High Resolution Flood and Drought Monitor (FDM)
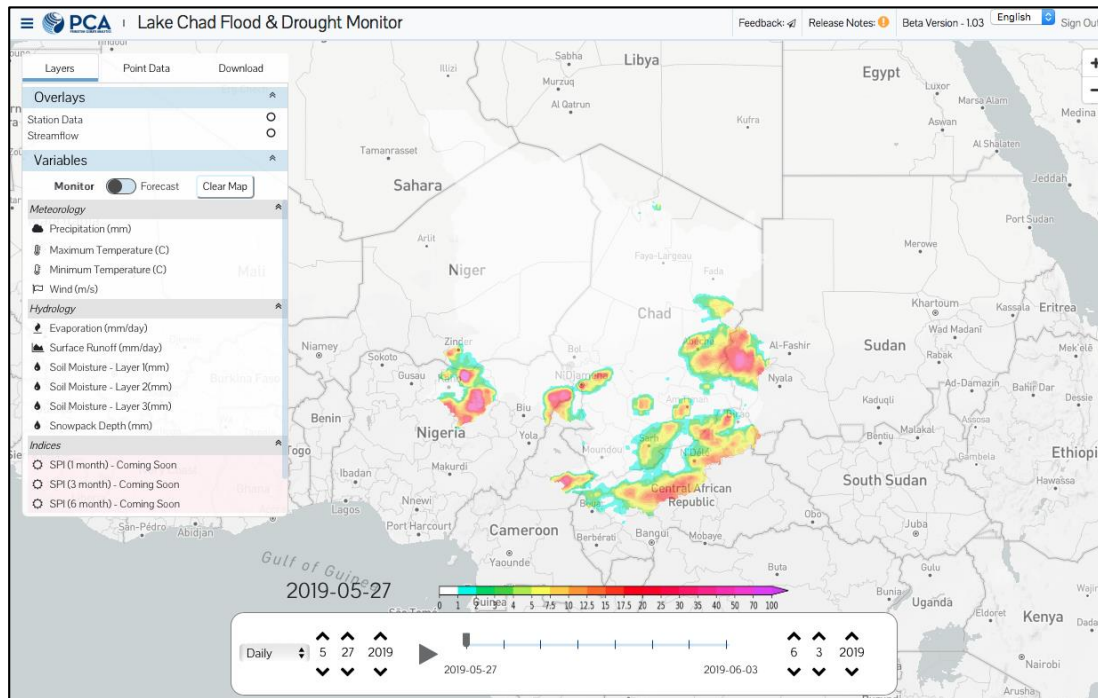
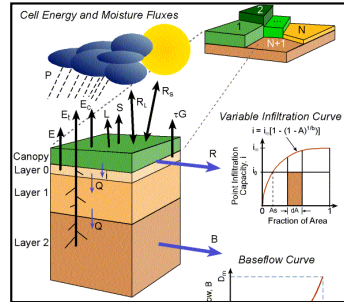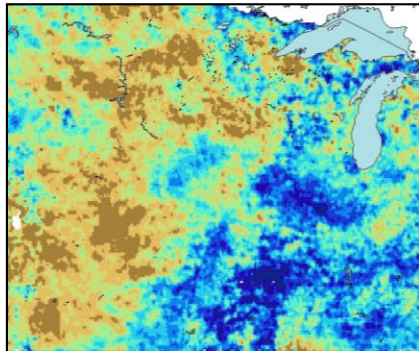Justin Sheffield, University of Southampton, UK
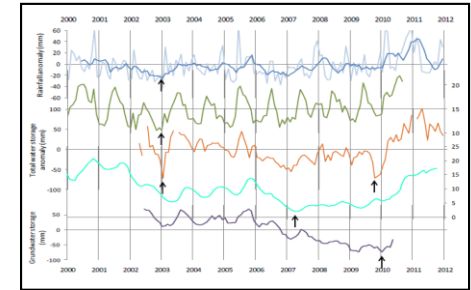
Components of the FDM
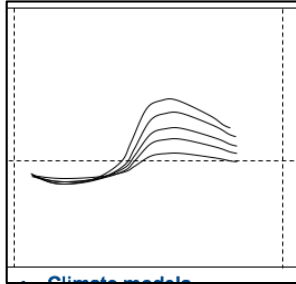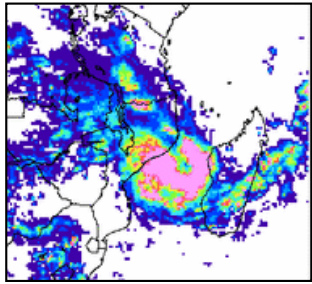
Real-time Weather and Seasonal Forecasts → **Land surface (hydrology) models** → **Hydrological Variables, Streamflow, Drought Indices**
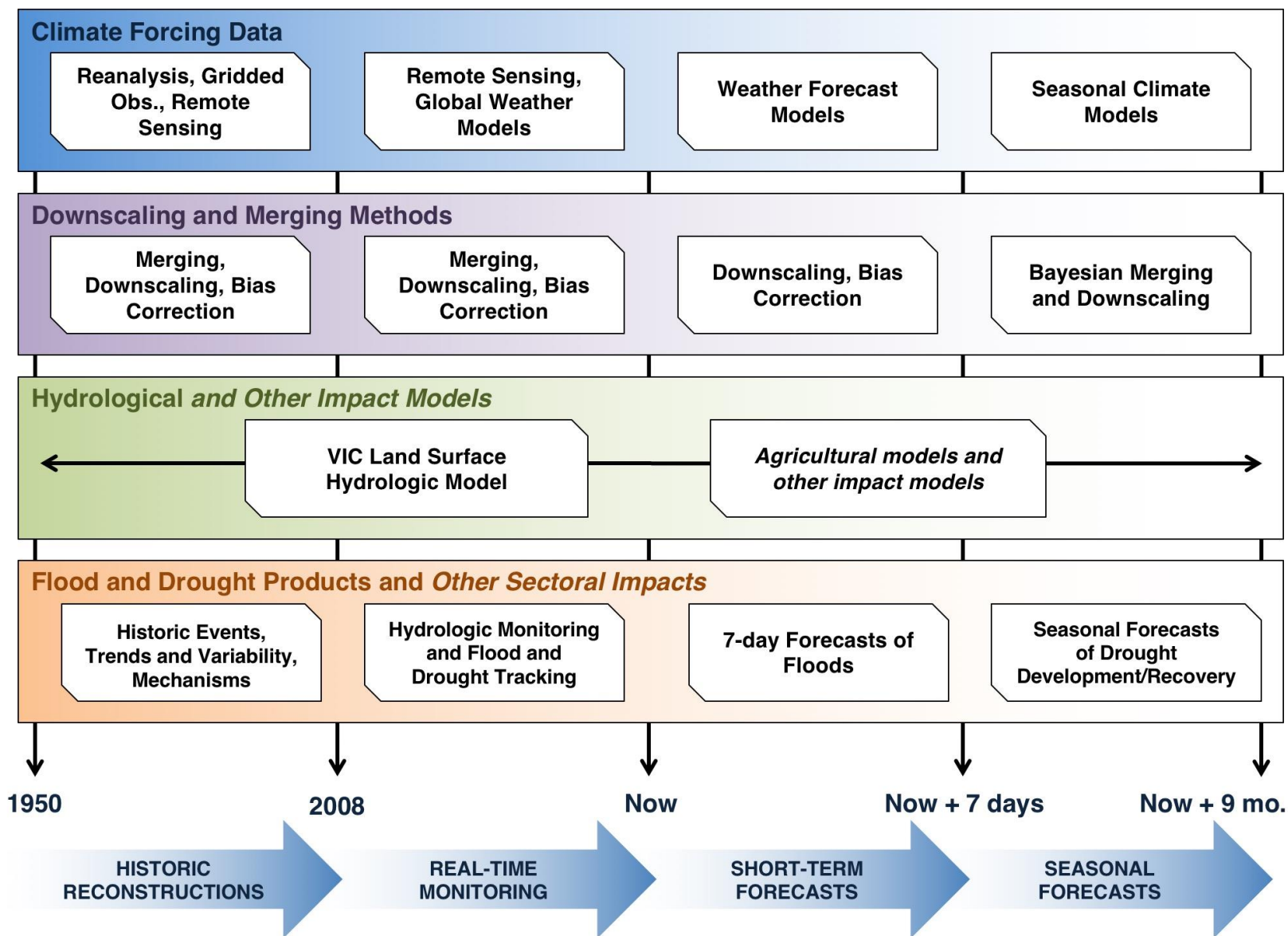
Initial Conditions ↔ **Land surface (hydrology) models**

Hydrological Variables, Streamflow, Drought Indices → **Management/Mitigation**

What is behind the FDM?

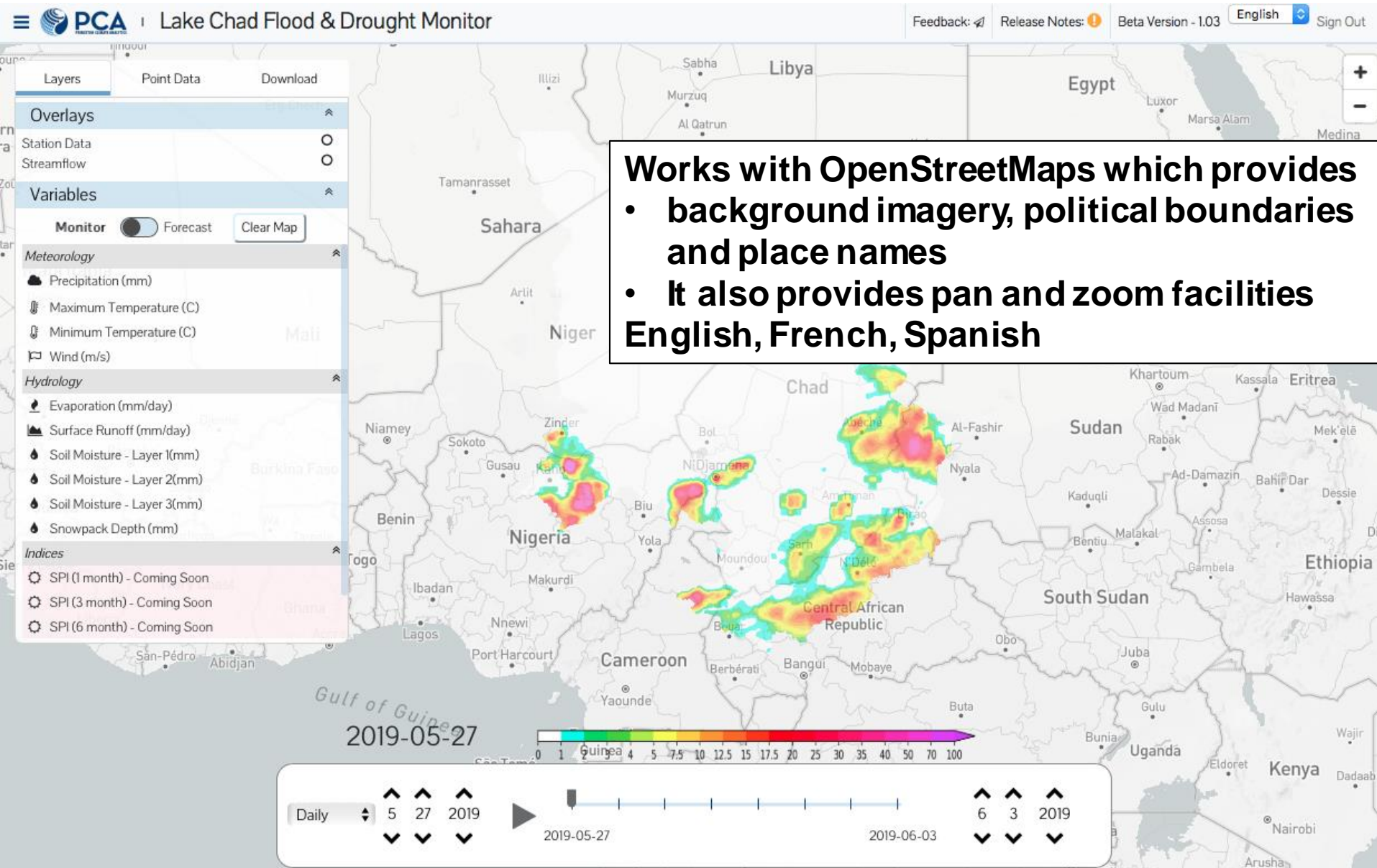Sheffield et al. (2014), BAMS

Main Web Portal for the Flood and Drought Monitors

https://platform.princetonclimate.com/

Available in English, French, Spanish, Arabic, Mandarin, and Portuguese (depending on the system)

The FDM Web Interface

Variables, Drought Products and Indices

PCA | Lake Chad Flood & Drought Monitor

Feedback | Release Notes | Beta Version - 1.03 | English | Sign Out

Layers | Point Data | Download

Overlays
- Station Data
- Streamflow

Variables
Monitor / Forecast / Clear Map

- Maximum Temperature (C)
- Minimum Temperature (C)
- Wind (m/s)

Hydrology
- Evaporation (mm/day)
- Surface Runoff (mm/day)
- Soil Moisture - Layer 1(mm)
- Soil Moisture - Layer 2(mm)
- Soil Moisture - Layer 3(mm)
- Snowpack Depth (mm)

Indices
- SPI (1 month) - Coming Soon
- SPI (3 month) - Coming Soon
- SPI (6 month) - Coming Soon
- SPI (12 month) - Coming Soon
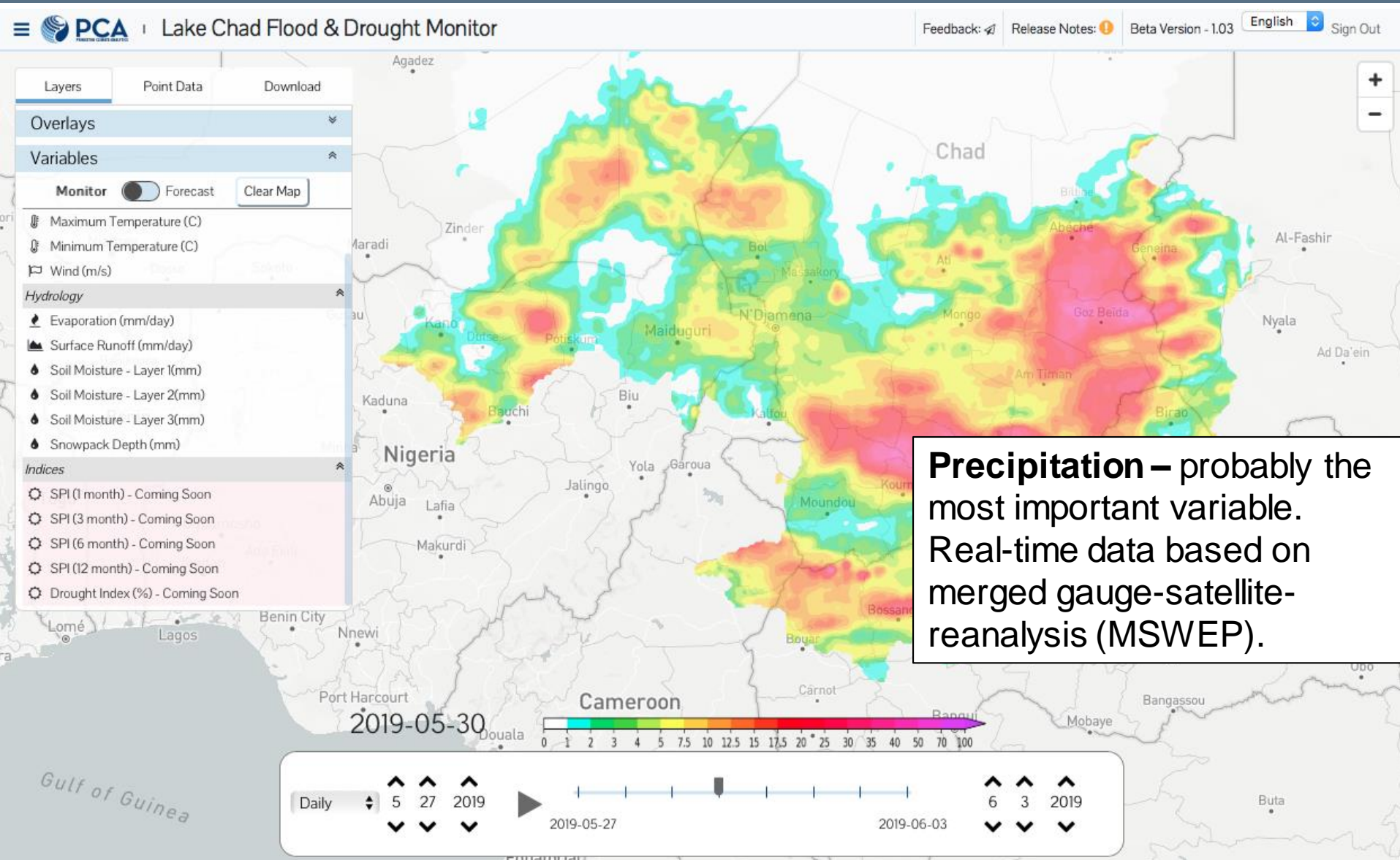- Drought Index (%) - Coming Soon

Meteorological Variables – Precipitation, temperature (daily max and min), windspeed

Hydrological Variables – standard variables such as evaporation, soil moisture at different levels, surface runoff, baseflow, snowpack.
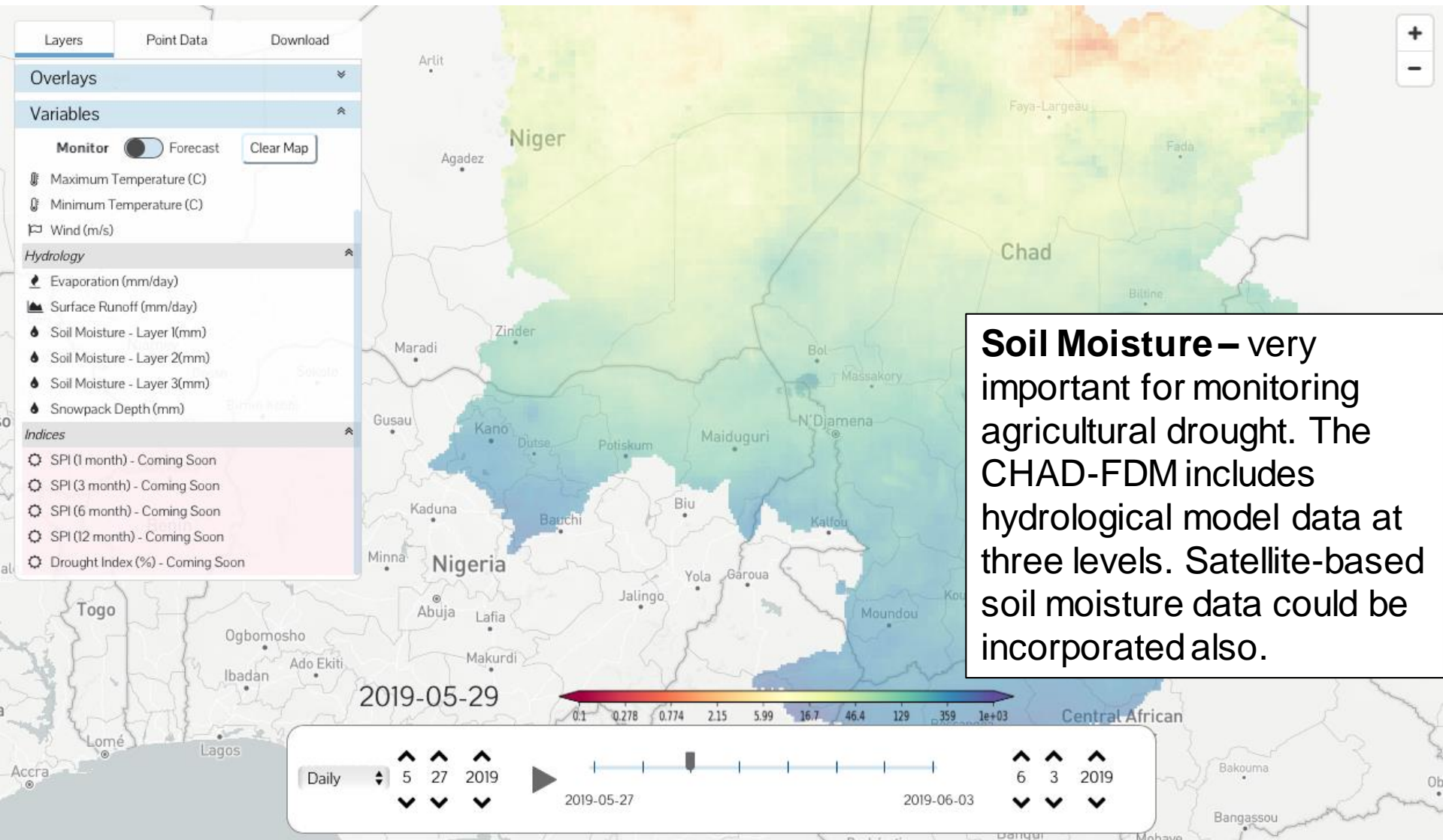
SPI – The standardized precipitation index is the number of standard deviations that observed cumulative precipitation deviated from the climatological average. Low values indicate meteorological drought.

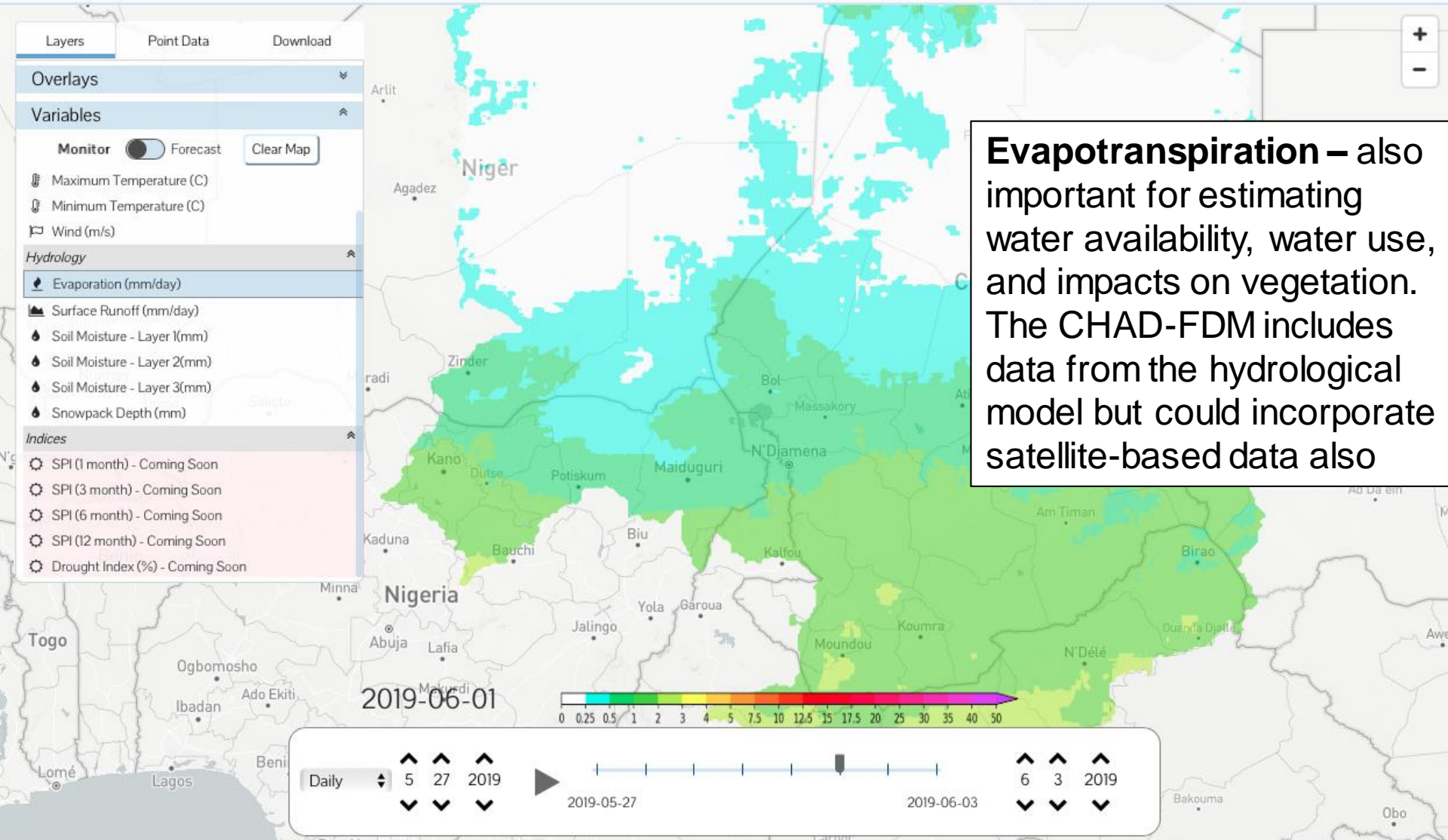**Drought Index -** Measure of the severity of drought; low values indicate drought conditions.

Precipitation – probably the most important variable. Real-time data based on merged gauge-satellite-reanalysis (MSWEP).

Hydrological Variables : Soil Moisture

Soil Moisture – very important for monitoring agricultural drought. The CHAD-FDM includes hydrological model data at three levels. Satellite-based soil moisture data could be incorporated also.

Hydrological Variables : Evapotranspiration

Evapotranspiration – also important for estimating water availability, water use, and impacts on vegetation. The CHAD-FDM includes data from the hydrological model but could incorporate satellite-based data also
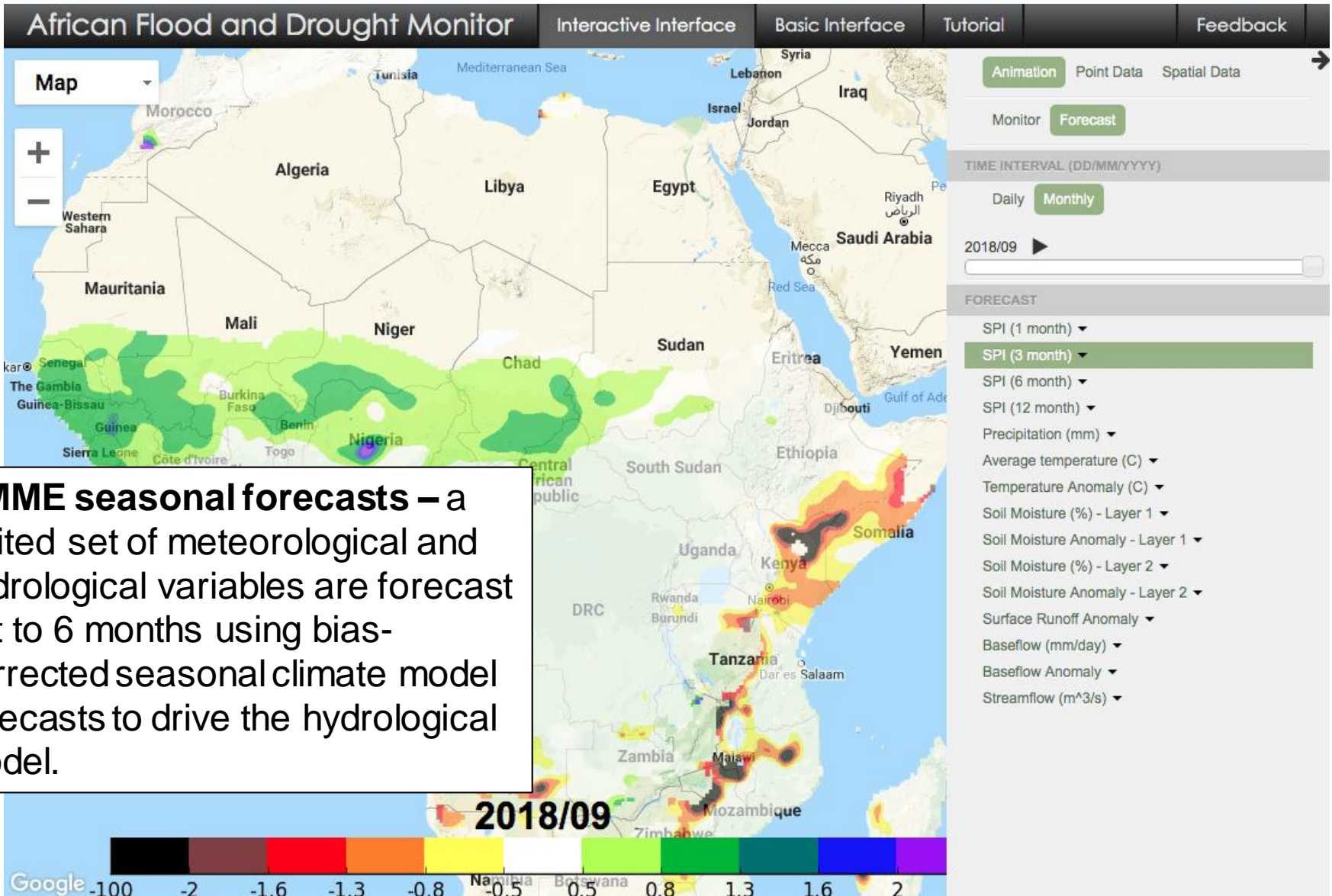
Forecasts: 7-day Precipitation Forecast
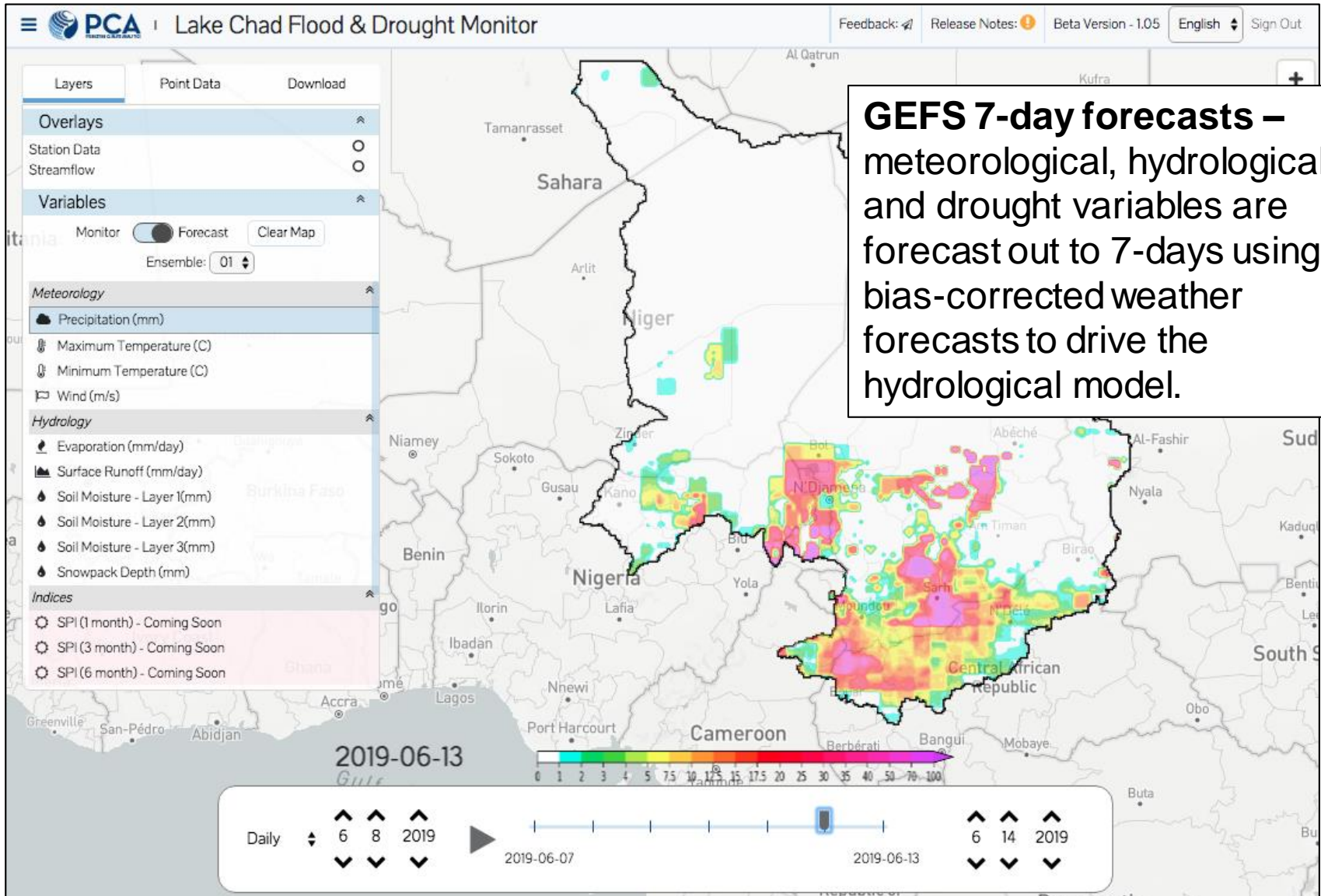
GEFS 7-day forecasts – meteorological, hydrological and drought variables are forecast out to 7-days using bias-corrected weather forecasts to drive the hydrological model.

Forecasts: Seasonal Precipitation Forecast

NMME seasonal forecasts – a limited set of meteorological and hydrological variables are forecast out to 6 months using bias-corrected seasonal climate model forecasts to drive the hydrological model.

Point Data: Station Observations

Time series of data at observation station – can be selected, visualized and *downloaded*.
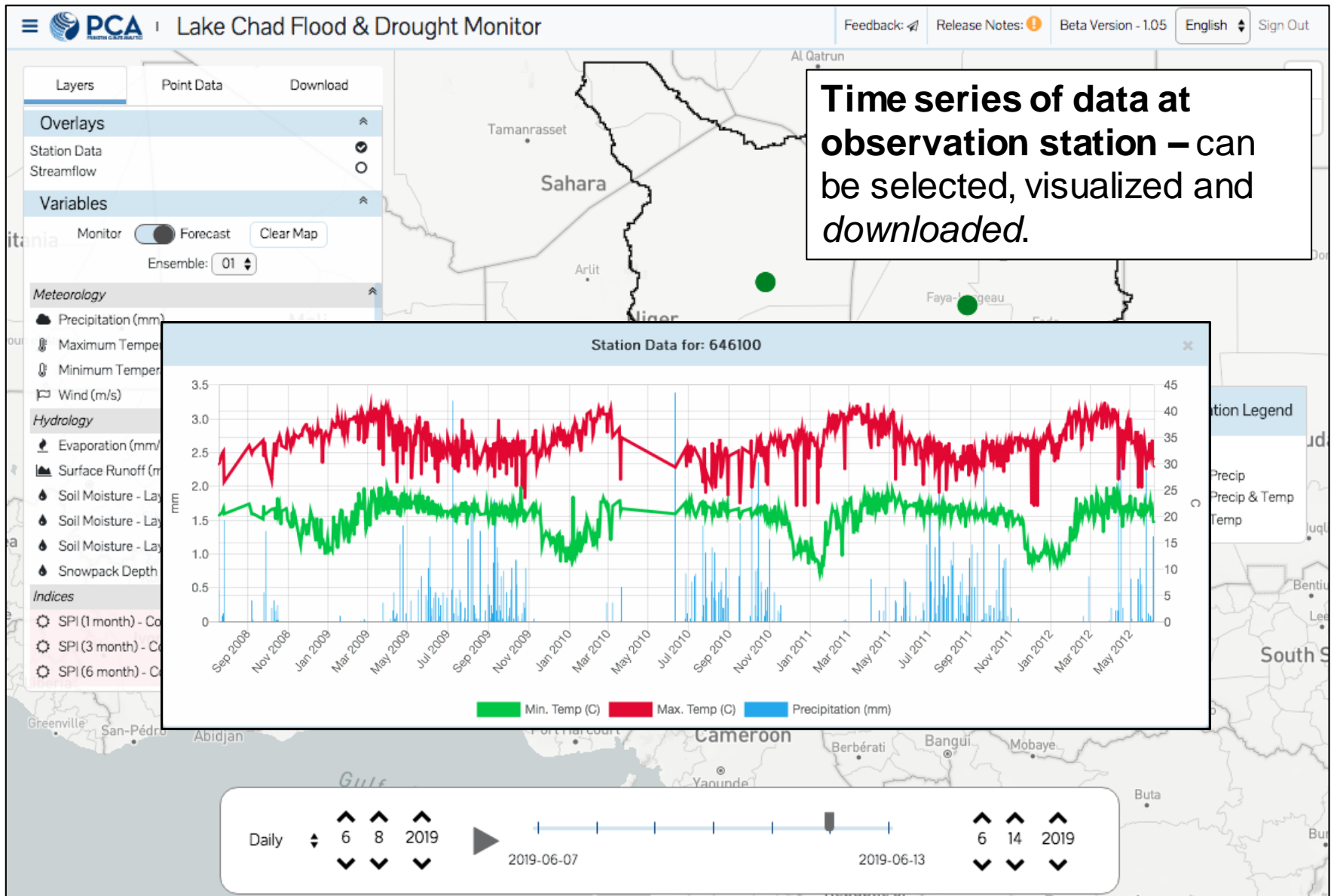
Point Data: Map Selection

Time series of data at a point – can be selected, visualized and downloaded. The location can be selected by clicking on the map, or by entering the latitue and longitude.

Point Data: Meteorological Data

Meteorology - Location (15,12)

Daily Maximum Temperature (C) ■ Daily Minimum Temperature (C) ■ Wind Speed (m/s) ■ Precipitation (mm)
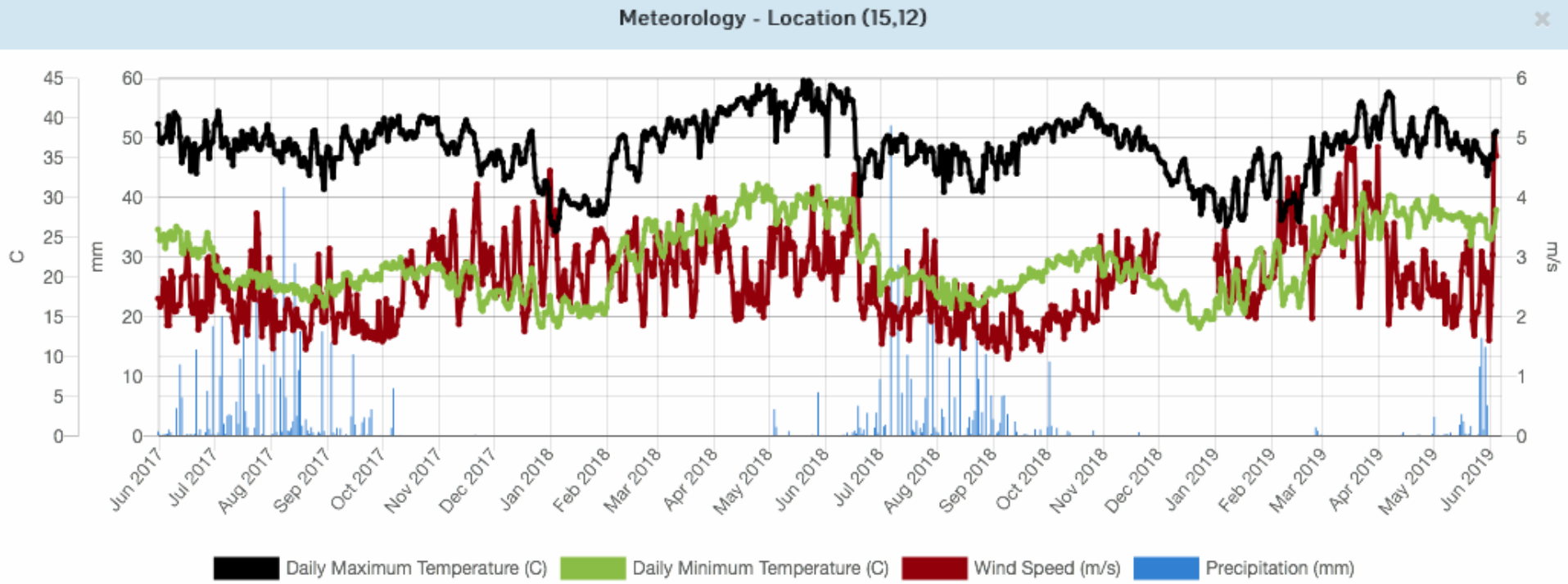
Meteorological Data – precipitation, max temperature, min temperature and windspeed are available at daily time step.
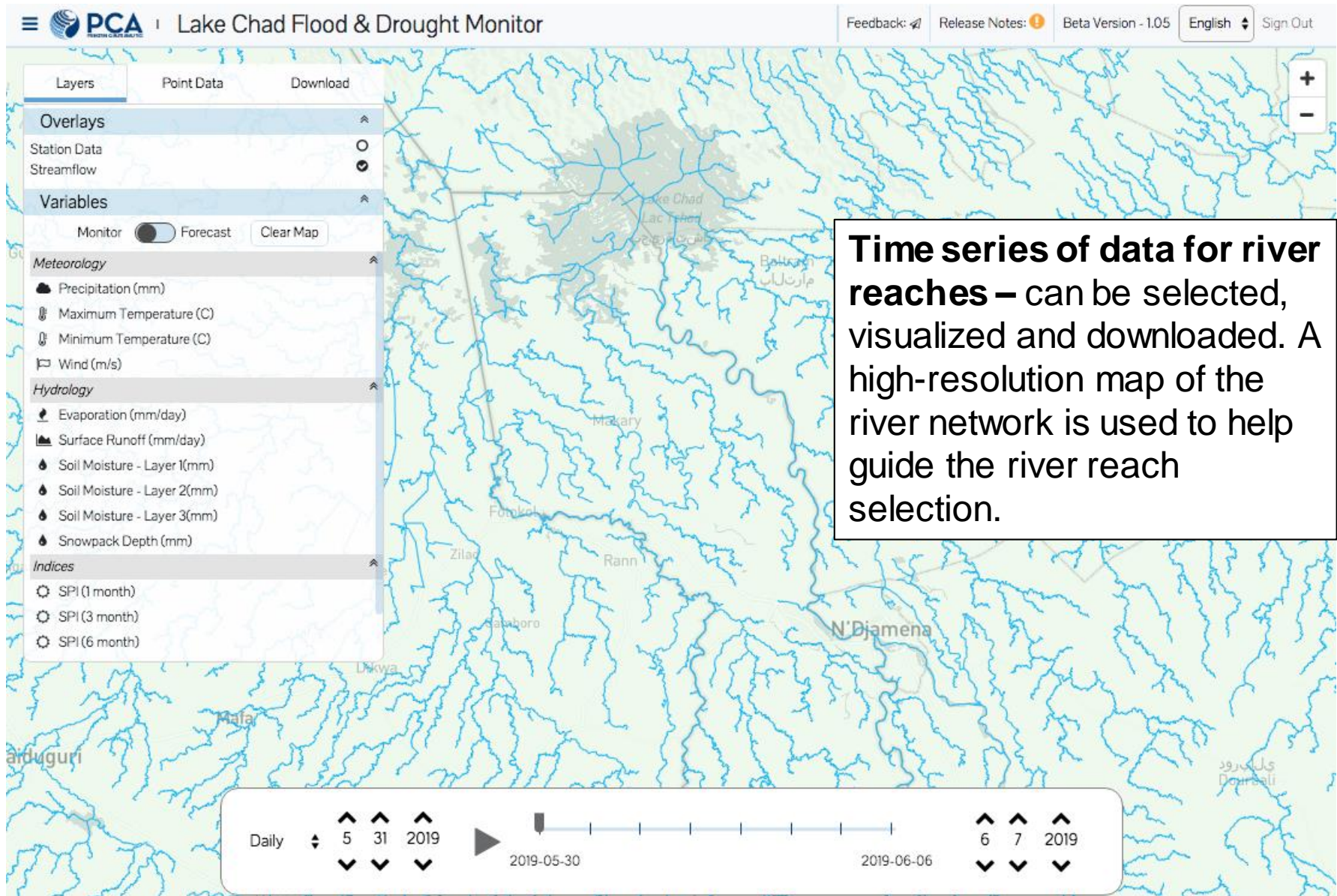
Point Data: Water Balance
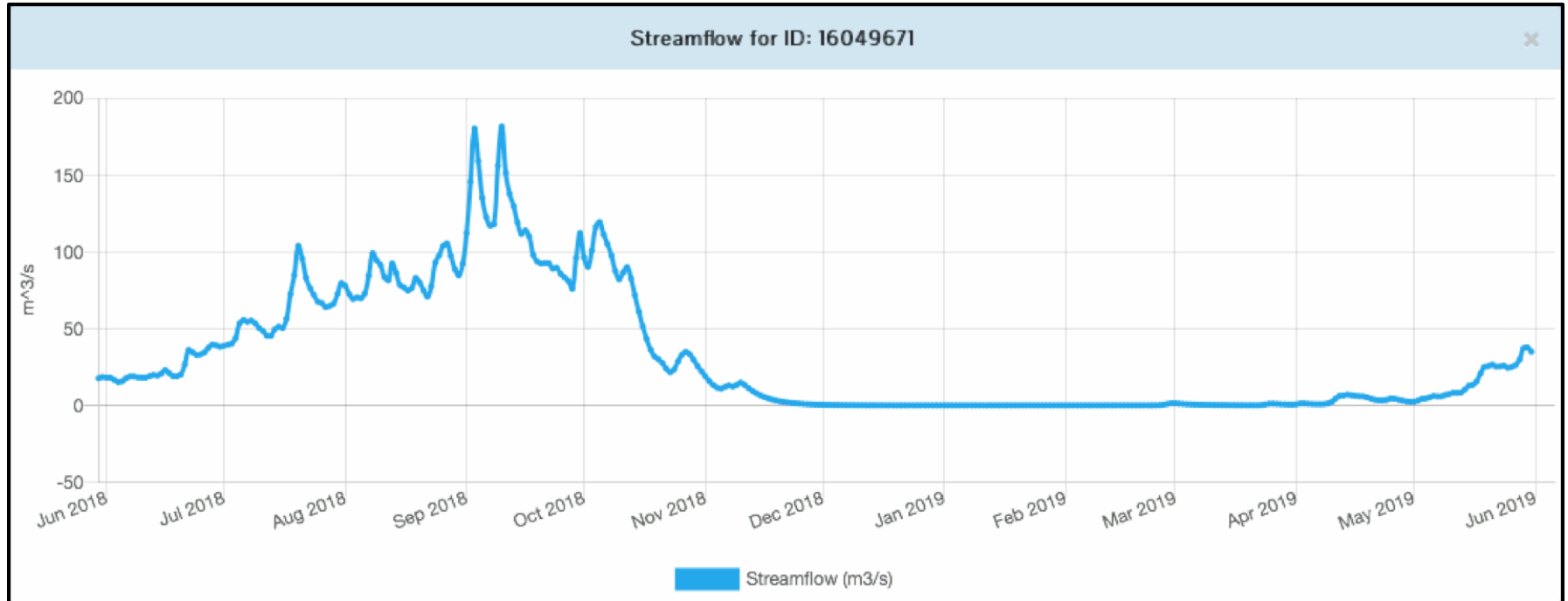

Water Balance - Location (18.3810,9.2508)

Legend: Evaporation (mm), Runoff (mm), Snowpack Depth (mm), Precipitation (mm)
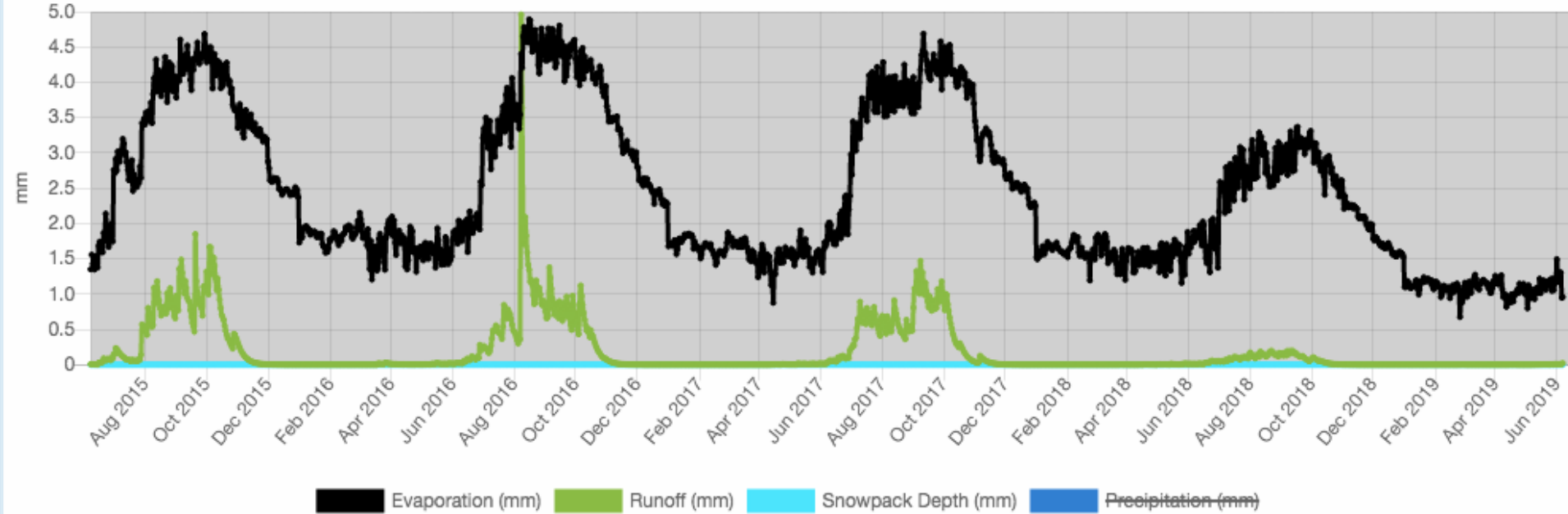
Water balance variables – the main water balance variables are estimated from the hydrological model

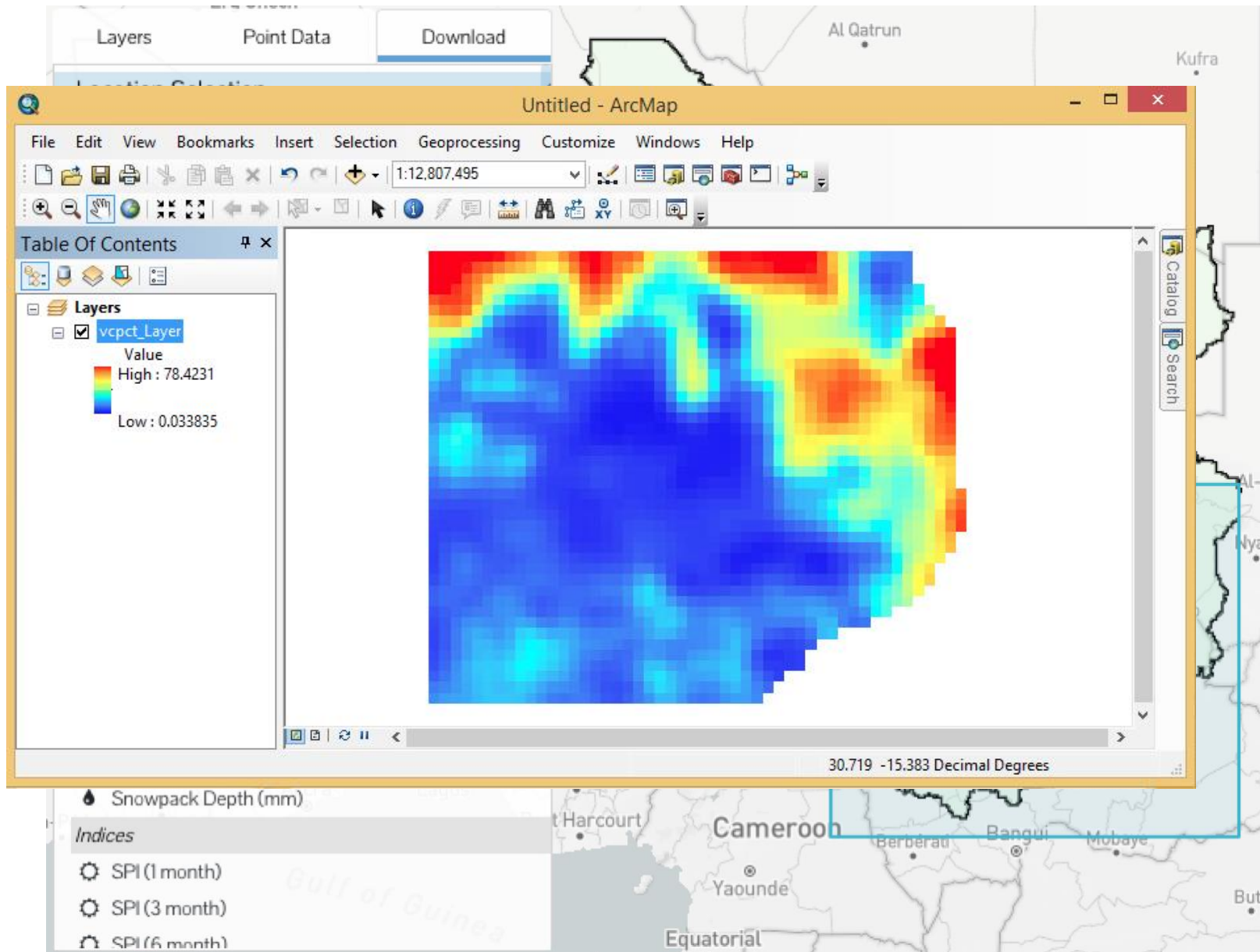# River Network Data: Streamflow Data

Time series of data for river reaches – can be selected, visualized and downloaded. A high-resolution map of the river network is used to help guide the river reach selection.

River Network Data: Streamflow Data

Streamflow – shown here are daily values of streamflow for the chosen reach. The data are available for 1979 to real-time. Validation has been done against a limited set of GRDC stations.

Point Data: Download

Spatial Data: Selection, Download, and GIS

Interface: Feedback

Summary of Monitors' Capabilities

- Multiple Languages
- Historic and monitoring data
- High-resolution streamflow data
- Station data showing observed meteorology
- Short-Term Forecast (7 days)
- Seasonal Forecast (6 months) – *coming soon (AFDM)*
- Standard Precipitation Index (SPI) and Drought Index
- Download point data
- Download spatial data
- Provide feedback
- Potential to incorporate other datasets (e.g. satellite datasets of NDVI, soil moisture, etc)

https://platform.princetonclimate.com

What can it be used for?

- Historic data analysis, back to 1979
- Near real-time monitoring of meteorological, hydrological and *vegetation* variables
- Monitoring of drought and large-scale flood conditions
- Early warning of flood conditions (7-day)
- Early warning of drought conditions (out to 6-months)
- Applications include: hazard risk mapping; hazard early warning; agricultural applications (crop water use; irrigation requirements; drought impacts); water resources management and planning; hydropower production and planning; WEF trade-off analysis; health applications (extreme heat; vector/water borne disease mapping); …

- https://platform.princetonclimate.com

- User: entroTestUser@princetonclimate.com

- Password: PCA_entro_134!