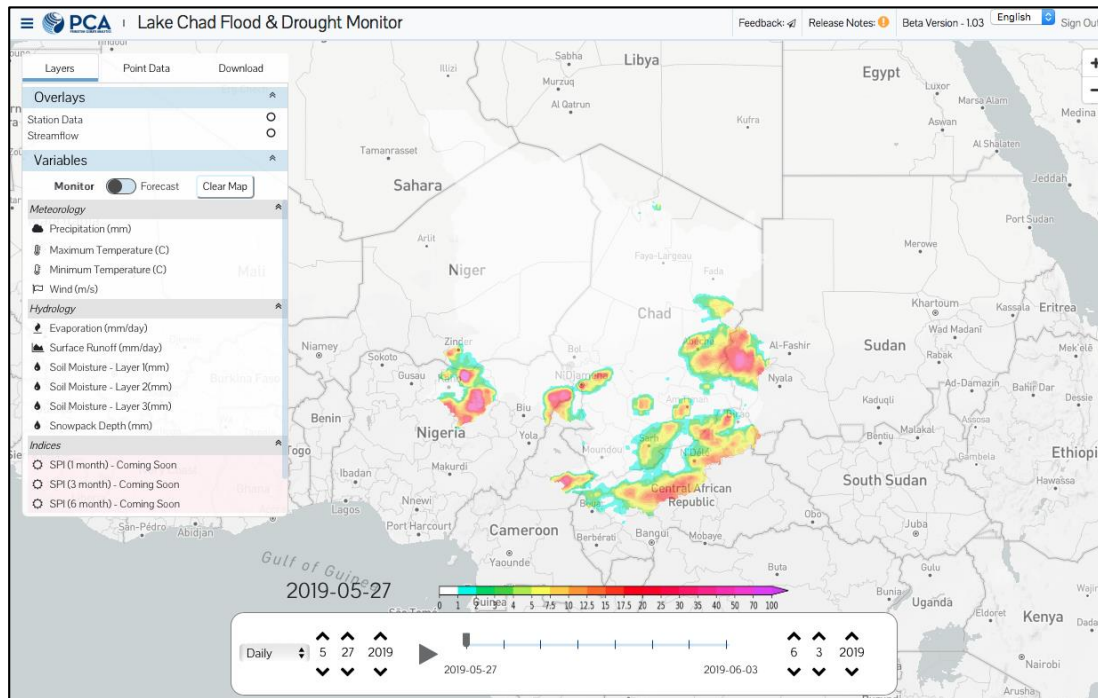


High Resolution Flood and Drought Monitor (FDM)



UNIVERSITY OF
Southampton



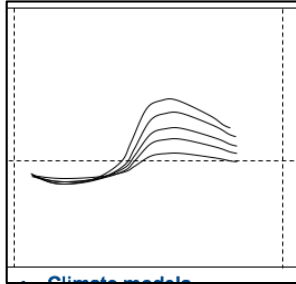
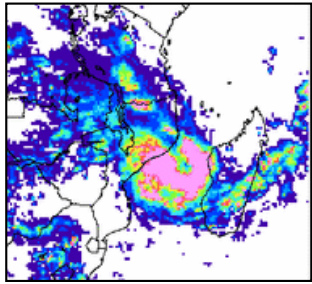
**PRINCETON
UNIVERSITY**



PCA
PRINCETON CLIMATE ANALYTICS

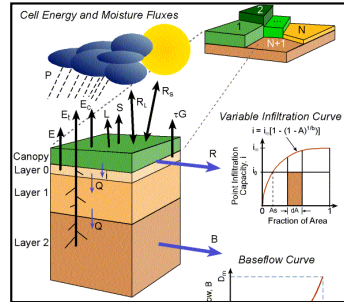
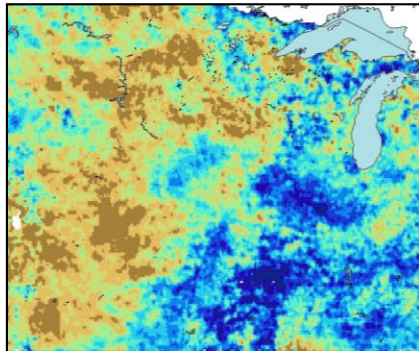
Justin Sheffield, University of Southampton, UK

Components of the FDM

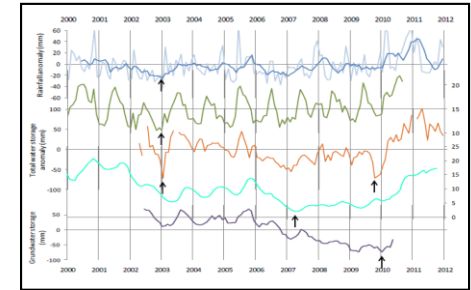


Real-time
Weather and
Seasonal Forecasts

Initial
Conditions



Land surface
(hydrology)
models

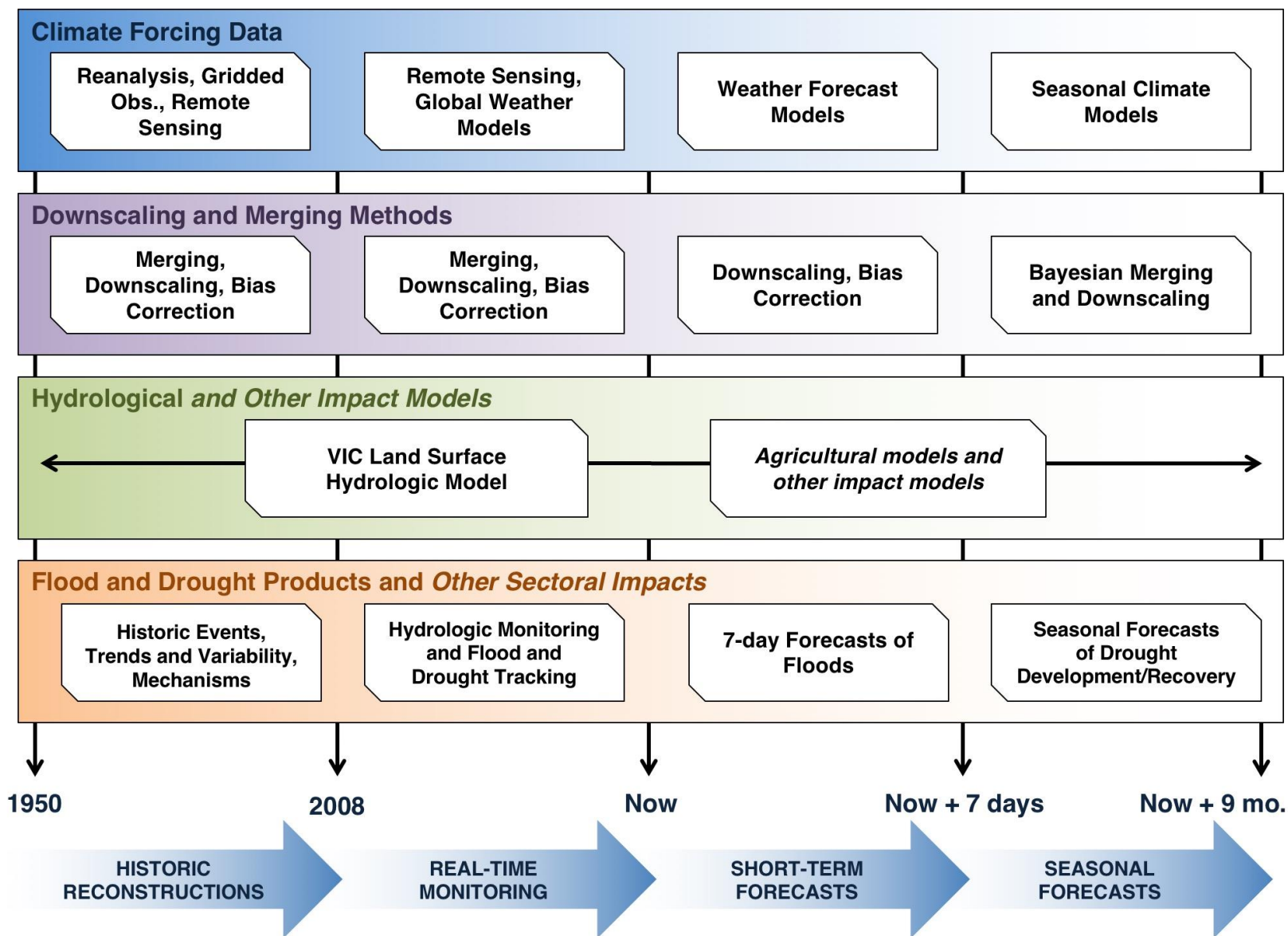


Hydrological
Variables,
Streamflow,
Drought
Indices



Management/Mitigation

What is behind the FDM?



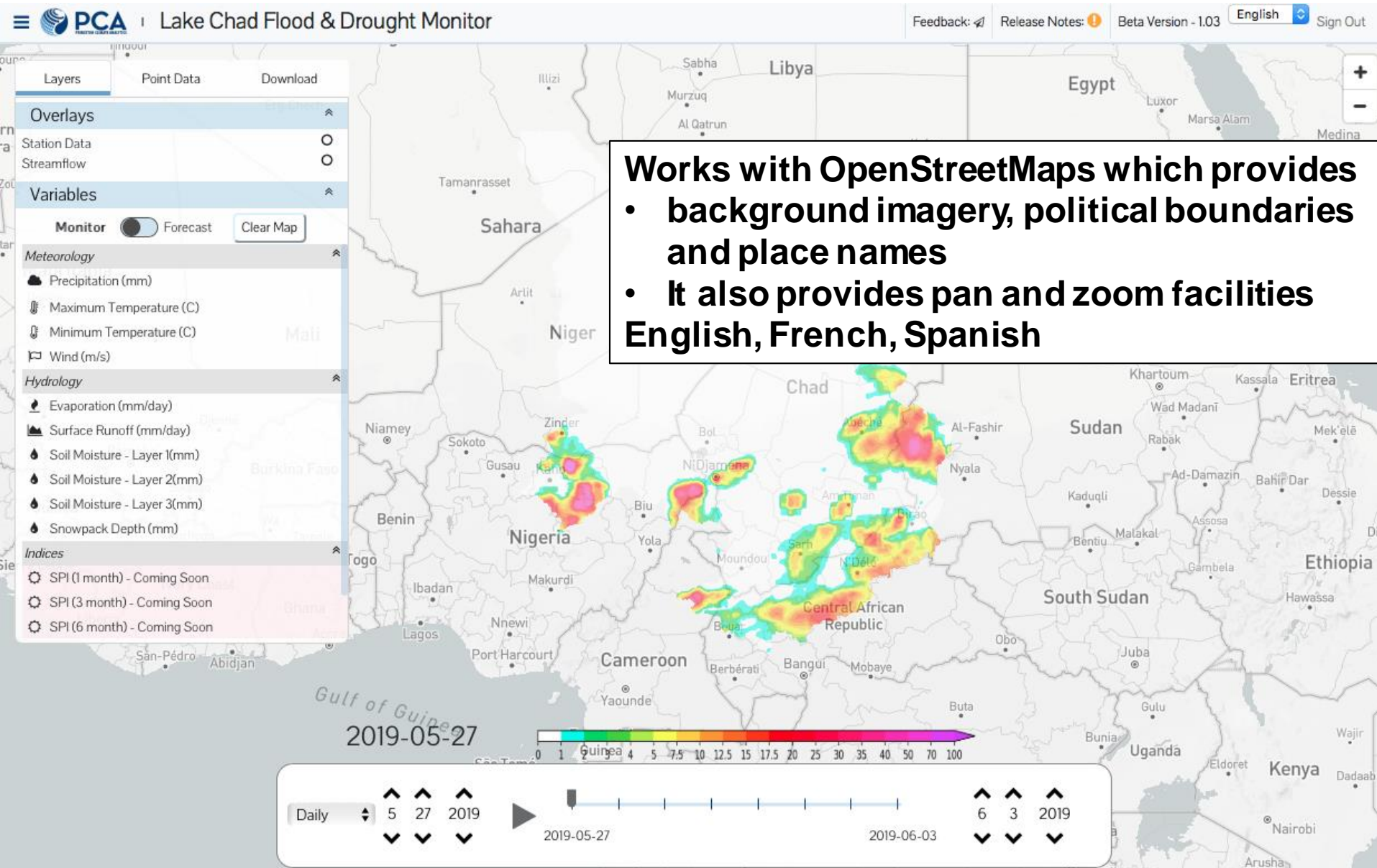
Main Web Portal for the Flood and Drought Monitors

<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

The screenshot shows the 'Lake Chad Flood & Drought Monitor' interface. On the left, there is a sidebar menu with sections: 'Layers', 'Point Data', and 'Download'. Under 'Layers', there are 'Overlays', 'Station Data', 'Streamflow', and 'Variables'. The 'Variables' section is expanded, showing a 'Monitor' toggle (currently off) and a 'Forecast' toggle (currently on). Below these are several variable categories: 'Maximum Temperature (C)', 'Minimum Temperature (C)', and 'Wind (m/s)'; 'Hydrology' including 'Evaporation (mm/day)', 'Surface Runoff (mm/day)', 'Soil Moisture - Layer 1(mm)', 'Soil Moisture - Layer 2(mm)', 'Soil Moisture - Layer 3(mm)', and 'Snowpack Depth (mm)'; and 'Indices' including 'SPI (1 month) - Coming Soon', 'SPI (3 month) - Coming Soon', 'SPI (6 month) - Coming Soon', 'SPI (12 month) - Coming Soon', and 'Drought Index (%) - Coming Soon'. The main area is a map of the Lake Chad region, showing precipitation and drought indices. A color scale at the bottom indicates values from 0 to 1. The date '2019-05-27' is visible at the bottom of the map. Four text boxes with arrows point to specific elements: the top box points to the 'Variables' section; the second box points to the 'Hydrology' section; the third box points to the 'SPI (1 month) - Coming Soon' item; and the bottom box points to the 'Drought Index (%) - Coming Soon' item.

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

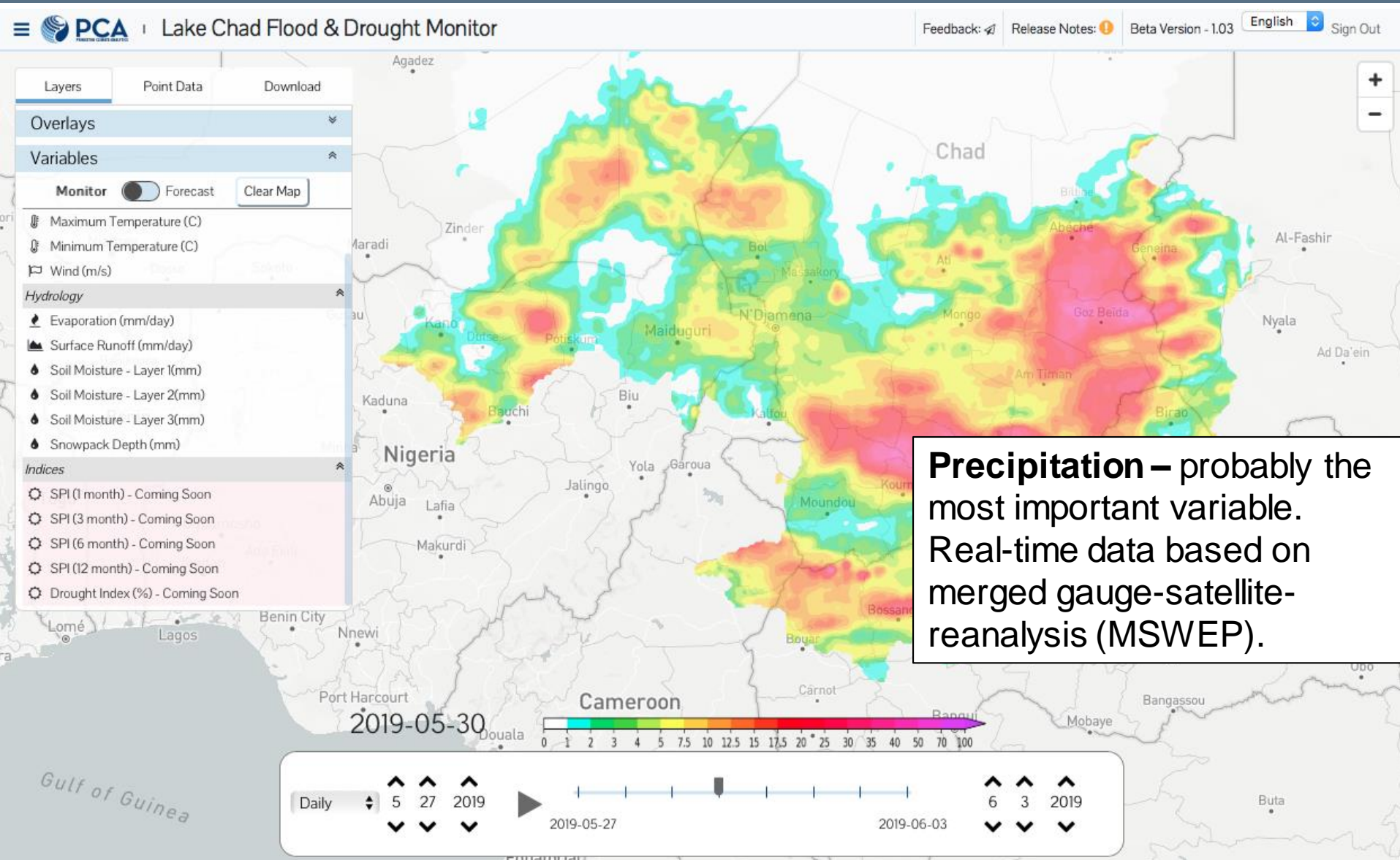
Meteorological Variables – Precipitation, temperature (daily max and min), windspeed

Hydrological Variables – standard variables such as evaporation, soil moisture at different levels, surface runoff, baseflow, snowpack.

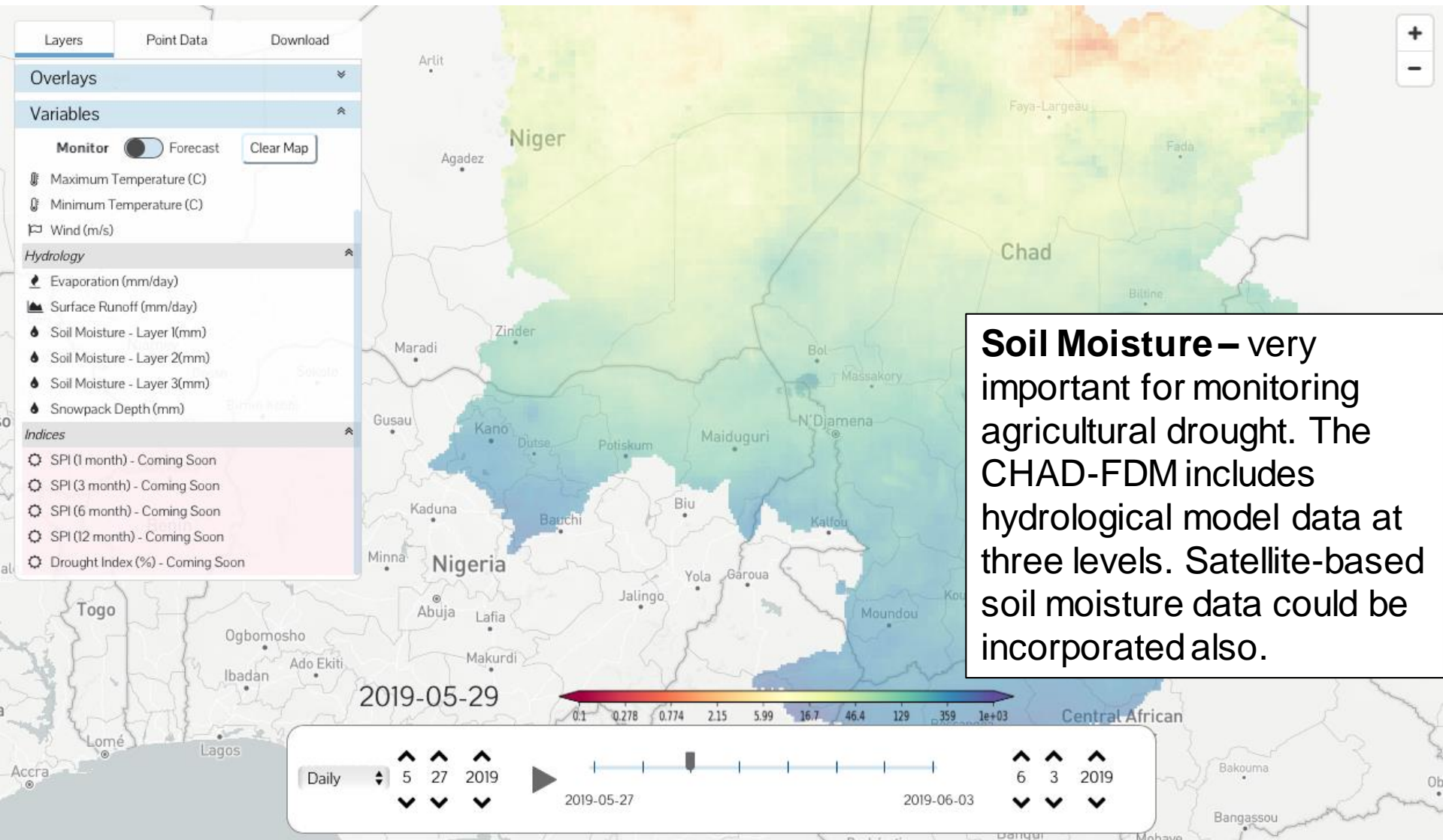
SPI – The standardized precipitation index is the number of standard deviations that observed cumulative precipitation deviated from the climatological average. Low values indicate meteorological drought.

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

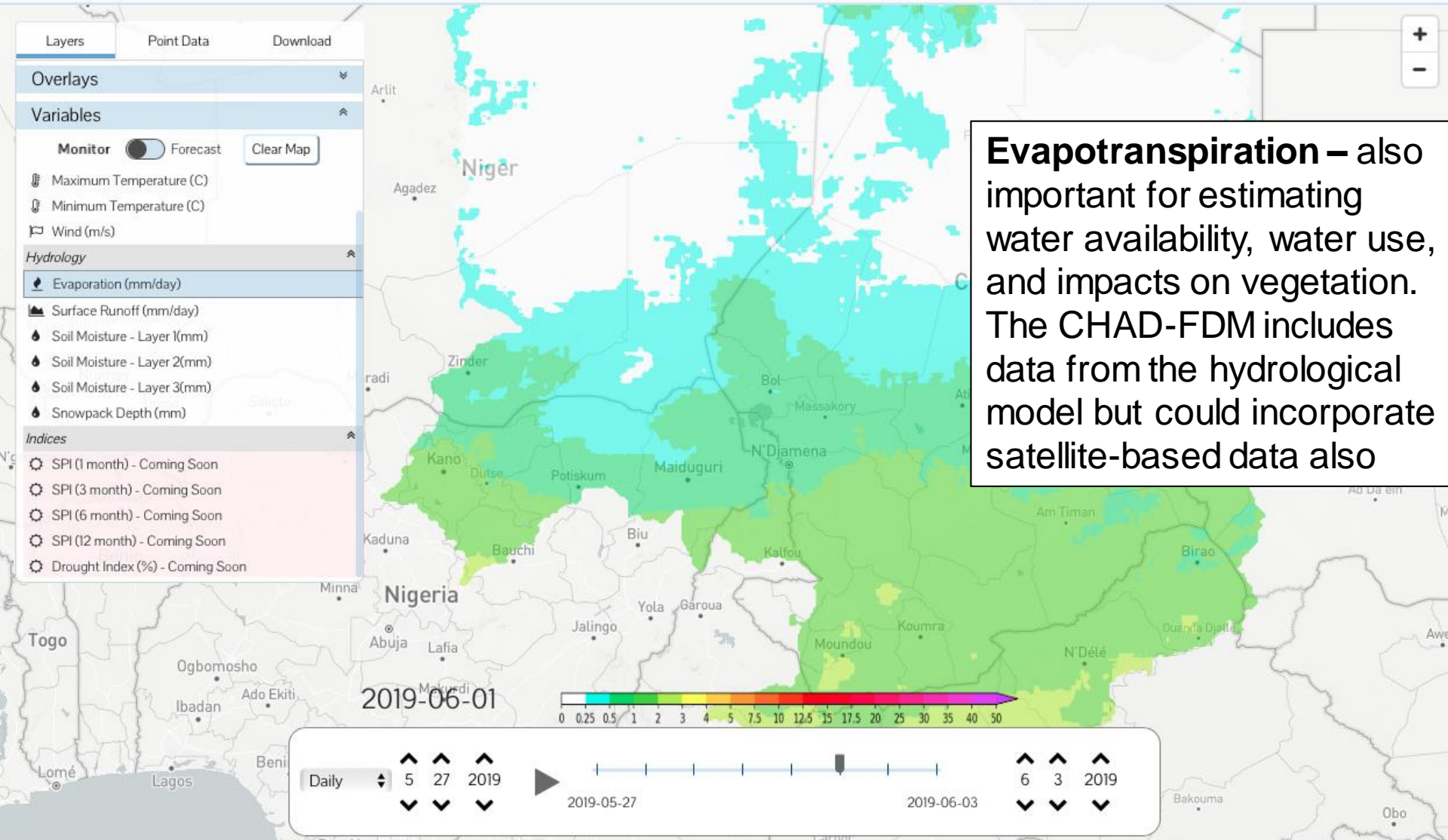
Meteorological Variables: Precipitation



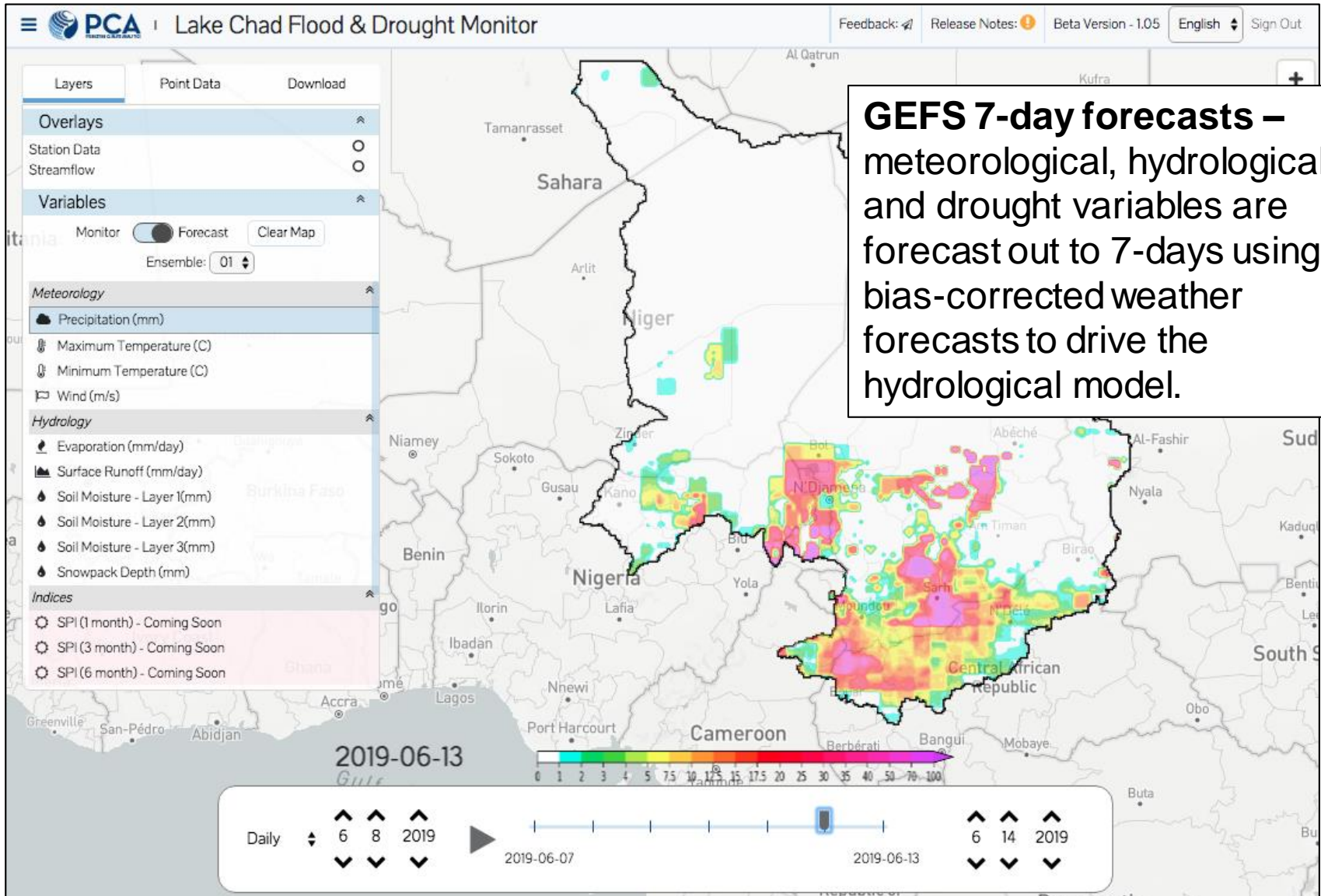
Hydrological Variables : Soil Moisture



Hydrological Variables : Evapotranspiration

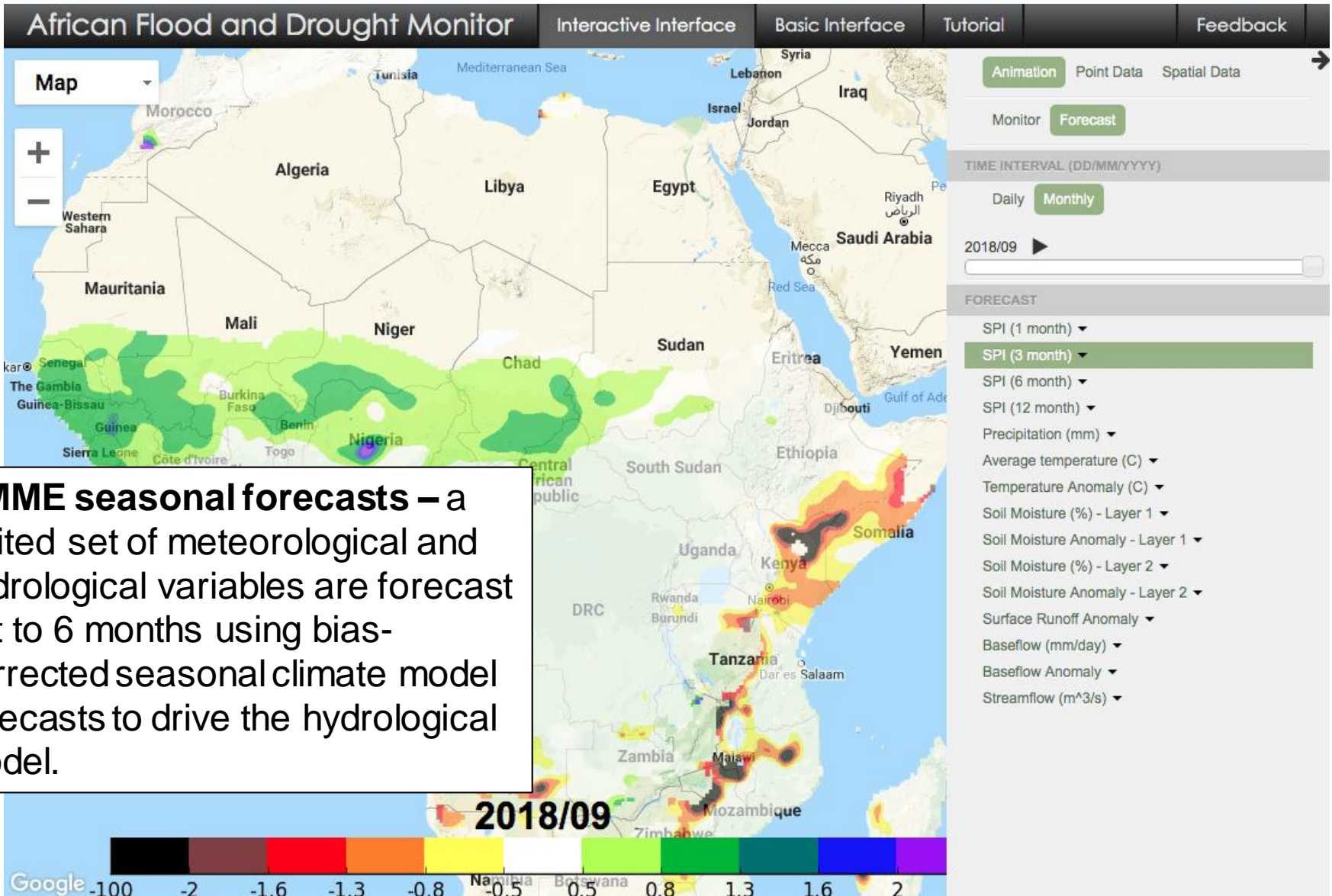


Forecasts: 7-day Precipitation Forecast



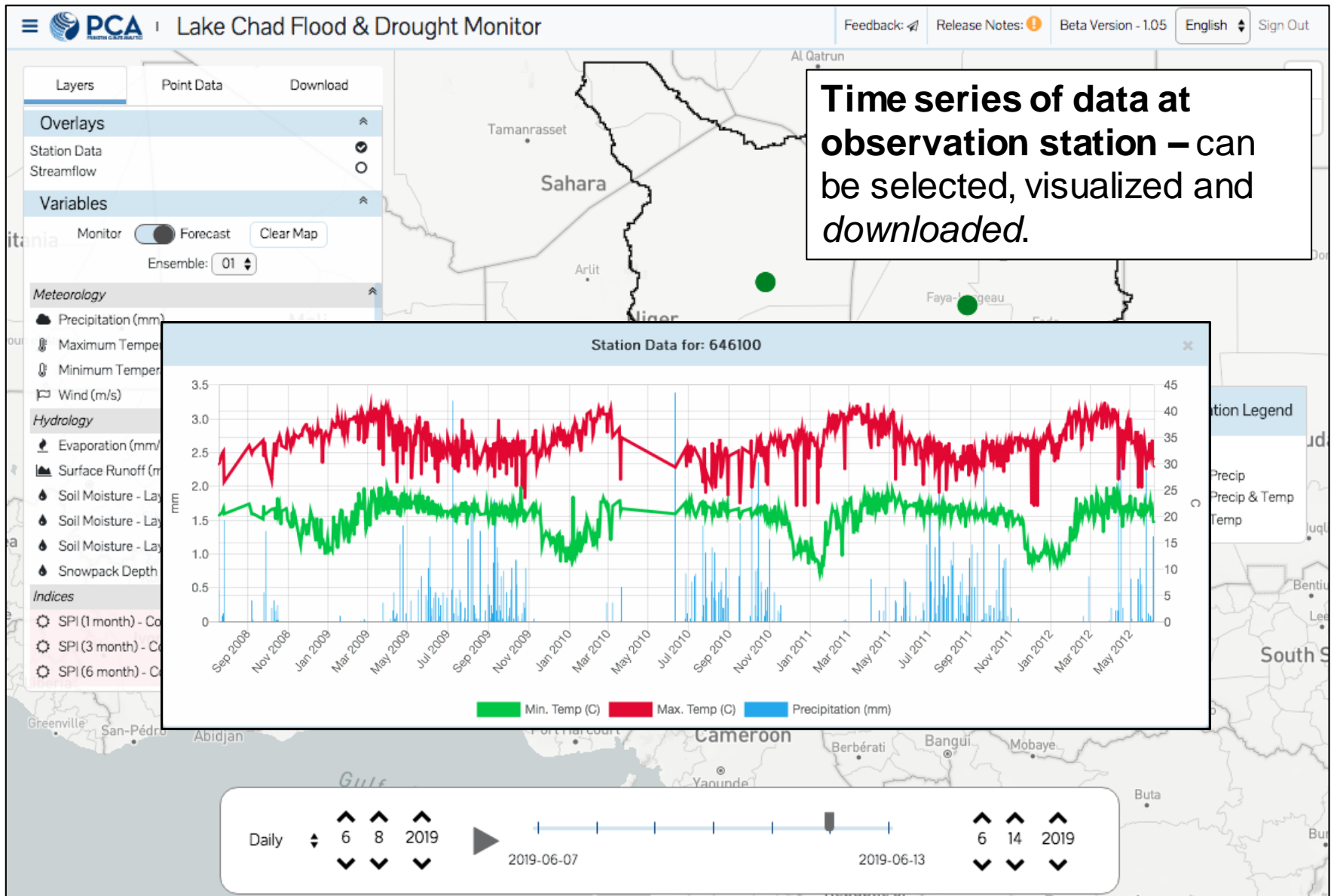
GEFS 7-day forecasts – meteorological, hydrological and drought variables are forecast out to 7-days using bias-corrected weather forecasts to drive the hydrological model.

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



Point Data: Map Selection

Layers | **Point Data** | Download

Location Selection

Map Manual

Lat:

Lon:

Point Data Variables

Indices

Water Balance

Meteorology

Soil Moisture - Upper Layer

Soil Moisture - Lower Layer

Create Data File ?

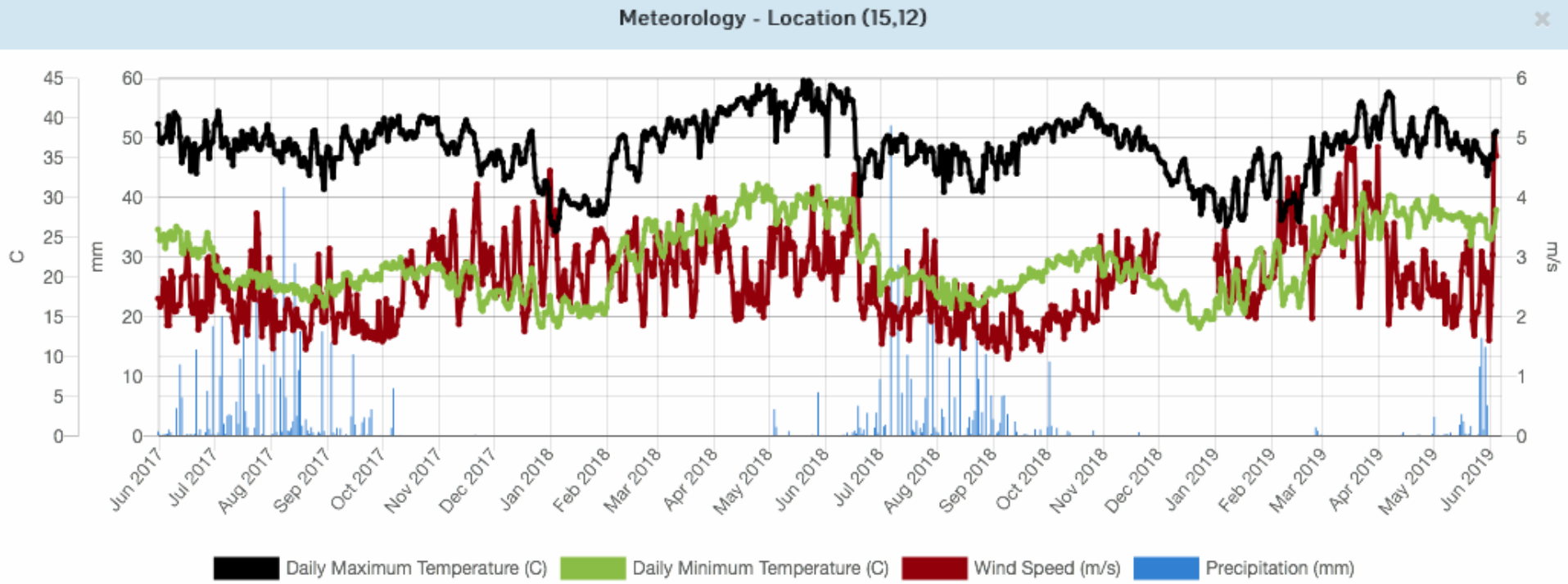
Yes No

Map showing a location pin in West Africa (Niger/Chad region).

Time range: Daily 5 30 2008 to 6 6 2012

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 latitude and longitude.

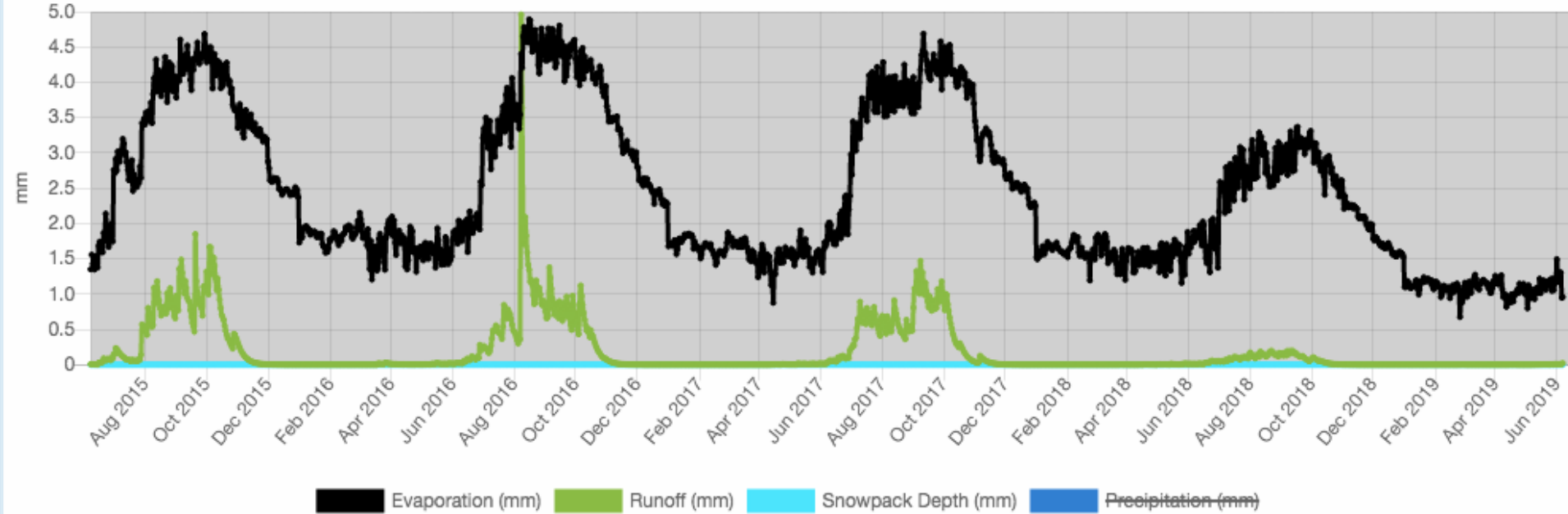
Point Data: Meteorological Data



Meteorological Data – precipitation, max temperature, min temperature and windspeed are available at daily time step.

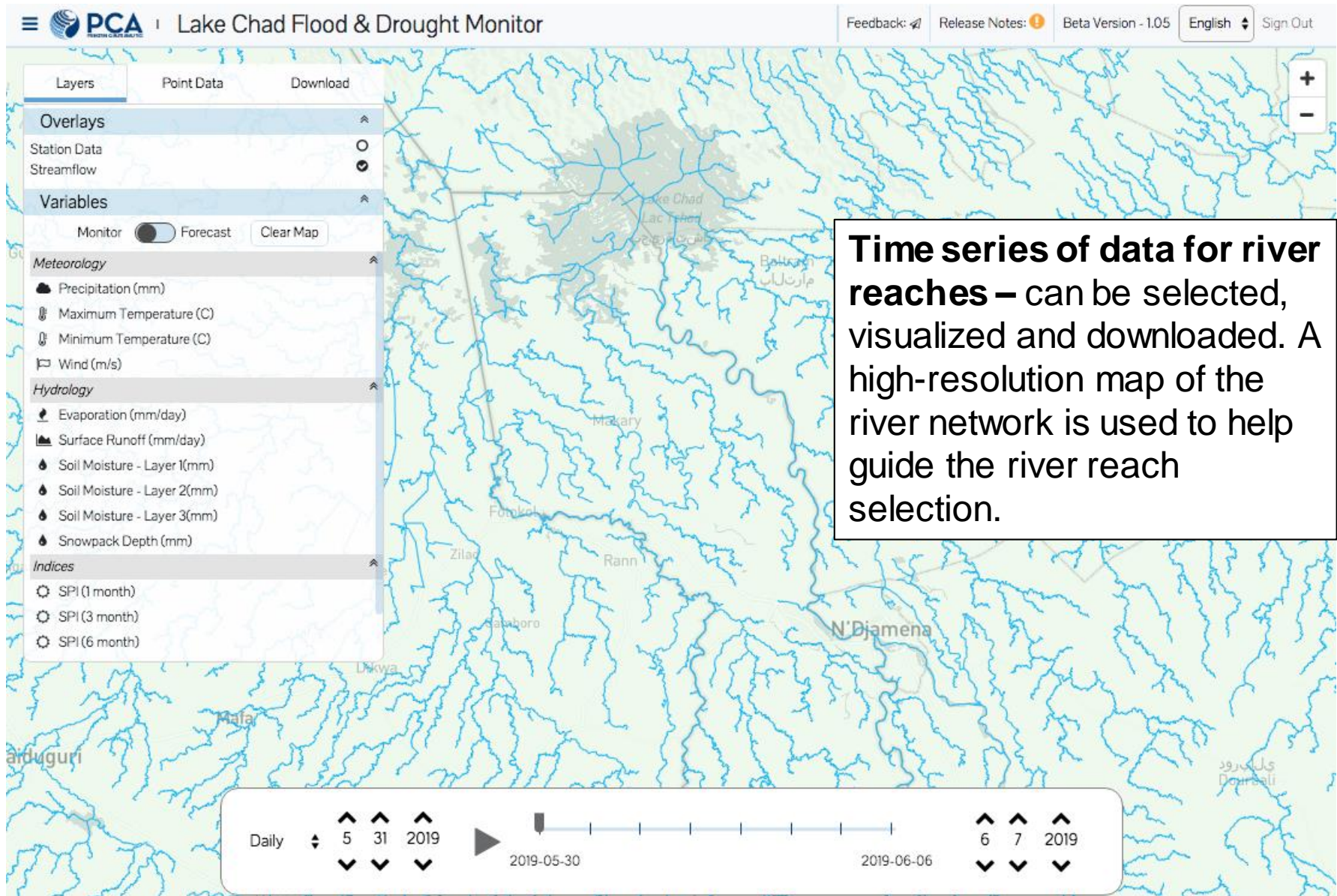
Point Data: Water Balance

Water Balance - Location (18.3810,9.2508)

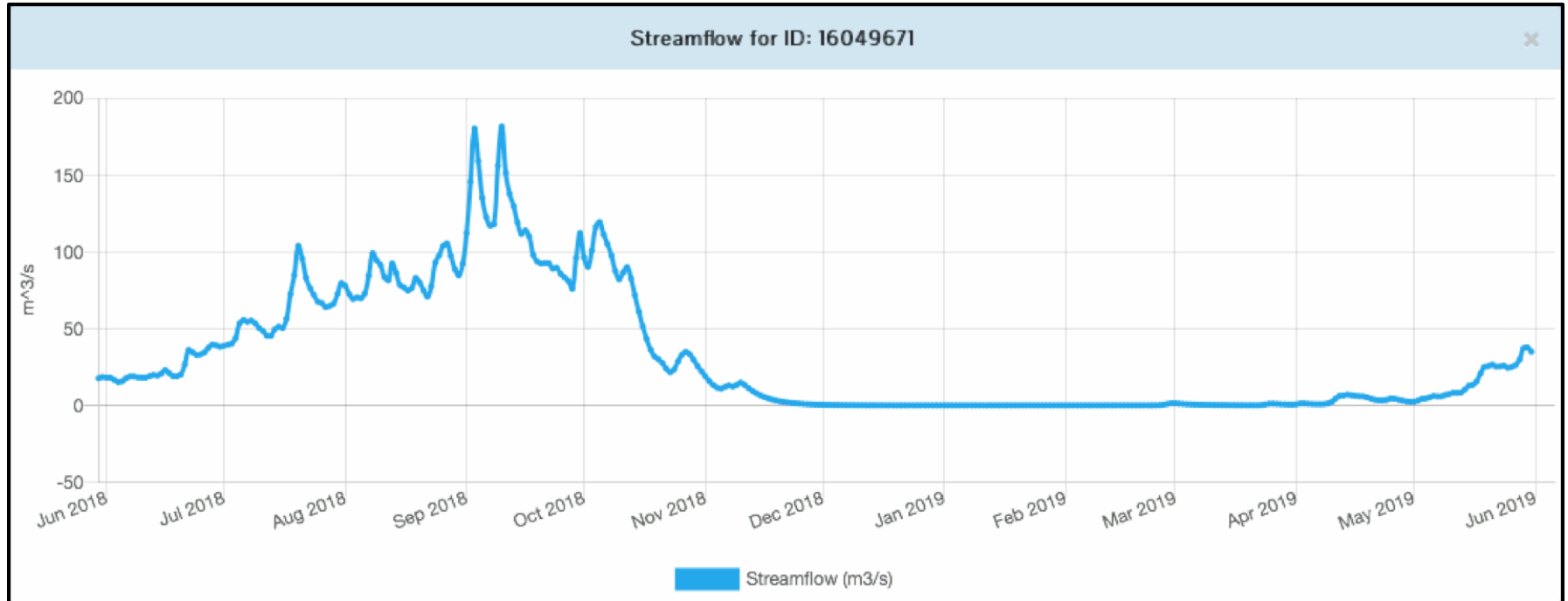


Water balance variables –
the main water balance variables are estimated from the hydrological model

River Network Data: Streamflow Data



River Network Data: Streamflow Data



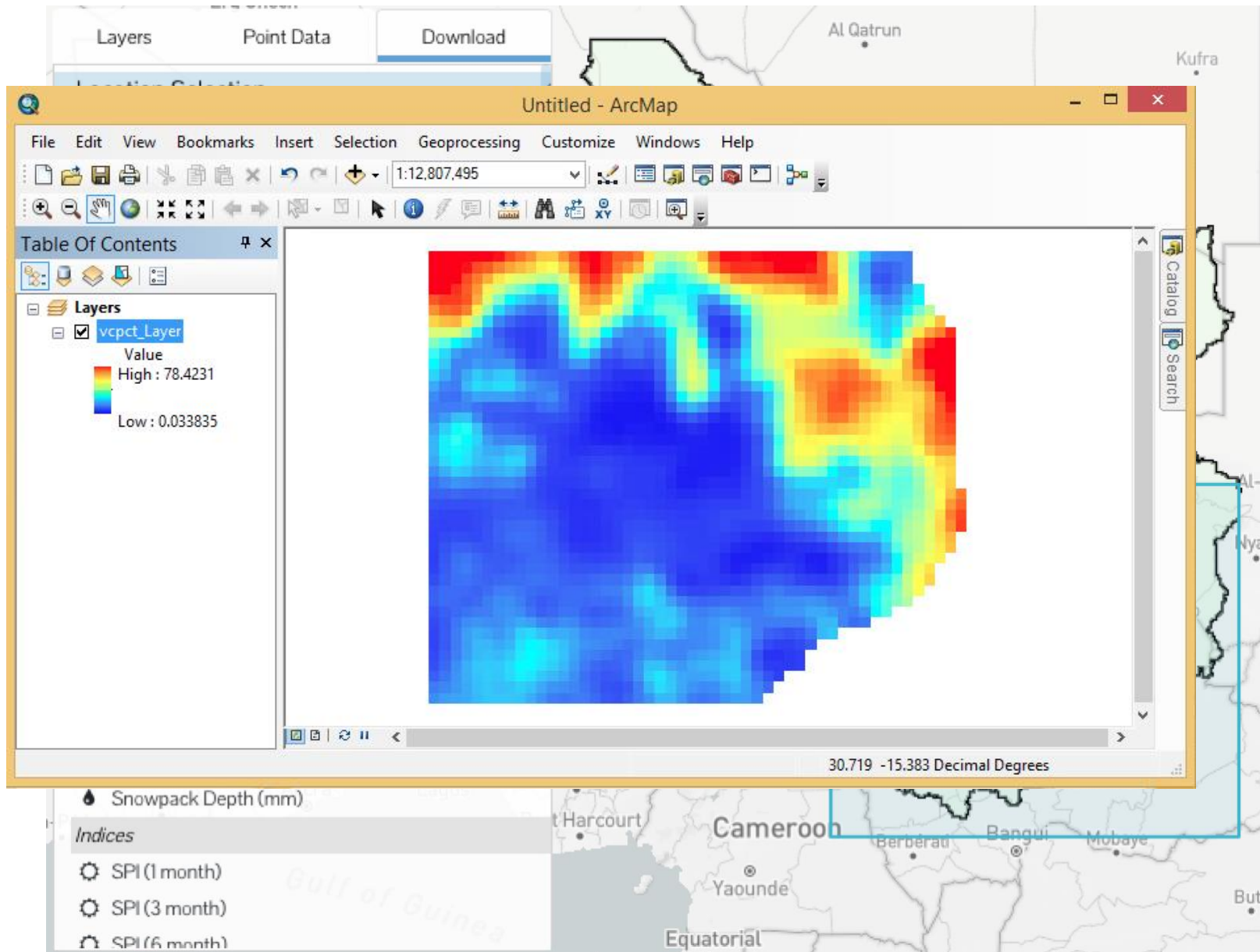
Streamflow – shown here are daily values of streamflow for the chosen reach. The data are available for 1979 to real-time. Validation has been done against a limited set of GRDC stations.

Point Data: Download

The screenshot shows a Microsoft Excel spreadsheet with the following data:

year	SPI (3 month)	SPI (12 mese)	SPI (1 mes)	SPI (6 month)	Anomalia (C)	Indice del ca	Indice de veg	Indice de la humedad del suelo (%)
1951	-0.492	-0.854	-0.393	-0.856	-999	42.043	-999	42.605
1952	-0.25	-0.815	-0.067	-0.395	-999	43.668	-999	41.584
1953	-0.11	-0.436	-0.034	-0.237	-999	45.87	-999	41.082
1954	-0.021	-0.042	0.054	-0.06	-999	49.678	-999	52.572
1955	0.494	0.584	0.28	0.595	-999	54.743	-999	57.608
1956	0.548	0.733	0.381	0.664	-999	57.609	-999	59.628
1957	-0.651	0.434	-0.564	-0.414	-999	42.285	-999	38.691
1958	-0.714	-1.087	-0.343	-0.801	-999	44.127	-999	37.901
1959	0.897	0.32	0.537	0.802	-999	58.375	-999	56.906
1960	-0.879	-0.817	-0.546	-1.064	-999	32.59	-999	26.857
1961	0.552	1.003	0.149	0.865	-999	61.429	-999	51.095
1962	-0.18	-0.595	0.047	-0.386	-999	52.049	-999	49.801
1963	-0.121	0.183	-0.215	-0.064	-999	44.332	-999	39.811
1964	-0.35	-0.19	-0.213	-0.219	-999	53.979	-999	51.398
1965	-0.54	-0.78	-0.288	-0.754	-999	45.508	-999	43.474
1966	-0.282	-1.369	-0.099	-0.465	-999	43.775	-999	39.606
1967	-0.238	0.287	-0.19	-0.061	-999	48.41	-999	42.786
1968	0.118	-0.204	0.209	0.049	-999	51.184	-999	54.524
1969	-0.652	-0.241	-0.546	-0.524	-999	42.646	-999	42.432
1970	-0.383	-1.644	-0.084	-0.994	-999	42.091	-999	36.29
1971	0.173	0.213	0.128	0.252	-999	55.126	-999	53.509
1972	-0.43	0.108	-0.273	-0.361	-999	50.802	-999	47.974
1973	0.53	-0.512	0.48	0.11	-999	57.834	-999	63.293
1974	0.727	1.1	0.466	0.912	-999	52.21	-999	60.882
1975	1.106	2.853	0.579	2.066	-999	71.675	-999	72.592
1976	-0.65	-0.141	-0.392	-0.673	-999	46.673	-999	44.431
1977	0.096	-0.845	0.069	-0.238	-999	54.895	-999	52.751
1978	-0.027	0.148	0.018	-0.023	-999	47.593	-999	56.796
1979	-0.035	-0.142	-0.119	-0.04	-999	49.731	-999	47.595
1980	-0.977	-1.197	-0.567	-1.138	-999	32.561	-999	32.888
1981	-1.497	-2.373	-0.906	-2.095	-999	31.942	-999	25.732
1982	-0.447	0.049	-0.283	-0.301	-999	46.935	-999	41.121
1983	-1.32	-2.896	-0.86	-1.989	-999	29.18	-999	27.745
1984	1.534	0.413	0.978	1.631	-999	60.213	-999	62.992
1985	0.131	1.343	0.177	0.268	-999	48.941	-999	50.171
1986	0.523	1.514	0.137	1.07	-999	51.099	-999	56.688
1987	-0.175	-0.297	-0.315	-0.185	-999	47.083	-999	42.983
1988	0.471	-0.156	0.526	0.26	-999	56.705	-999	62.1
1989	1.345	1.758	0.944	1.456	-999	69.78	-999	78.9
1990	-0.458	0.276	-0.453	-0.412	-999	36.636	-999	45.414
1991	0.087	-0.039	0.03	0.126	-999	55.968	-999	56.63
1992	-0.524	-1.048	-0.283	-0.818	-999	40.456	-999	41.031
1993	-0.704	-0.317	-0.054	-0.711	-999	48.685	-999	48.763

Spatial Data: Selection, Download, and GIS



Interface: Feedback

PCA | Lake Chad Flood & Drought Monitor

Feedback: | Release Notes: | Beta Version - 1.04 | English | Sign Out

PCA | Lake Chad Flood & Drought Monitor

Feedback: | Release Notes: | Beta Version - 1.04 | English | Sign Out

Submit Feedback ✕

Please enter your feedback or comments here:

- Precipitation (mm)
- Maximum Temperature (C)
- Minimum Temperature (C)
- Wind (m/s)
- Hydrology**
- Evaporation (mm/d)
- Surface Runoff (mm)
- Soil Moisture - Layer
- Soil Moisture - Layer
- Soil Moisture - Layer
- Snowpack Depth (m)
- Indices**
- SPI (1 month) - Cor
- SPI (3 month) - Cor
- SPI (6 month) - Cor
- SPI (12 month) - Co
- Drought Index (%) -



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!

