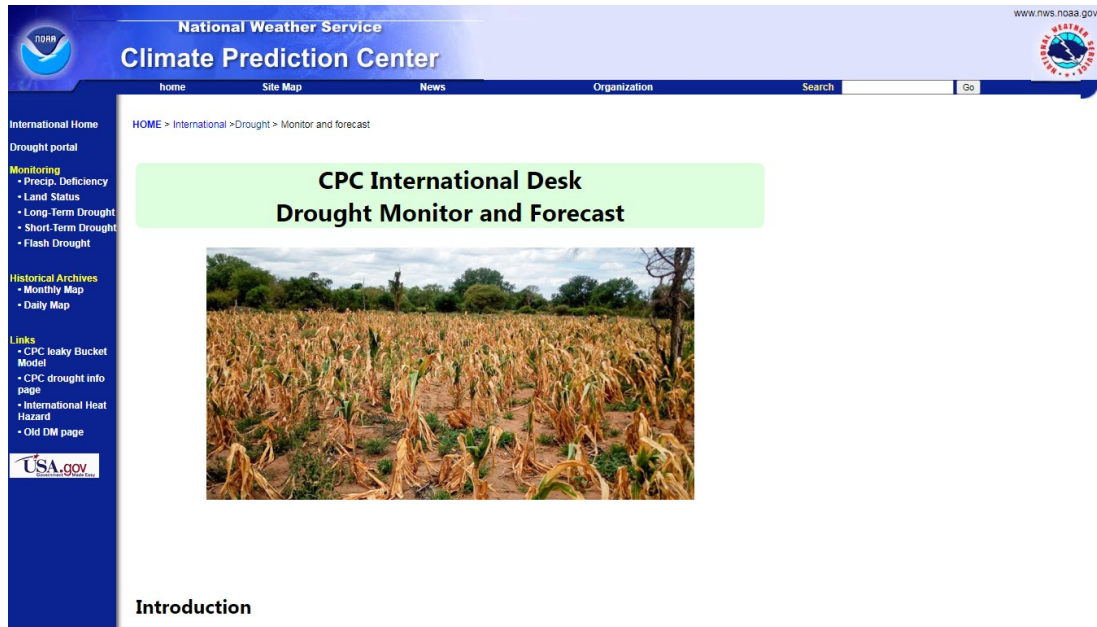


REAL-TIME
FORECAST OF
RUNOFF FOR
JULY 19-25, 2024

Drought hazards

- Drought is a slow onset natural hazard with far-reaching impacts that range from economic losses to loss of agriculture and livelihoods (<http://www.drought.gov>).
- NOAA-CPC provides advanced drought warnings for integration with livelihood data to predict food security through co-production and to reduce risks associated with drought including famine.
- Drought is divided into 3 parts: **Abnormal dryness**, **Drought**, and **Severe Drought**. All require convergence of evidence from analysis of:
 - Precipitation, especially Standardized Precipitation Index (SPI)
 - Soil moisture
 - Normalized difference vegetation index (NDVI)
 - Vegetation health index (VHI)
 - Hydrological data
 - Field observations

NOAA-CPC International Desks Drought Monitoring and Forecasting Webpage



The screenshot shows the NOAA-CPC International Desk Drought Monitor and Forecast webpage. The page features a blue header with the NOAA logo and the text "National Weather Service Climate Prediction Center". Below the header is a navigation menu with links for "home", "Site Map", "News", "Organization", and "Search". The main content area is titled "CPC International Desk Drought Monitor and Forecast" and includes a photograph of a drought-stricken cornfield. A sidebar on the left contains navigation links for "International Home", "Drought portal", "Monitoring", "Historical Archives", and "Links".

**National Weather Service
Climate Prediction Center**

HOME > International > Drought > Monitor and forecast

**CPC International Desk
Drought Monitor and Forecast**

Introduction

Monitoring

- Precip. Deficiency
- Land Status
- Long-Term Drought
- Short-Term Drought
- Flash Drought

Historical Archives

- Monthly Map
- Daily Map

Links

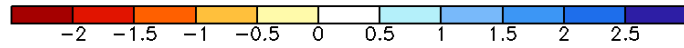
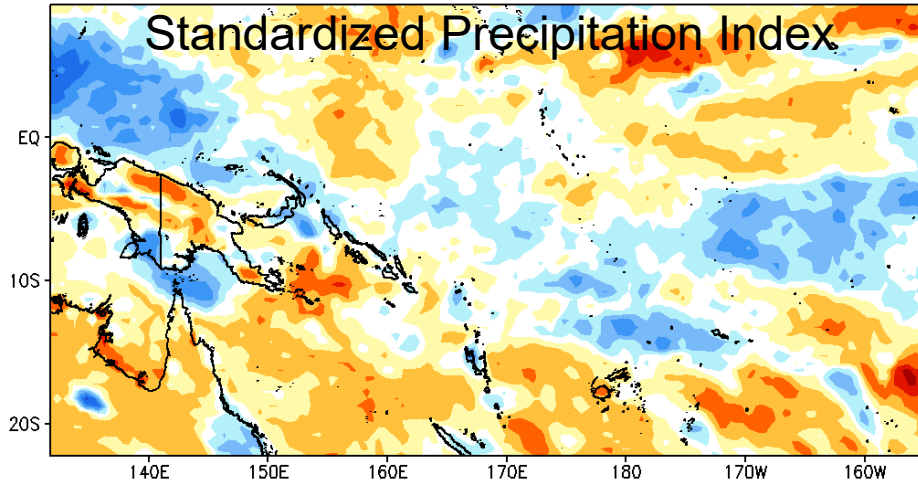
- CPC leaky Bucket Model
- CPC drought info page
- International Heat Hazard
- Old DM page

USA.gov

<https://www.cpc.ncep.noaa.gov/products/international/drought/>

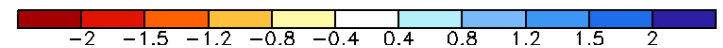
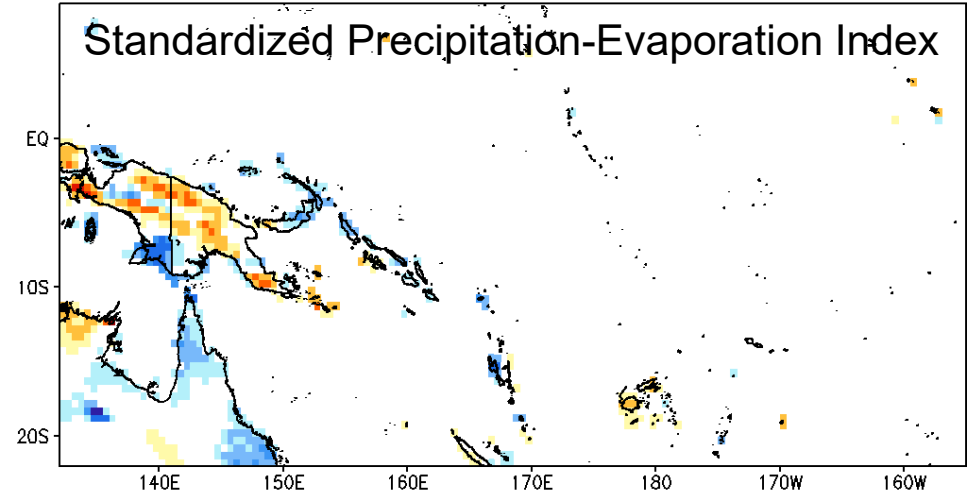
Drought hazards -- Monitoring

CMORPH ADJ 00Z SPI 1mo
17 June 2024 - 16 July 2024

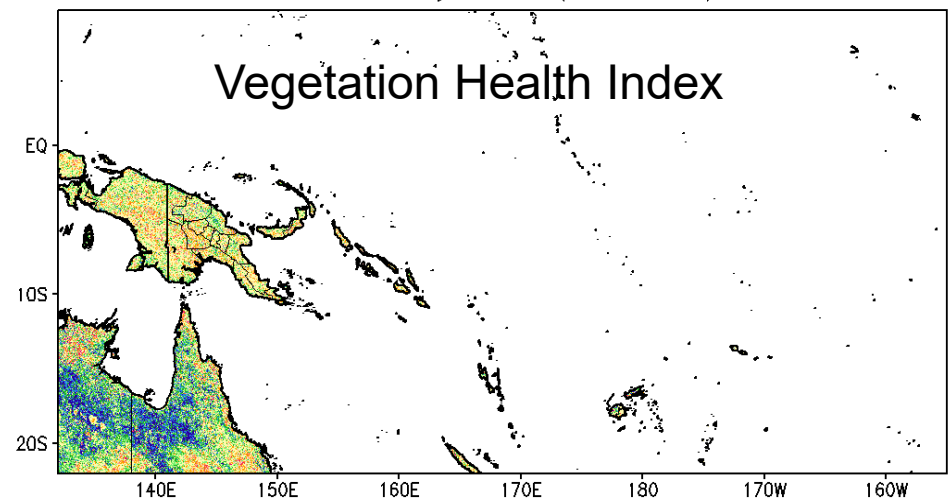
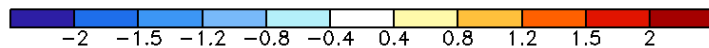
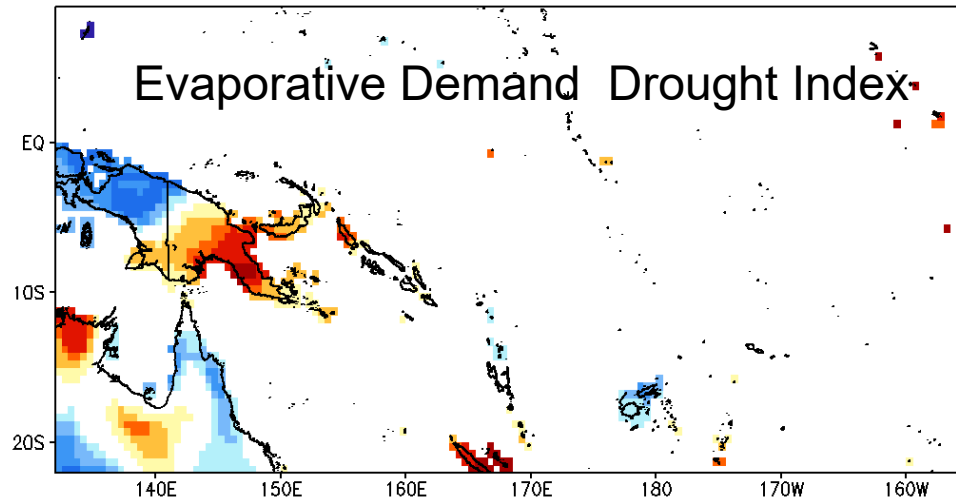


EDDI 01mn 20240716

CMORPH ADJ 00Z SPEI 1mo
17 June 2024 - 16 July 2024



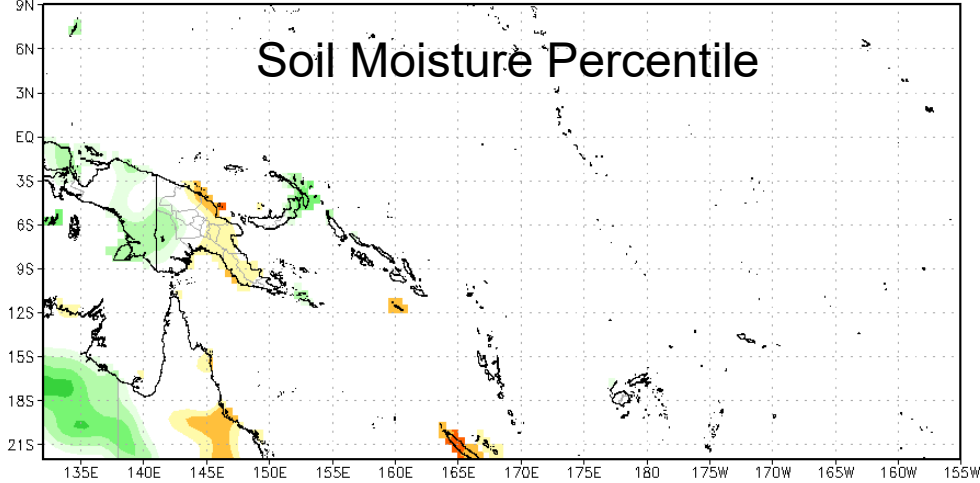
VHI 14 July 2024 (Week 028)



Drought hazards -- Outlook

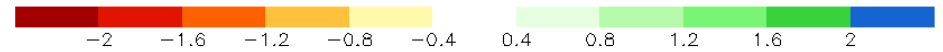
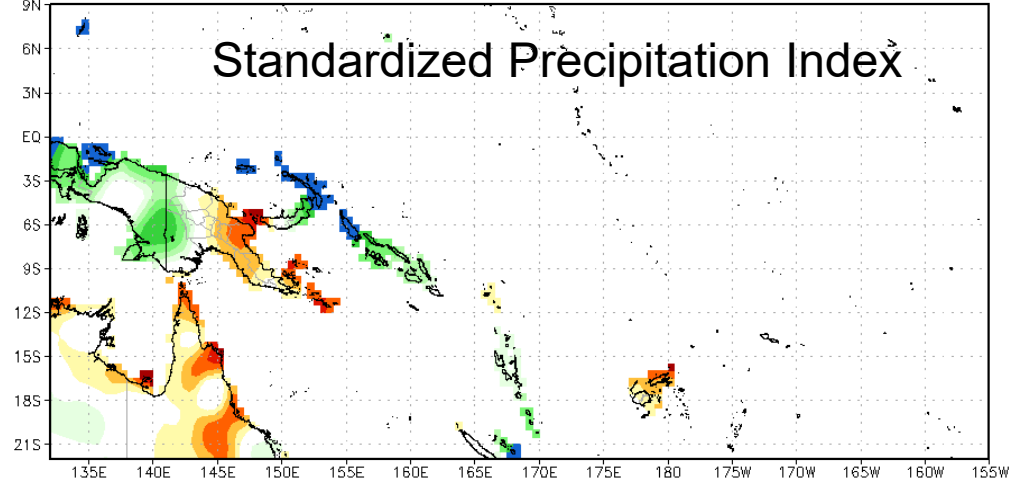
initial: 2024-07-18 00Z

Valid: 24Jul2024



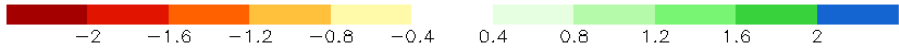
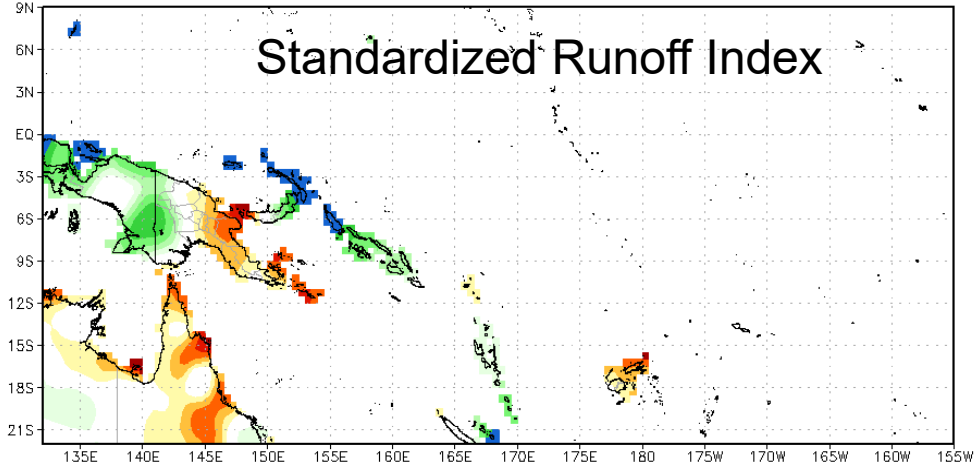
initial: 2024-07-18 00Z

Valid: 24Jul2024



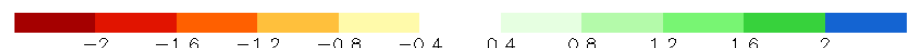
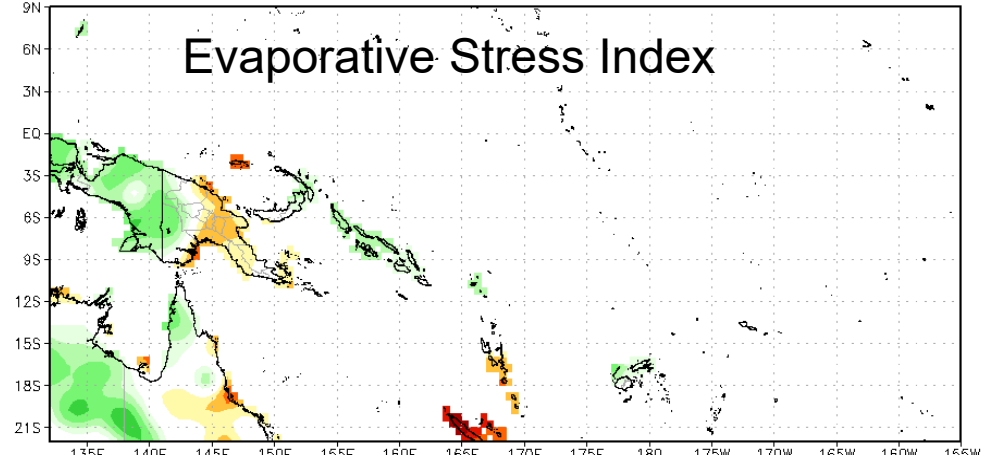
initial: 2024-07-18 00Z

Valid: 24Jul2024



initial: 2024-07-18 00Z

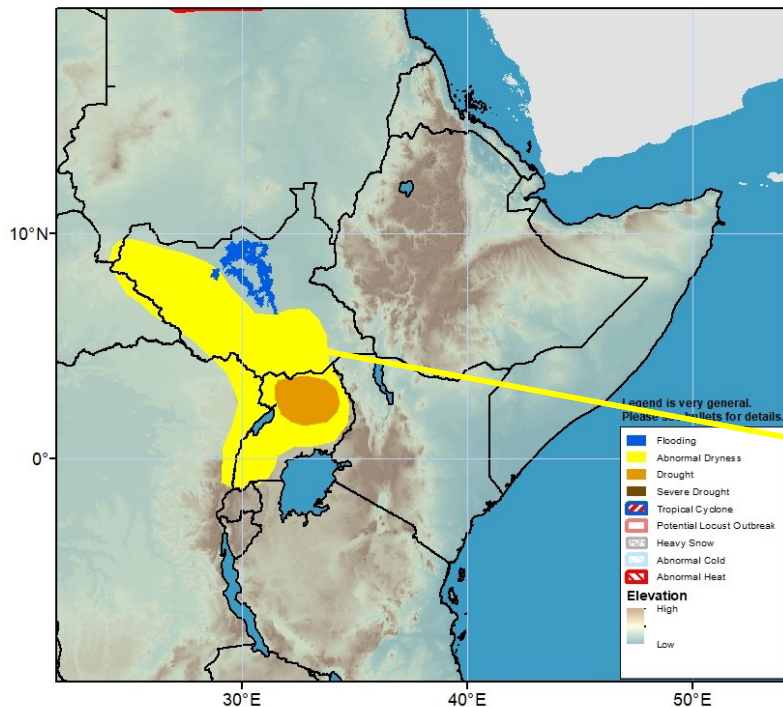
Valid: 24Jul2024



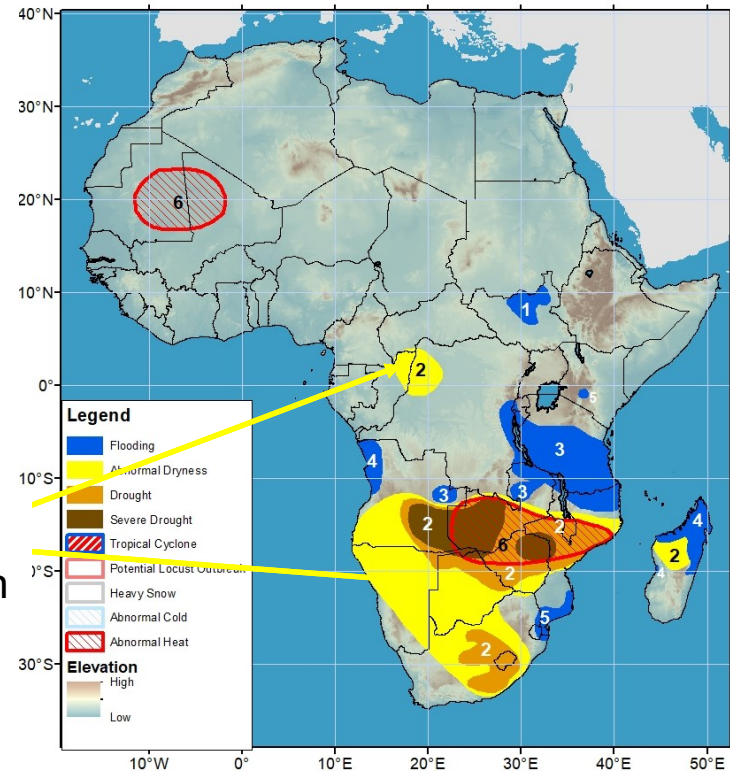
Drought hazards

- **Abnormal Dryness:**

- Defined during active rainfall season
- Area has registered cumulative 4-week precipitation and soil moisture ranking less than the 30th percentile, with an SPI of 0.4 standard deviation below the mean
- Area is expected to receive below-average precipitation (less than 80% of normal) during the outlook period

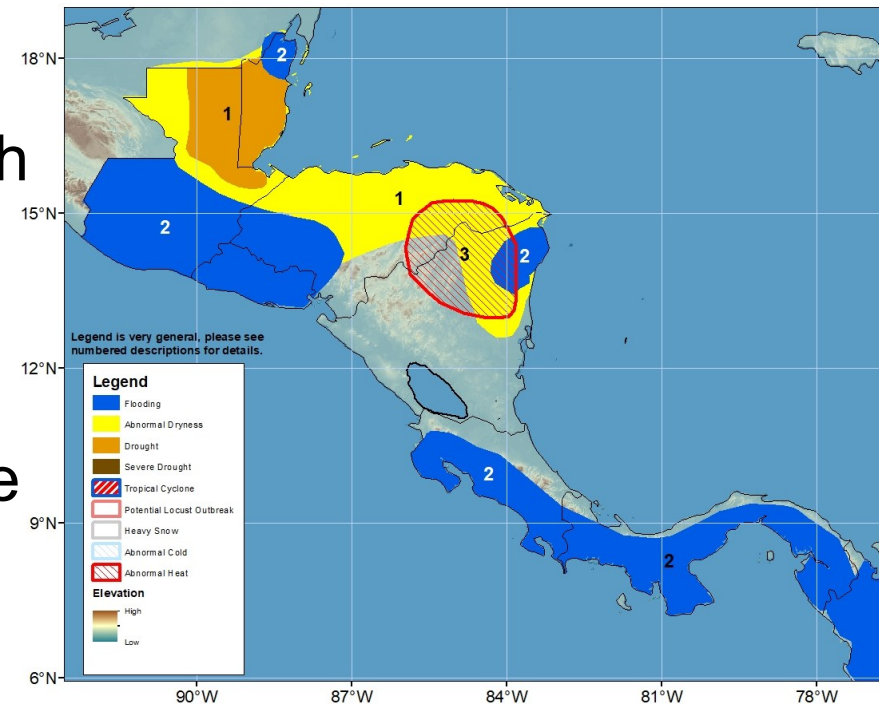


Yellow polygon



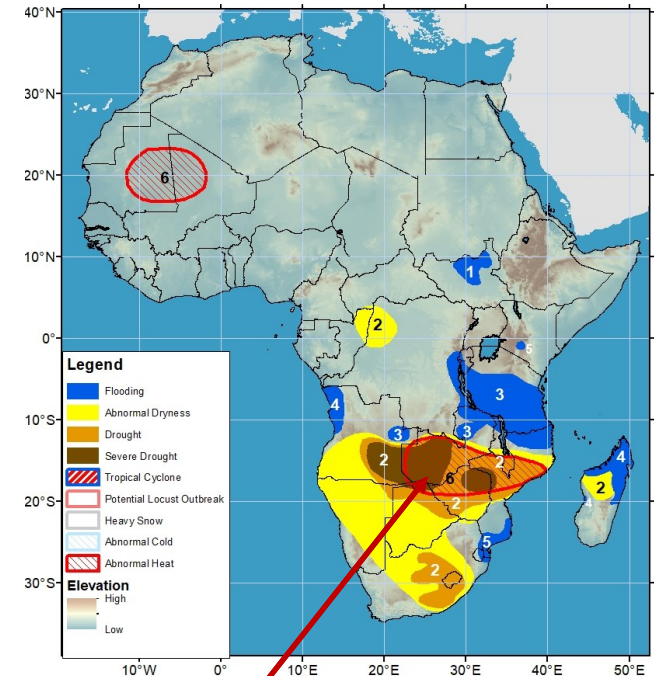
Drought hazards (Cont'd)

- **Drought:** Area must be under Abnormal Dryness
- Area has continued to register seasonal precipitation and soil moisture deficits that have resulted in since the beginning of the rainfall season an eight-week cumulative precipitation, soil moisture, and runoff below the 20th percentile rank, and an SPI of 0.8 standard deviation below the mean
- Developing drought conditions must be supported by field observations, including impacts of moisture shortages on crops and water resources.



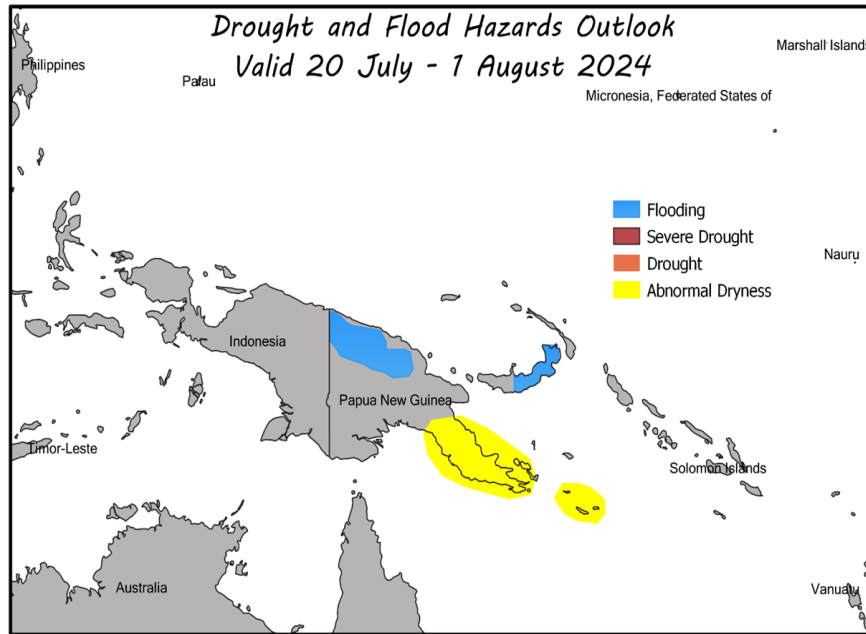
Drought hazards (Cont'd)

- **Severe Drought:**
 - Area must have previously been defined as “Drought”
 - Area has continued to register seasonal precipitation and soil moisture deficits that have resulted since the beginning of the rainfall season; a twelve-week cumulative precipitation, soil moisture, and runoff below the 10th percentile rank and an SPI of 1.2 standard deviation below the mean
 - Severe drought conditions must be supported by field observations, including impacts of moisture shortages on crops and water resources.



Drought and Floods in Central Pacific

- Tropical Cyclone, floods and droughts are the major hazards in the Central Pacific



- Numerous drought/flood forecasting tools at the NOAA-CPC International Desks

