

Using satellite information to predict local yields

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Tanzania yield survey

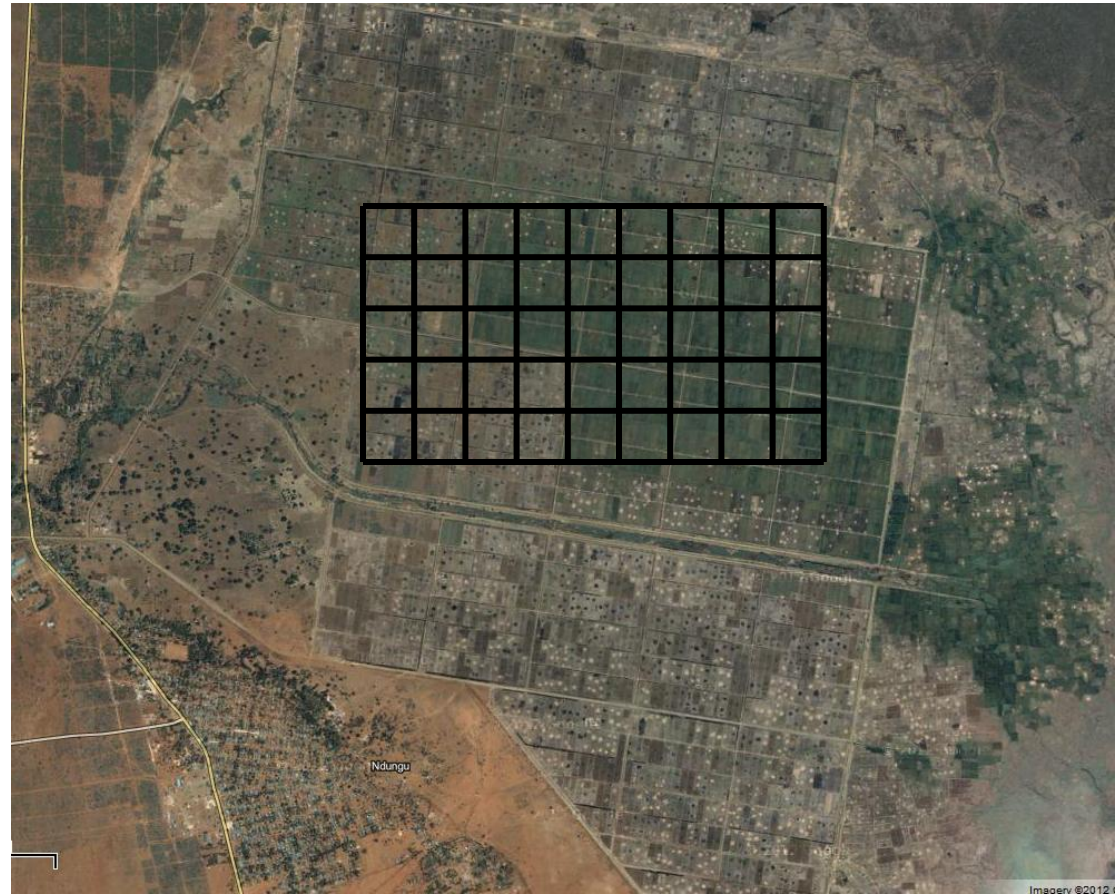
- Collected historic yield data from farmers based on recall
 - Sample: 397 paddy plots for farmers in 10 villages within our study region
 - Recall data go back 3-5 years
 - Data include: yield/acre, fertilizer use, start/end of season, weather events (droughts/floods)
 - Farmers indicated the approximate location of their plot(s) on a satellite map
- Surveyed all the areas used for paddy production using GPS
 - Walked around the boundaries of all the “paddy field areas” together with a local farmer and recorded GPS coordinates
 - These areas include all the plots for which we collected historic yield data

TAPRA Data

- Crop yield data collected by the Tegemeo Institute and MSU as part of a multi-year household survey
- Sample: 1309 households across 24 districts in Kenya
- Survey data exist for years 1997, 2000, 2004, 2007 and 2010
- Most farmers grow maize. Almost no paddy farmers in the sample
- No GPS coordinates for the plots (only for villages)

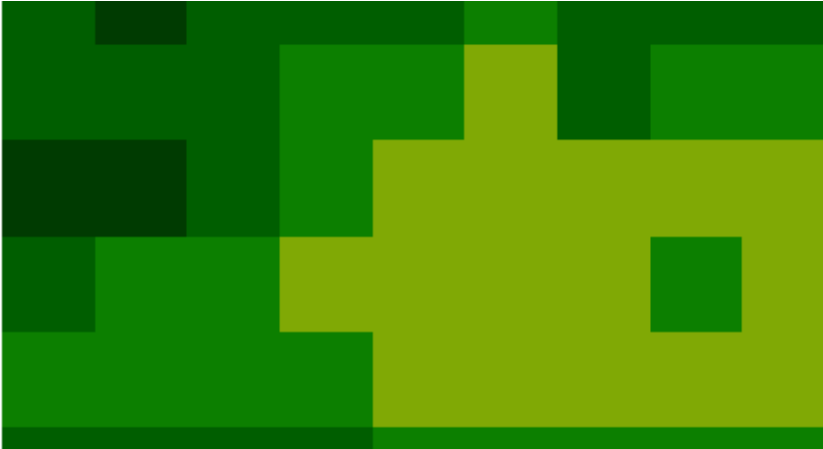
Satellite NDVI Data

- Consider NDVI data for pixels which are fully contained within a known “paddy field area”

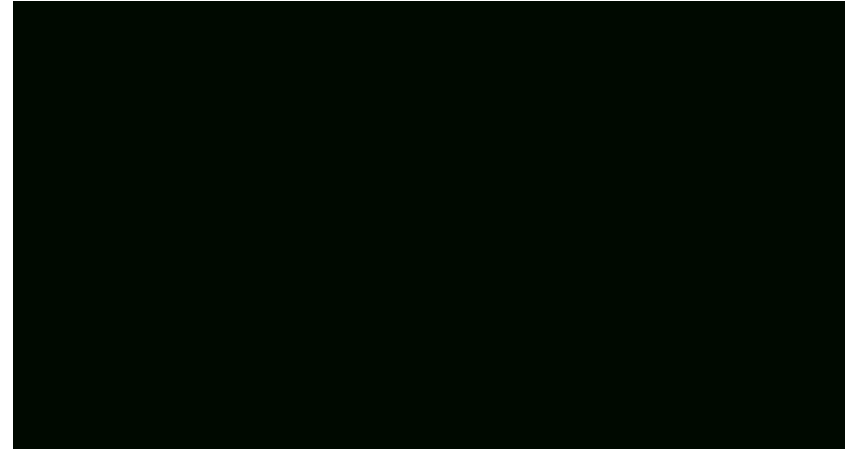


Satellite NDVI Data

Pre-planting (1-16 Nov, 2011)



Prior to harvest (18 Feb - 4 Mar, 2012)



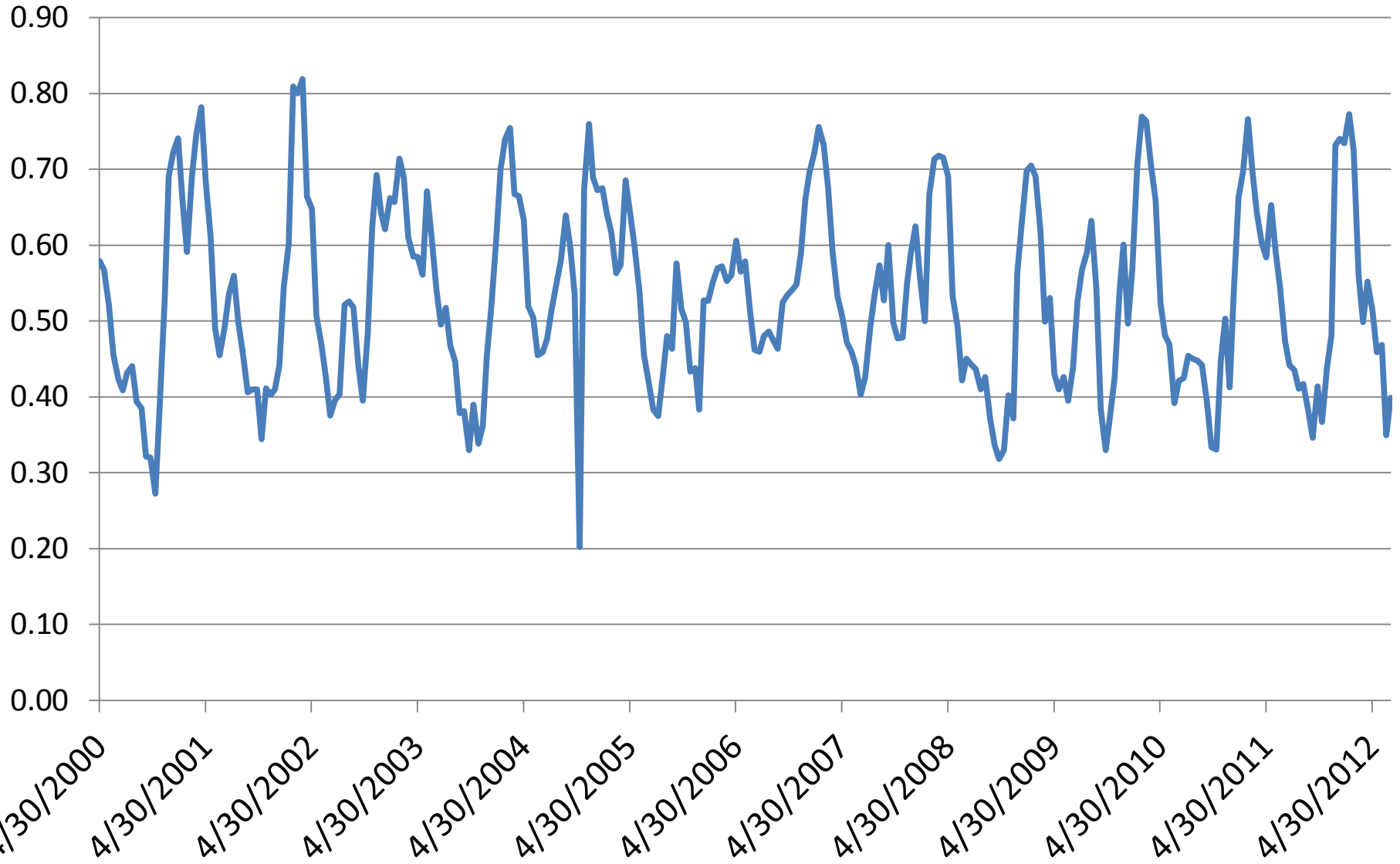
Mid-season (3-18 Dec, 2011)



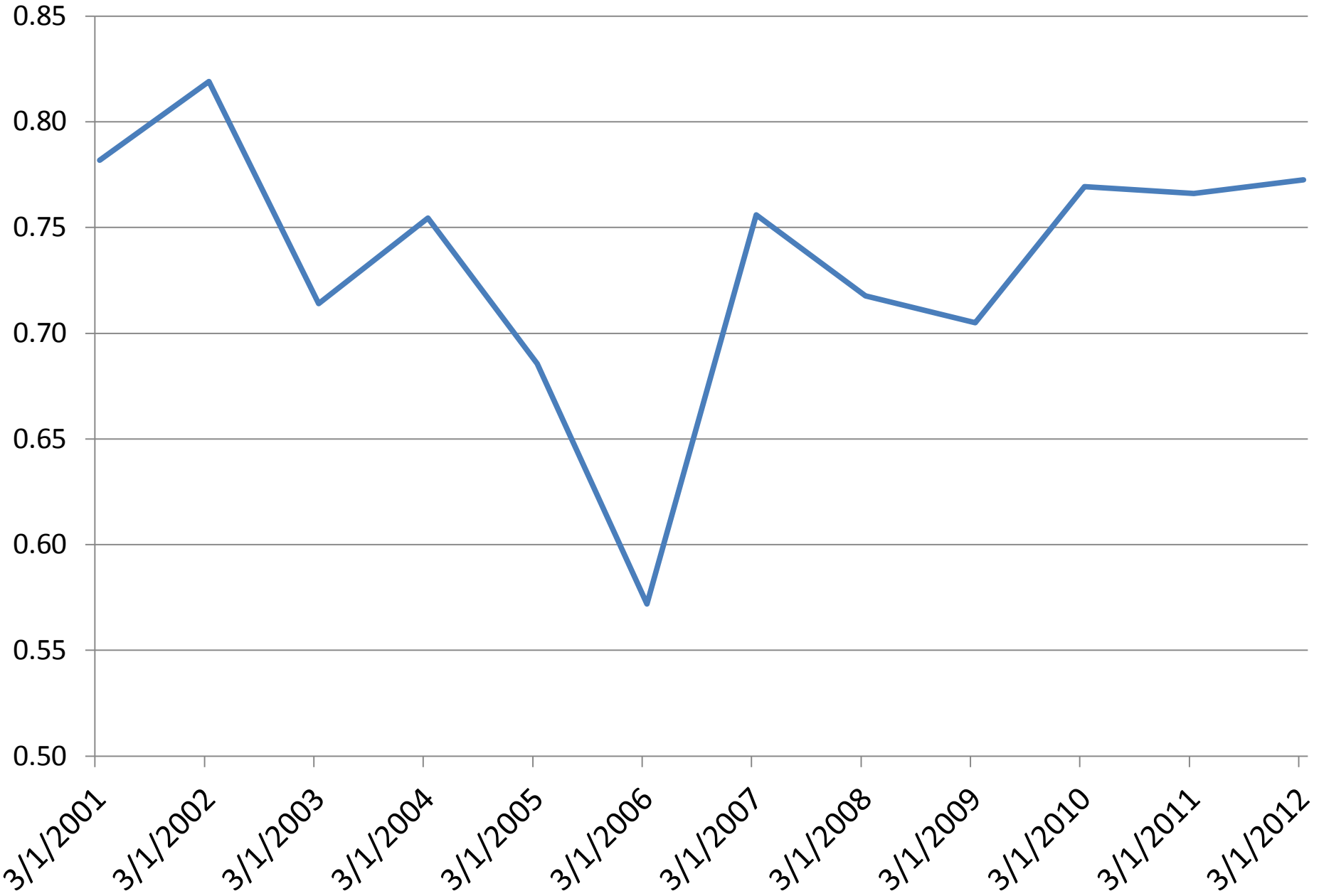
Post-harvest (21 Mar - 5 Apr, 2012)



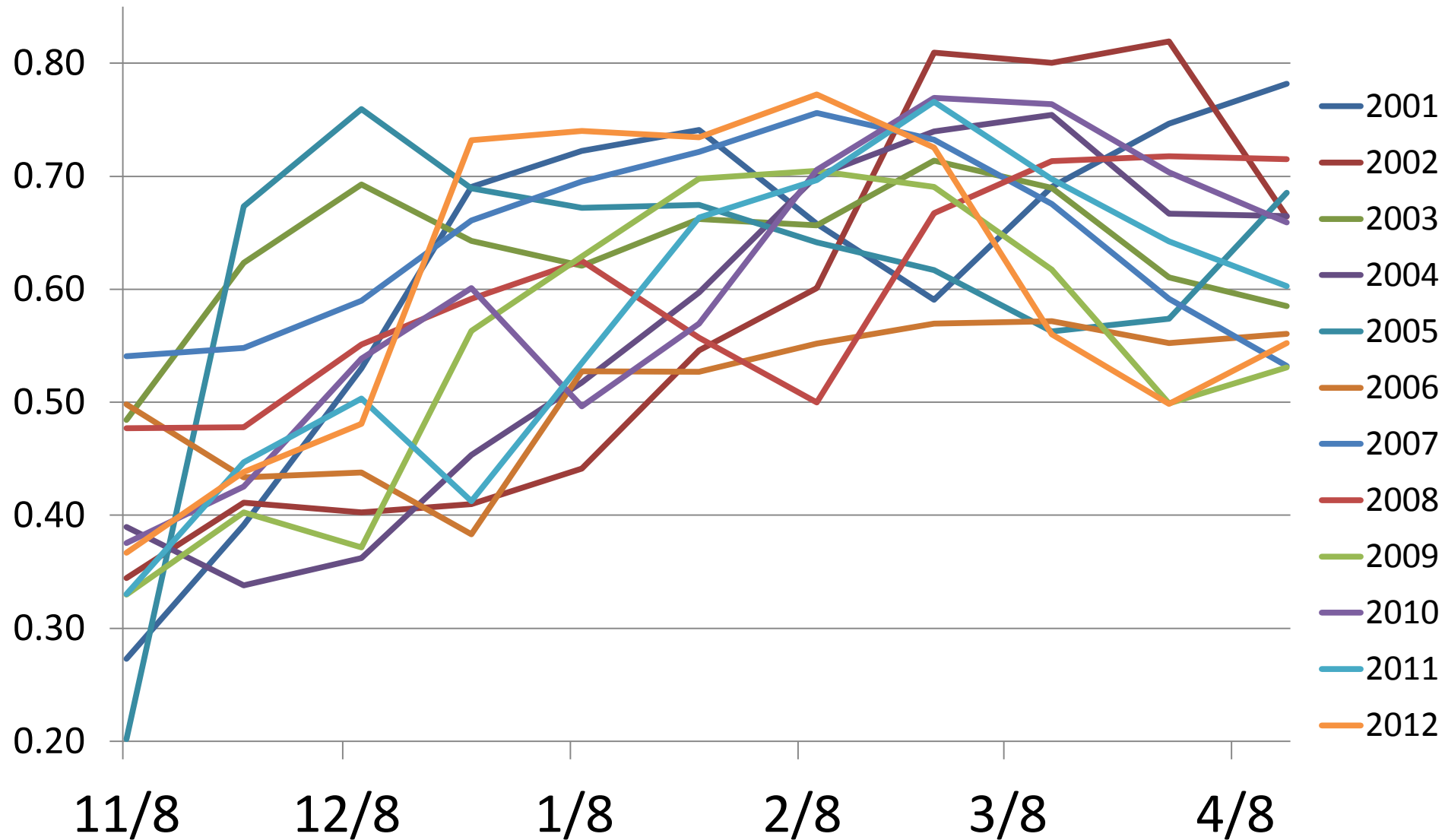
Average NDVI (across 16 pixels known to contain paddy fields) over time



Max NDVI during main paddy season

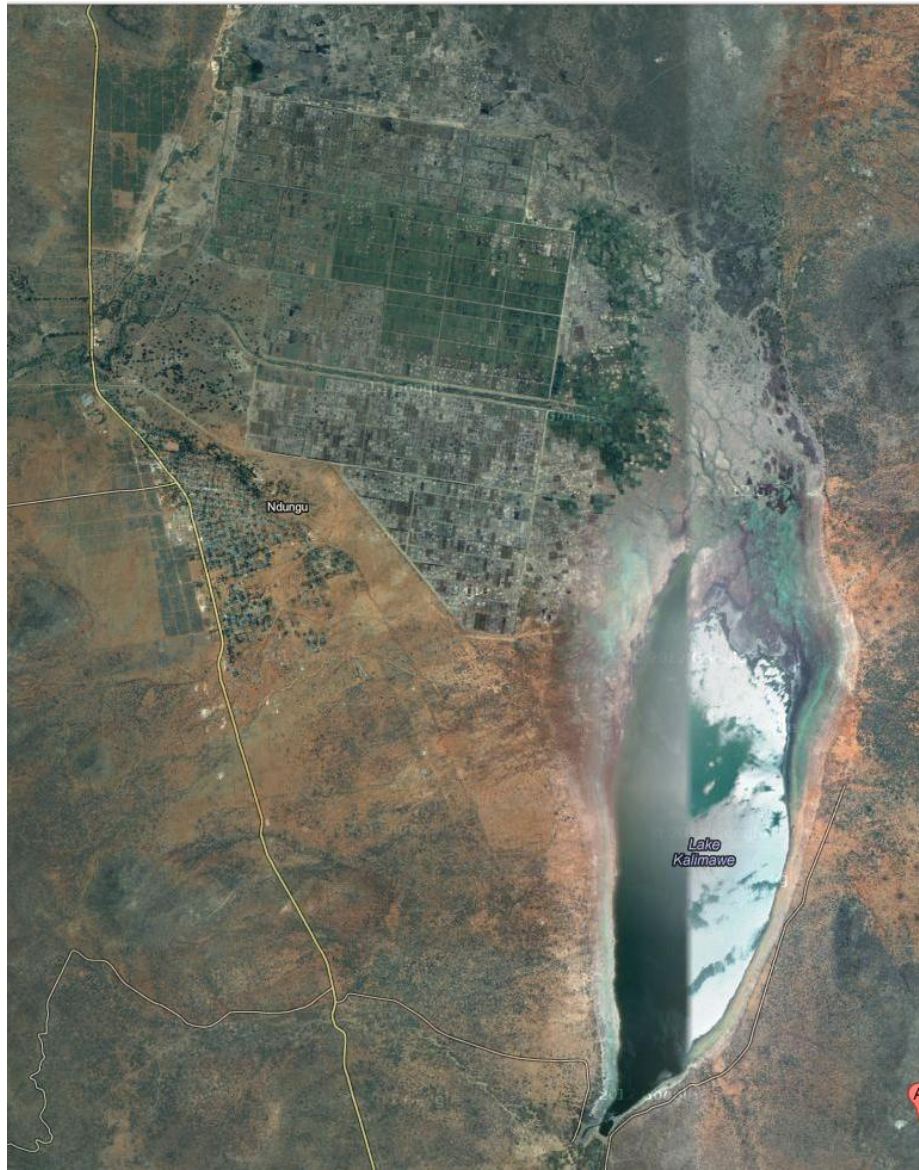


NDVI profile for paddy throughout main season



Identifying crop areas

Satellite map of area around Ndungu

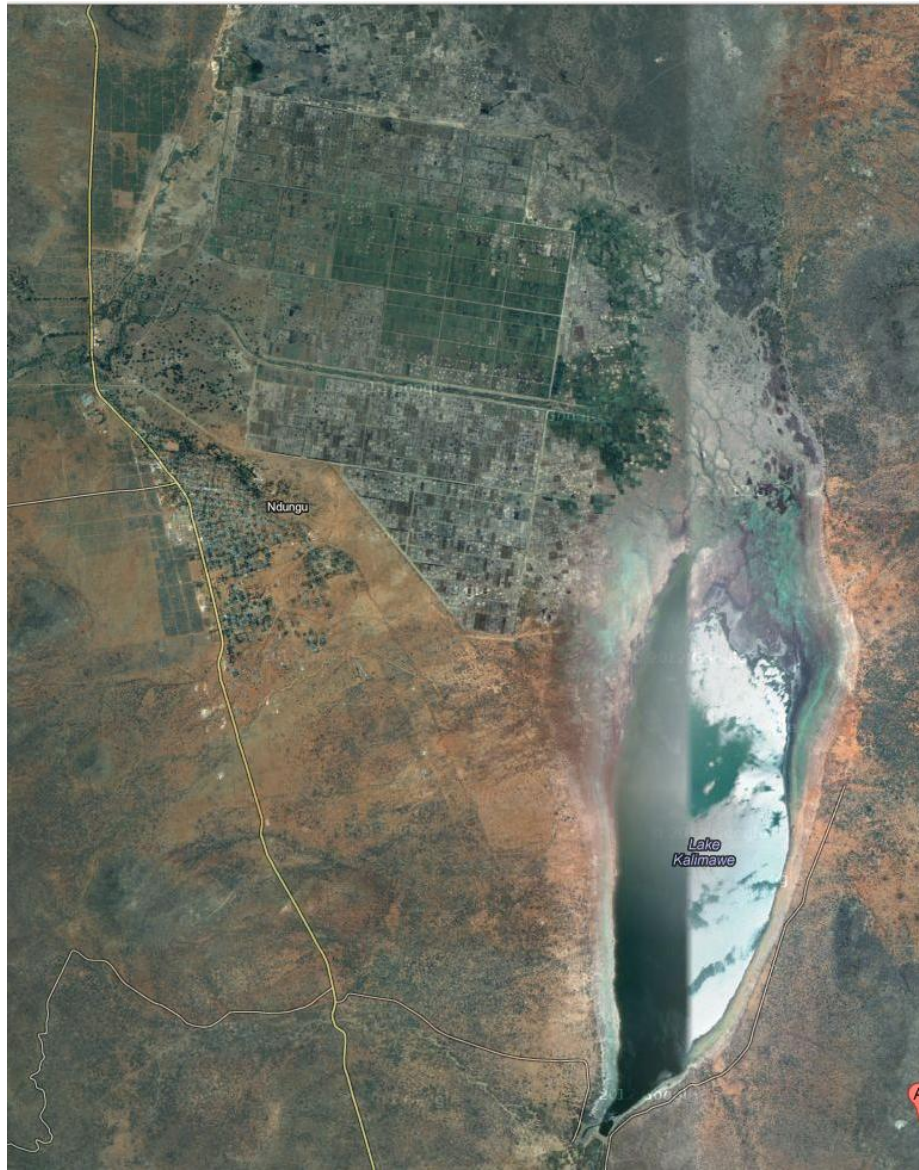


NDVI map of same area right before harvest (18 Feb 2012 - 4 Mar 2012)

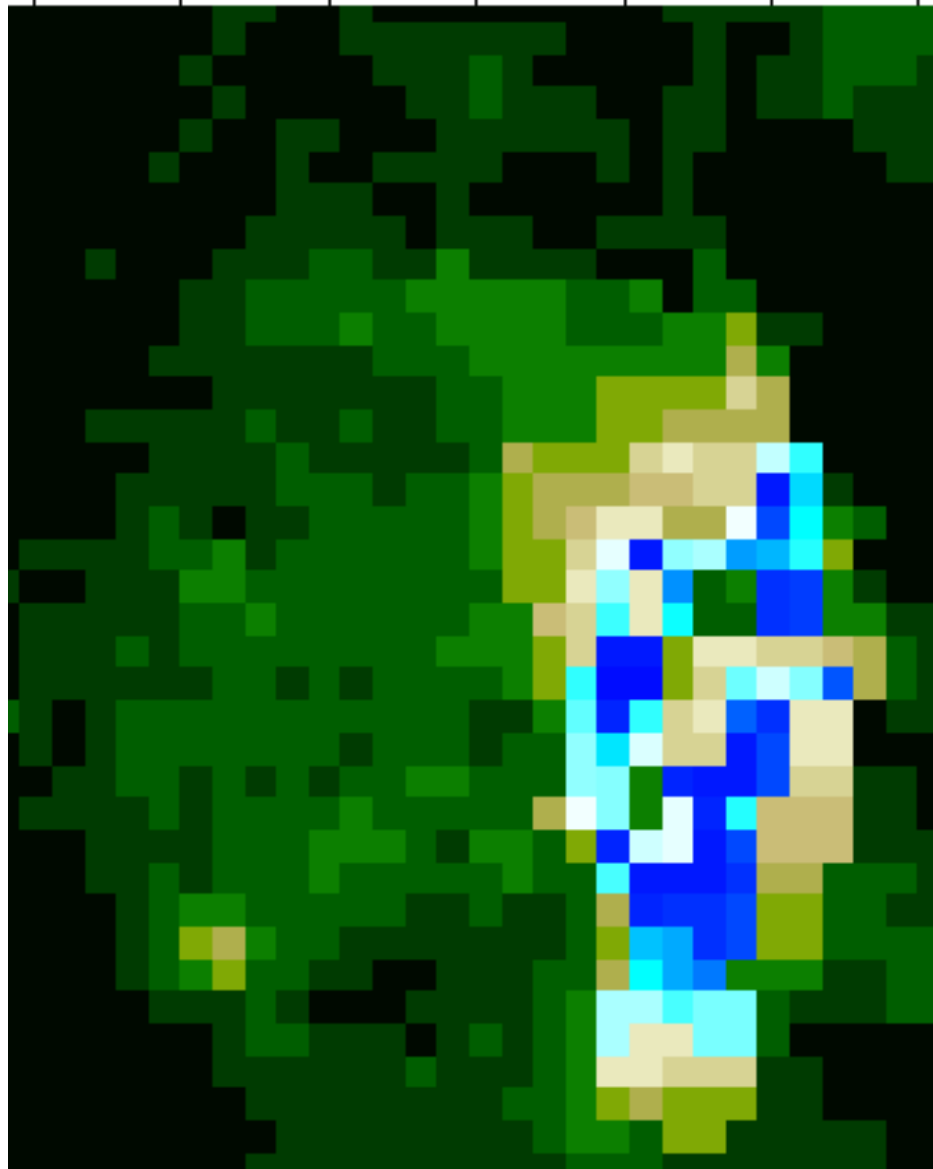


Identifying crop areas

Satellite map of area around Ndungu



NDVI map of same area right mid-season (3 Dec 2012 - 18 Dec 2012)



Challenges

- Recall data are for paddy only and may be inaccurate
- TAPRA data can be used for maize only and are missing GPS coordinates for plots
- Large intra-field variation in NDVI
 - Aggregation across the field or multiple fields might result in more stable measures
- No accurate NDVI profile for paddy
 - Differences in season start/end from year to year
 - Intercropping
 - Unplanted plots
- Cannot use NDVI data for crop identification

Questions

- Can your IDEAS engine be used to identify different crops and other vegetation (crop masking)?
- What type of satellite data does your database have in addition to NDVI (ET, weather data etc.)?
- Does the system already have a built-in functionality to identify start/end of season and NDVI profile for crops?