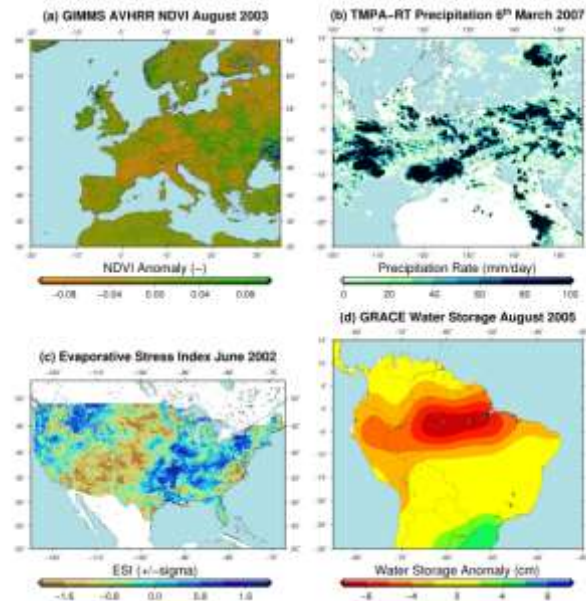


# Overview of the Training Workshop

Justin Sheffield, Nate Chaney, Colby Fisher, Eric F. Wood  
Princeton University

MWAR-LAC/UNESCO/Princeton  
Latin American and Caribbean Flood and Drought Monitor (LACFDM)  
Training Workshop  
Santiago, Chile, November 17-18, 2014



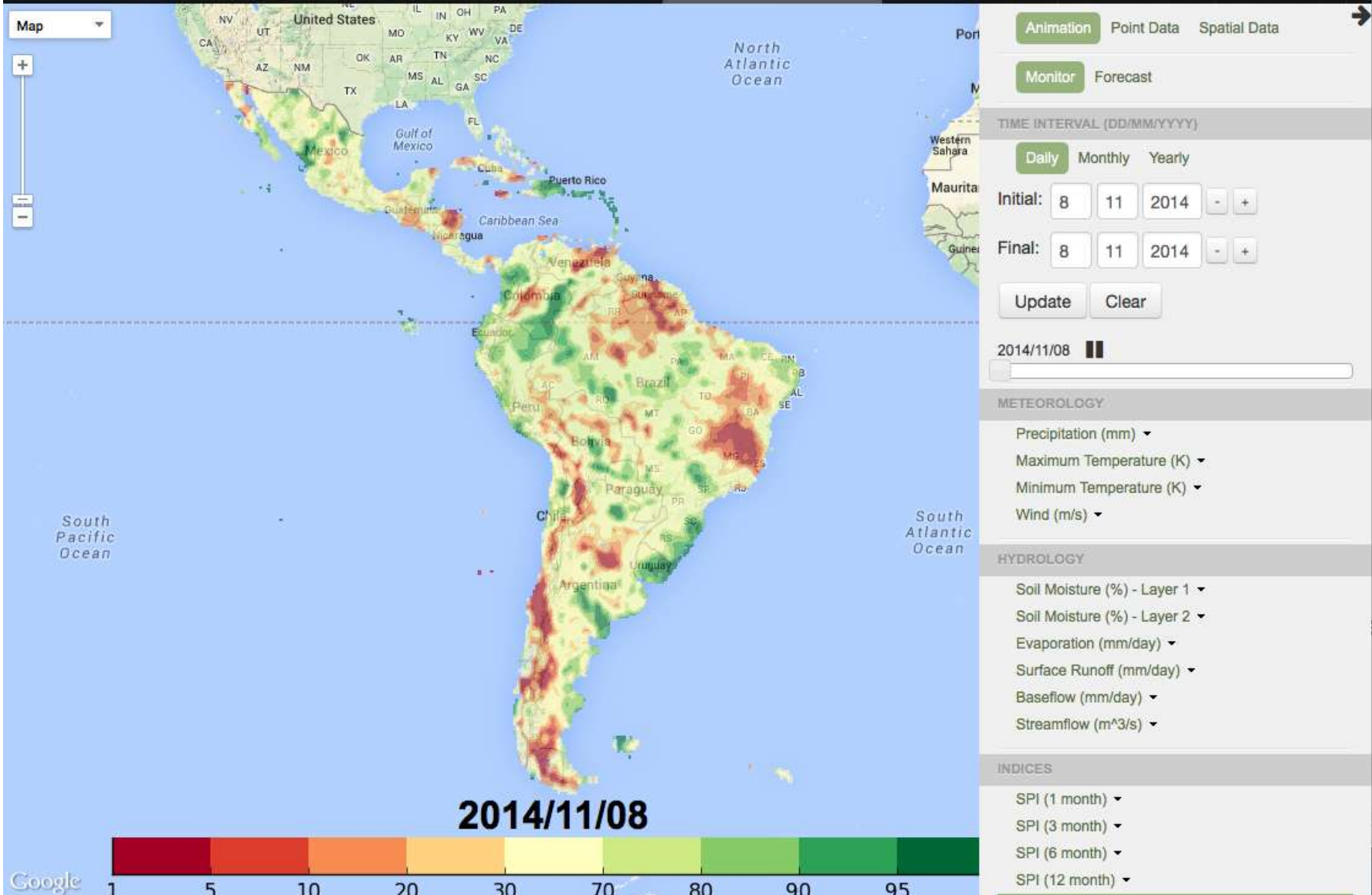


# LAFDM

Latin American Flood and Drought Monitor

<http://stream.princeton.edu/LAFDM/WEBPAGE/>

Latin American Flood and Drought Monitor    Interactive Interface    Basic Interface    Feedback



# **Overview of Training Workshop**

- Day 1 (Monday):**
- Introduction to the system**
  - Overviews of Drought Concepts**
  - Monitoring and Forecasting Approaches**
- Day 2 (Tuesday):**
- Computer Exercises**
  - Feedback and follow-up activities**

## Day 1 (Monday Morning)

### Introductions and Overviews of Drought Concepts

- 10:45-11:00      **Overview of the LACFDM training** (Sheffield)
- 11:30-12:00      **Introduction to the LACFDM interface:** Introduction to the web portal; navigating the system; basic interface (Chaney, Fisher)
- 12:00-1:00        **Overview of the drought concepts and related products;** examples with monitor and forecast data (Chaney)
- 13:00-14:30      *Lunch*

## Day 1 (Monday Afternoon)

### Introductions and Overviews of Drought Concepts

- 14:30-14:45     **Presentation: Drought and flood risk and management:** natural hazards; population vulnerability; reducing risk; monitoring, prediction and early warning; integrated drought and flood management (Sheffield)
- 14:45-15:00     **Presentation: Challenges to monitoring in data sparse regions:** data sources; satellite remote sensing; hydrological modeling; integrated monitoring systems (Fisher)
- 15:00-15:15     **Presentation: Environmental sensors for drought and agricultural monitoring:** sensor technology; integrated monitoring (sensor deployment, maintenance, uplinks, integration) (Wood)
- 15:00-15:15     **Presentation: Forecasting:** how forecasts are made (6-month/7-day); methods (statistical/physical); uncertainties; verification and interpretation; drought early warning and decision making (Wood)
- 16:00-16:30     *Coffee break*
- 16:30-18:30     **Hands-on training:** interactive interface; examples with monitor and forecast data (Chaney. Fisher)

## Day 2 (Tuesday Morning)

### Hands-on Training

- 09:00-10:30 **Hands-on training:** Point data visualization; point data extraction; excel visualization; Spatial data extraction; GIS software visualization (Chaney/Fisher)
- 10:30-10:45 *Coffee break*
- 10:45-13:00 **Hands-on exercises:** Case studies (e.g. recent drought/flood event) and validation exercises (Chaney/Fisher)
- 13:00-14:30 *Lunch*

## Day 2 (Tuesday Afternoon)

### Hands-on Training and Feedback

- 14:30-16:00 **Exercises and Feedback:** Participatory exercises on decision making; Feedback and discussion on upgrades and enhancements to the LAC-FDM (Chaney/Fisher)
- 16:00-16:30 *Coffee break*
- 16:30-17:30 **Group discussion and roadmap for follow-up activities:** Validation; GDIS pilot study; other? (All)
- 17:30-18:00 **Summary and wrap-up**

# People

Dr. Justin Sheffield



Prof. Eric F. Wood



Nathaniel Chaney



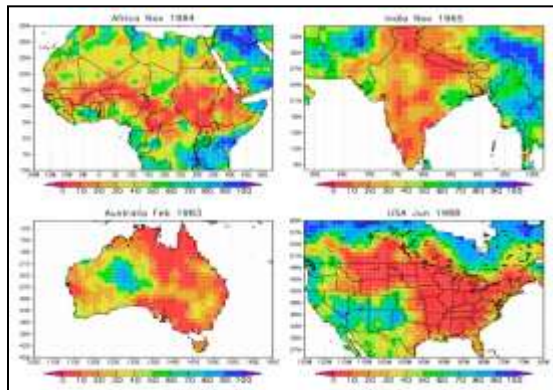
Colby Fisher



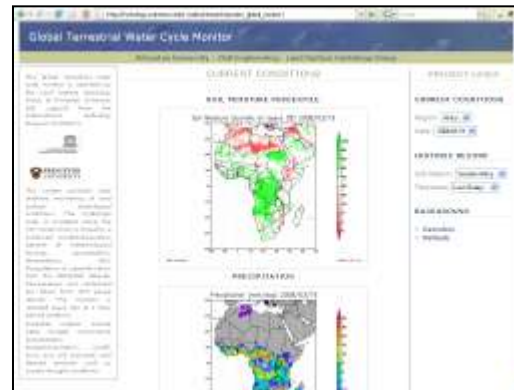


# Some Background: Princeton Activities in Drought Research

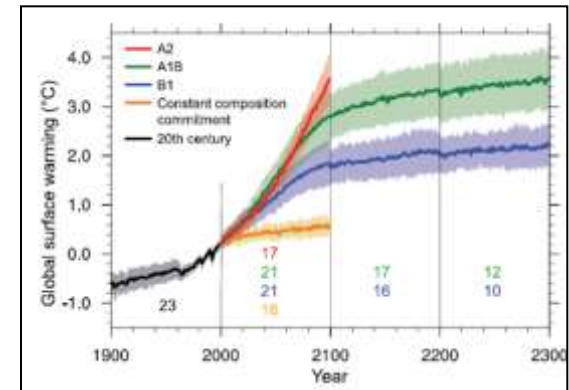
## Historic Drought Analysis



## Drought Monitoring And Forecasting



## Future Projections of Drought



1900

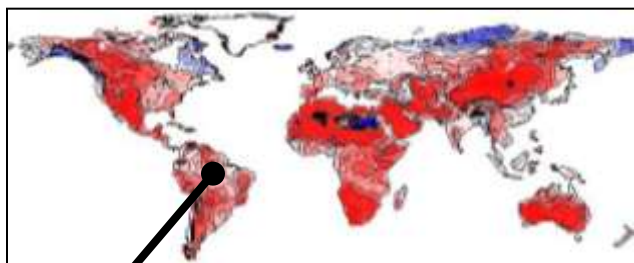
1950

2000

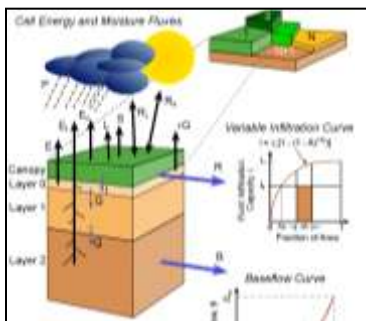
2050

2100

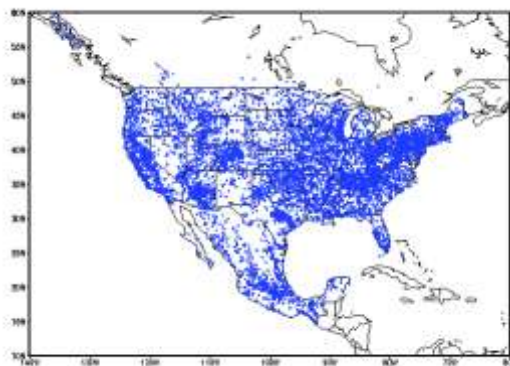
# Data and Tools for Drought Monitoring and Prediction



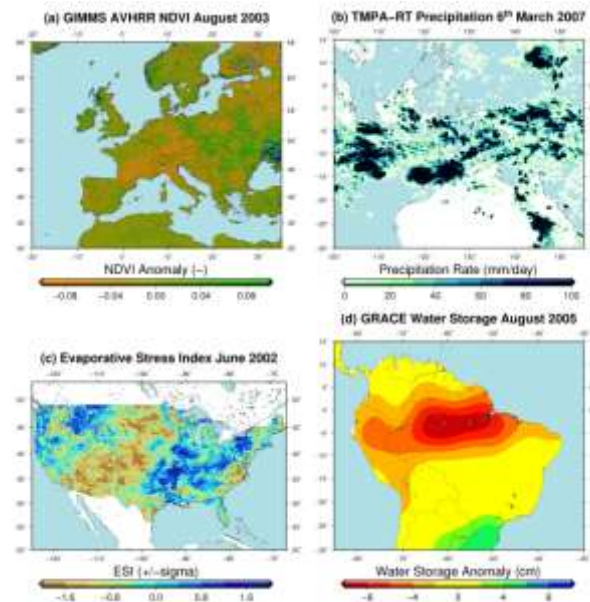
Hydrological Modeling



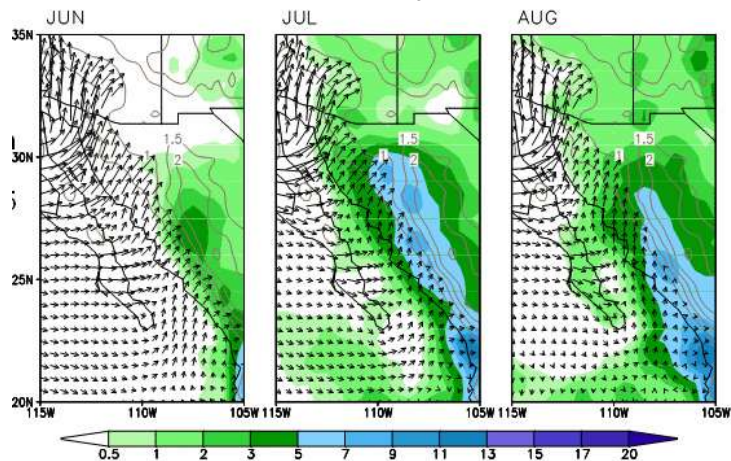
## Ground Observations



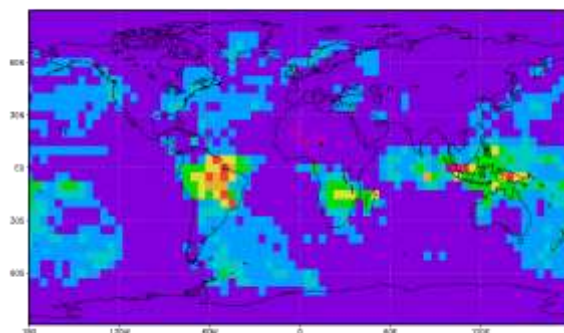
## Satellite Remote Sensing



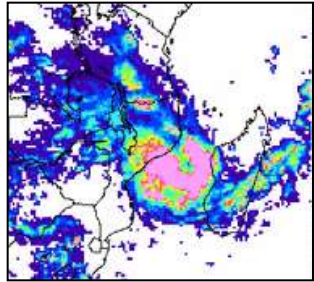
## Reanalysis



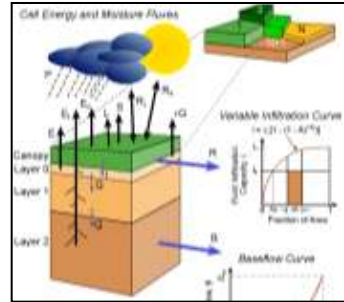
## Regional/Global Climate Models, Statistical Prediction



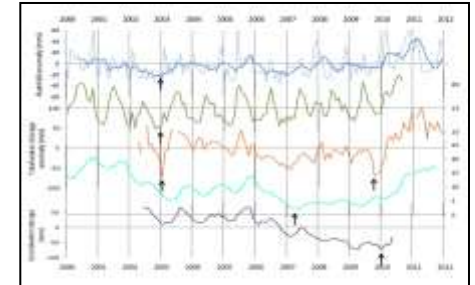
# Putting it all together: Hydrological and Drought Monitoring System



**Real-time  
Weather**

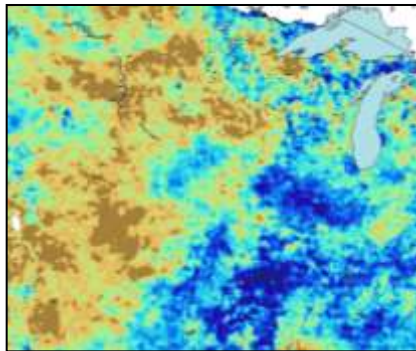


**Land surface  
(hydrology)  
models**



**Hydrological  
Variables,  
Streamflow,  
Drought  
Indices**

**Initial  
Conditions**



**Management/Mitigation**

# Development of the System

## Initial Version Developed for the U.S. (2000-2005)

### Drought Monitoring and Hydrologic Forecasting with VIC

Nowcast/Forecast	Historical Droughts/Hindcast	Documentation	About the Project
------------------	------------------------------	---------------	-------------------

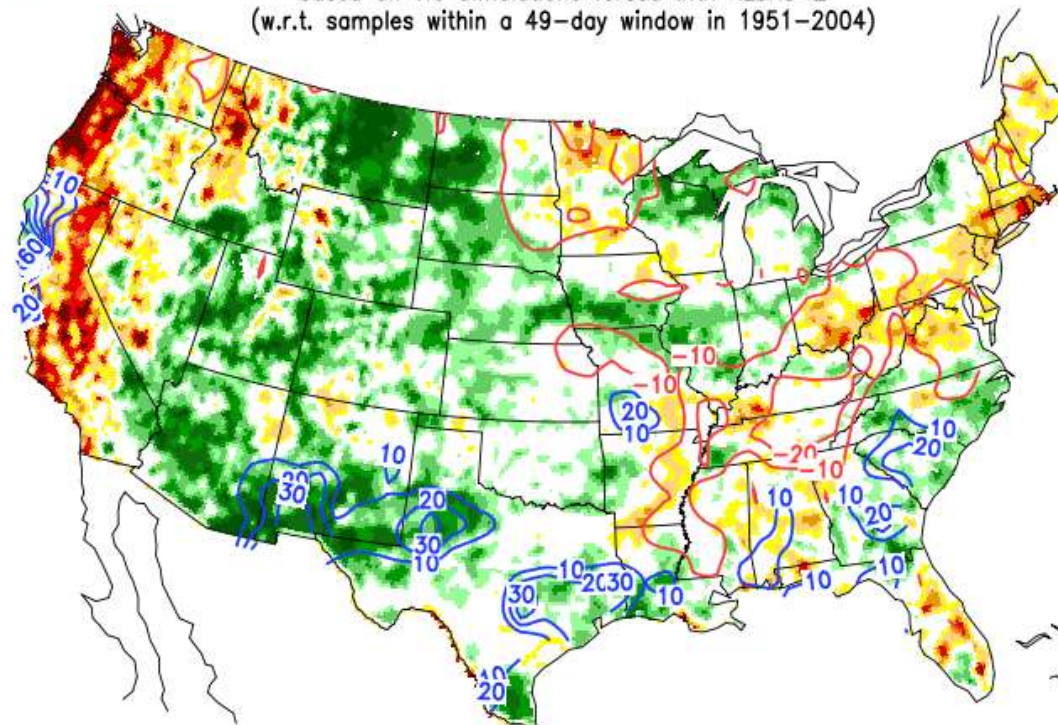
As of 2012/05/01, CFS forecasts are switched to CFSv2. Hover mouse on items to see more info.

Product/Date/Variable (click to change)

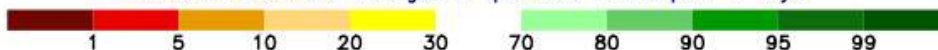
Monitoring validated < 2014/09/18 > for  Soil Moisture  Snow  Streamflow  Precipitation  
 Forecast initialized < 2014/09/01 > for  Soil Moisture  Drought Probability



Total Column Soil Moisture Percentiles for 2014/09/18  
 based on VIC Simulations forced with NLDAS-2  
 (w.r.t. samples within a 49-day window in 1951-2004)



Contours show the changes in quantiles in the past 7 days.



[Link to Image](#)

Timeline (click & hover to change)

	2014/07/31		
	2014/08/07		
	2014/08/14		
Preceding	2014/09/21		
Monitoring	2014/08/28		
	2014/09/04		
	2014/09/11		
	2014/09/18		
Forecast	CFS	CPC	ESP
2014/11	0.5mo	0.5mo	0.5mo
2014/12	1.5mo	1.5mo	1.5mo
2015/01	2.5mo	2.5mo	2.5mo
2015/02	3.5mo	3.5mo	3.5mo
2015/03	4.5mo	4.5mo	4.5mo
2015/04	5.5mo	5.5mo	5.5mo

Monitoring from other centers:

- US Drought Monitor
- USGS Streamflow/Drought
- CPC Drought Severity
- CPC Soil Moisture
- UW Surface Water Monitor
- NLDAS Drought Monitor

# Development of the System Expansion to a global system (2005-2008)

## Experimental Global Water Cycle and Drought Monitor

Princeton University : Civil Engineering : Land Surface Hydrology Group

The experimental Global Water Cycle and Drought Monitor is operated by the Land Surface Hydrology Group at Princeton University with support from the International Hydrology Program of UNESCO.

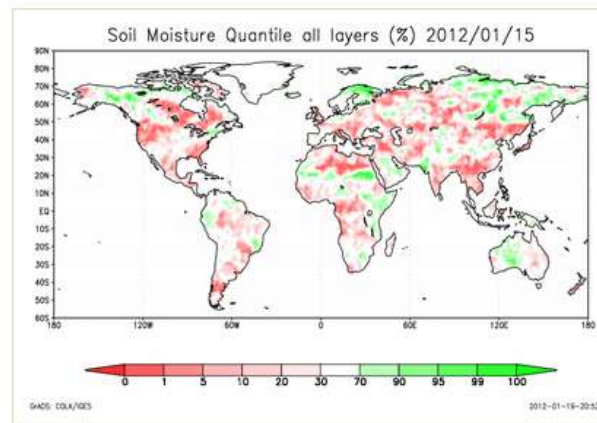


The system provides near realtime monitoring of land surface hydrological conditions. The hydrologic cycle is modeled using the VIC model which is forced by a combined model/observation dataset of meteorological forcings (precipitation, temperature, etc). Precipitation is currently taken from the PERSIANN and TRMM datasets. Temperature and windspeed are taken from GTS gauge reports. The monitor is updated every day at 2 days behind realtime.

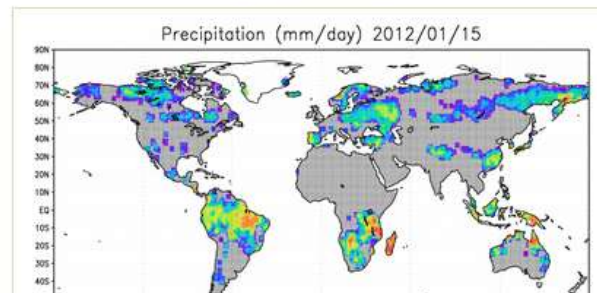
Available outputs include water budget components (precipitation, evapotranspiration, runoff, snow and soil moisture) and derived products such as current drought conditions.

### CURRENT CONDITIONS

#### SOIL MOISTURE PERCENTILE



#### PRECIPITATION



### PROJECT LINKS

#### NEWS

Biases in high latitude realtime precipitation (from GFS) cause biases in the hydrological fields. This is currently being fixed.

#### CURRENT CONDITIONS

Region:

Date:

#### HISTORIC RECORD

Sub Region:

Timeseries:

#### BACKGROUND

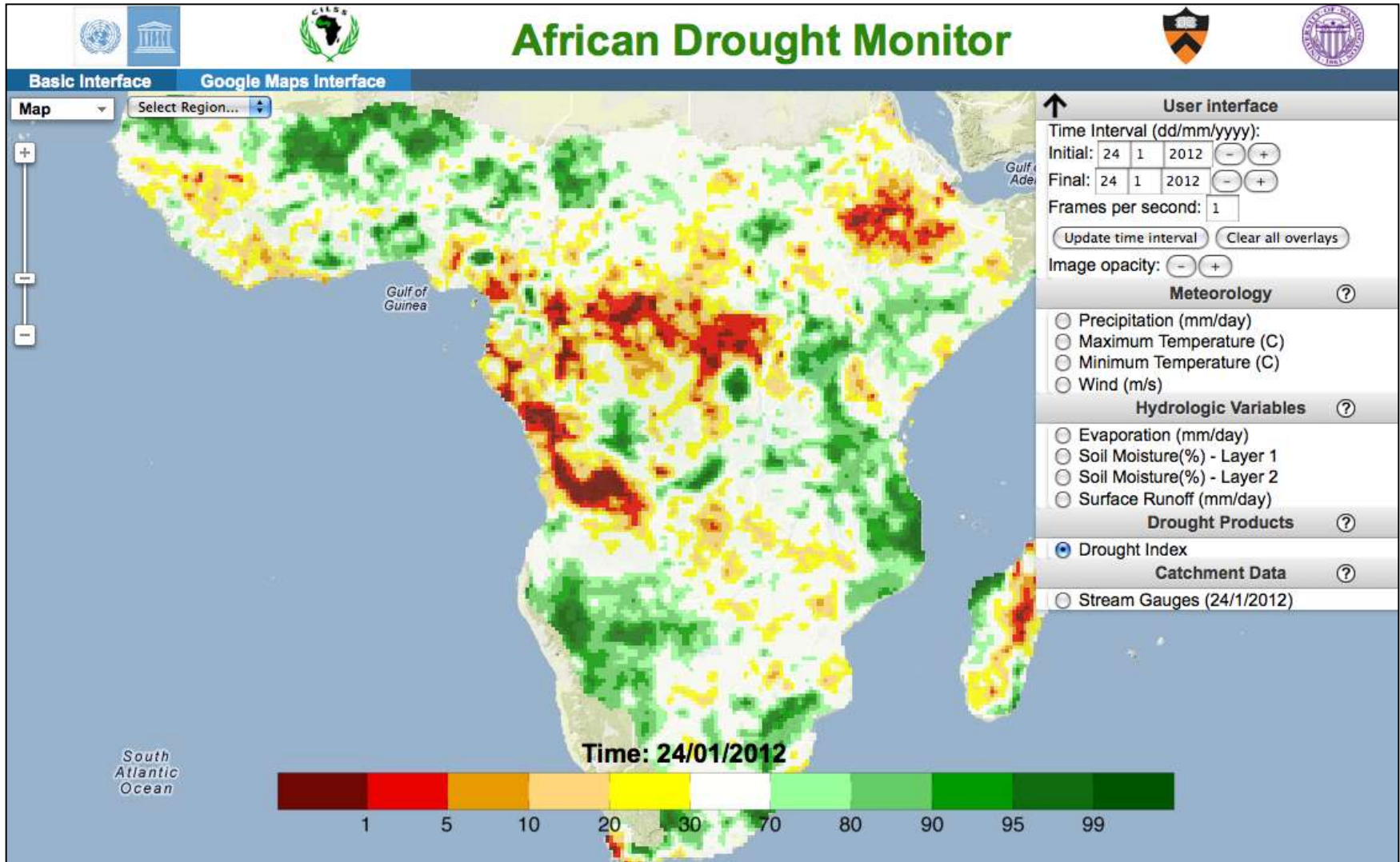
- [Overview](#)
- [Methods](#)

#### PRINCETON MONITORS

- [Global Water Cycle Monitor](#)
- [African Drought Monitor](#)

# Development of the System

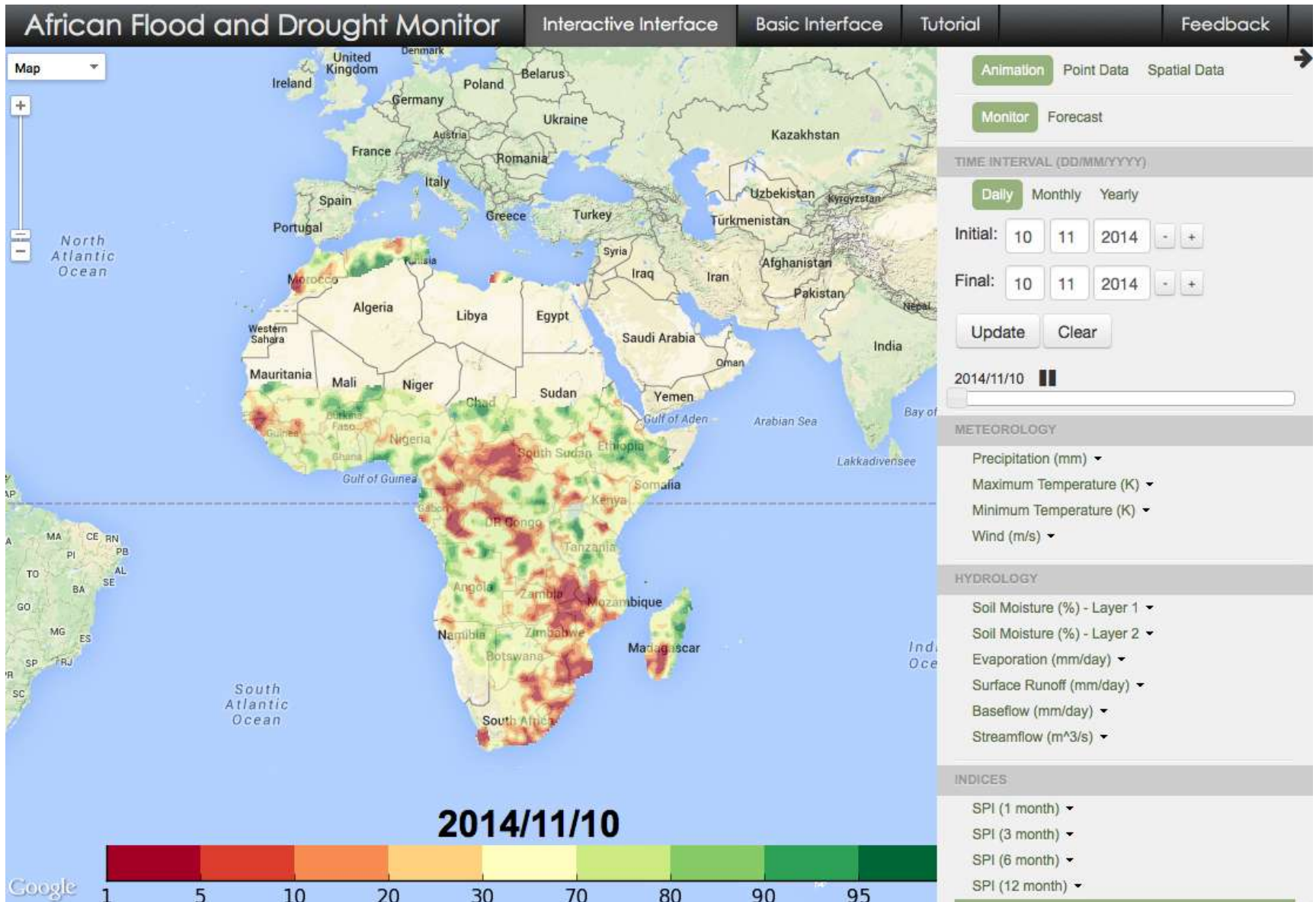
## Regionalization to the African Drought Monitor (2008-2012)



# Training Workshops in 2012/2013 (Kenya and Niger)



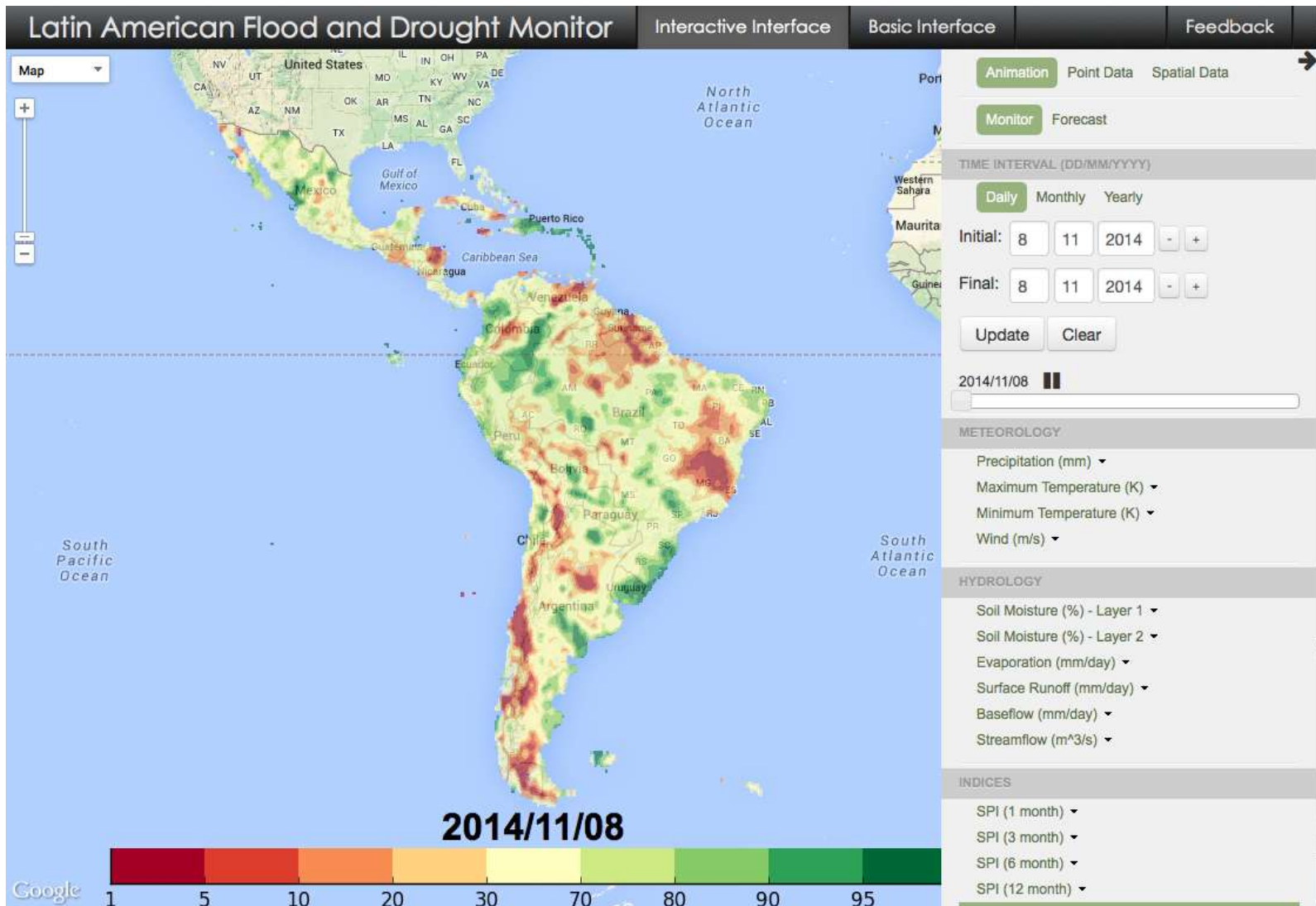
# 2013: African Flood and Drought Monitor (AFDM)



<http://stream.princeton.edu/AWCM/WEBPAGE/>



# 2014: Latin American and Caribbean Flood and Drought Monitor (LACFDM)



<http://stream.princeton.edu/LAFDM/WEBPAGE/>