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LESSON 3.
THE CALCULATION OF THE *FEWS-NET ET$_P$* PRODUCT

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WHAT IS FEWS-NET

- The Famine Early Warning Systems Network is a leading provider of early warning and analysis on food insecurity.
- Created by USAID in 1985 to help decision-makers plan for humanitarian crises,.
- FEWS NET provides evidence-based analysis on some 35 countries.
- Implementing team members include NASA, NOAA, USDA, and USGS, along with Chemonics International Inc. and Kimetrica.
- www.fews.net

USAID FROM THE AMERICAN PEOPLE

USGS science for a changing world

NASA

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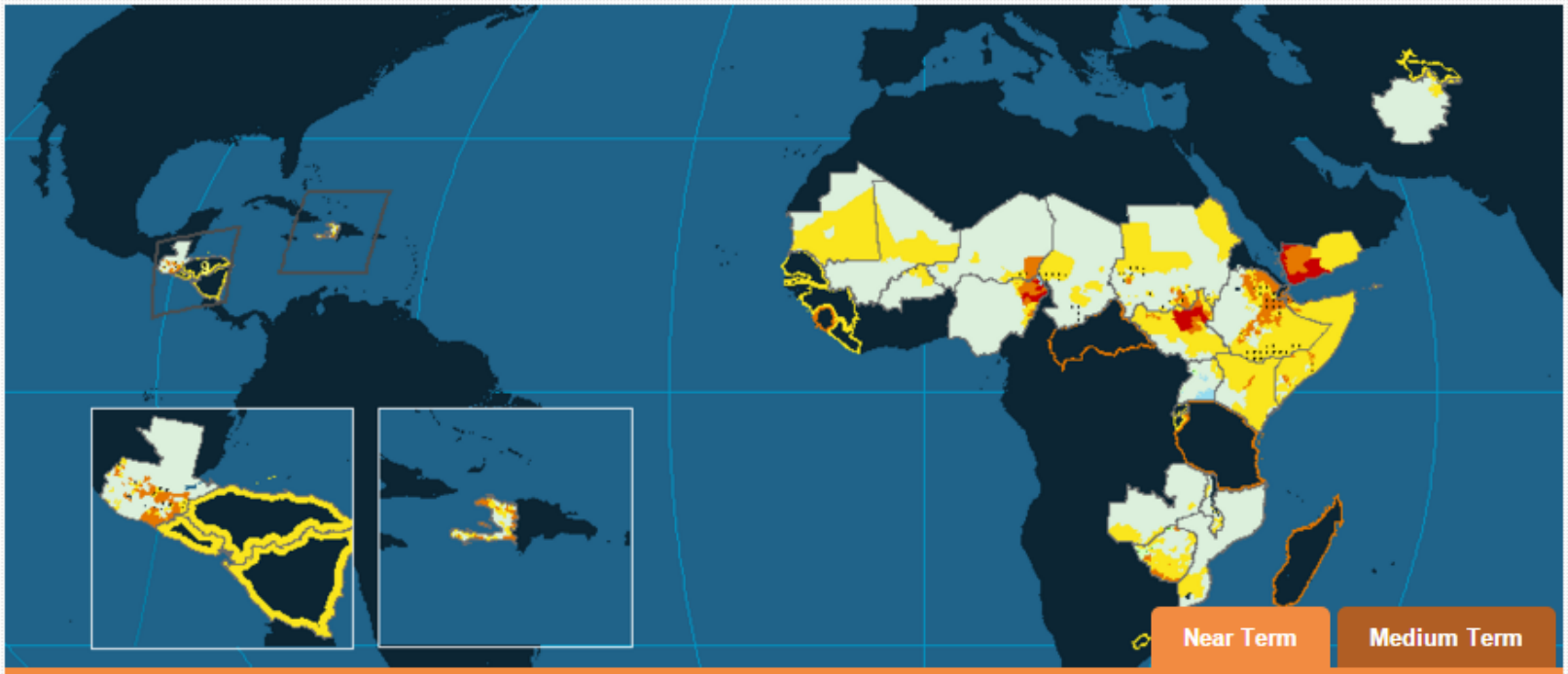


Areas of Highest Concern

Country or Region	Reason for Concern	Current Observations
ETHIOPIA	Following a very severe drought in eastern Ethiopia, more people will need food assistance over the coming year than at any time in the past 10 years.	Unusually during the harvest, the price of staple foods continues to gradually rise in some markets in eastern Ethiopia, constraining food access for the poor.

FEWS-NET ETp product uses Penman-Monteith equation

$$\lambda E = \frac{\Delta[R_n - G] + \frac{\rho c_p}{r_a}[e_s(T_a) - e_a]}{\Delta + \gamma\left[1 + \frac{r_c}{r_a}\right]}$$

What is needed:

- Net radiation Rn, thus albedo, emissivity, incident irradiance
- Ground heat flux G
- Aerodynamic resistance, thus wind speed
- Surface resistance of well-watered surface.
- Air temperature
- Vapour pressure

Where do these data come from?

The following data:

air temperature, wind speed, relative humidity and net radiation

Are taken from the Global Data Assimilation System (GDAS) of NOAA (resolution of 1°):

Global: gridded data for the whole Earth

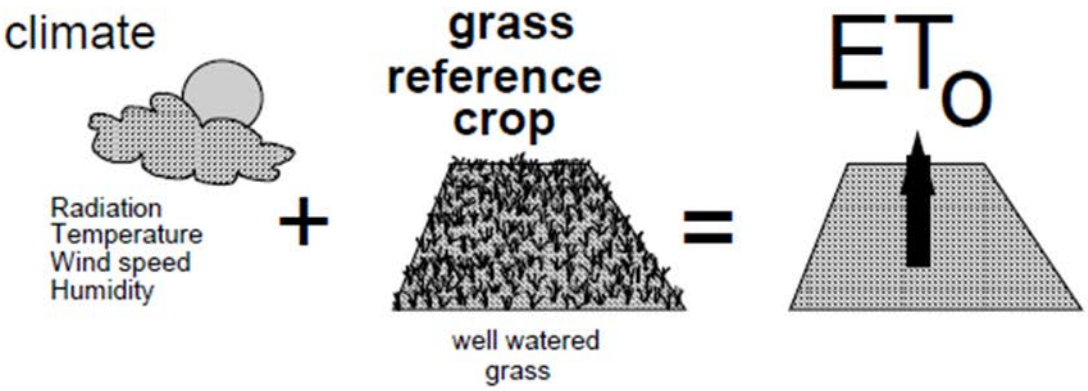
Data: surface observations, balloon data, wind profiler data, aircraft reports, buoy observations, radar observations, and satellite observations

Assimilation System: Combined and used to force numerical weather prediction model ensemble (National Centers for Environmental Prediction)

From GDAS, but what about the rest?

$$\lambda E = \frac{\Delta[R_n - G] + \frac{\rho c_p}{r_a}[e_s(T_a) - e_a]}{\Delta + \gamma\left[1 + \frac{r_c}{r_a}\right]}$$

Using FAO56 report (Allen et al., 1998, 'Crop Evapotranspiration', definition for reference grass. So ET_p of FEWS-NET is not potential ET but reference ET !!!



Aerodynamic and surface resistance

Using:

Crop height = 0.12 m
z_{0m} = 0.123* crop height
d = 2/3* crop height

In the equation for r_a (s m^{-1}) in Chapter 2 of Allen et al, results in:

$$r_a = \frac{208}{u}$$

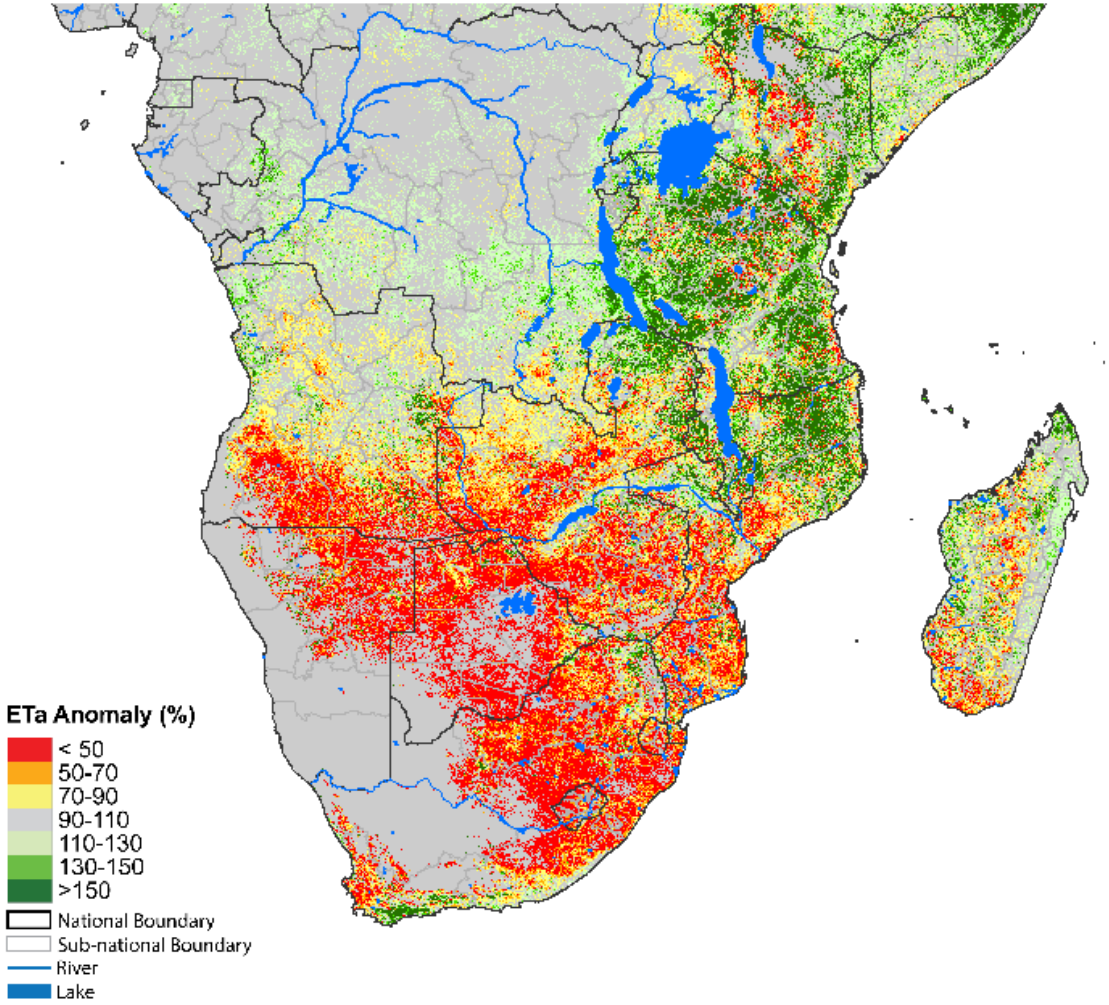
Wind speed *u* (ms^{-1}) from GDAS

For the surface resistance is used:

r_c = 70 s m^{-1}

Cumulative ETa Anomaly: Oct Dekad 1 - Nov Dekad 1, 2015

Percent of Median (2003-2013)



Map Produced by USGS/EROS

USGS USAID FEWS NET

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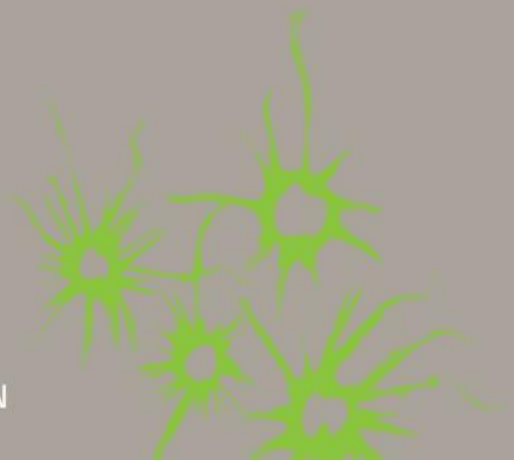
THE END

THANK YOU



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