Agricultural susceptibility to climate variability: Insight from two Indian agro-ecoregions

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Background
- A majority of the rural Indian population relies on agriculture for sustenance and livelihoods.
- A future challenge for India's agricultural sector will be to produce 50% more grain over the next decade to feed an increasing population.
- Crop productivity in India is highly dependent on monsoon rainfall and varies greatly with inter-annual climate variability.
- It is important to identify relative climate dependence of small-scale farmers in different Indian agro-ecoregions in order to assess vulnerability to climate change at a national scale.

Research Questions
1. Do seasonal crop phenologies in different agro-ecoregions respond differently to inter-annual climate variability?
2. What factors determine such differential agricultural sensitivity to climate variability?

Method


Step 2: Calculate ΔNDVI (peak-season NDVI - pre-season NDVI) as a proxy for crop productivity for random cropped pixels for the selected years.

Step 3: Select climate variables derived from MODIS and TRMM.

Step 4: Examine statistical relationships between ΔNDVI and climate variables.

Climate Data

Fig. 2. Daily precipitation time-series (2000-2012) for study sites in Madhya Pradesh and Gujarat. Study site in Madhya Pradesh receives an average of 1,052 mm of precipitation each year, while the Gujarat site receives approximately 300 mm per year.

Fig. 3. Spatial distribution of seasonal (monsoon) and climate variables for 97 random pixels from Madhya Pradesh and Gujarat for the years 2000-2001.

Future Work
- Future work would extend this analysis to other agro-ecoregions in India to assess relative climate dependence at a national scale.
- This work would further contribute in developing a national-level climate vulnerability map based on satellite data, and socio-economic data.

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