Use of Satellite Rainfall Estimates for Improving Climate Services in Africa

Tufa Dinku
tufa@iri.columbia.edu
International Research Institute for Climate and Society
The Earth Institute at Columbia University

Collaborators:
- The TAMSAT Group at University of Reading
- National Meteorology Agency, Ethiopia
- Tanzanian Meteorological Agency
- The AGRHYMET Center, Niger
- EUMETSAT
- WMO
Outline

I. Problems
II. Proposed Solutions
III. Implementation in Ethiopia
IV. Significance and Next Steps
I. Problems

- Number of weather stations not adequate in most Africa
- Most stations located in the cities along main roads
  - Limited data over most of rural Africa
- Serious gaps in observations (missing data)
- Quality of available data not very good
- Limited access and use of the available data
II. Proposed Solutions

Improving data availability:
Quality control and combine local observations with global products such as satellite proxies and model reanalysis data

→ Global products help in filling spatial and temporal gaps
II. Proposed Solution

Improving access and use:
- Provide online-access to analysis tools and products
- Develop products for specific applications
- Train users to understand, demand, and use climate data
- Facilitate the formation of community of practice
III. Implementation in Ethiopia
Implementation: Main Components

- Training of NMA staff
- Organizing and QC station data
- Obtaining and processing raw METEOSAT data
- Calibrating satellite rainfall algorithm
- Generating climate time series
- Redesigning NMA’s Web Page
- Creating Climate Analysis and Applications Map Rooms
Improved Data Availability

Combined Gauge-Satellite, 1983-Current (10-daily @ 10km)
Improved Access and Use: New Maprooms

**Climate Analyses and Applications Map Room**

**Climate Analysis**

Rainfall and temperature time series (1983-2008) reconstructed from station observations and remote sensing proxies. This interface allows users to view rainfall, maximum and minimum temperature climatologies and anomalies.

**Climate Monitoring**

This is a rainfall-monitoring product based on dekadal rainfall. The interface allows users to view recent rainfall with a seasonal and recent historical perspective. Time series analyses of rainfall data are generated based on user-selected parameters.

**Climate and Agriculture**

Under Construction

[Legend of Agricultural Zones Here]

**Climate and Water**

Under Construction

**Climate and Health**

Under Construction
Improved Access and Use: Climate Monitoring Maproom

Variable to map: rainfall  Local time series at Woreda  level near or at: lon 40.53472  lat 6.419652

Time:
- Sep
- Aug
- Oct

Monthly Climatologies for Guradamole, Bale, Oromiya

Maximum Temperature
- 31°C
- 30°C
- 29°C
- 28°C
- 27°C
- 26°C
- 25°C
- 24°C
- 23°C
- 22°C
- 21°C
- 20°C
- 19°C
- 18°C
- 17°C
- 16°C

Minimum Temperature
- 15°C
- 14°C
- 13°C
- 12°C
- 11°C
- 10°C
- 9°C
- 8°C
- 7°C
- 6°C
- 5°C
- 4°C
- 3°C
- 2°C
- 1°C
- 0°C
Improved Access and Use: Climate Monitoring Maproom

Climate Monitoring Maproom

Observations for: Liben, Somali

- Generate new time series

(a) Adjusted Rain Fall Reconstruction
(b) Precipitation 1983-2010 Anomaler:
(c) Cumulative Precipitation
(d) Adjusted Rain Fall Reconstruction

Description

The International Research Institute for Climate and Society
IV. Significance and Next Steps
Significant Accomplishments

1. Organization and processing of 30-years of raw METEOSAT data

2. Availability of 30-years of spatially and temporally complete data: “Gold mine” for research and applications

3. Online access to this kind of information is unprecedented in Africa

4. Transfer of IRI Data Library Technology to NMS in Africa
Next Steps

1. Strengthen the Ethiopian case
2. Test the approach in some countries
3. Evaluate the approach
2. Scale-up to more countries
Next Steps: The process so far:

**Tanzania: Completed**

Climate Analyses and Applications Map Room

**Climate Analysis**
Rainfall and temperature time series (1983-2010) reconstructed from station observations and remote sensing proxies. This interface allows users to view rainfall, maximum and minimum temperature climatologies and anomalies.

**Climate Monitoring**
This is a rainfall-monitoring product based on dekadal rainfall. The interface allows users to view recent rainfall with a seasonal and recent historical perspective. Time series analyses of rainfall data are generated based on user-selected parameters.
Next Steps: The process so far:

CILSS/AGRHYMET: 90 % Completed
Next Steps: The process so far:

Coming soon: Burkina, Mali, Niger, Madagascar