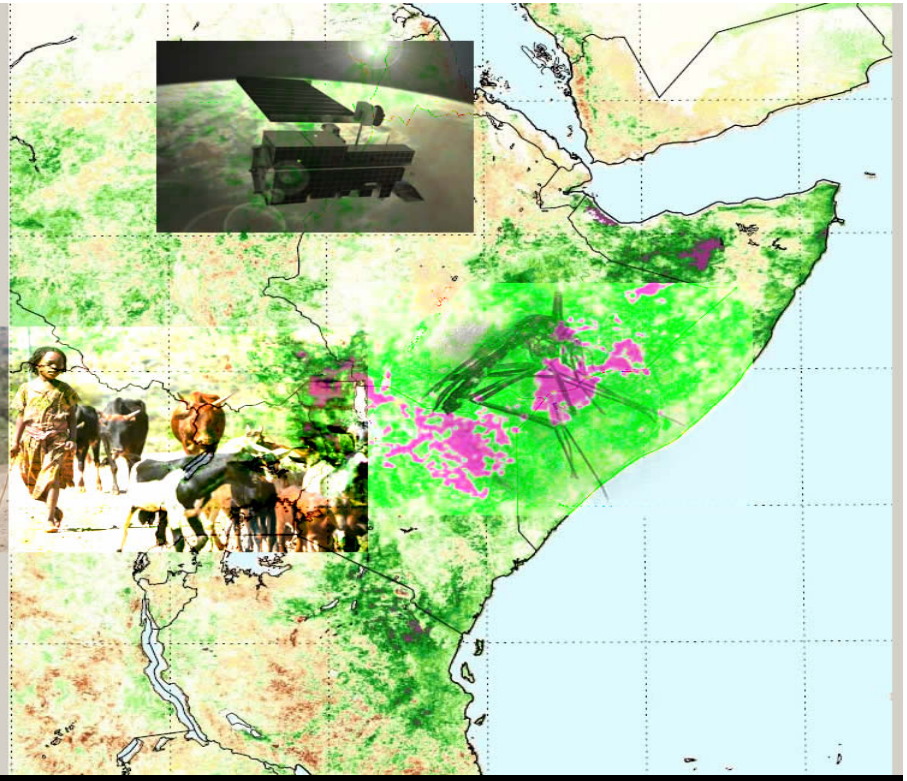
**Assaf Anyamba**
**NASA Goddard Space Flight Center**
**Biospheric Sciences Brach & USRA**


GF-TADs
GLOBAL FRAMEWORK FOR THE PROGRESSIVE CONTROL OF TRANSBOUNDARY ANIMAL DISEASE



# Rift Valley Fever: Prediction and Risk Mapping

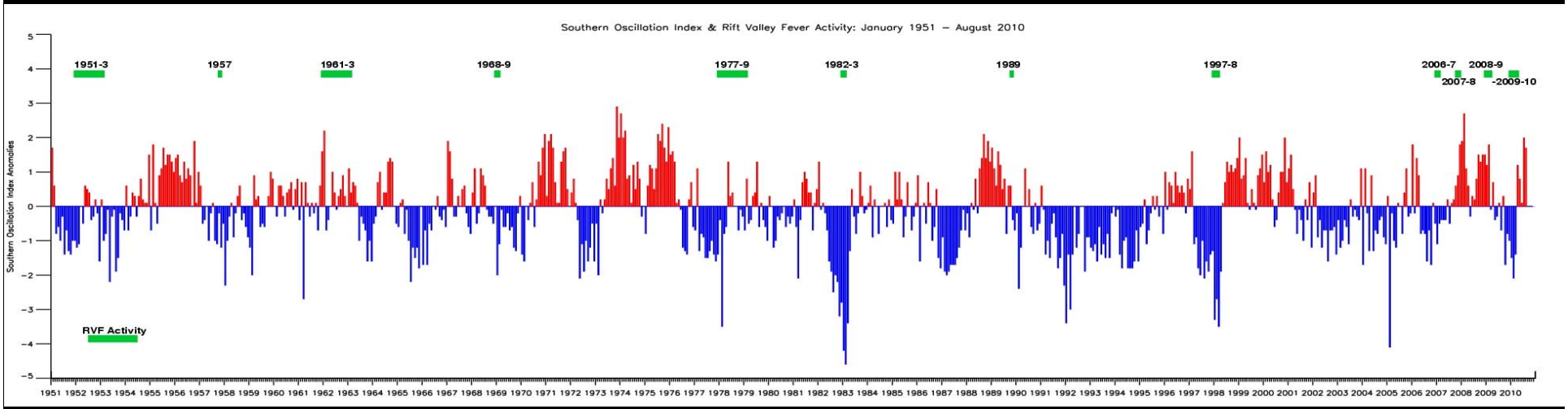
RIFT VALLEY FEVER: CHALLENGE, PREVENTION AND CONTROL
MOMBASA (KENYA), 13-15 NOVEMBER 2012

United States Department Of Agriculture
Agricultural Research Service

# Outline

- Review: 2006/07 Event
- Current Conditions
- Future and Challenges

# History




Linthicum et al (Science, 1999, Updated 2011)

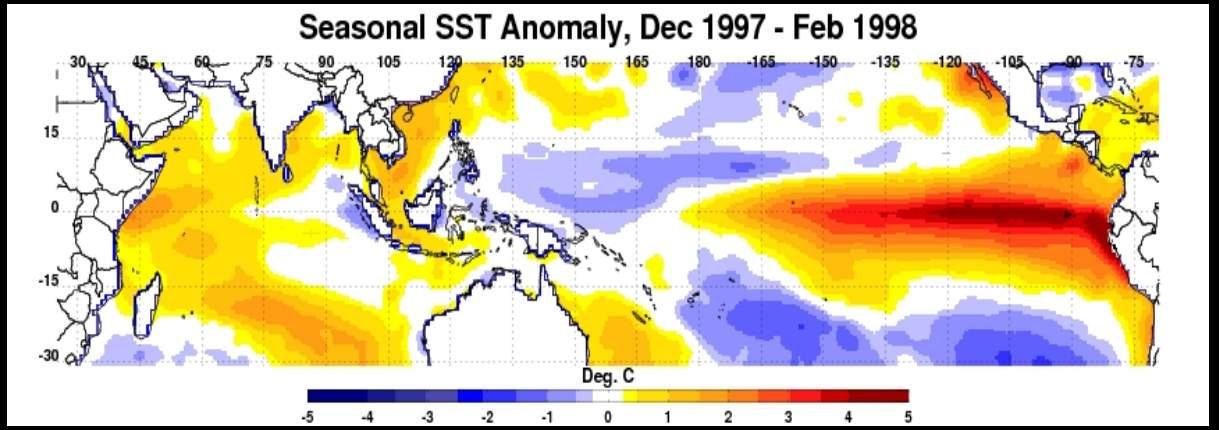
# El Niño/ Southern Oscillation (ENSO)

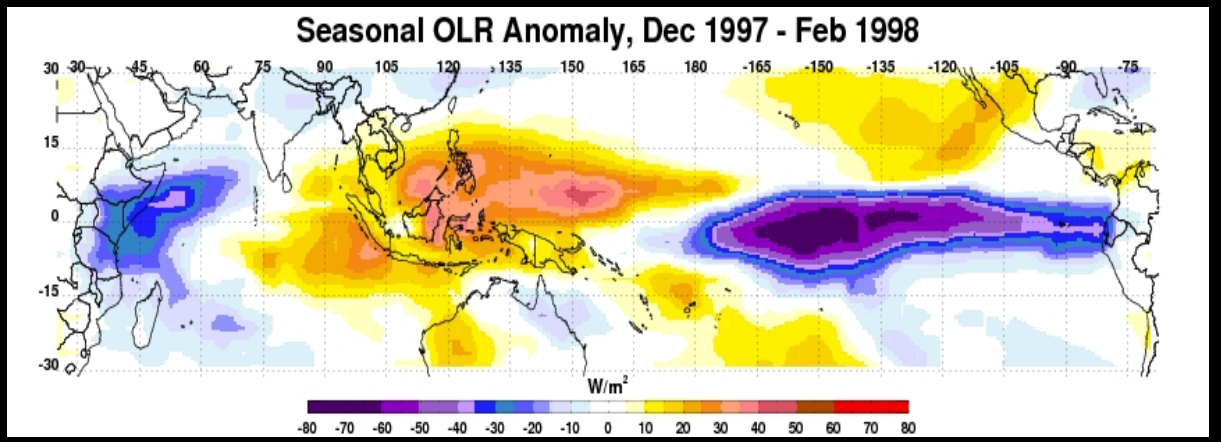
## ENSO

•- Influences the patterns of floods and drought on an interannual time scale

-- the extremes have an impact on the emergence, propagation and survival of disease vectors/pathogens

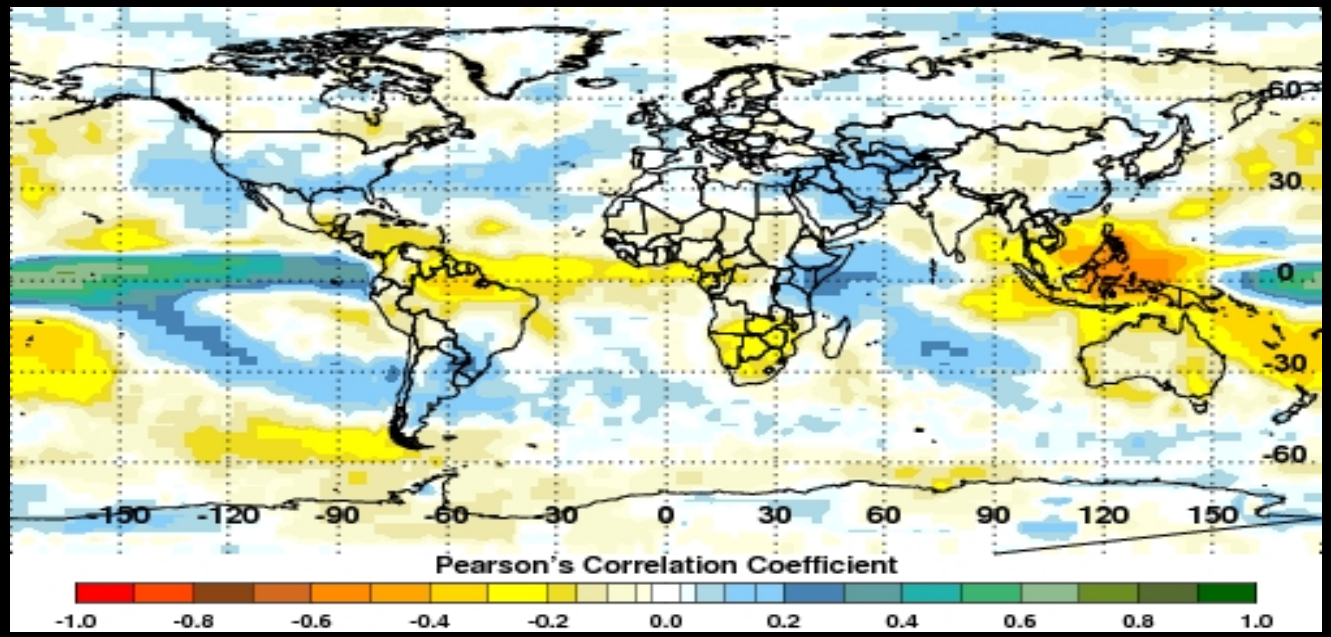
-- Results in episodic patterns of disease outbreaks as they dance in tune with climate variability



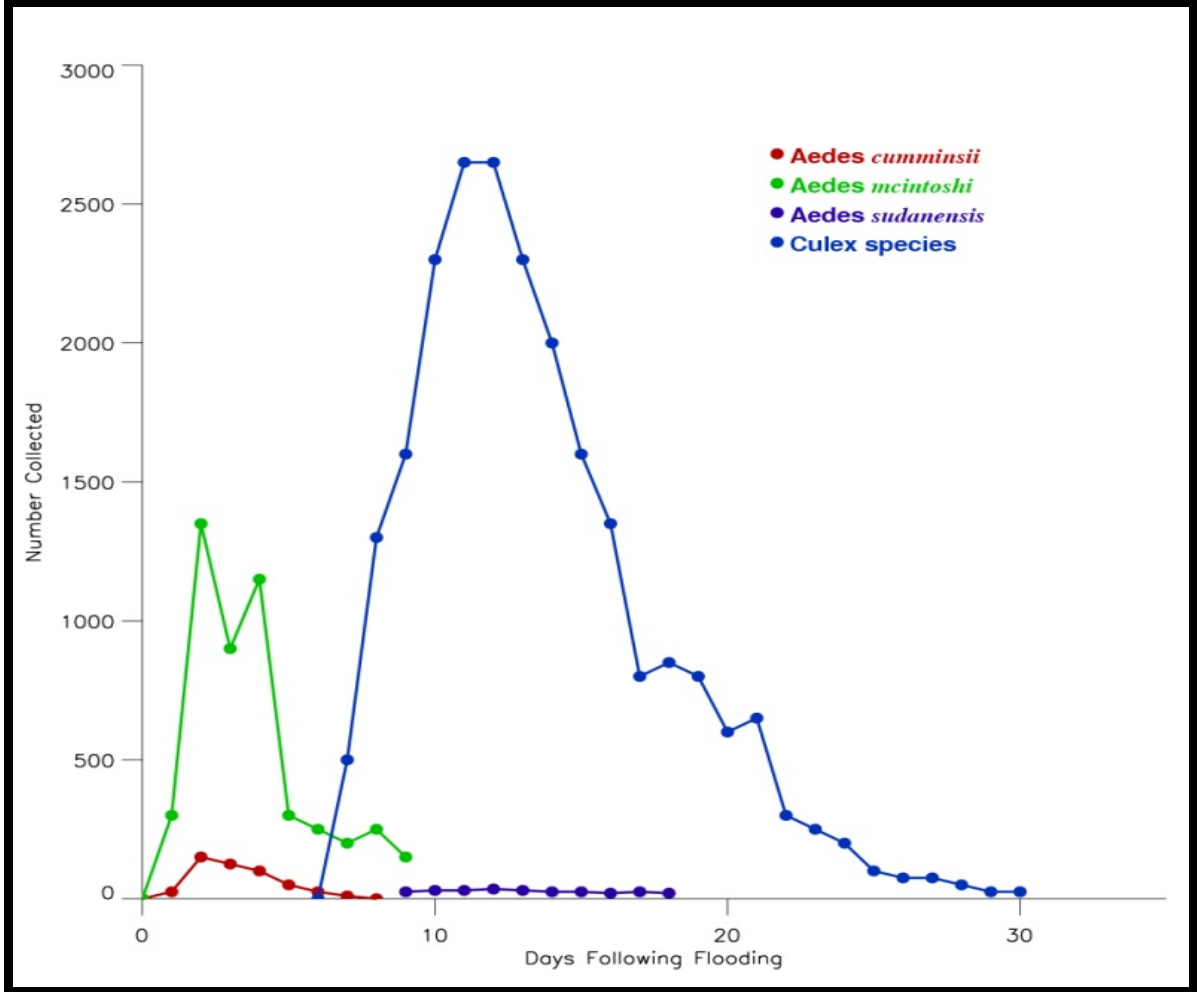
# ENSO Teleconnections

- Differential impacts at specific regional locations around the world
- - EN +| Floods and excess rainfall in EEA, EAPacific, Southern Brazil/Argentina, Southern-tire US
- EN+| Drought and >+ temperatures (Southern Africa, SE Asia, NE Brazil, C Africa
- - EN – [Largely reverse conditions)




Anyamba et al, PLOS NTD 2012

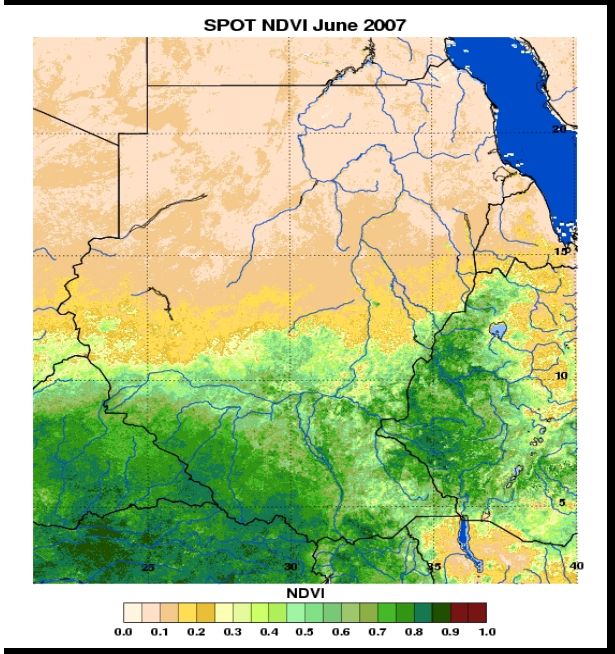
# Vector Population Dynamics

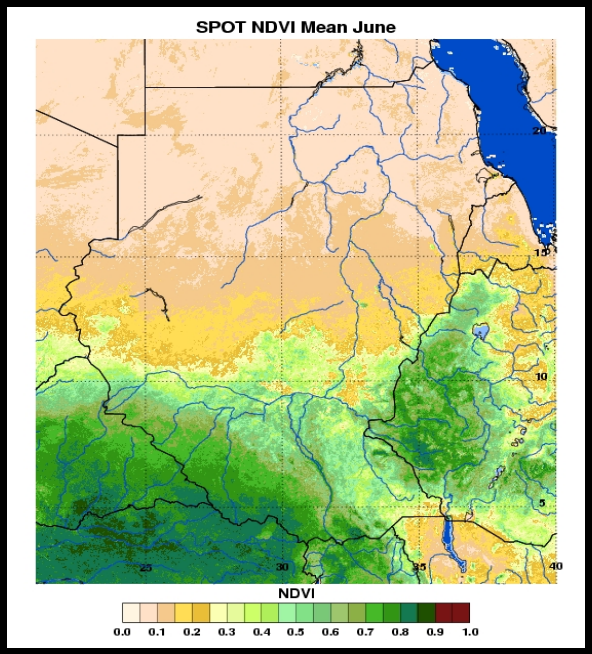


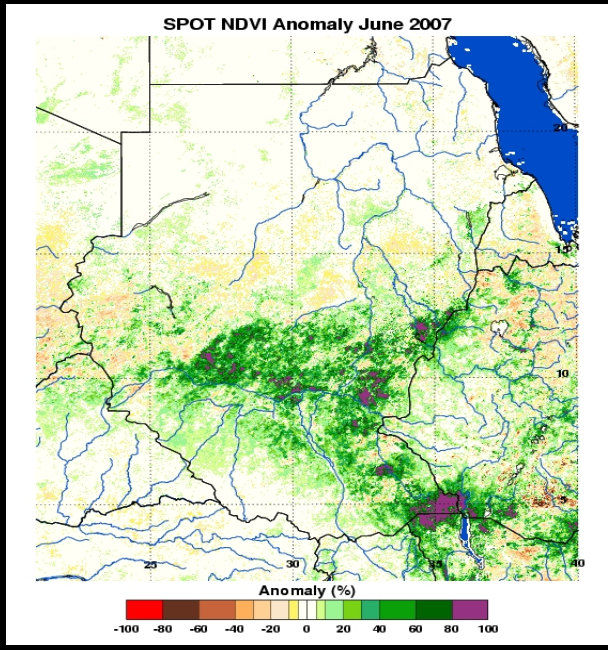

Dambo in Baringo, March 2007

**Linthicum et al, 1985**

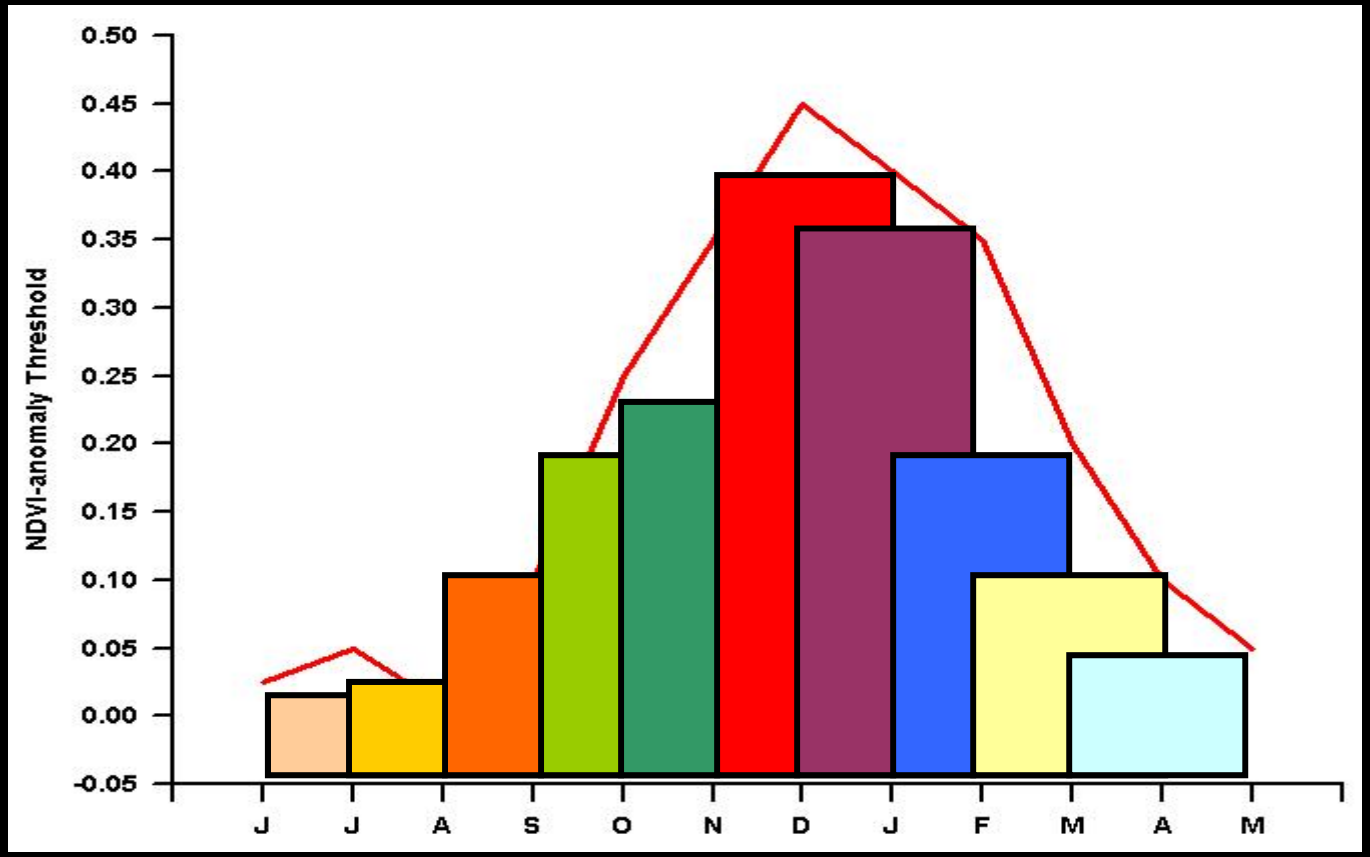
# Ecological Indicators: NDVI + anomalies



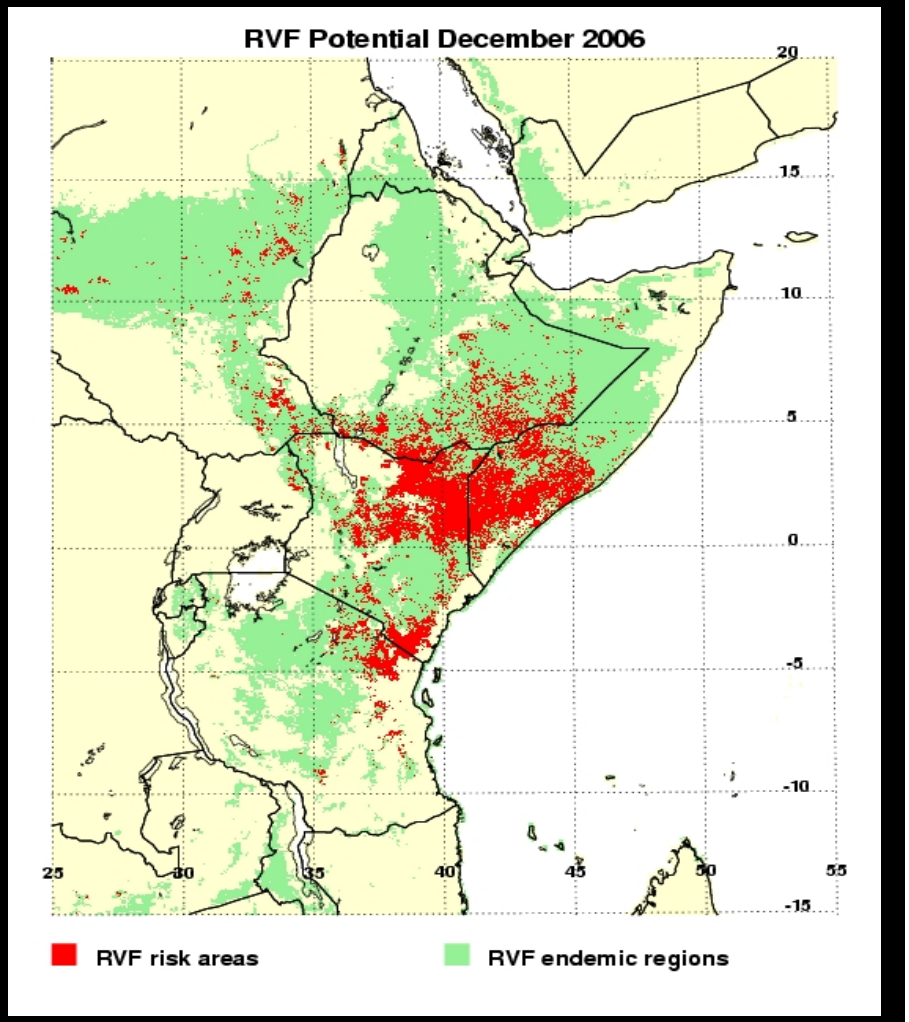



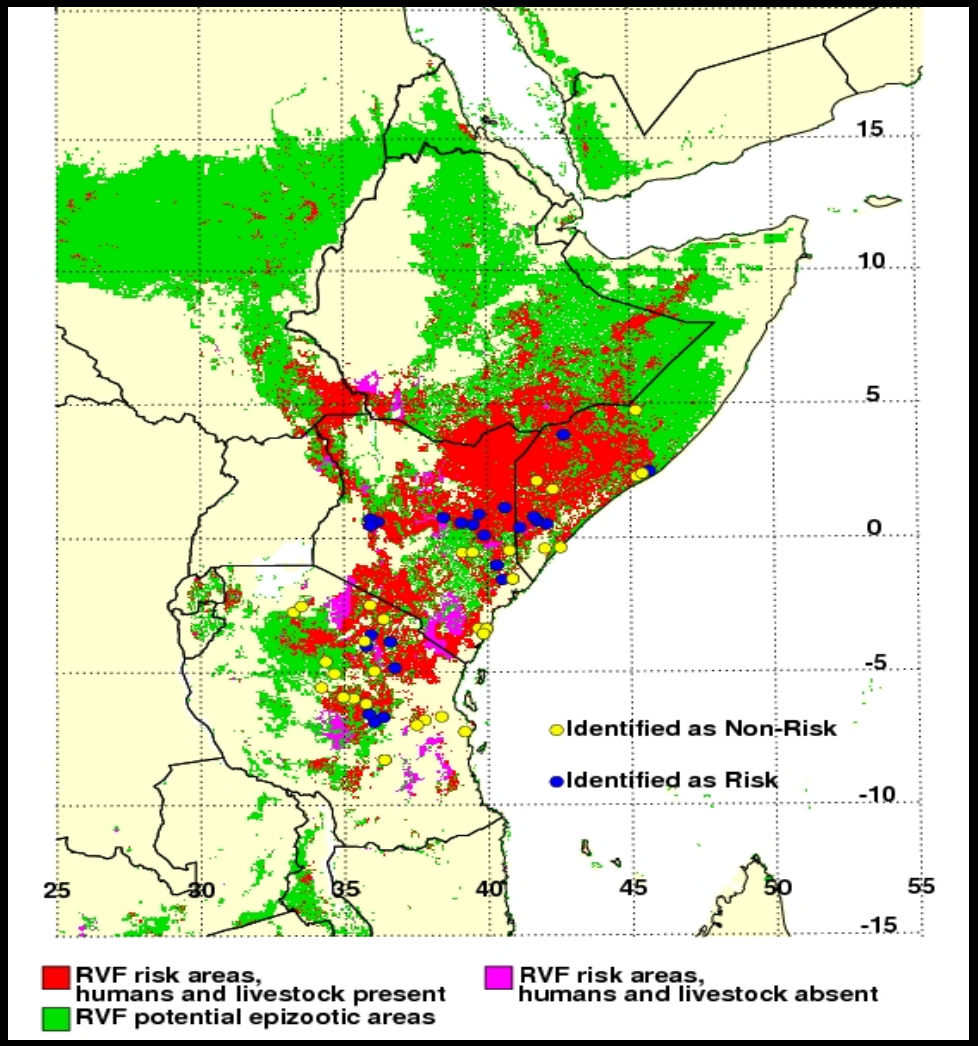



# RVF Risk Mapping - Dynamic

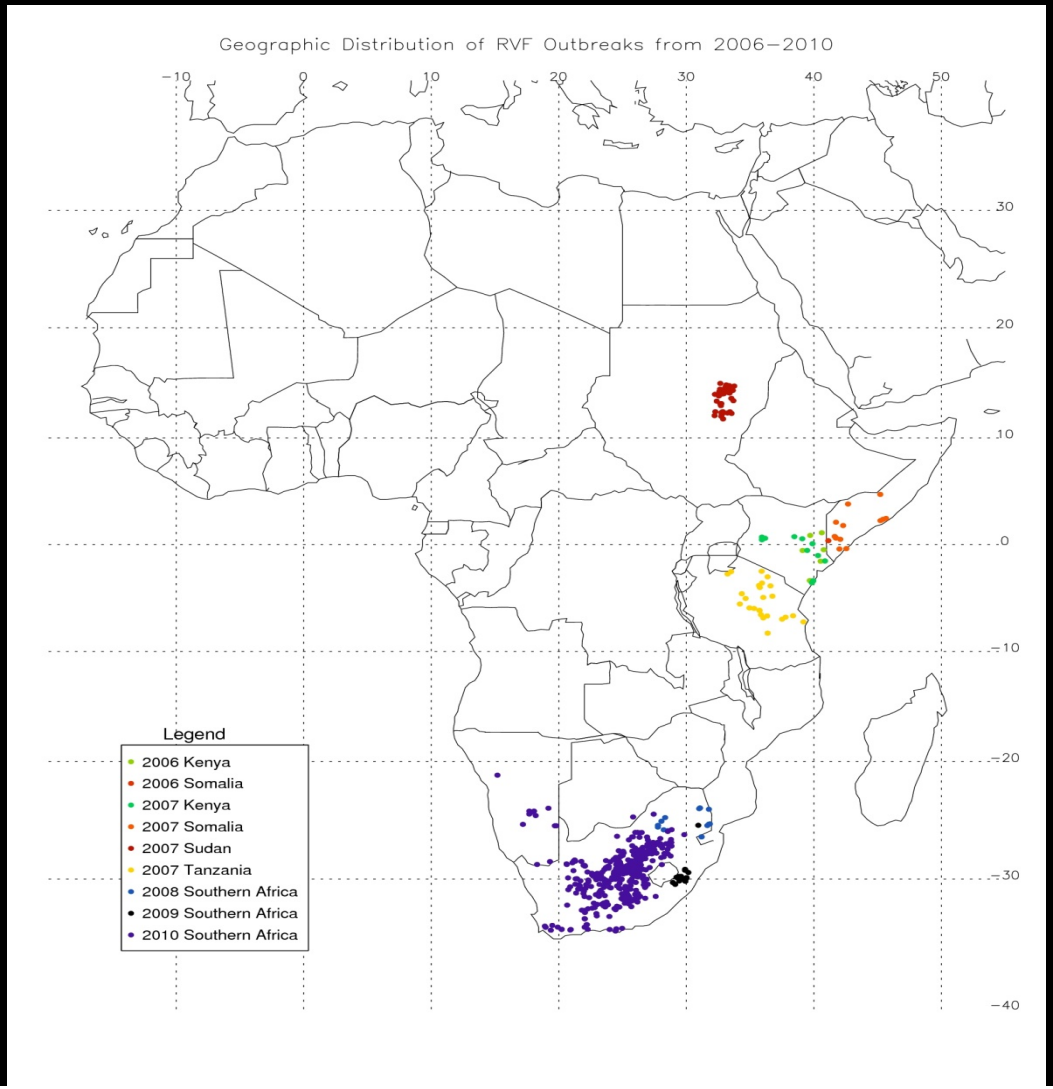


# RVF Potential Risk Products



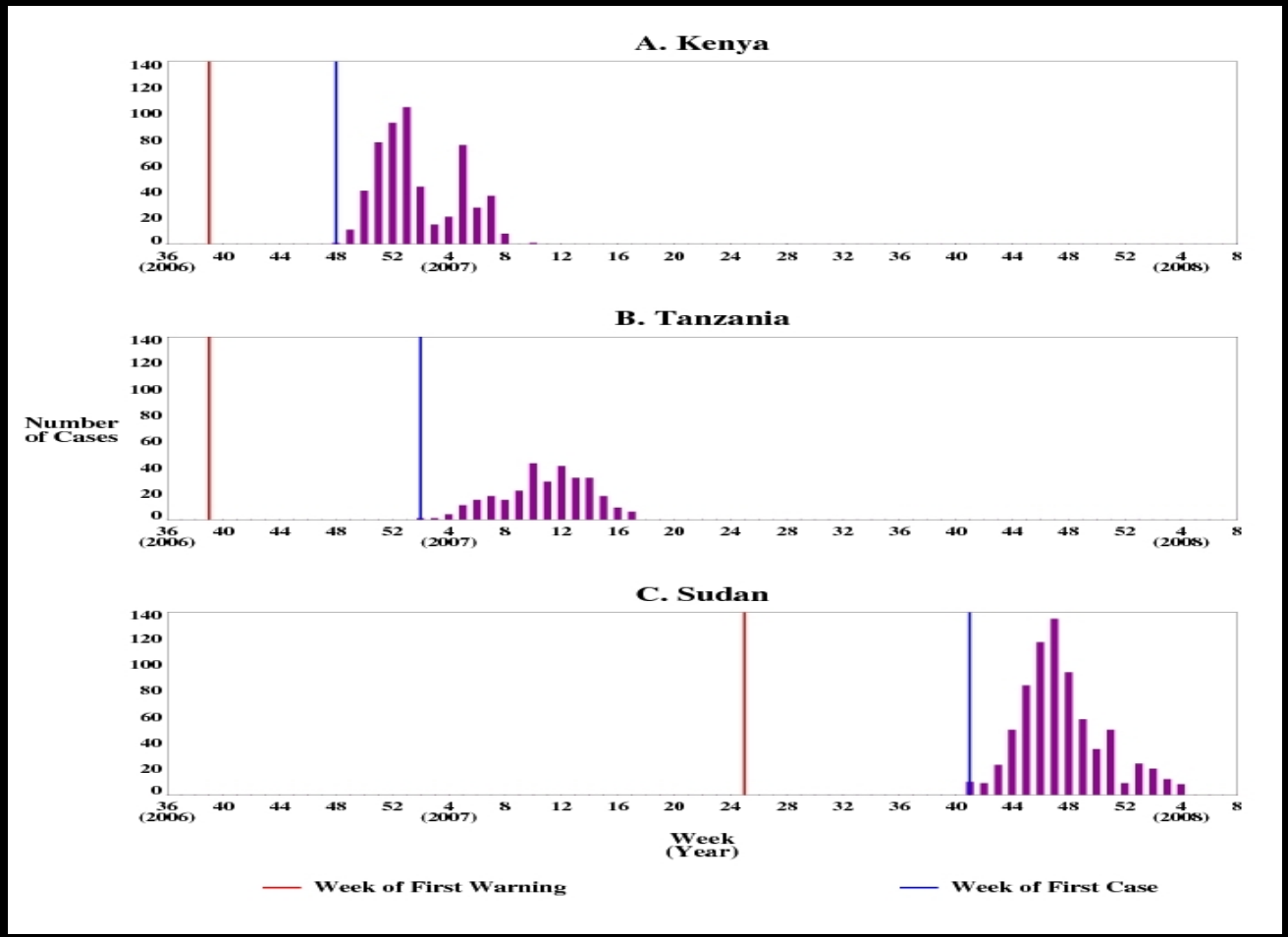



# RVF Outbreaks: 2006-2010




Anyamba et al (IEEE, 2012)

# Prediction vs. Outbreak Timing

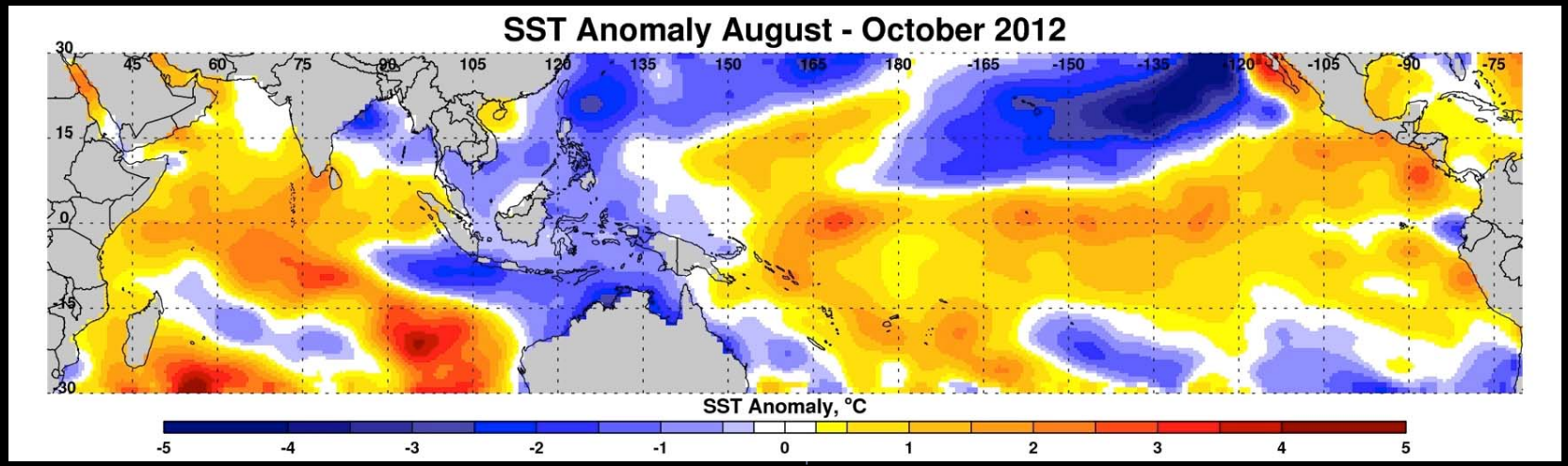


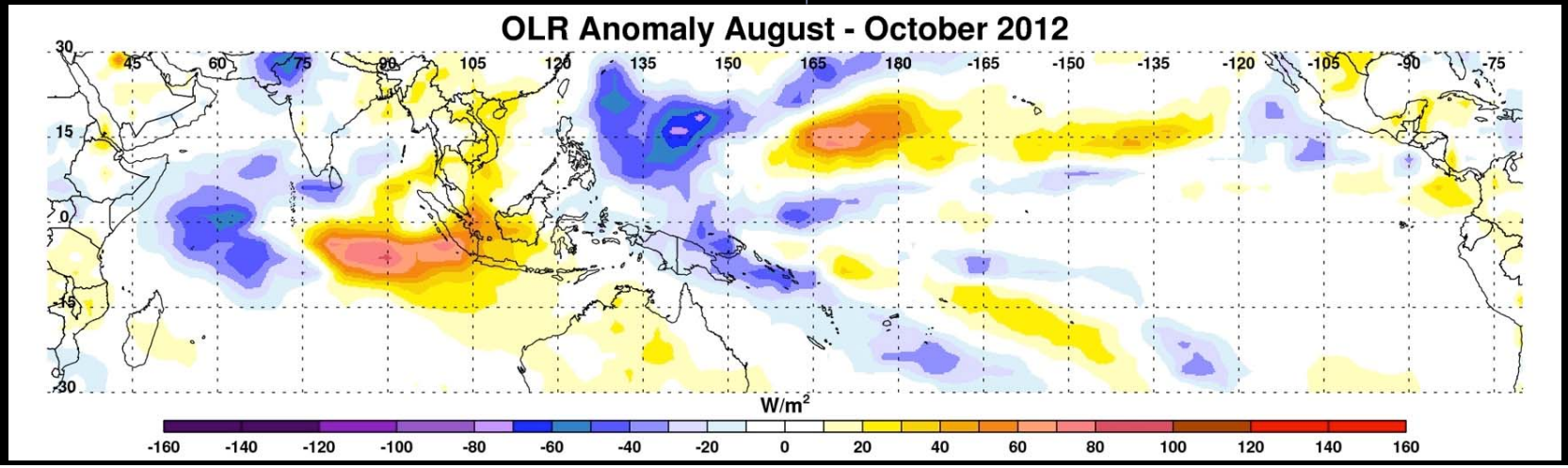

Kenya, Somalia, Tanzania: 4-5 Months
Sudan: 5-6 Months
Southern Africa: 2-3 Months

Anyamba et al (ajthm, 2010)

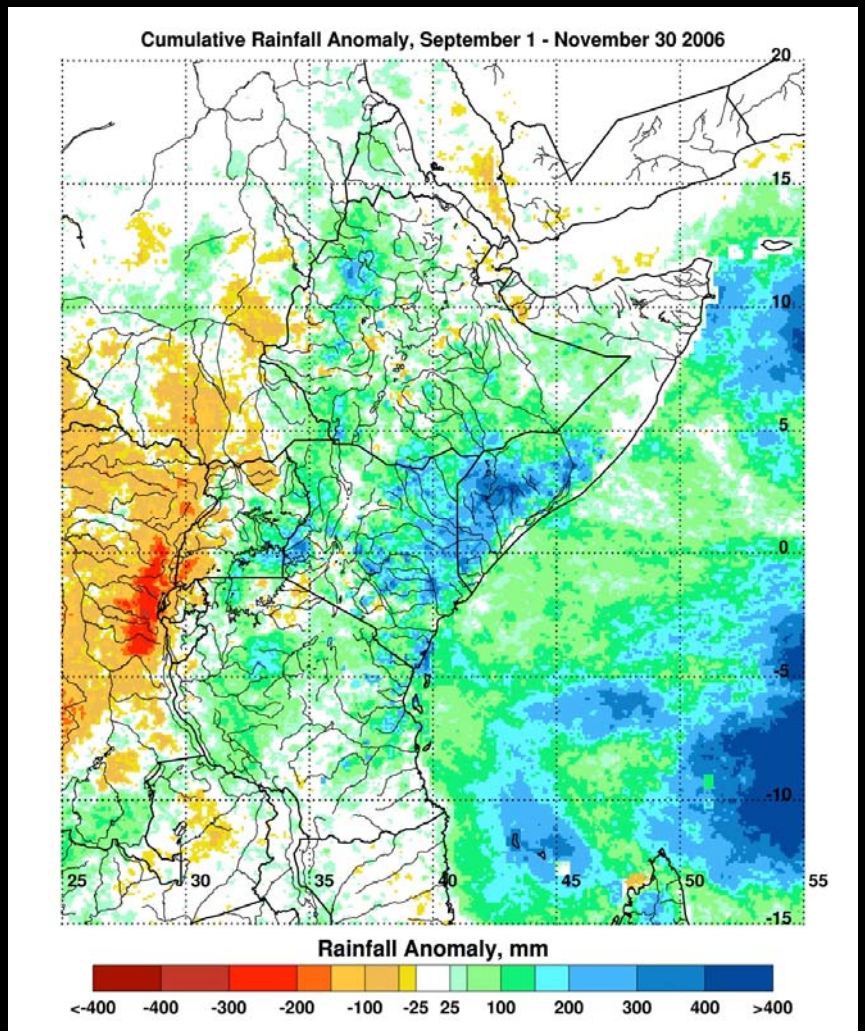
# CURRENT STATUS

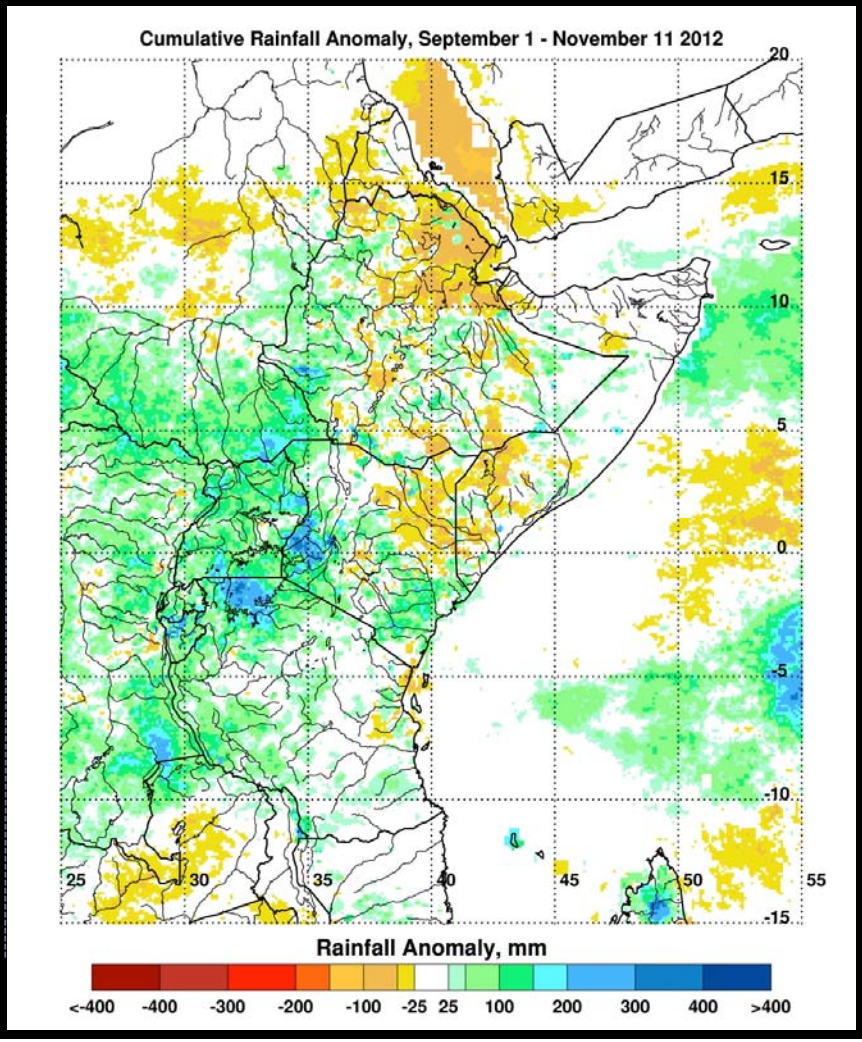
# Present: SST, OLR



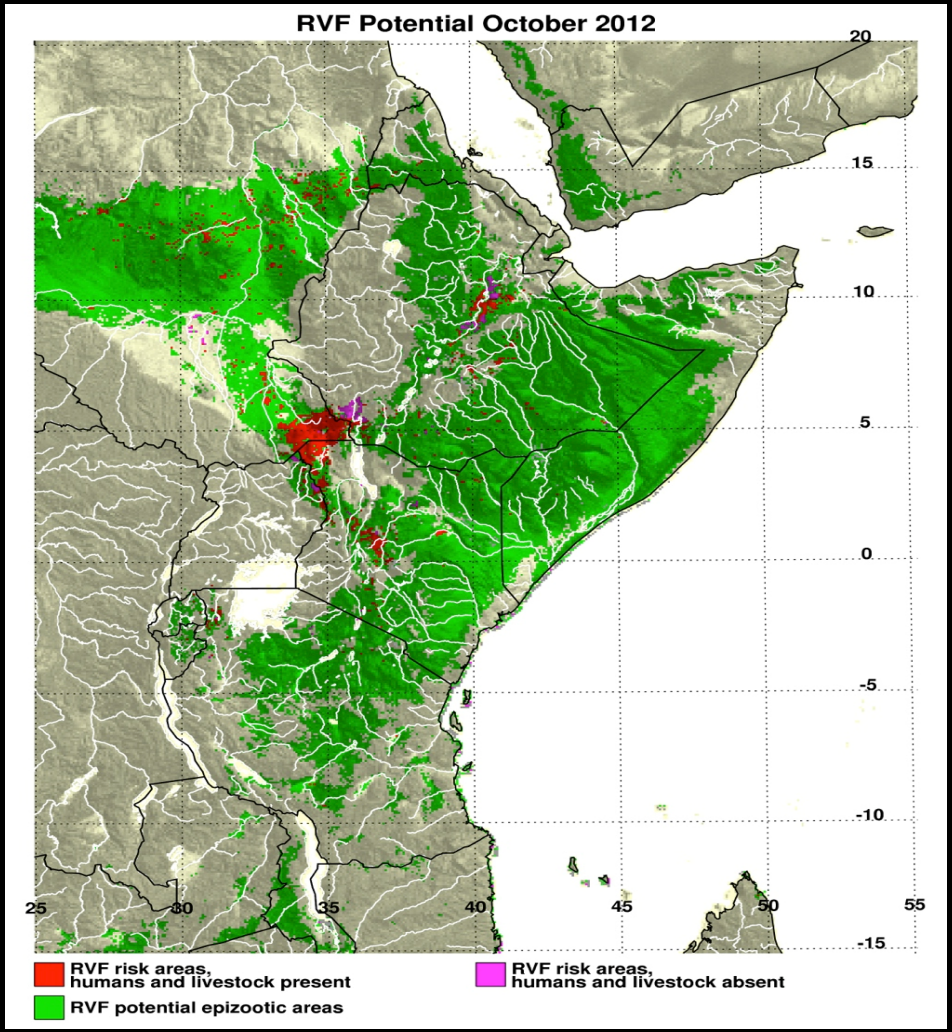



# Cumulative Rainfall Anomalies



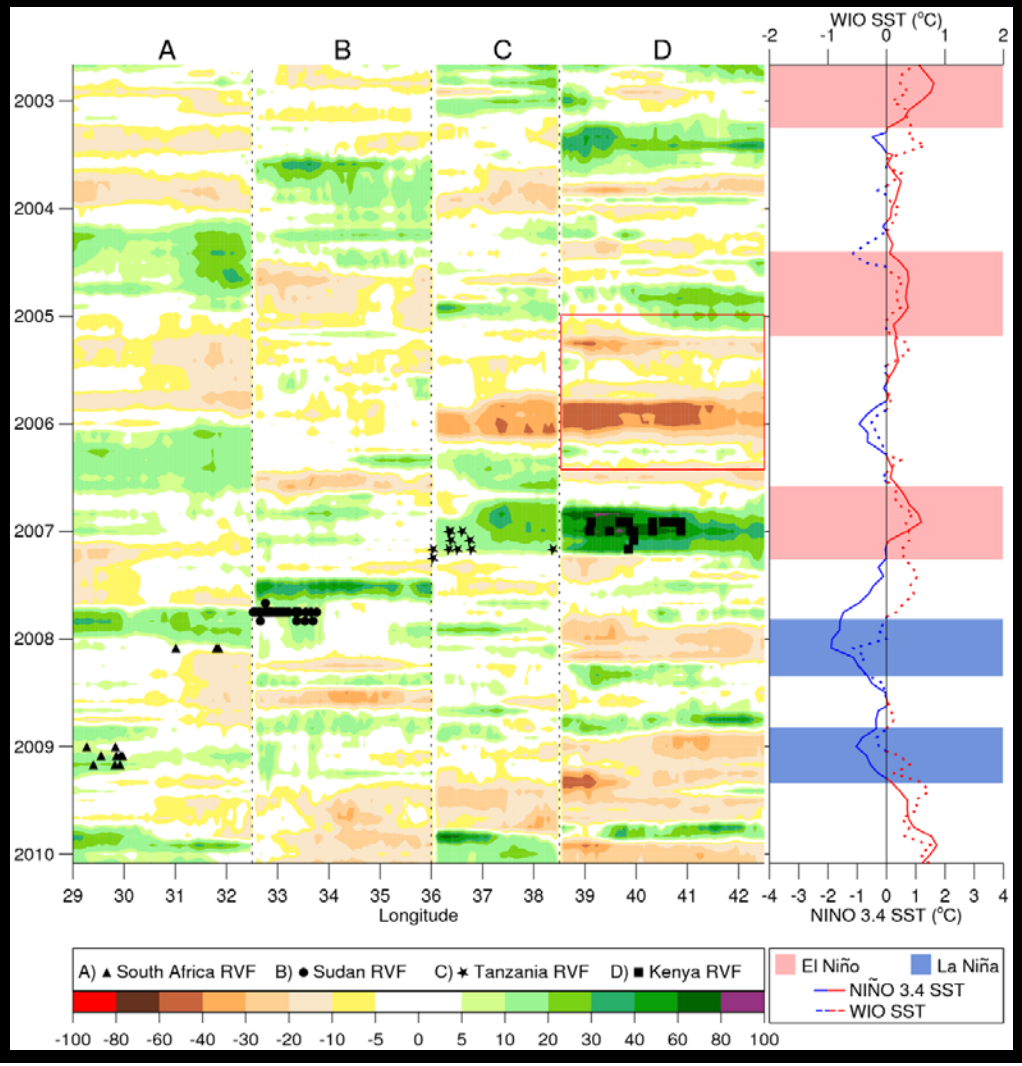



# Risk Map: October 2012



# Summary and Challenges

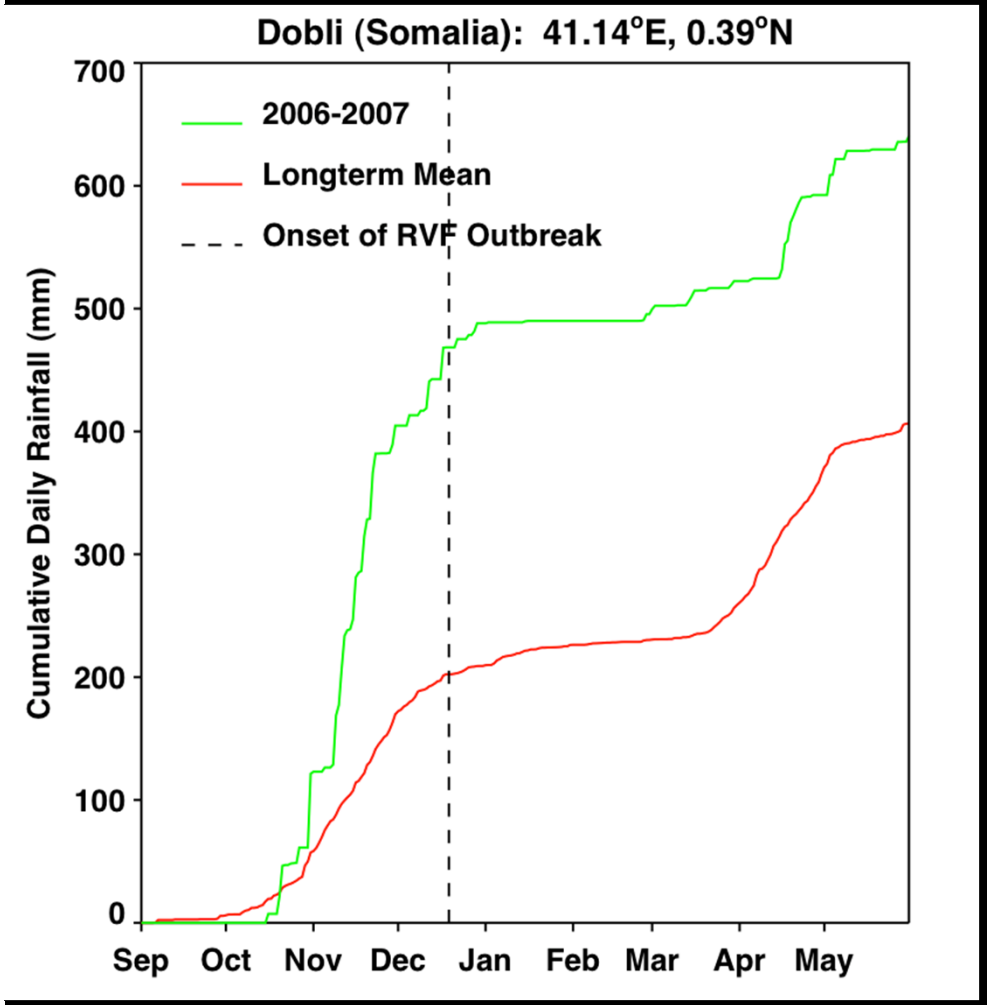
# Teleconnections and Event Timing




Timing is everything – biorhythms !

Anyamba et al, PLOS NTD 2012

# Monitoring and Surveillance




- Monitoring of daily rainfall in high risk zones
- Exploit institutional capacity by leveraging resources: e.g. ICPAC, Remote Sensing Center, Met Depts. for monitoring
- Need for revised PEAM
- Immunity and influence on outbreak frequency
- Need Updated Livestock and Human Population Distribution Maps – FAO
- Focus on developing regional models

# Team

# Thanks !

- Department of Defense - Armed Forces Health Surveillance Center, Division of GEIS Operations
- United States Department of Agriculture - Agricultural Research Service
- National Aeronautics and Space Administration
- WHO, FAO, OIE, USAMRU-K, CDC-K, KEMRI