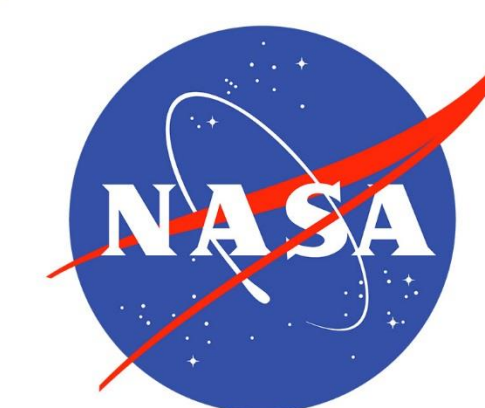# Implementing a Global Tool Based on Spatially Continuous Precipitation Analysis for Resiliency Monitoring and Measuring at the Community Scale

## Abstract

Global water resources are important for societies, economies, and the environment. In Niger, limited water resources restrict the expansion of communities and agriculture. Mercy Corps currently works in over 40 countries around the world to address a variety of stresses which include water resources and building long-term food resilience. As Mercy Corps seeks to integrate the use of Earth observations into their resilience building process, NASA DEVELOP established a partnership to help facilitate this effort incorporating the Tropical Rainfall Measuring Mission (TRMM), Global Precipitation Measurement (GPM), and Climate Hazards Group InfraRed Precipitation with Station data (CHIRPS) to create a standardized precipitation index that highlights low and high rainfall from 1981 to 2016. The team created a Google Earth Engine tool that combines precipitation data with other metrics of stress in Niger. The system was designed to be able to incorporate groundwater storage data as they become available. This tool allows for near real-time updates of trends in precipitation and improves Mercy Corps' ability to spatially evaluate changes in resiliency by monitoring shocks and stressors.
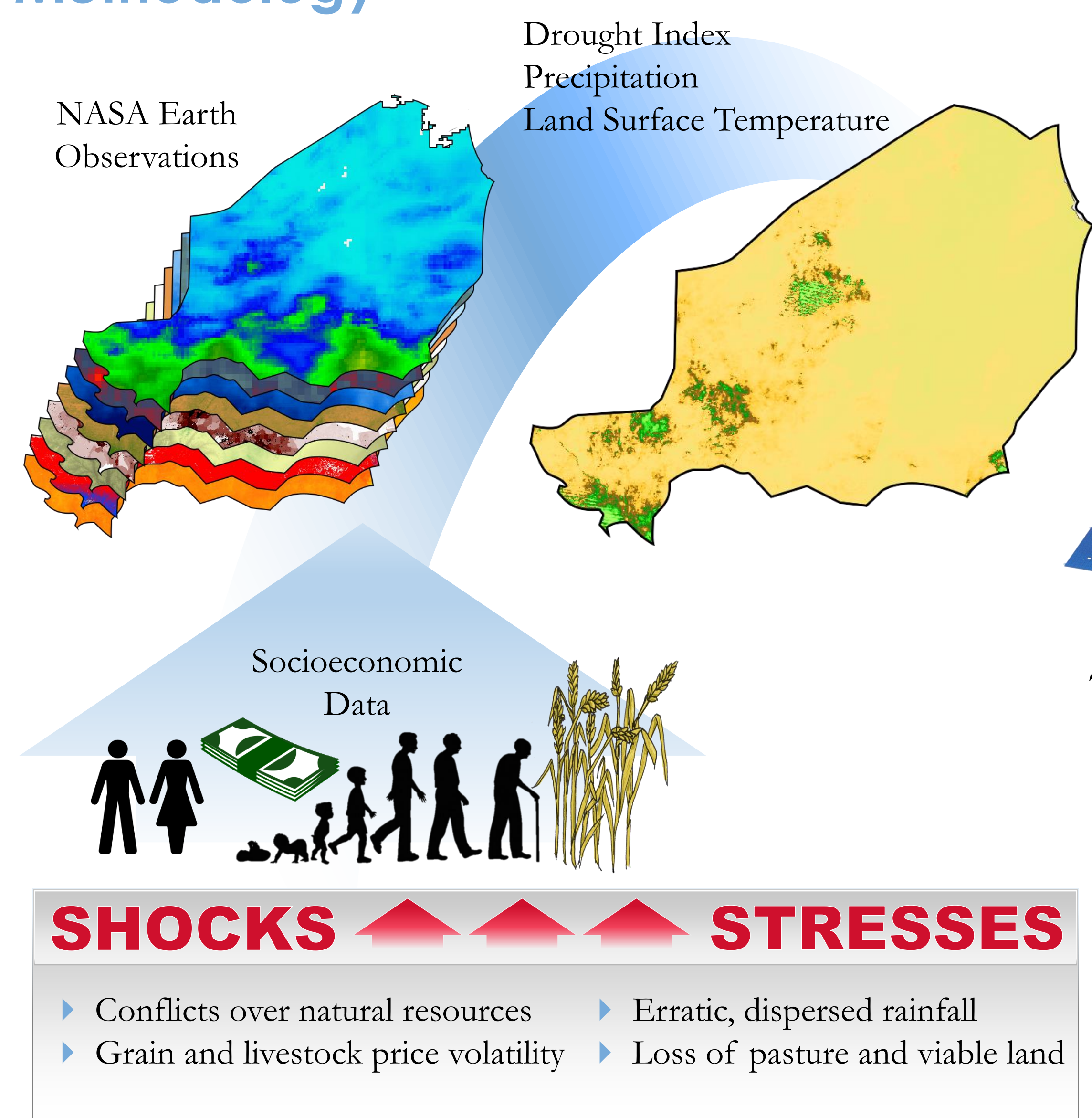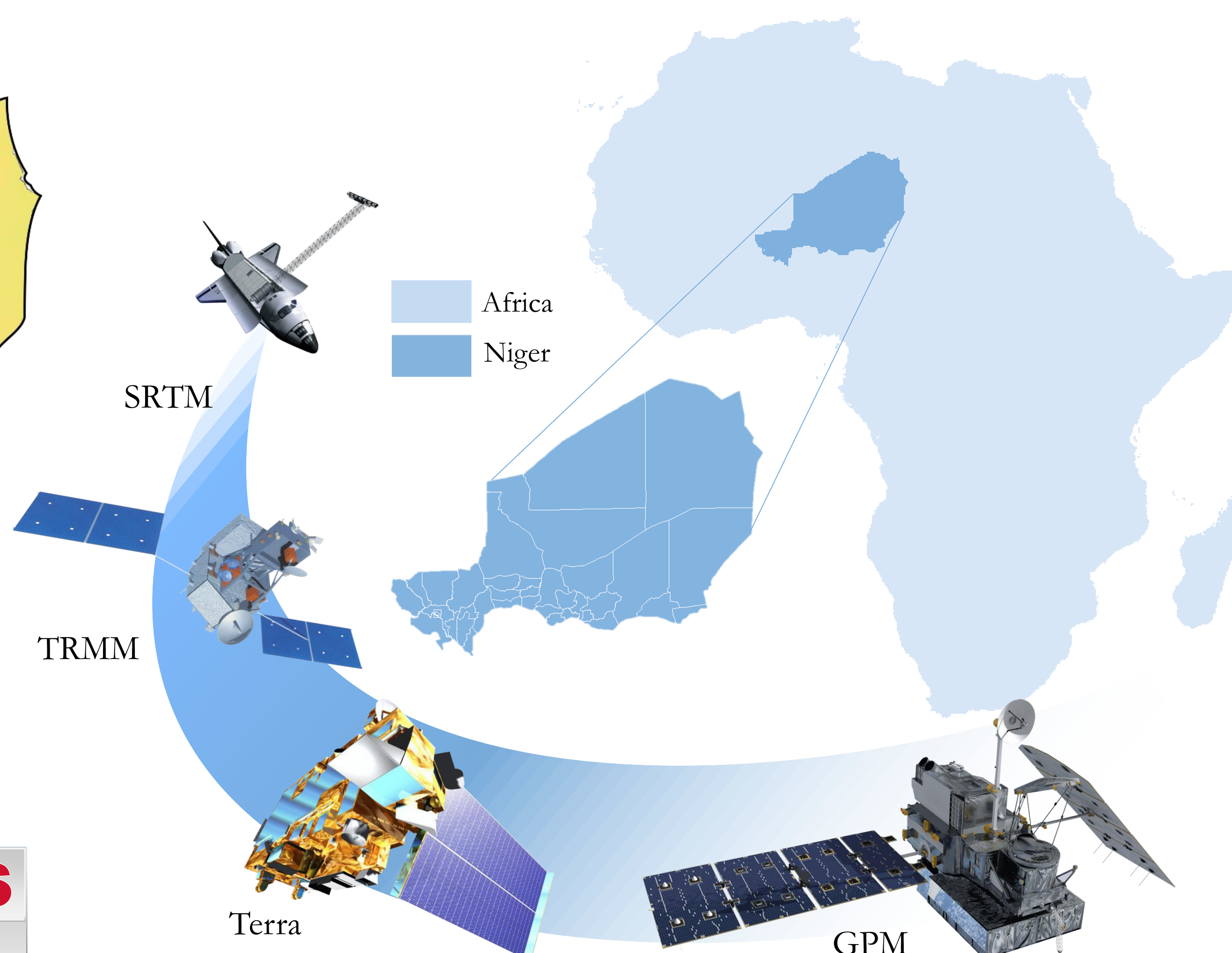
## Project Partners

Mercy Corps

## Objectives

- **Enhance** Mercy Corps' ability to assess the role of precipitation as a shock or stressor in Niger
- **Address** historical precipitation trends to identify the average start of the growing season and significant deviations
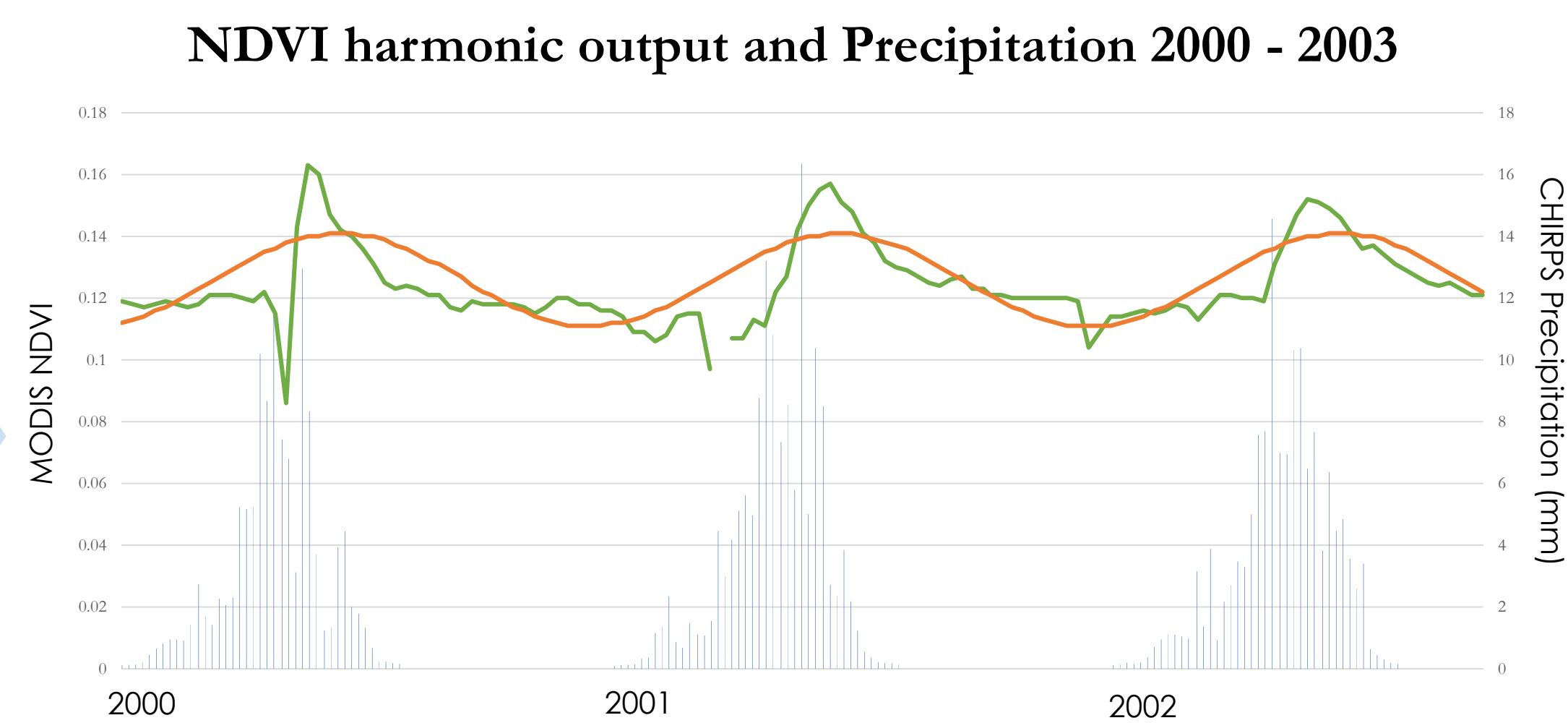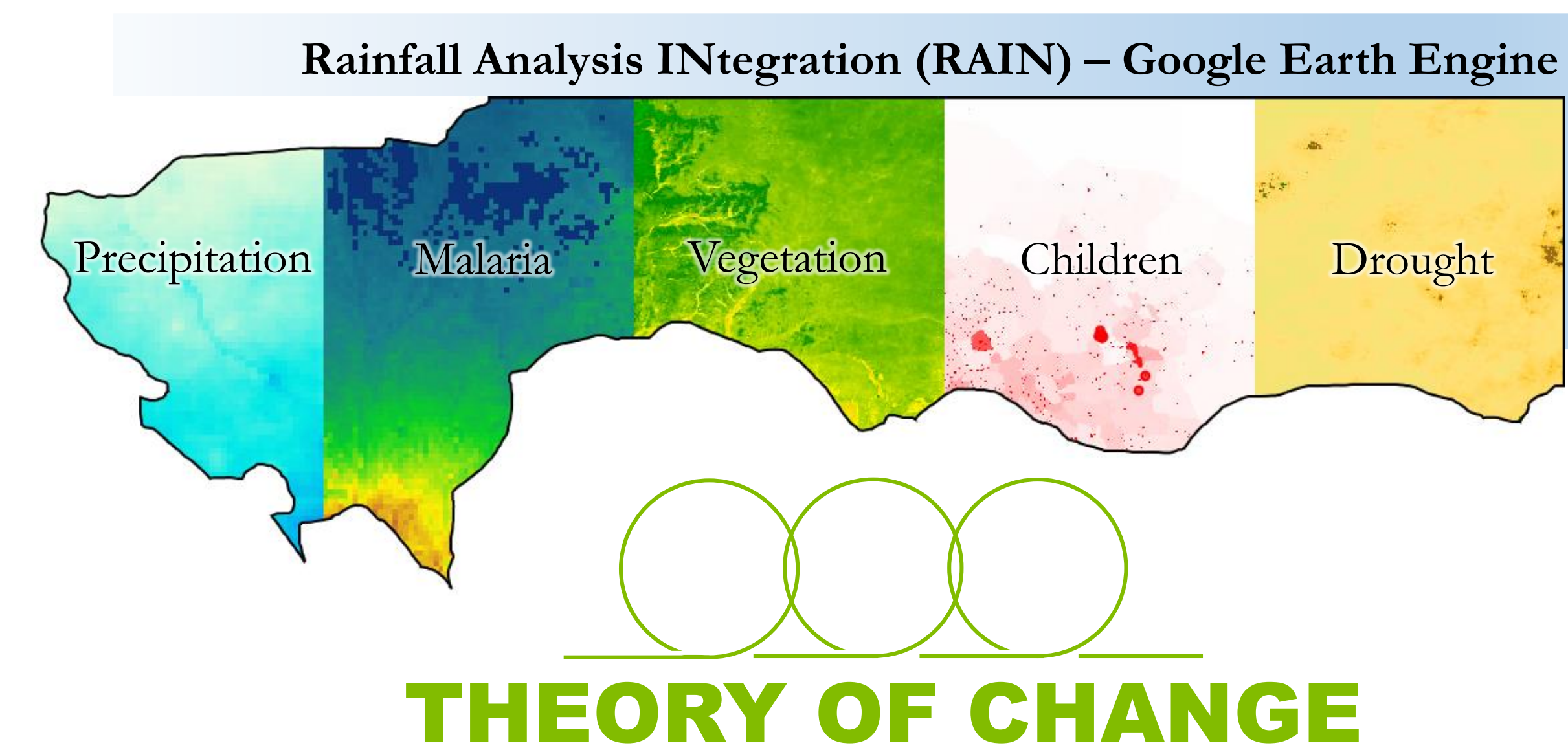- **Provide** an interface for developing a strategy to increase food security for all citizens

## Methodology



NASA Earth Observations

Drought Index
Precipitation
Land Surface Temperature

Socioeconomic Data

**SHOCKS ⬆⬆⬆ STRESSES**

- Conflicts over natural resources
- Grain and livestock price volatility
- Erratic, dispersed rainfall
- Loss of pasture and viable land

## Study Area & Earth Observations



Africa
Niger

SRTM

TRMM

Terra

GPM

## Results

### Rainfall Analysis INtegration (RAIN) – Google Earth Engine



Precipitation | Malaria | Vegetation | Children | Drought

**THEORY OF CHANGE**

### NDVI harmonic output and Precipitation 2000 - 2003



MODIS NDVI

CHIRPS Precipitation (mm)

2000 | 2001 | 2002

## Conclusions

- Harmonic analysis was used to determine the seasonal trends in each agricultural zone.
- An interactive map of environmental and socio-economic layers was generated to dynamically query and visualize weekly data.

## Team Members



Jared Tomlin (Project Lead) | Raghda El-Behaedi | Ryan Lingo | Sean McCartney | Alison Thieme

## Acknowledgements

**Niger Water Resources**