Central America and Hispaniola Hazards Outlooks: Process and Use

WMO-RCC International Workshop

1 October 2019

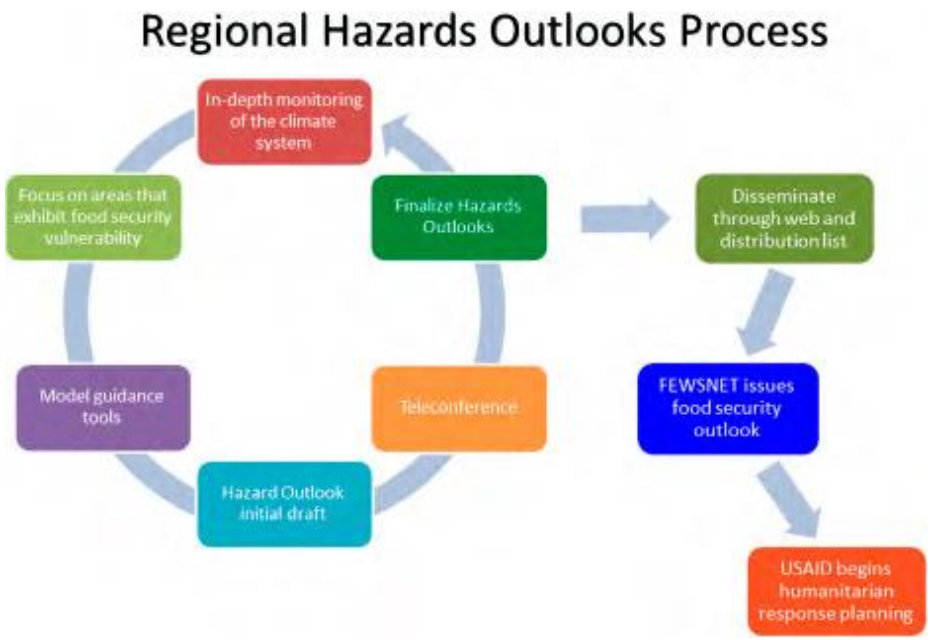
Outlook

1. Background
2. Process and tools
3. Latest hazards
4. Use

Background

- **Goal:**
  - To support the United States Agency for International Development (USAID) Famine Early Warning Systems Network (FEWS NET) program
- **Characteristics:**
  - A short weather and climate document
  - Highlight hazards in both graphical and text formats
  - Has a weekly time scale
  - Operational product
- **Strengths:**
  - Evidence-based, collaborative, and cyclical process

Process



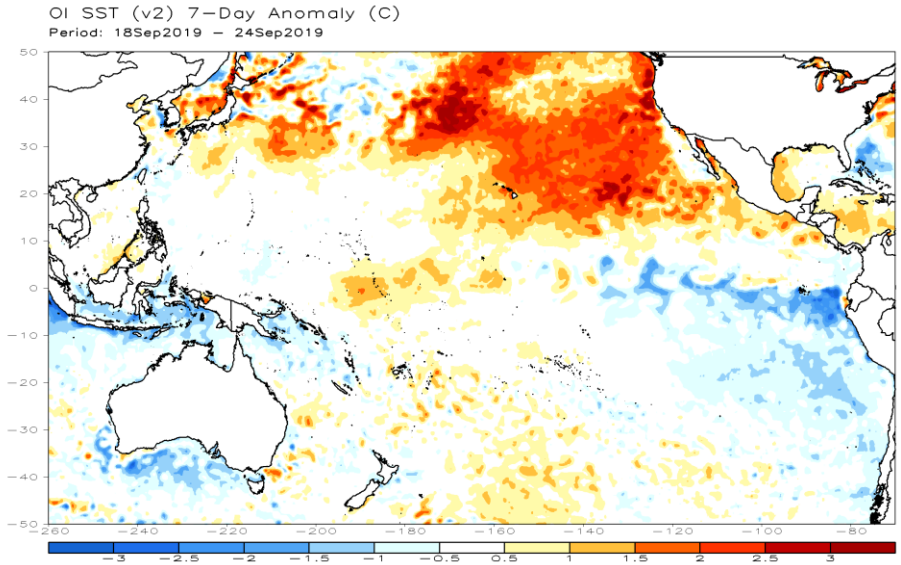
(Thiaw and Kumar, 2015)

1. Begin with climate monitoring
   What happened in the past?
2. Analyze forecast
   What's in store for the future?
3. Send draft for review
   Is there anything wrong?
4. Brief via teleconference
   Explain reasoning to partners
5. Issue final document
6. FEWS NET issues food security outlook
7. USAID begins humanitarian responses

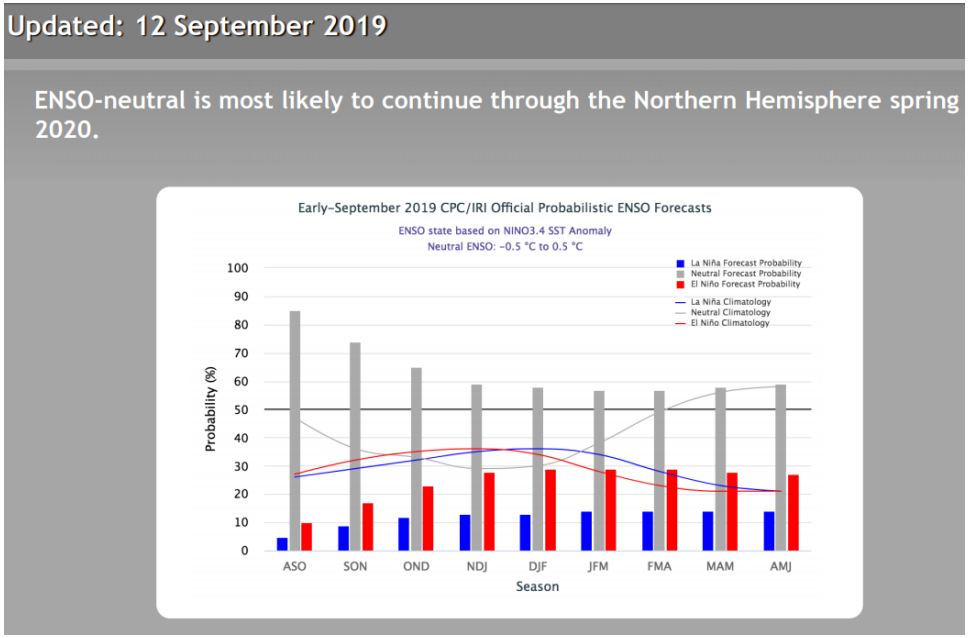
El-Nino Southern Oscillation (ENSO)

Current conditions and forecasts

7-day SST anomalies



Probabilistic ENSO forecasts



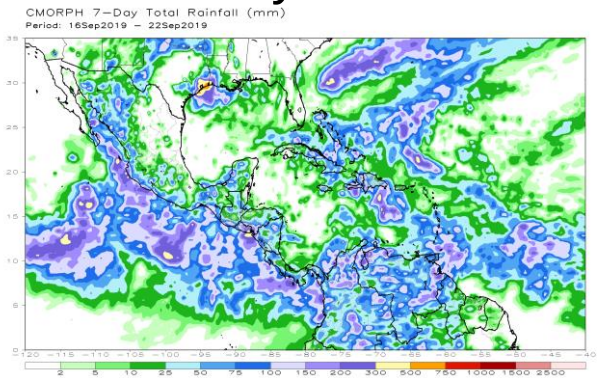
ENSO has well-known teleconnections over Central America and the Caribbean

How will ENSO likely to evolve over the upcoming season?

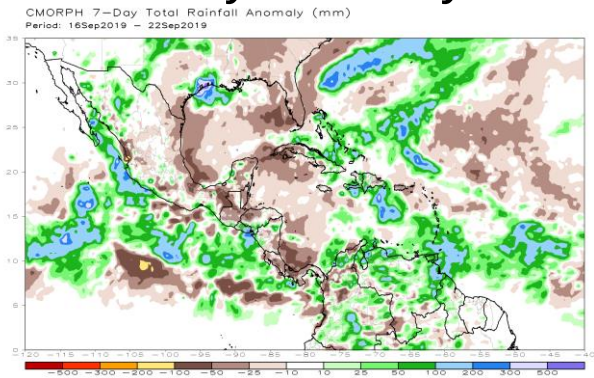
Climate monitoring tools

Rainfall difference anomalies

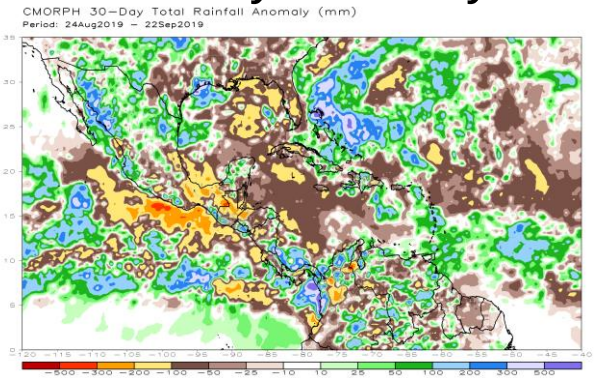
7-day totals



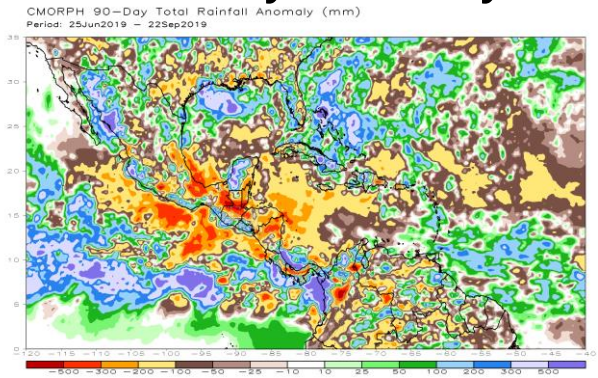
7-day anomaly



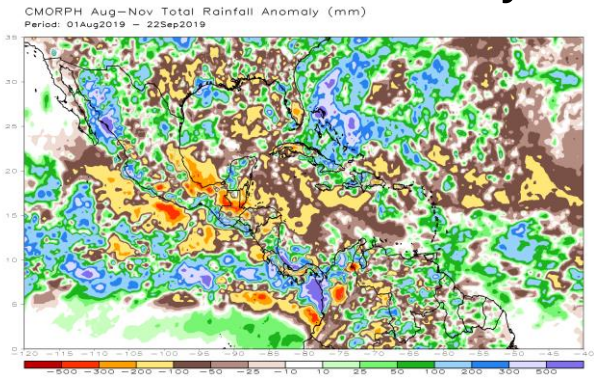
30-day anomaly



90-day anomaly



Seasonal anomaly



Difference anomaly = observation - climatology

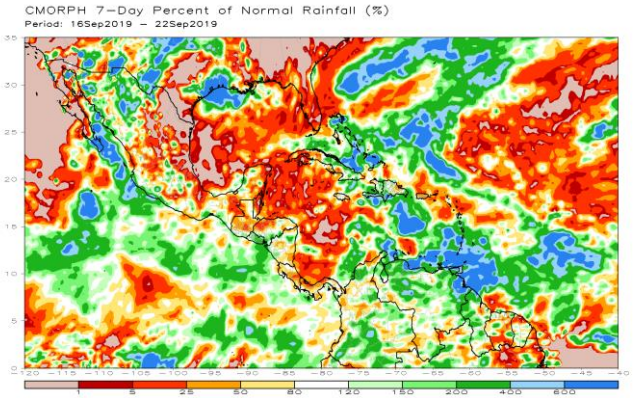
Identify short and long-term anomalies

Quantify rainfall deficits (surpluses)

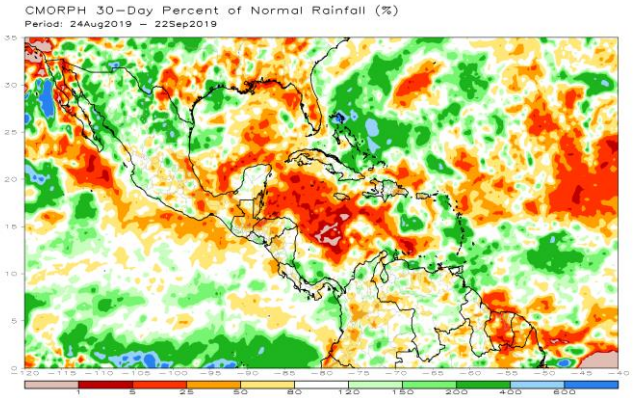
Climate monitoring tools

Percent of normal rainfall

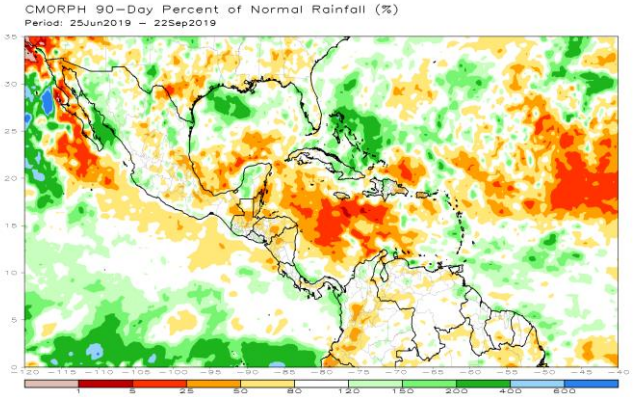
7-day



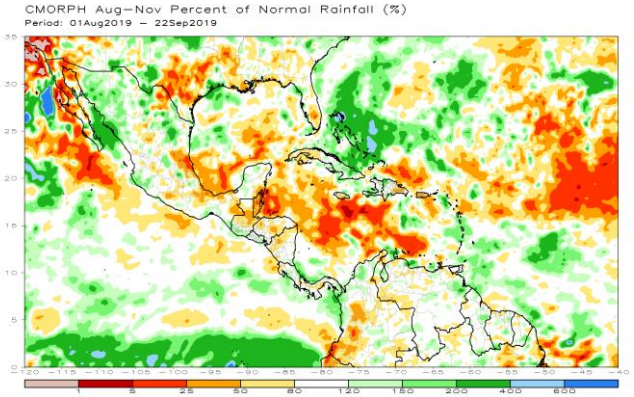
30-day



90-day



Seasonal



Percent of normal = 100 x observation / climatology

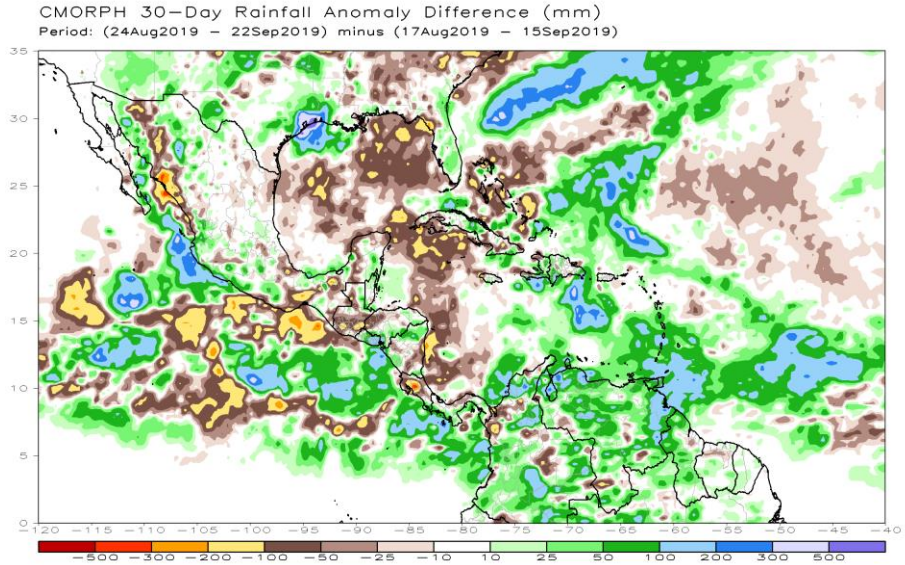
Quantifies anomaly as a fraction of the normal value

e.g. a quarter, half, near-normal (80-120%), twice, …

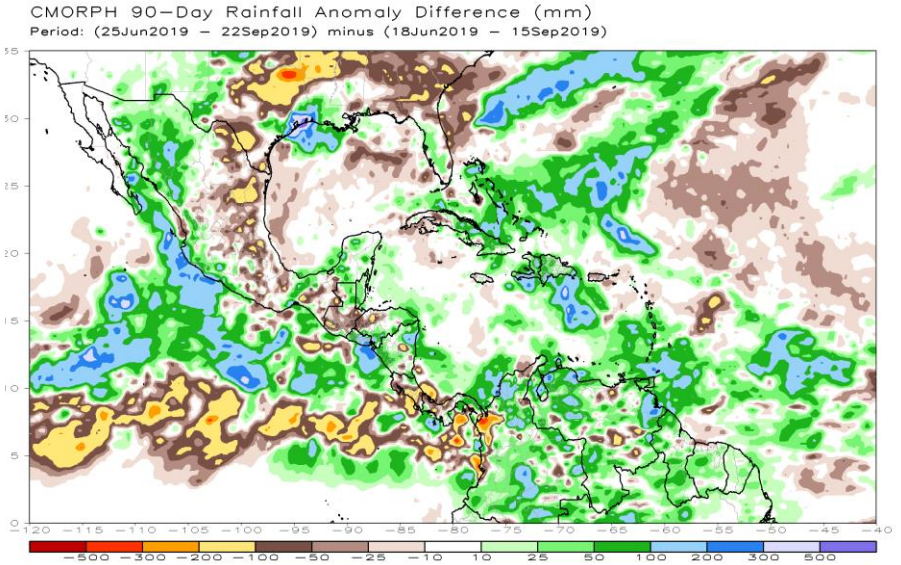
Climate monitoring tools

Weekly tendency

30-day



90-day



Tendency = current anomaly – previous anomaly

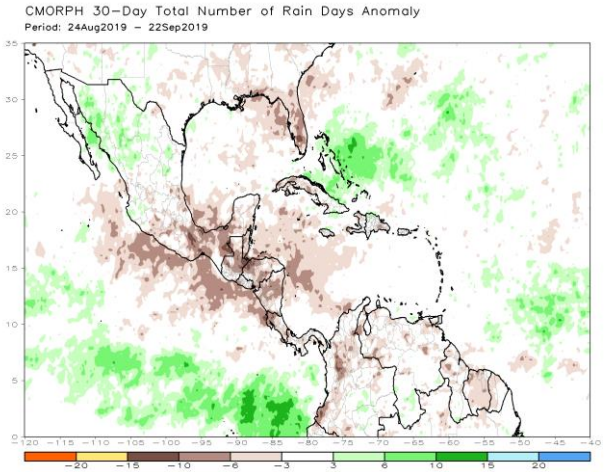
Identifies drying (wetting) or no changes

Implies recent worsening (improvement) in cimate conditions

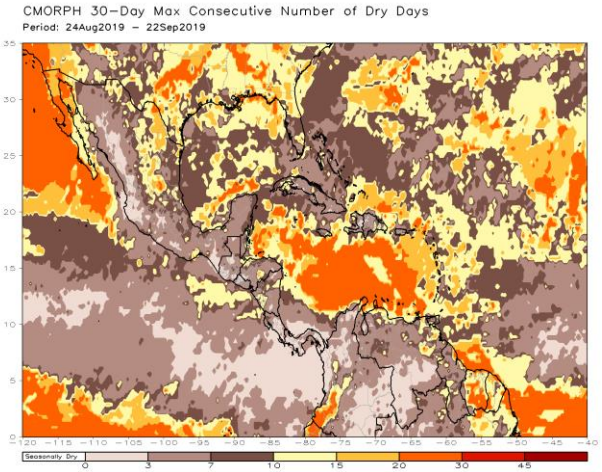
Climate monitoring tools

Rainfall frequency analysis

30-day # of rain day anomaly

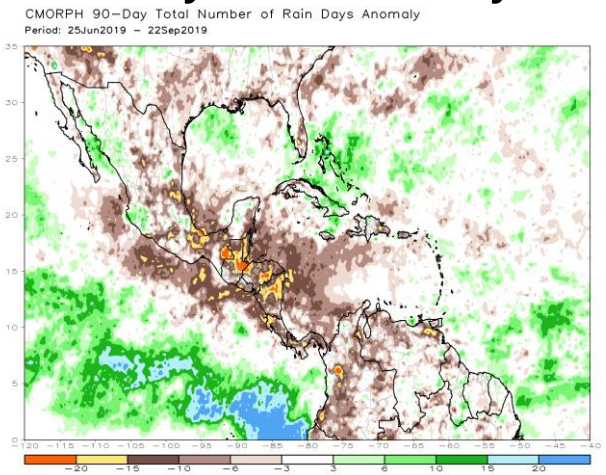


90-day max consecutive # of dry days

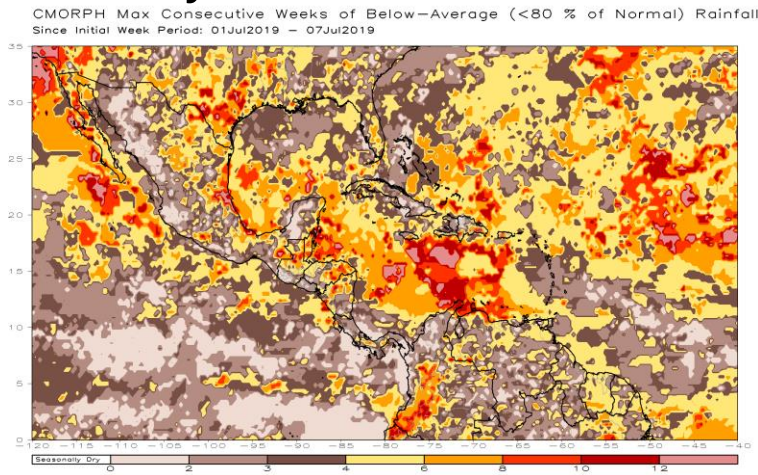


Rain day = day, with P >= 1mm

90-day # of rain day anomaly

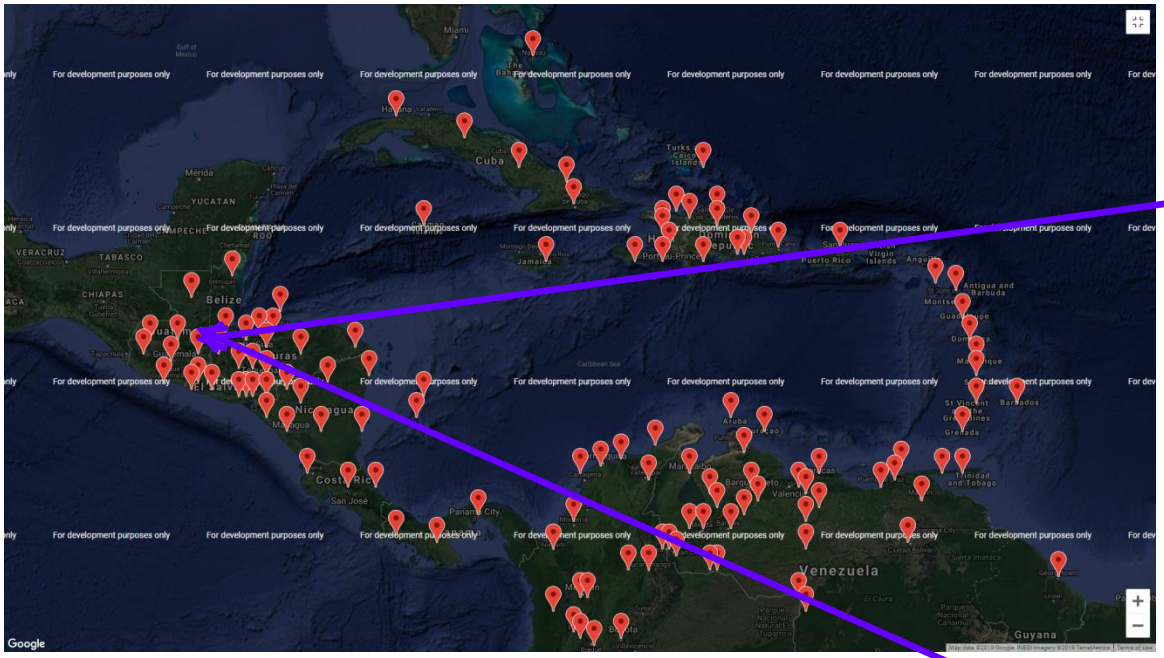


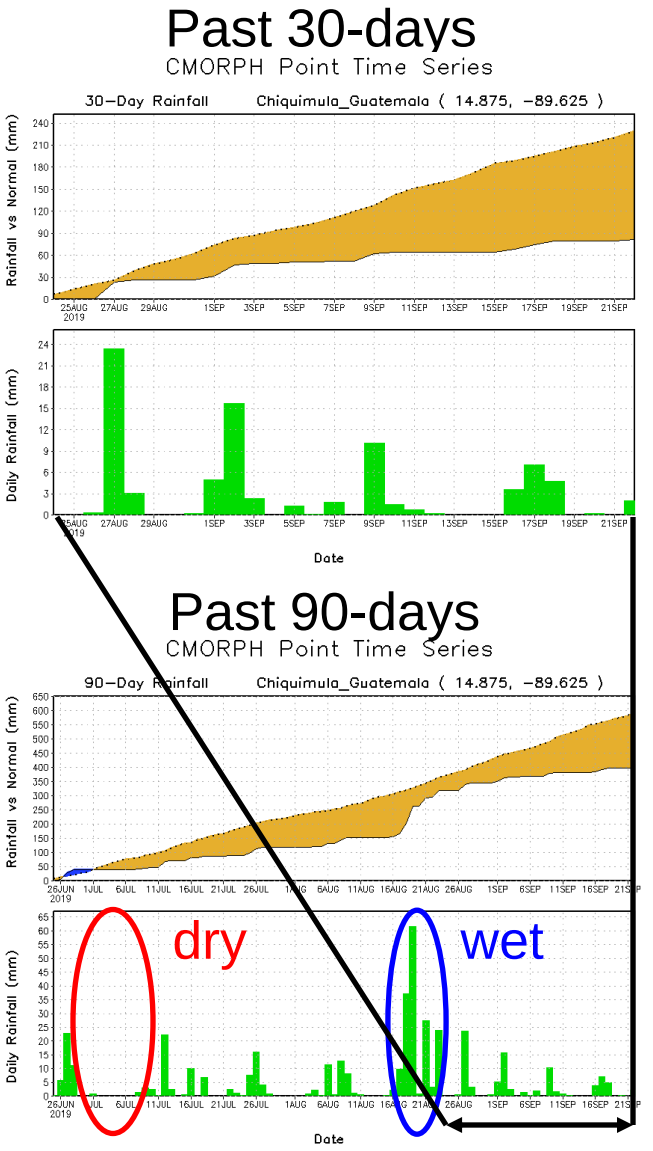
90-day max consecutive weeks of < 80%



Climate monitoring tools

Time series analysis





Identify rainfall frequency and amounts to highlight wet (dry) episodes

Delayed onset and early cessation are of importance

Agroclimatic products

Drought monitors & land surface information

Focus on areas with with low values of SPI, indicating dryness/drought

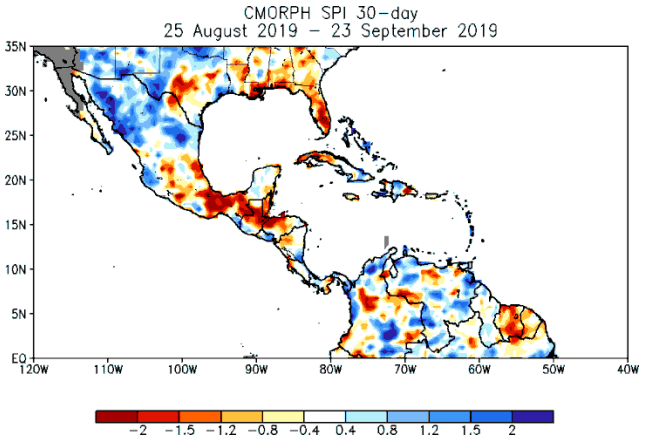
Low (< 48%) values of VHI and below-average NDVI, pointing to poor vegetation conditions

SPI: Standardized Precipitation Index

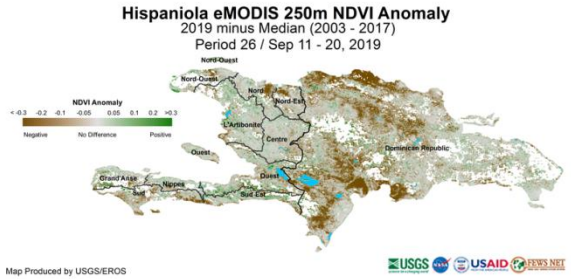
VHI: Vegetation Health Index

NDVI: Normalized Difference Vegetation Index

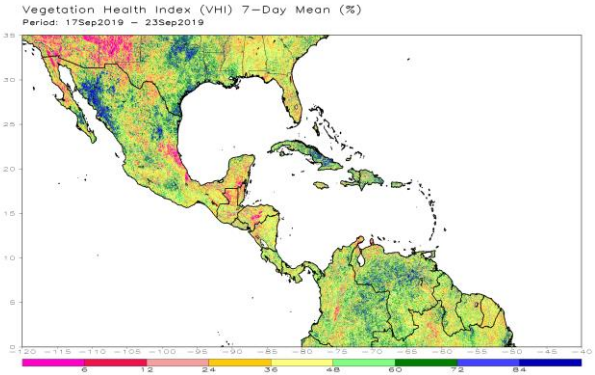
SPI 30-day

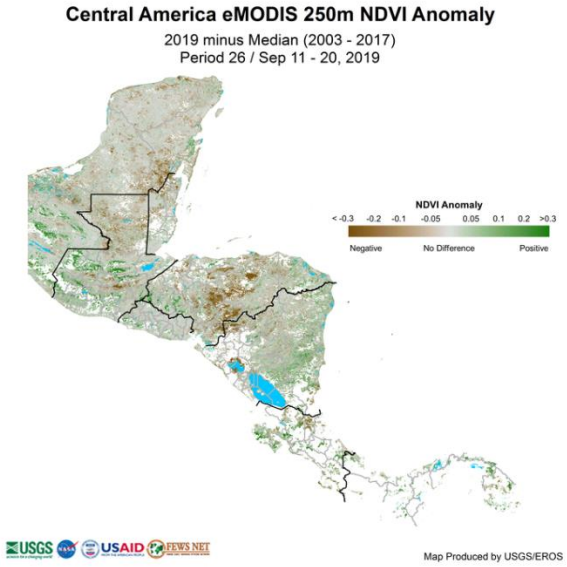


Sep dekad 2 NDVI anomaly



VHI 7-day





Agroclimatic products

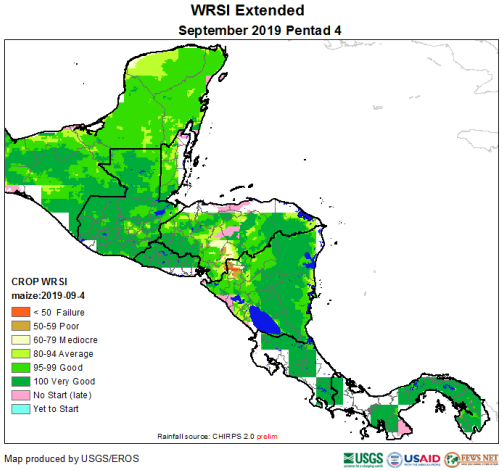
WRSI & SWI

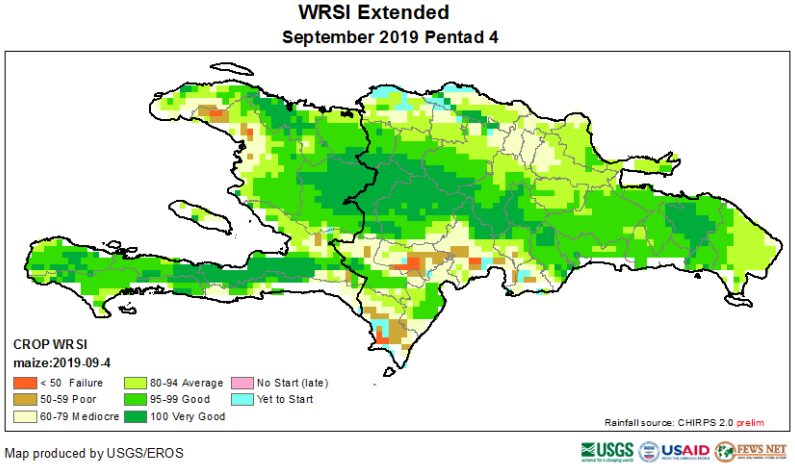
Focus on areas with less than mediocre crop status and under soil moisture stress or worse conditions

WRSI: Water Requirement Satisfaction Index

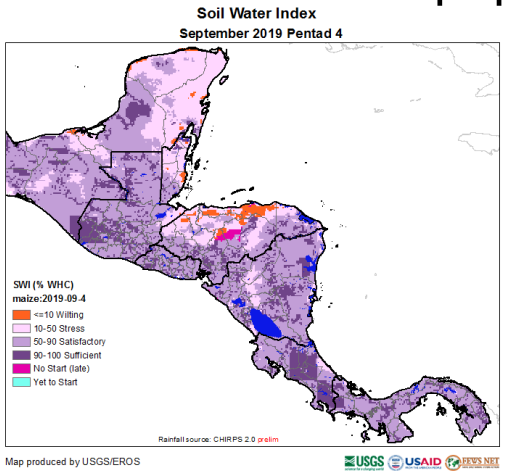
SWI: Soil Water Index

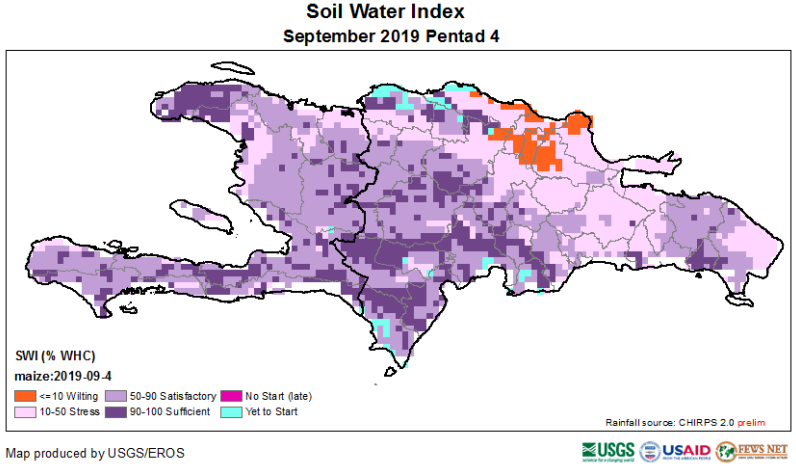
Sep. pentad 4 WRSI





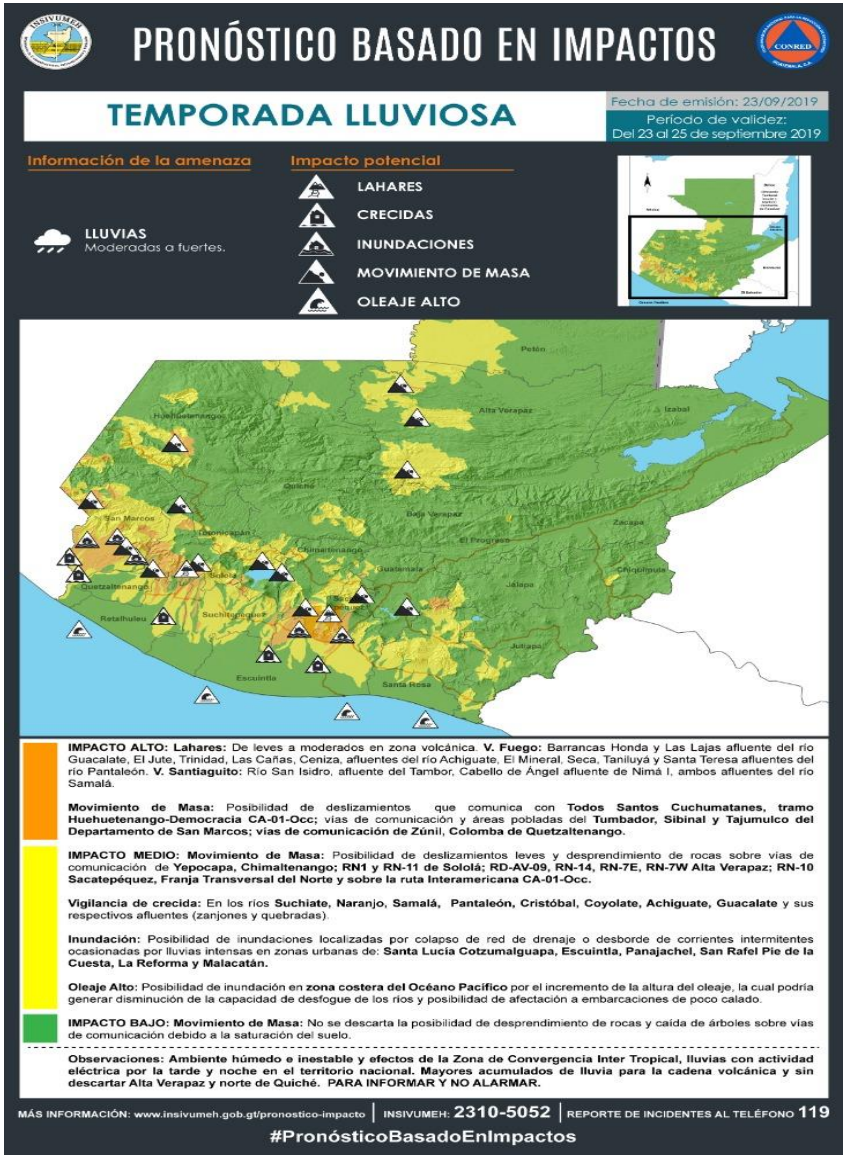
Sep. pentad 4 SWI





Feedback from partners

Impact-based prognostics



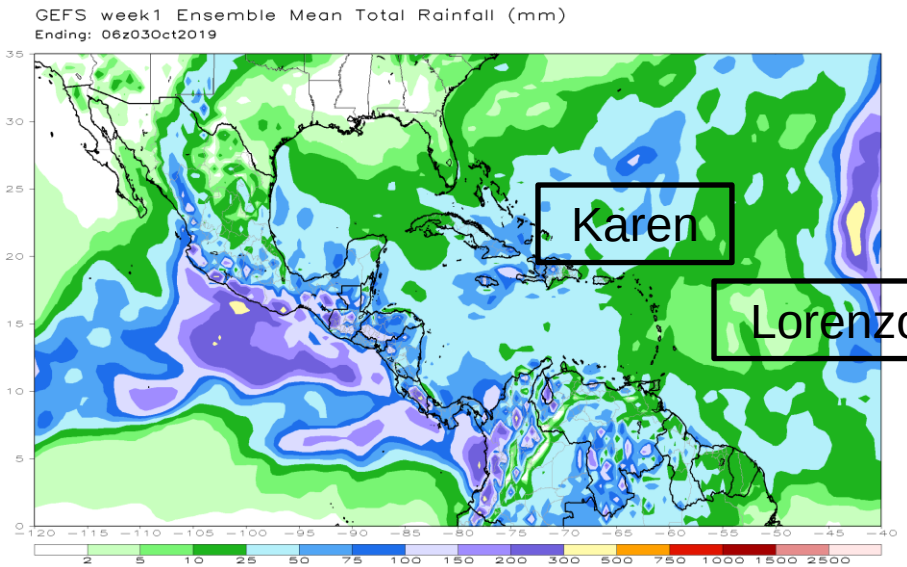
In-situ information, shared by partners enable to calibrate and adjust hazards outlooks

Convergence of evidence reduces uncertainties of ground impacts

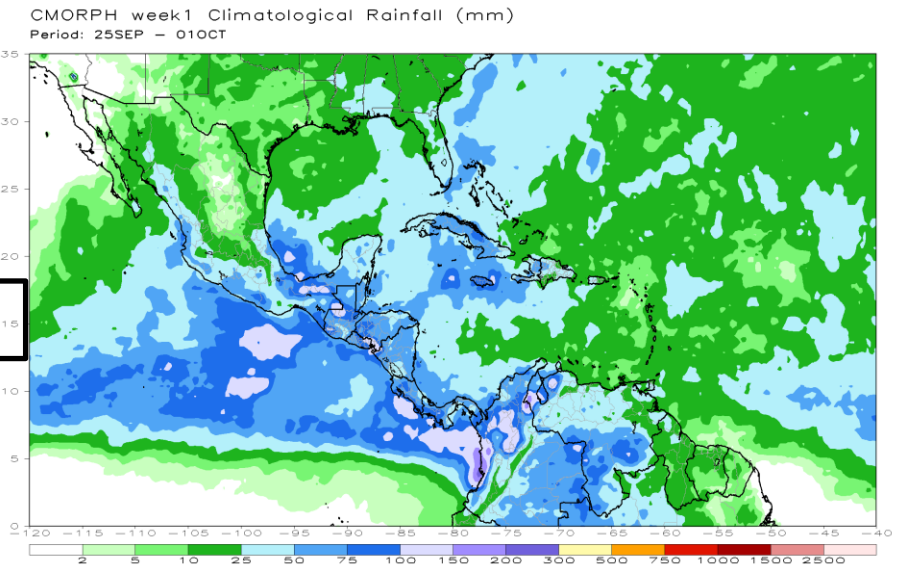
Model guidance tools

GEFS QPF and CMORPH climatology

GEFS 7-day forecast



Week 1 climatology



Comparison gives a first estimate on how rainfall may evolve during the upcoming week:

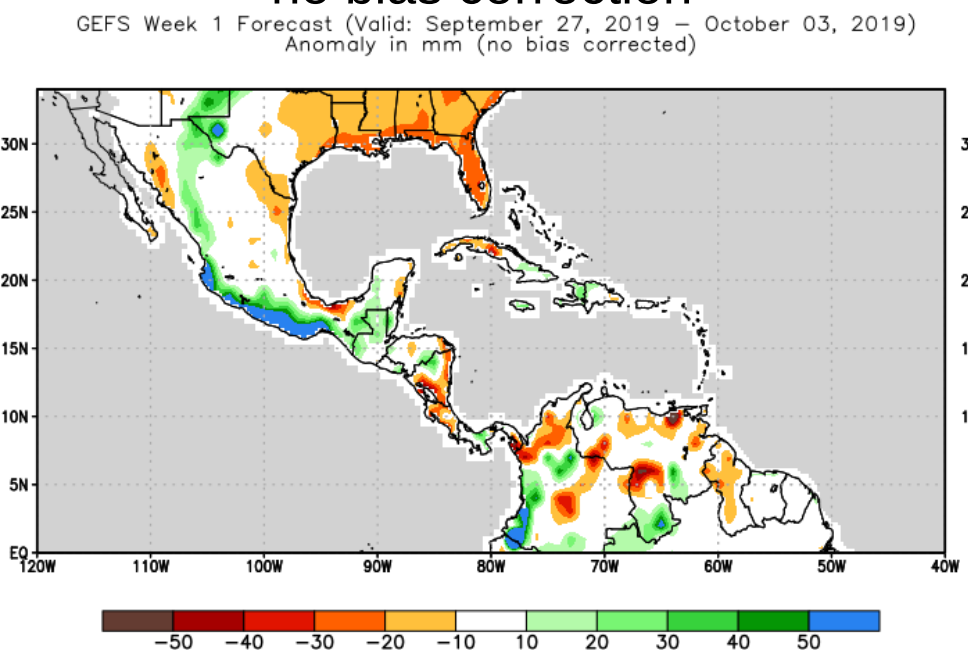
- Rainfall amounts forecast
- Rainfall anomaly forecast

GEFS: Global Ensemble Forecasting System

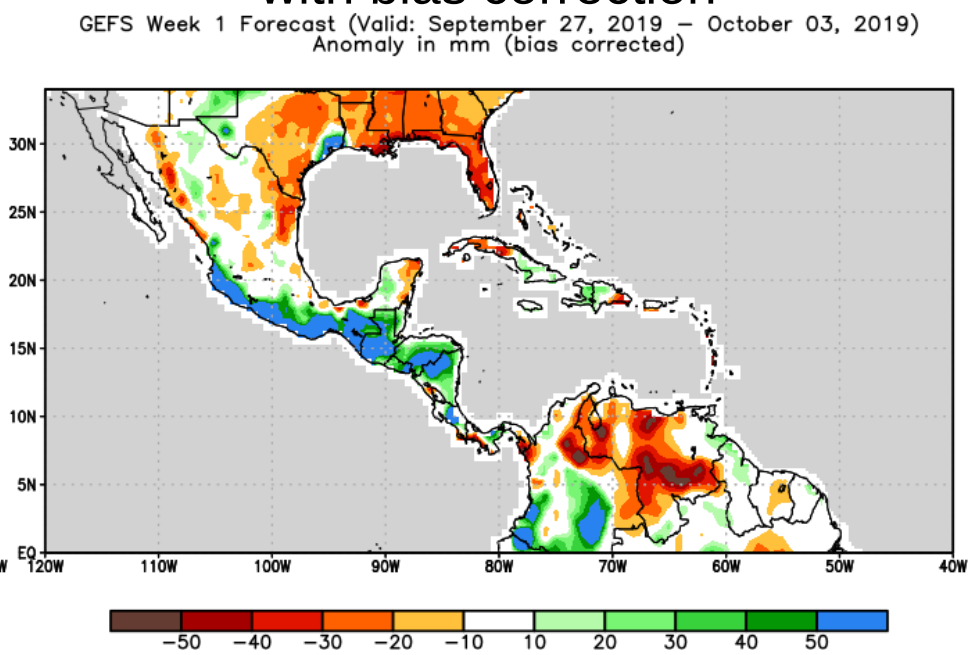
Model guidance tools

Rainfall anomaly forecast

no bias correction



with bias correction



Provides forecast anomalies from the GEFS model perspective, accounting for recent biases

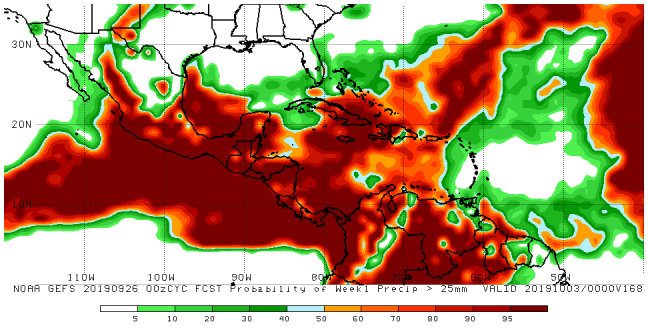
Model guidance tools

Probability of exceedance

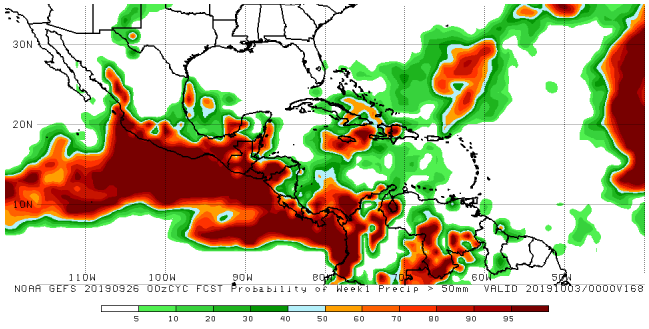
Increases confidence that rainfall totals would exceed a given threshold

Important for flood risks analysis

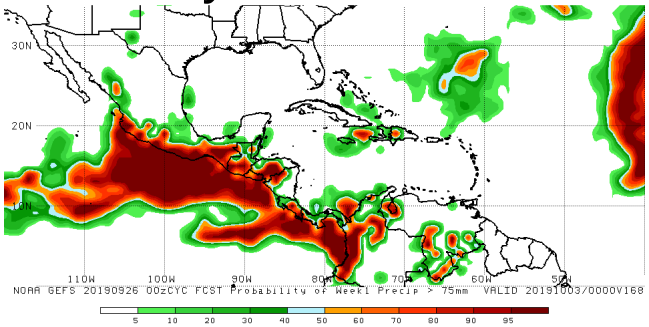
Weekly totals > 25 mm



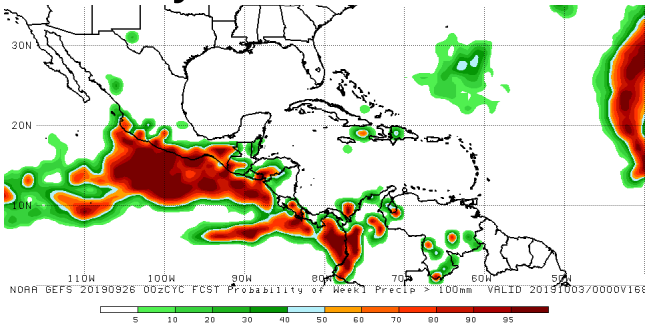
Weekly totals > 50 mm



Weekly totals > 75 mm



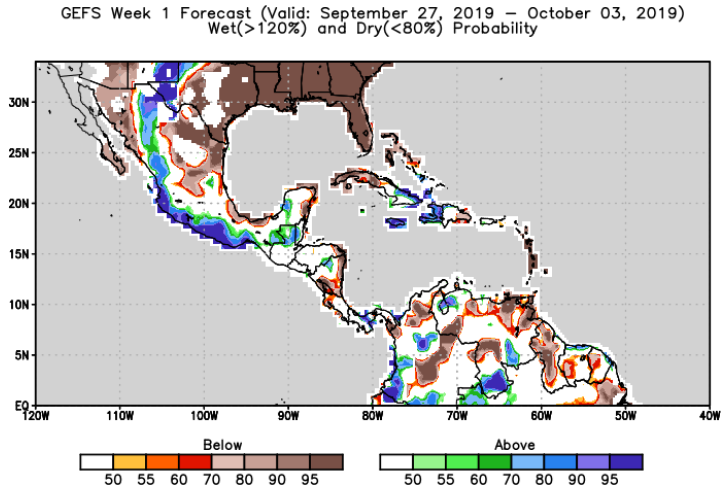
Weekly totals > 100 mm



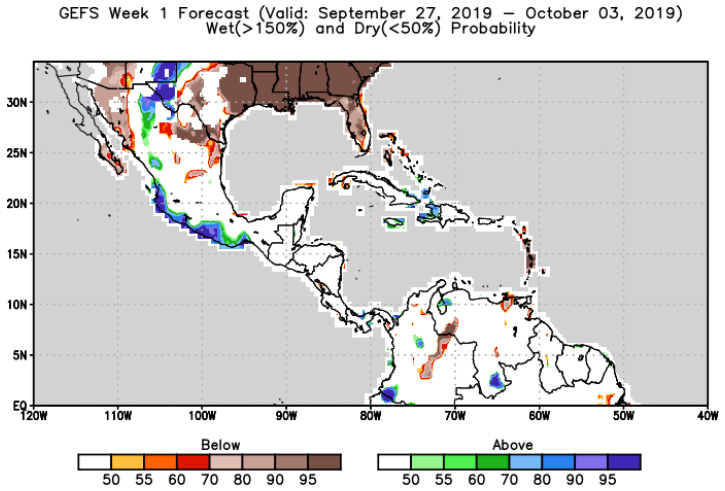
Model guidance tools

Probabilistic rainfall forecast

< 80% and > 120%

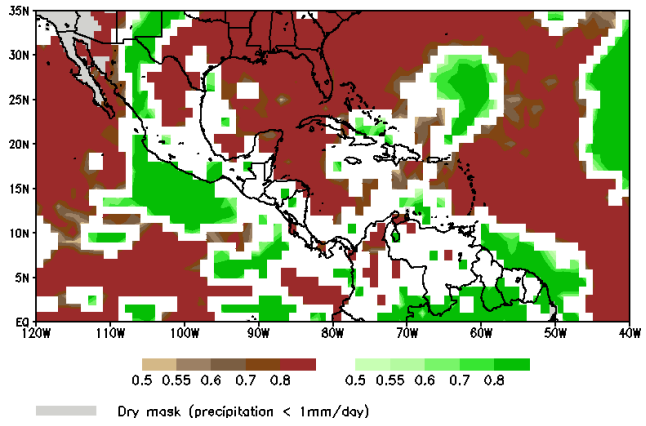


< 50% and > 150%

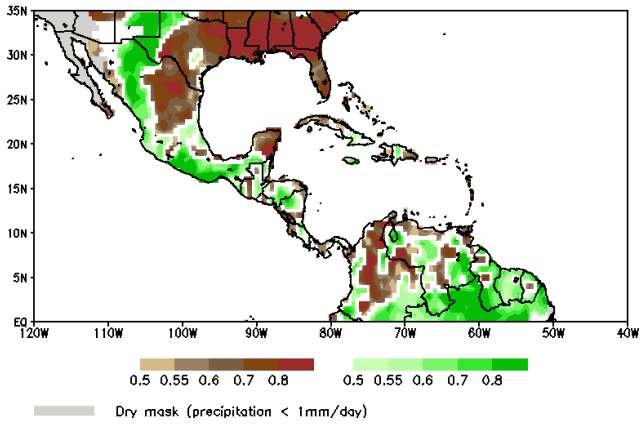


Complement previous forecast anomalies in a probabilistic format

no calibration



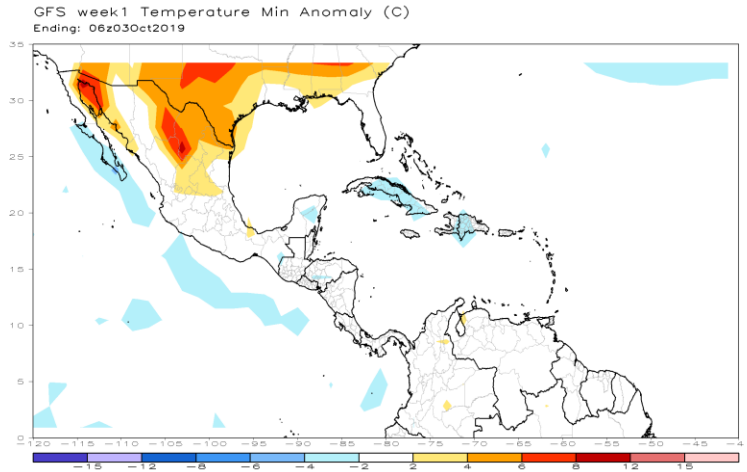
with calibration



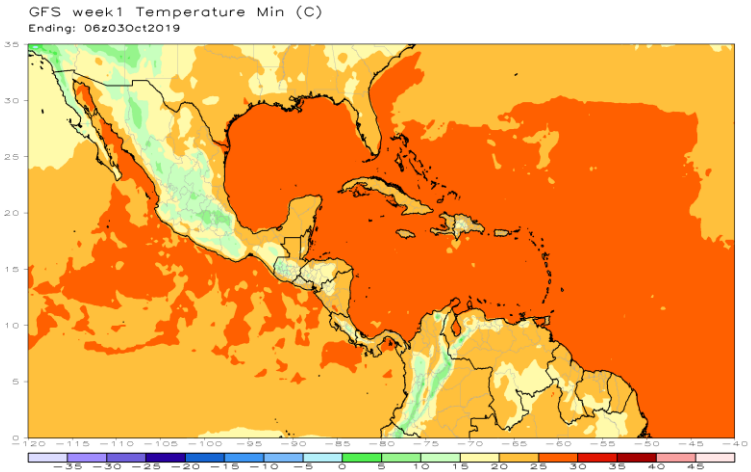
Model guidance tools

Temperature forecast

Min. temperature anomaly

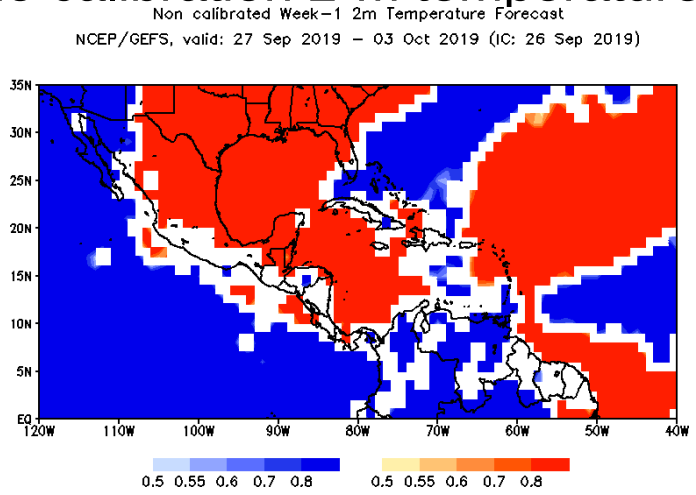


Min. temperature

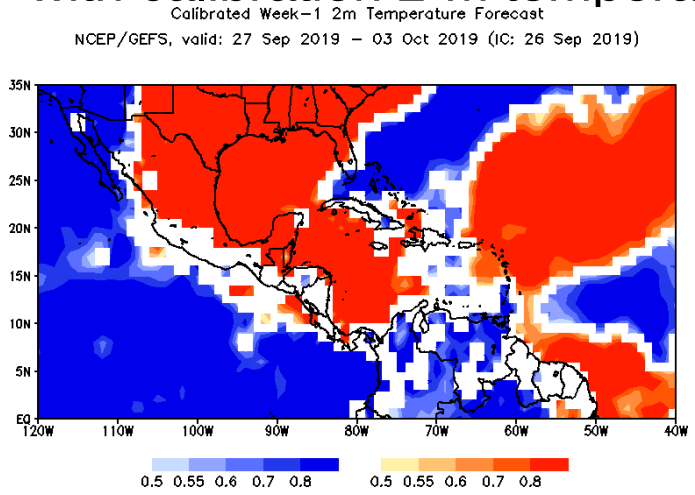


Important for abnormal cold over higher terrains

no calibration 2-m temperature



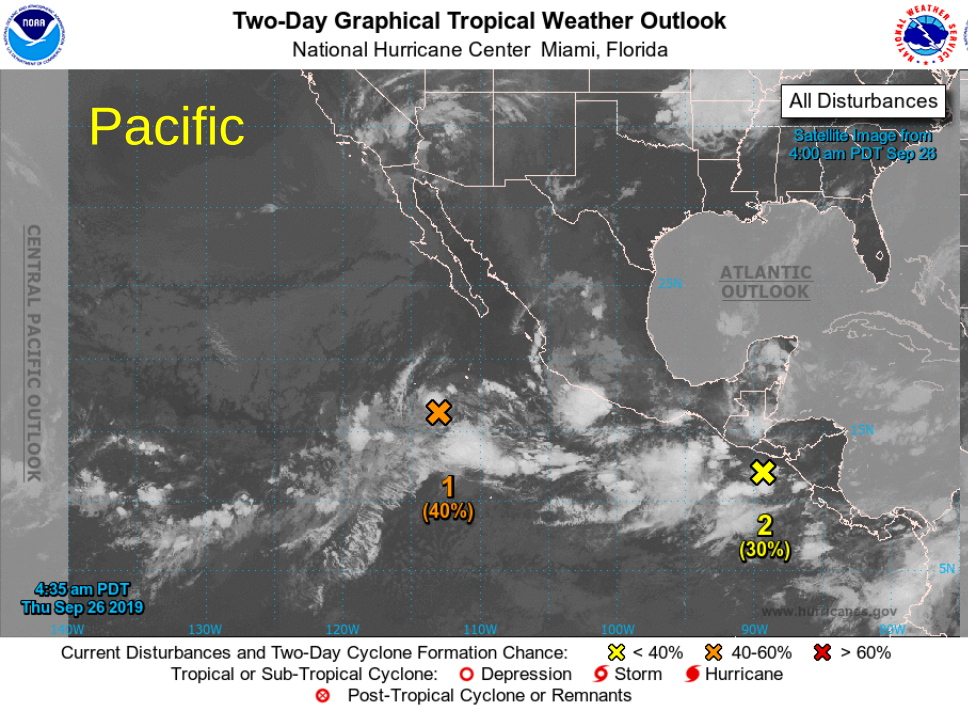
with calibration 2-m temperature

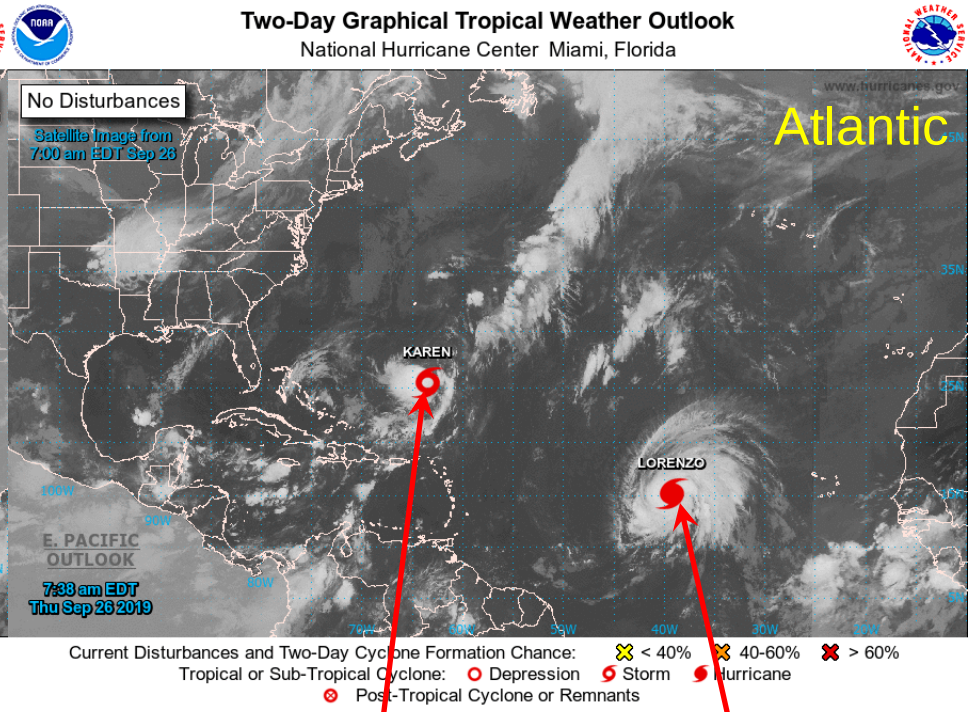


Higher temperature increases evaporation and exacerbates droughts

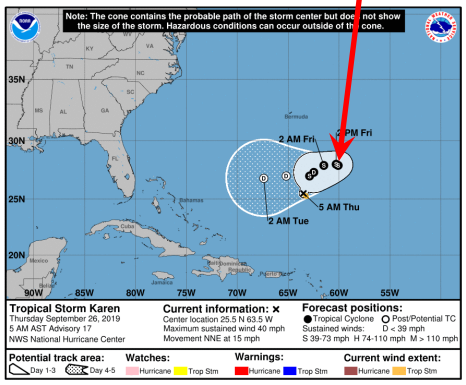
Model guidance tools

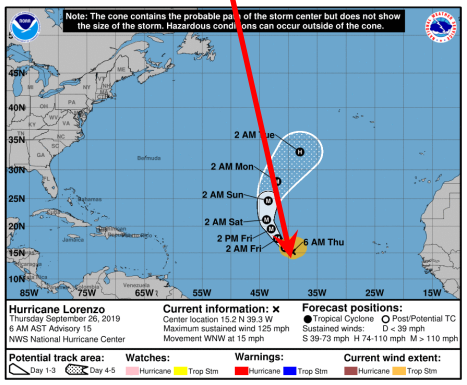
Hurricane track forecast





The National Hurricane Center (NHC)'s storm forecasts enable to evaluate potential impacts from 1-5 days in advance

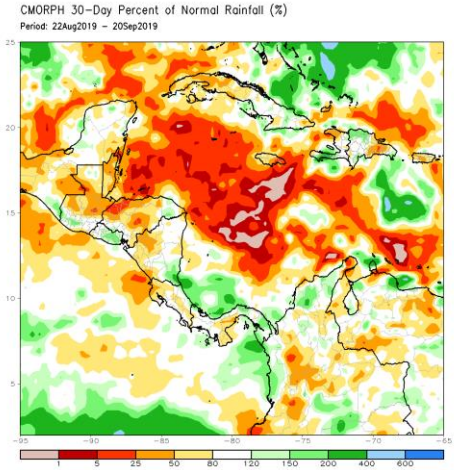


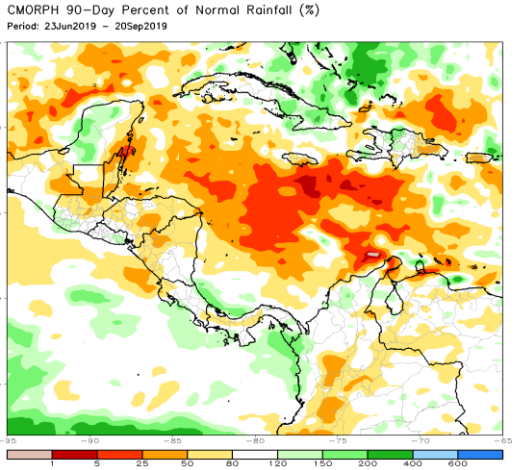


Latest hazards

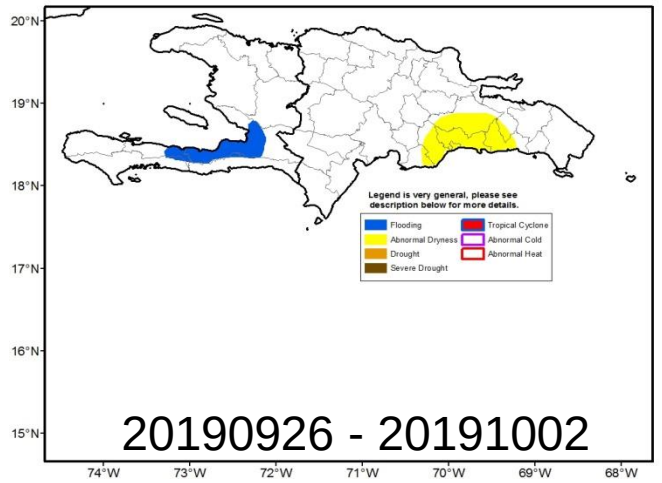
Flooding and abnormal dryness

Climate monitoring

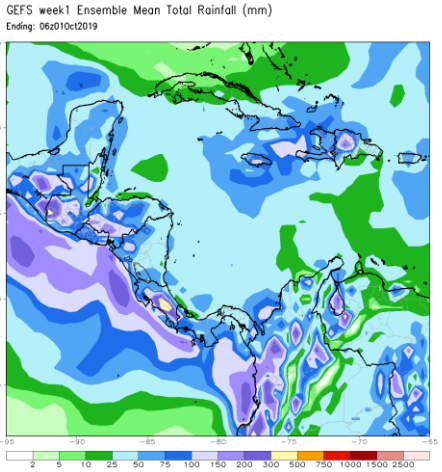




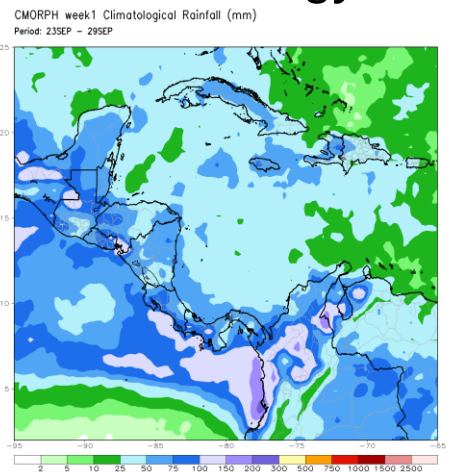
Hazards outlooks

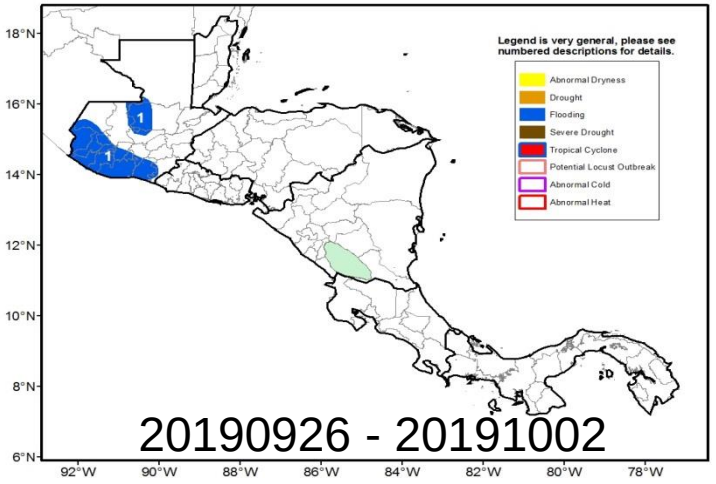


Forecasts



Climatology





Use of the hazards outlooks

FEWS NET food security outlook

Central America and Caribbean

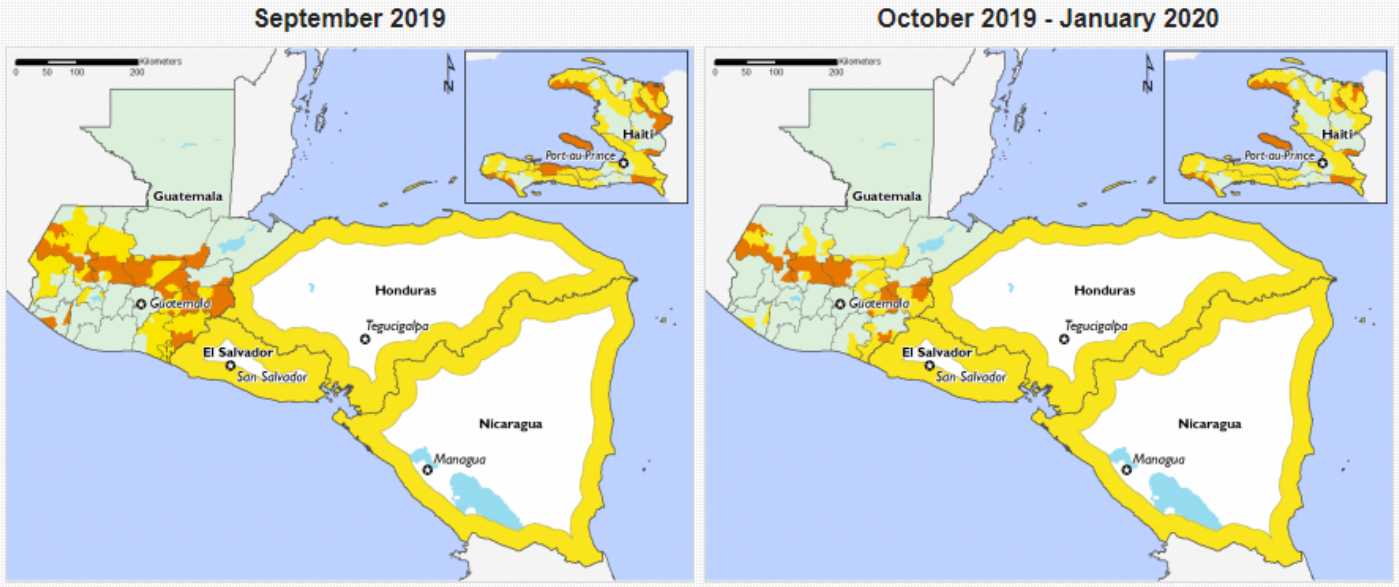
Key Message Update

Archive

Rainfall irregularities affect basic grains harvest

September 2019

FEWS NET incorporates the hazards outlooks among other indicators to produce food security outlooks



Thank you