Monitoring Water Use and Drought using Satellite Remote Sensing

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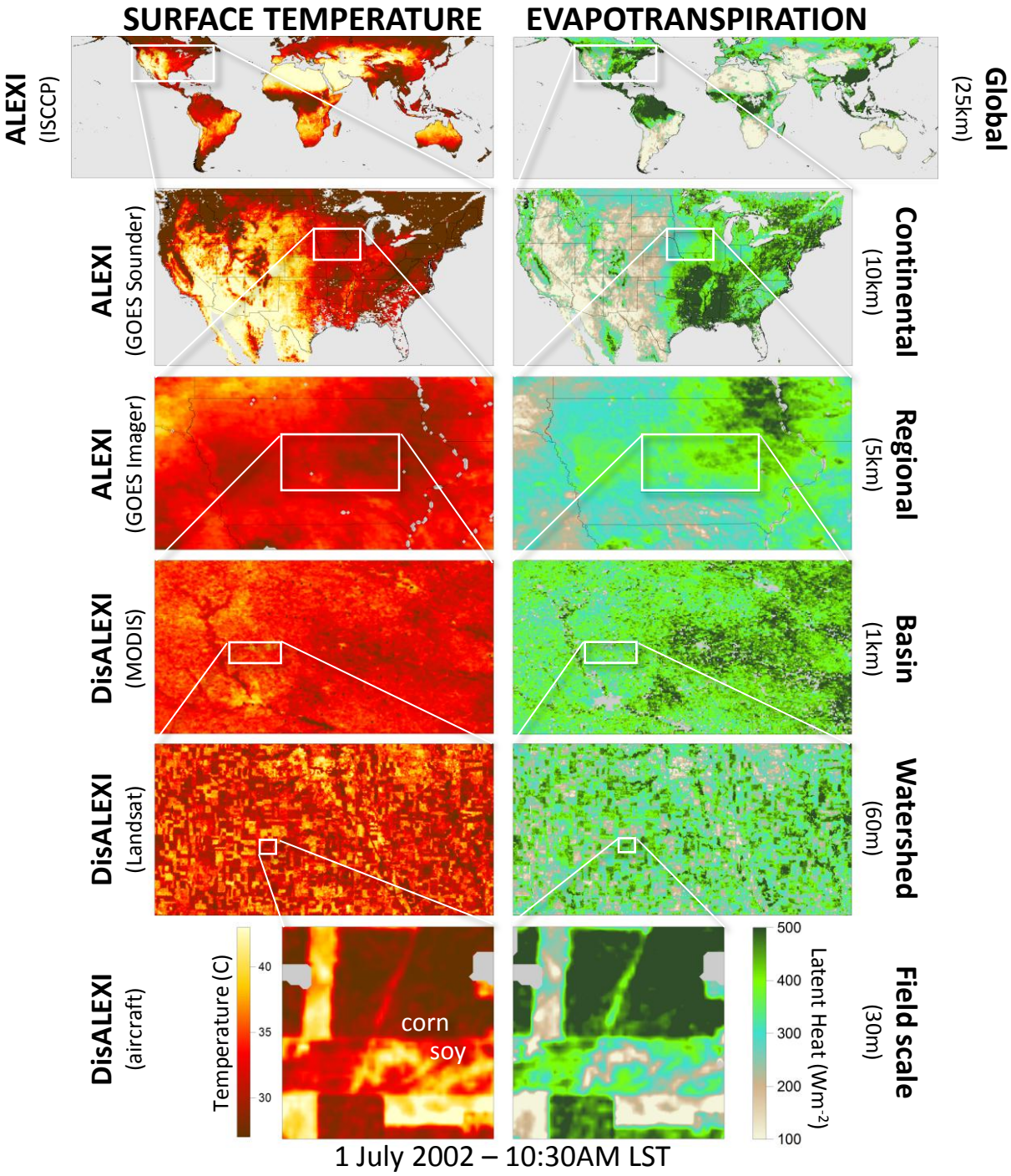
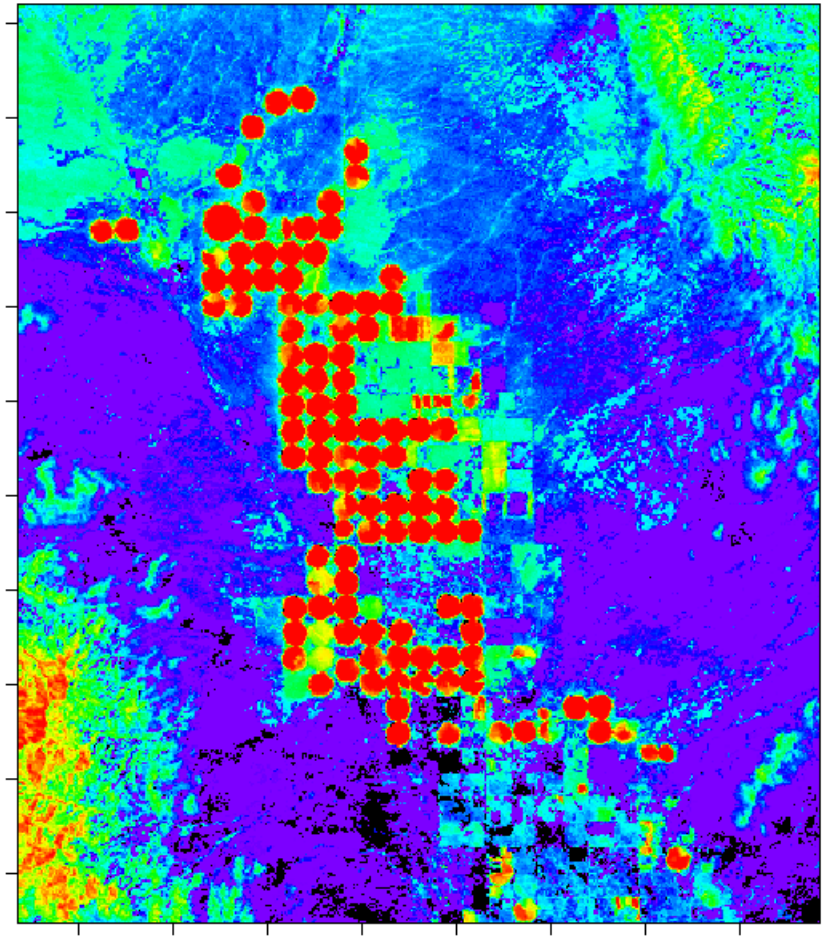
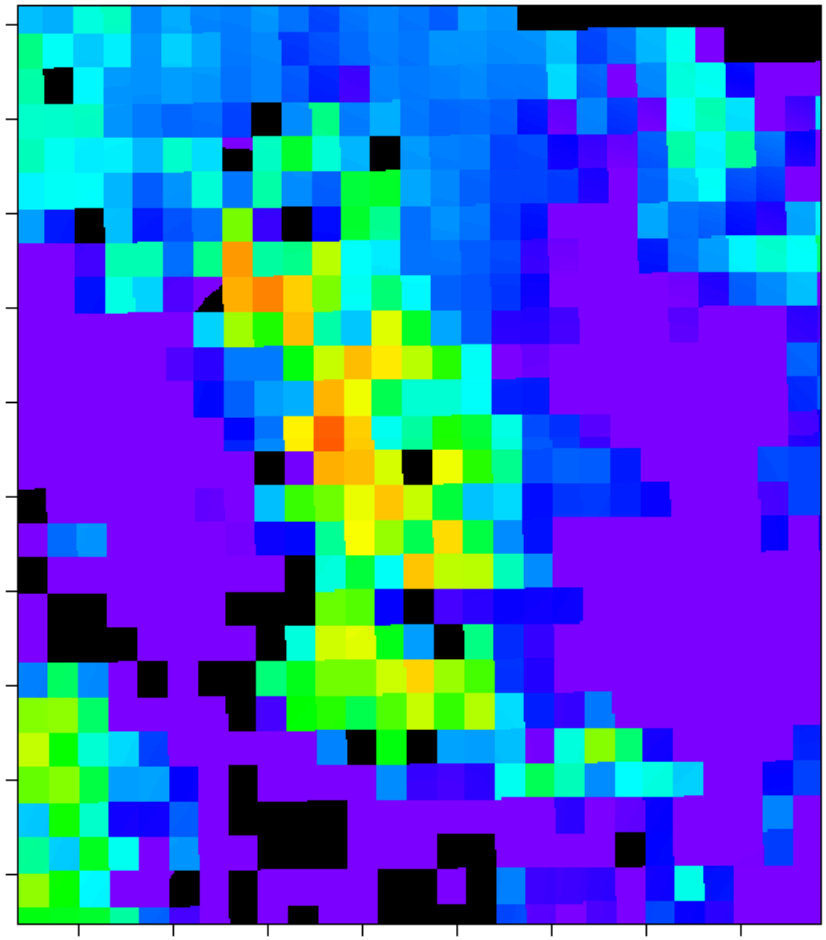

SURFACE TEMPERATURE
EVAPOTRANSPIRATION
ALEXI (ISCCP)
Global (25km)
ALEXI (GOES Sounder)
Continental (10km)
ALEXI (GOES Imager)
Regional (5km)
DisALEXI (MODIS)
Basin (1km)
DisALEXI (Landsat)
Watershed (60m)
DisALEXI (aircraft)
Field scale (30m)
Temperature (C)
40
35
30
corn
soy
Latent Heat (Wm-2)
500
400
300
200
100
1 July 2002 – 10:30AM LST

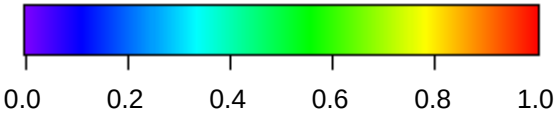
Sensitivity to irrigation

Landsat 7 – 60m



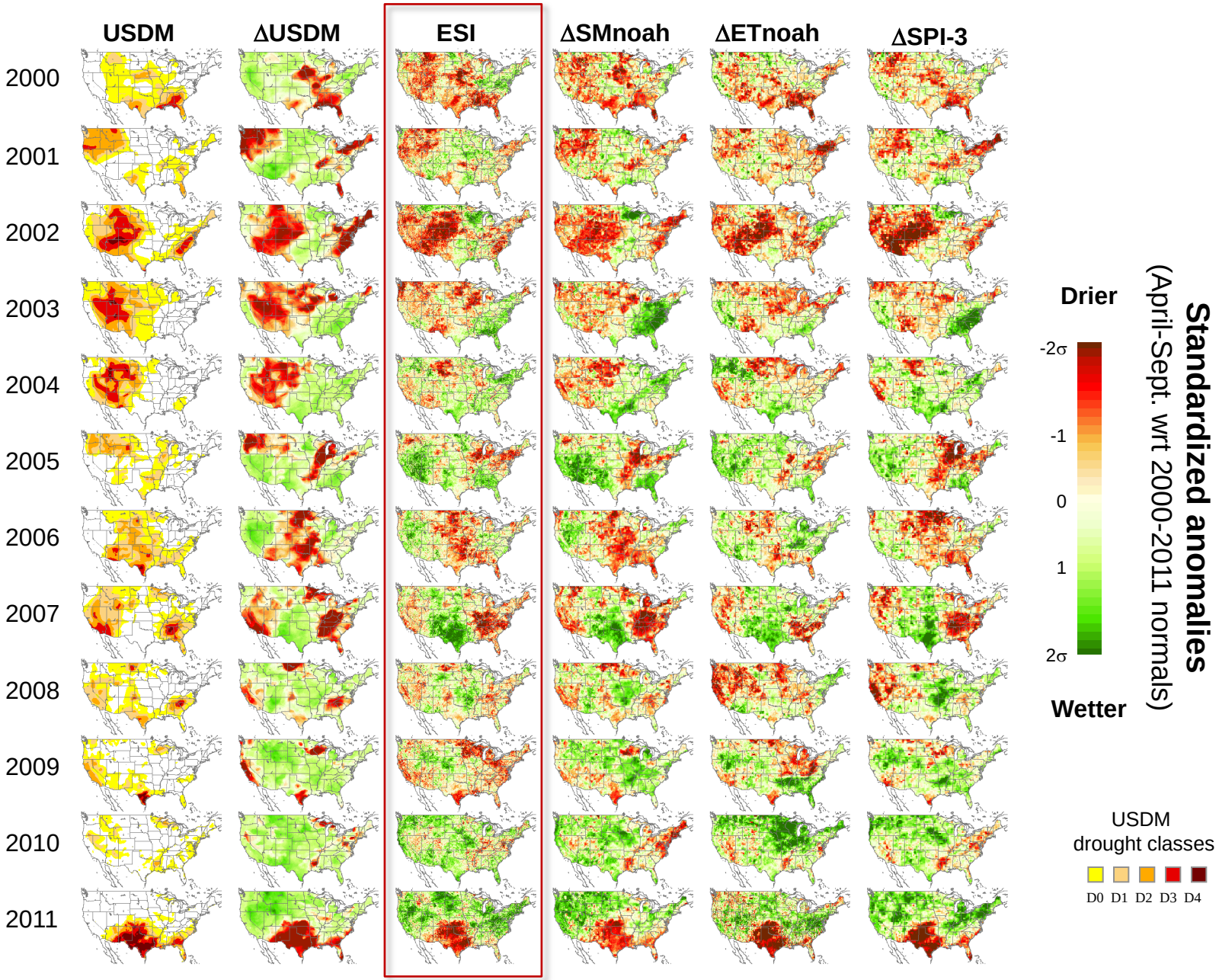
MODIS – 1km





$$\frac{ET}{PET}$$

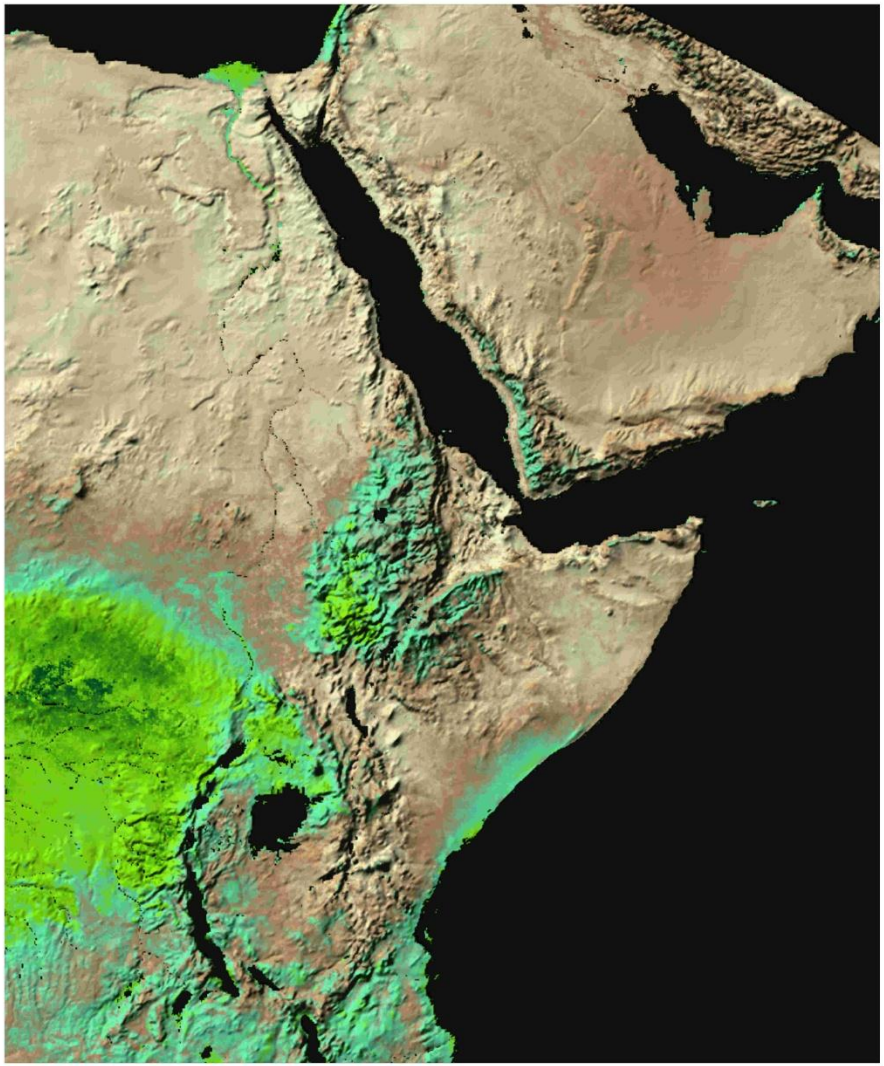
EVAPORATIVE STRESS INDEX

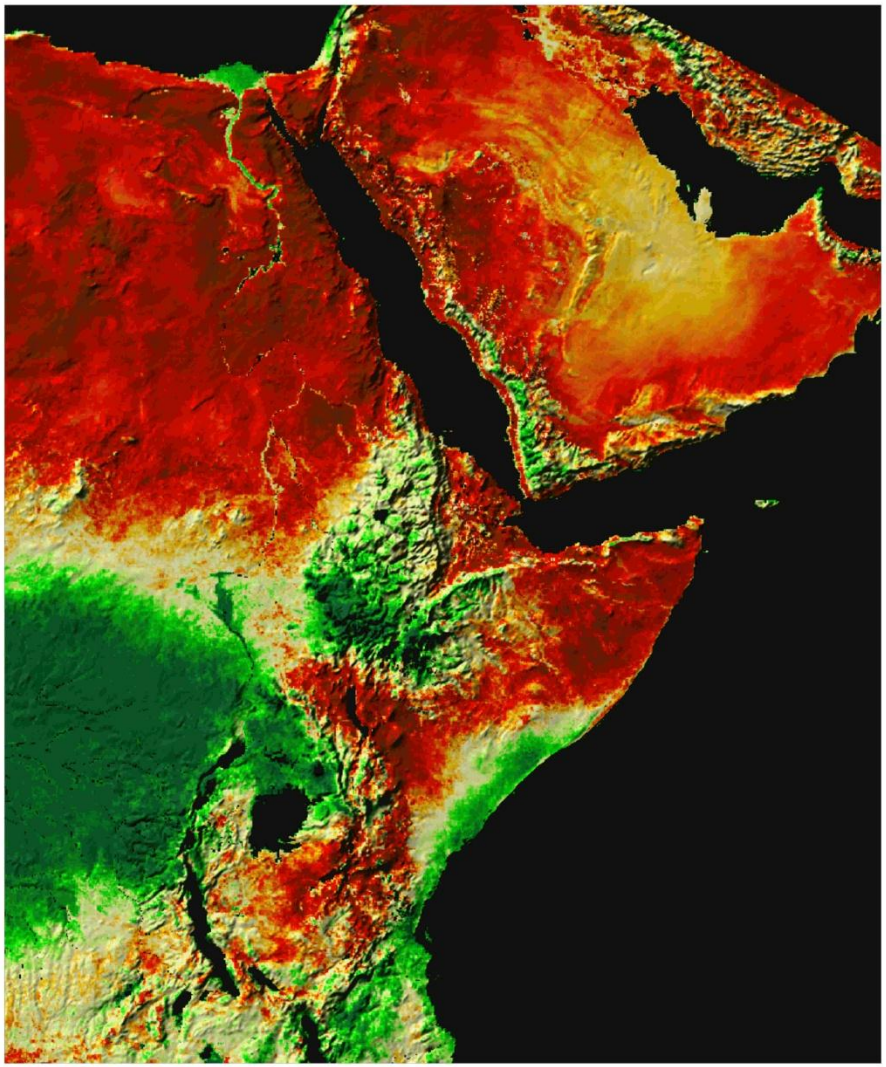


INTERNATIONAL APPLICATIONS

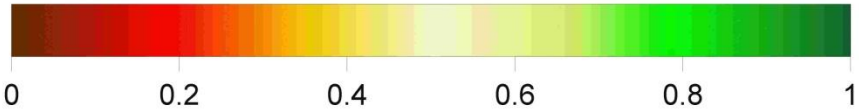
... Nile River Basin

2009 APRIL-SEPTEMBER

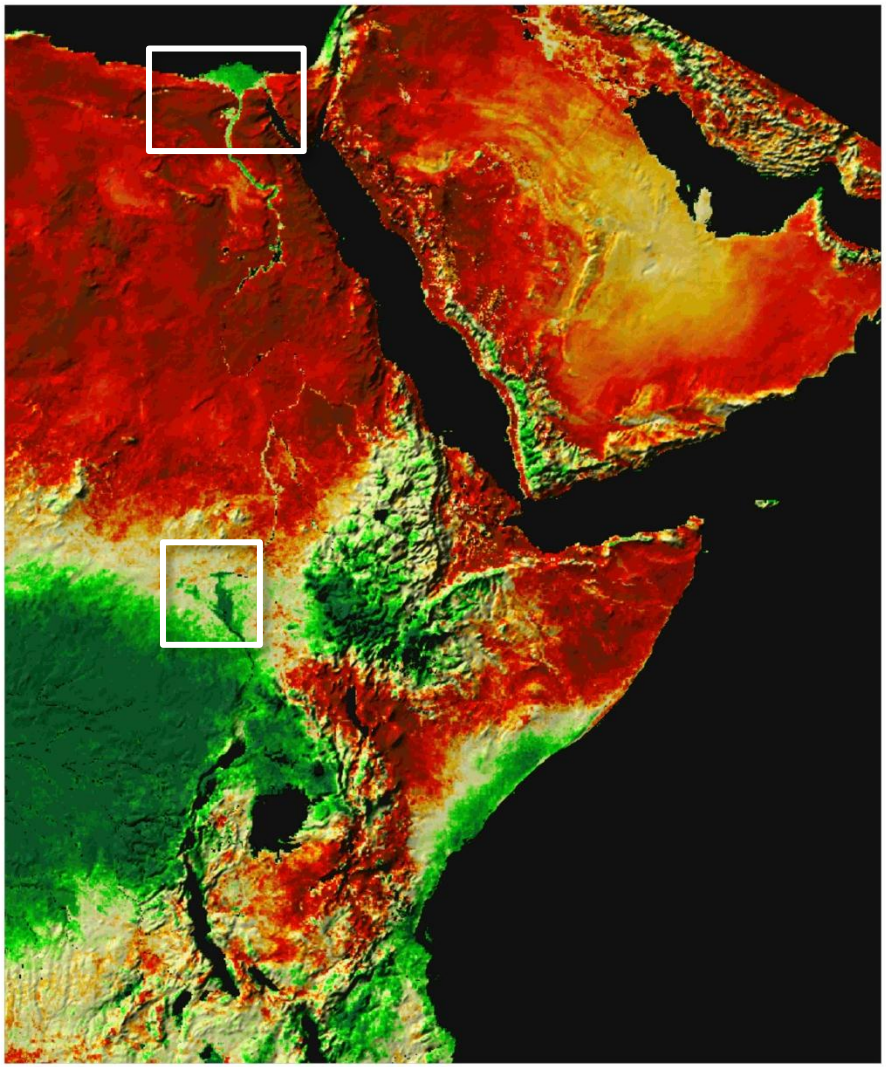


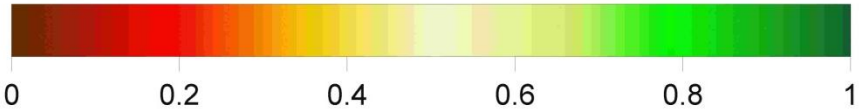


Average ALEXI ET (MJ m^{-2} d^{-1})

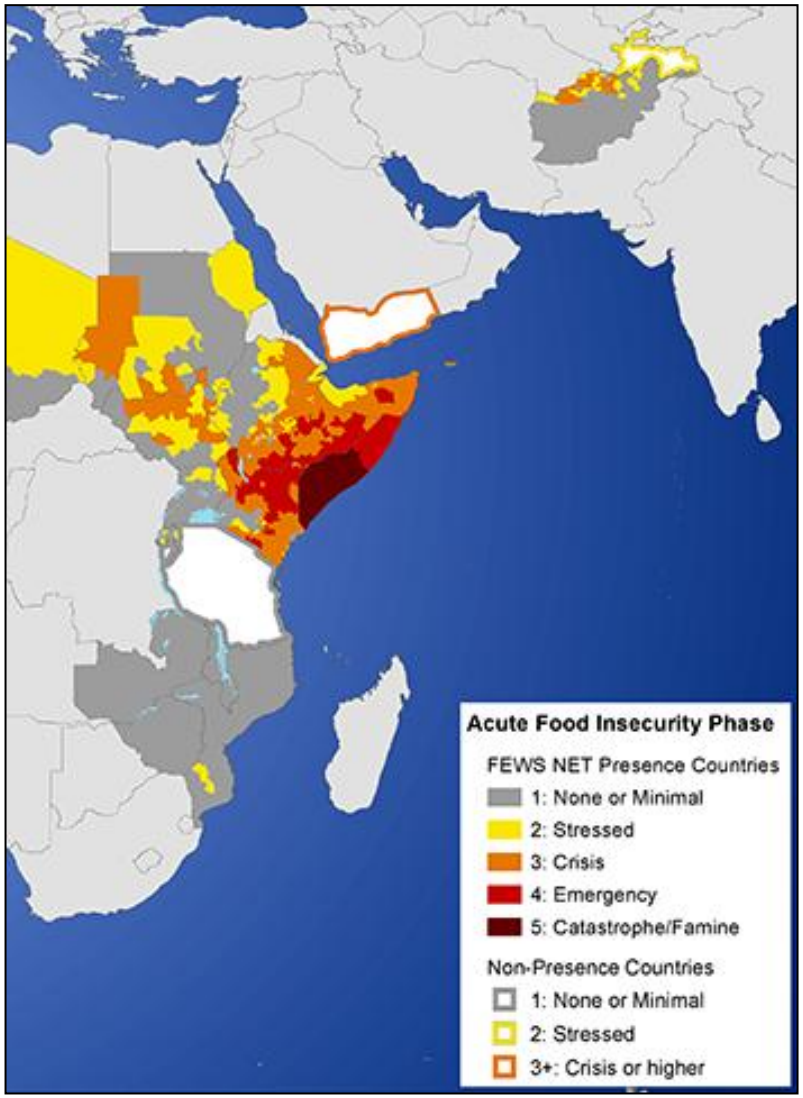


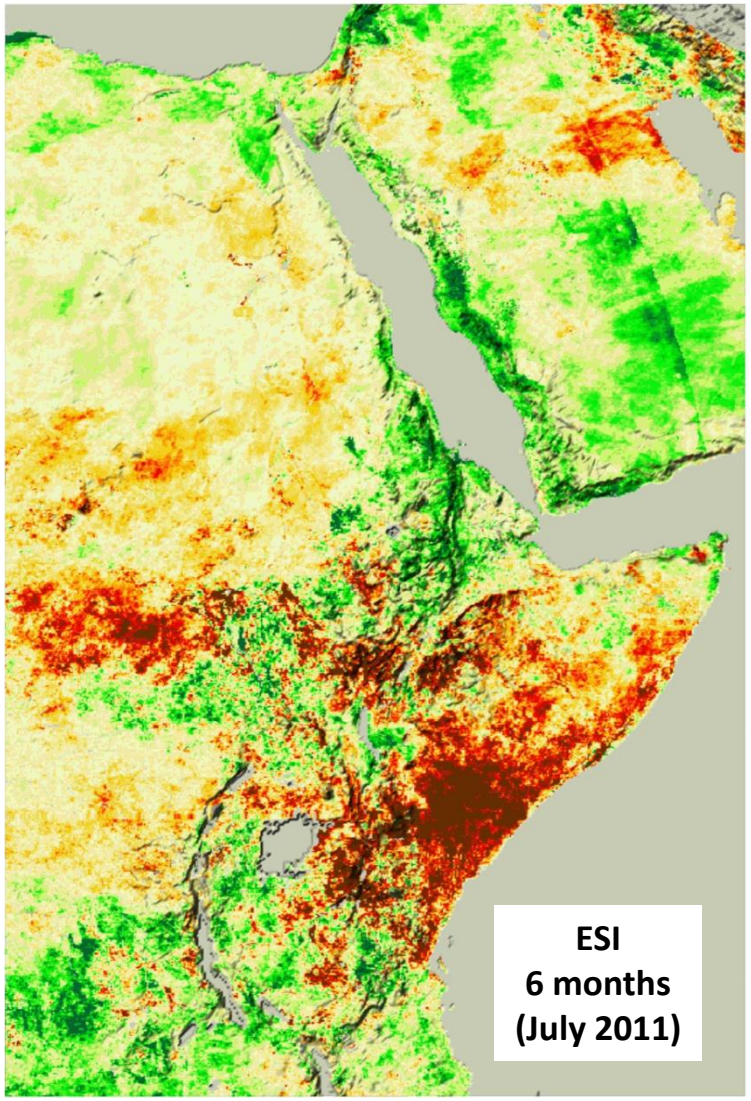
Average ALEXI ET/PET

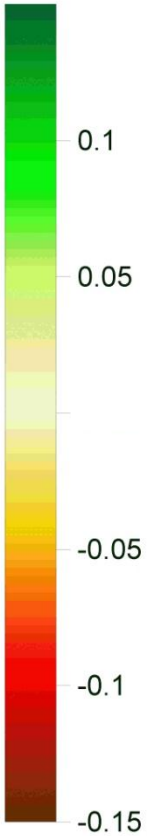




Average ALEXI ET/PET


Acute Food Insecurity Phase
FEWS NET Presence Countries
1: None or Minimal
2: Stressed
3: Crisis
4: Emergency
5: Catastrophe/Famine
Non-Presence Countries
1: None or Minimal
2: Stressed
3+: Crisis or higher

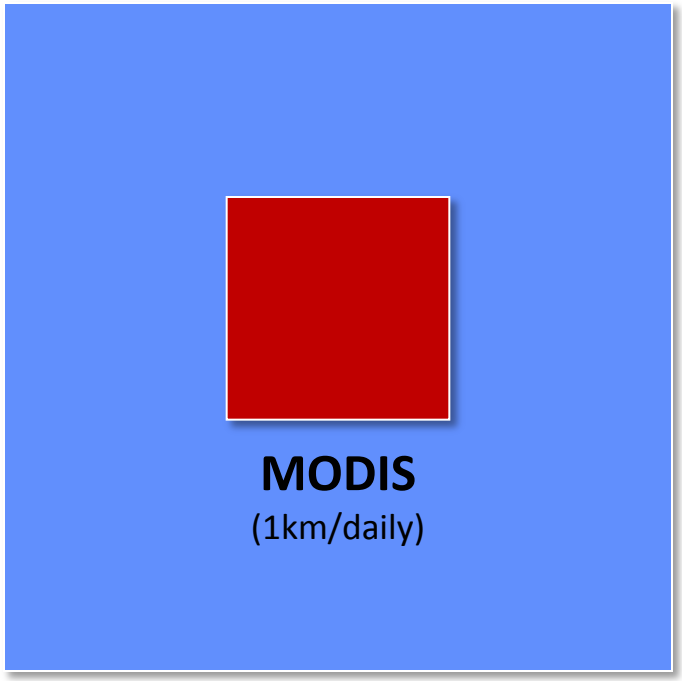

ESI
6 months
(July 2011)


0.1
0.05
-0.05
-0.1
-0.15

CLIMATE RESILIENCE STUDY:
CHOKE MOUNTAIN
Ethiopia

HyspIRI
(60m/5 day)

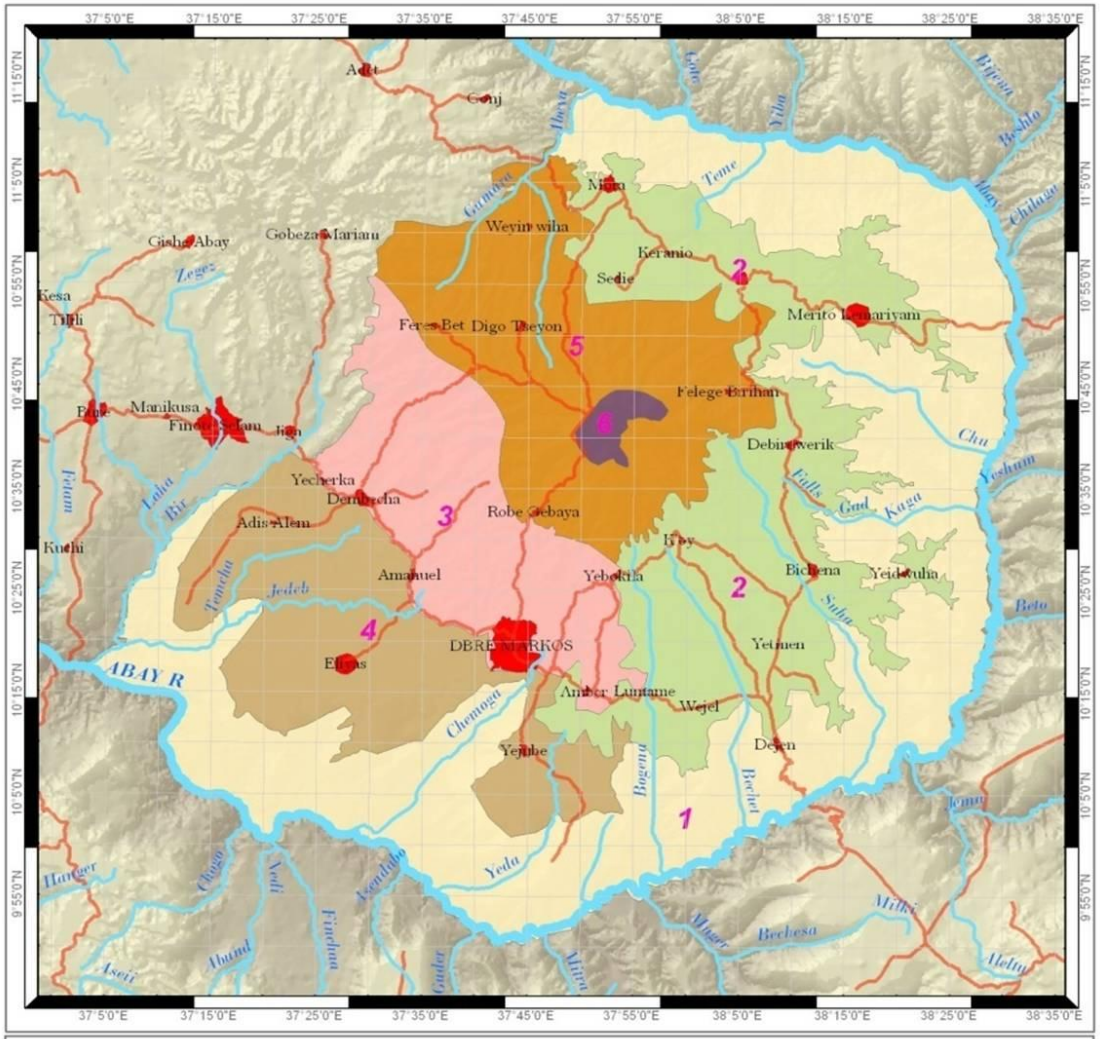
Landsat
(100m/16 day)



MODIS
(1km/daily)

Meteosat
(3km/15min)

(Addis Ababa, JHU, UWisc, USDA)

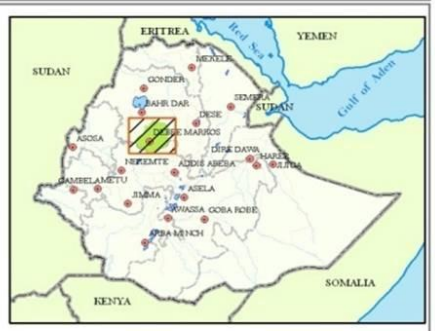


MAP LEGEND

DESCRIPTION

1. Lowlands and Valley Fragmented
2. Midland Plains with Black soil (Dejen-Mota)
3. Midland Plains with Brown Soil (Basso -Elias)
4. Midland Slopping Lands (Machacel-Gozamen)
5. Hilly and Mountainous Highlands
6. Afroalpine (Choke Protected area)

Towns
Rivers
Roads

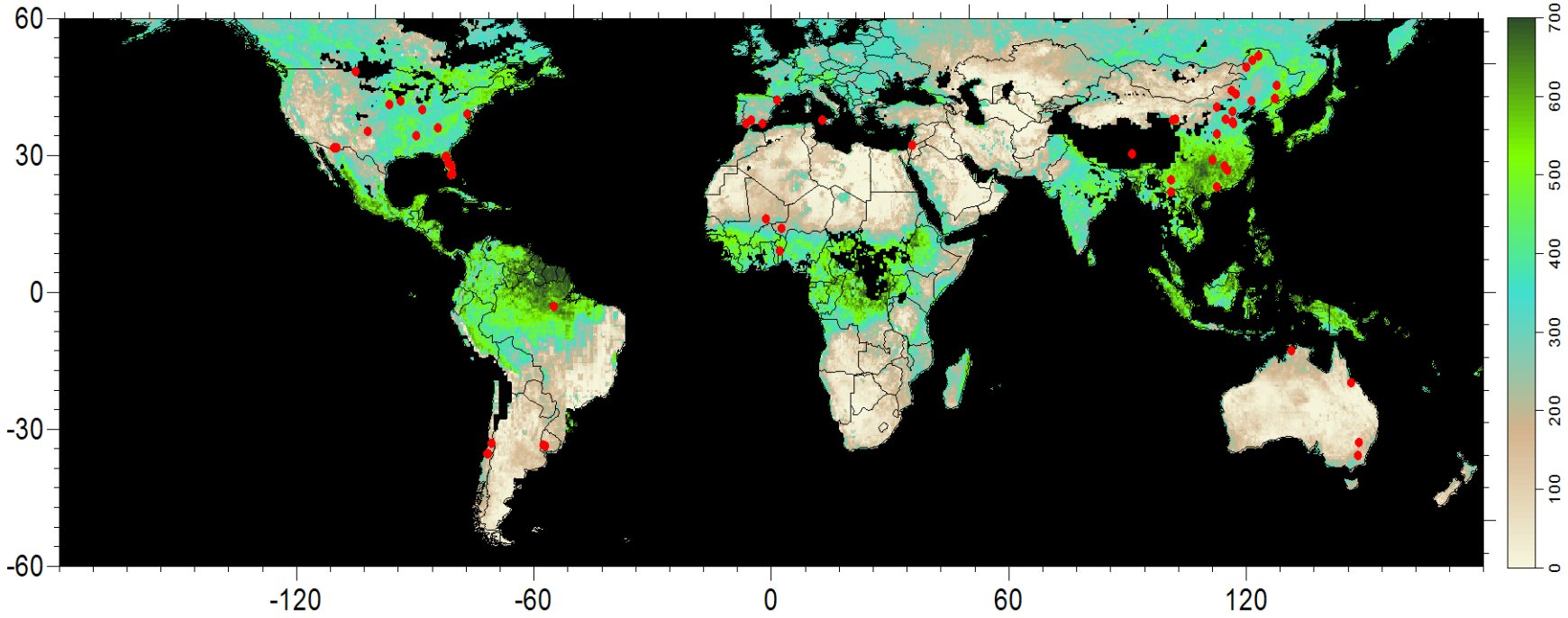


N
W
E
S

0 175 350 700 1,050 1,400
Kilometers

August 2004

Midday latent heat flux (clear-sky composite)



POTENTIAL CONTRIBUTIONS TO WORLD BANK

... multi-scale water-use mapping
... drought monitoring
... information for improving climate resilience

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