Mapping Cropped Area of Smallholder Farms in South Asia

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MAIN QUESTION
What is the most accurate method to map cropped area of smallholder farms using readily-available MODIS data?

Motivation
- Mapping cropped area of smallholders is difficult; farms are smaller than the resolution of readily-available imagery
- Scaling MODIS EVI-based Landsat accurately maps cropped area of farms (R2 up to 0.97; Jain et al. in press)
- This method is difficult to use over large scales because Landsat data are often unavailable

Study Goal
- We assess 3 methods to quantify cropped area that use only MODIS EVI data:
  - Relative scaling
  - Peak
  - Temporal mixture analysis (TMA) (Small 2012)
- Landsat and Quickbird imagery are used for validation

Study Area
- Validation will be conducted in 5 regions in India (Fig. 1)
- Regions represent a range in precipitation, soil type, crop type, and market access
- Gujarat winter and summer season results for 2009-2010 are presented. Monsoon season results are not presented - we assume 100% of farms are cropped during this season.

Results
- The relative scaling technique has the highest accuracy (Fig. 4)
- Accuracy is similar for both winter and summer seasons (Table 1)

Discussion and Conclusion
- It is possible to map cropped area of smallholder farms using the relative scaling technique of MODIS data at a scale of ≥ 1 x 1 km
- Future analyses will assess whether this method accurately maps cropped area in different agro-ecological zones (Fig. 1) and through time
- We will then assess the climate and irrigation drivers of cropped area from 2000 to 2013 across all of India

MAIN CONCLUSION
The relative scaling method most accurately maps smallholder cropped area

Acknowledgements and References
- This work was funded by the NASA LCLUC grant # 522363 and the NSF GRF awarded to M. Jain