Preliminary Work in Determining Rates and Drivers of Agricultural Intensification in Mato Grosso, Brazil

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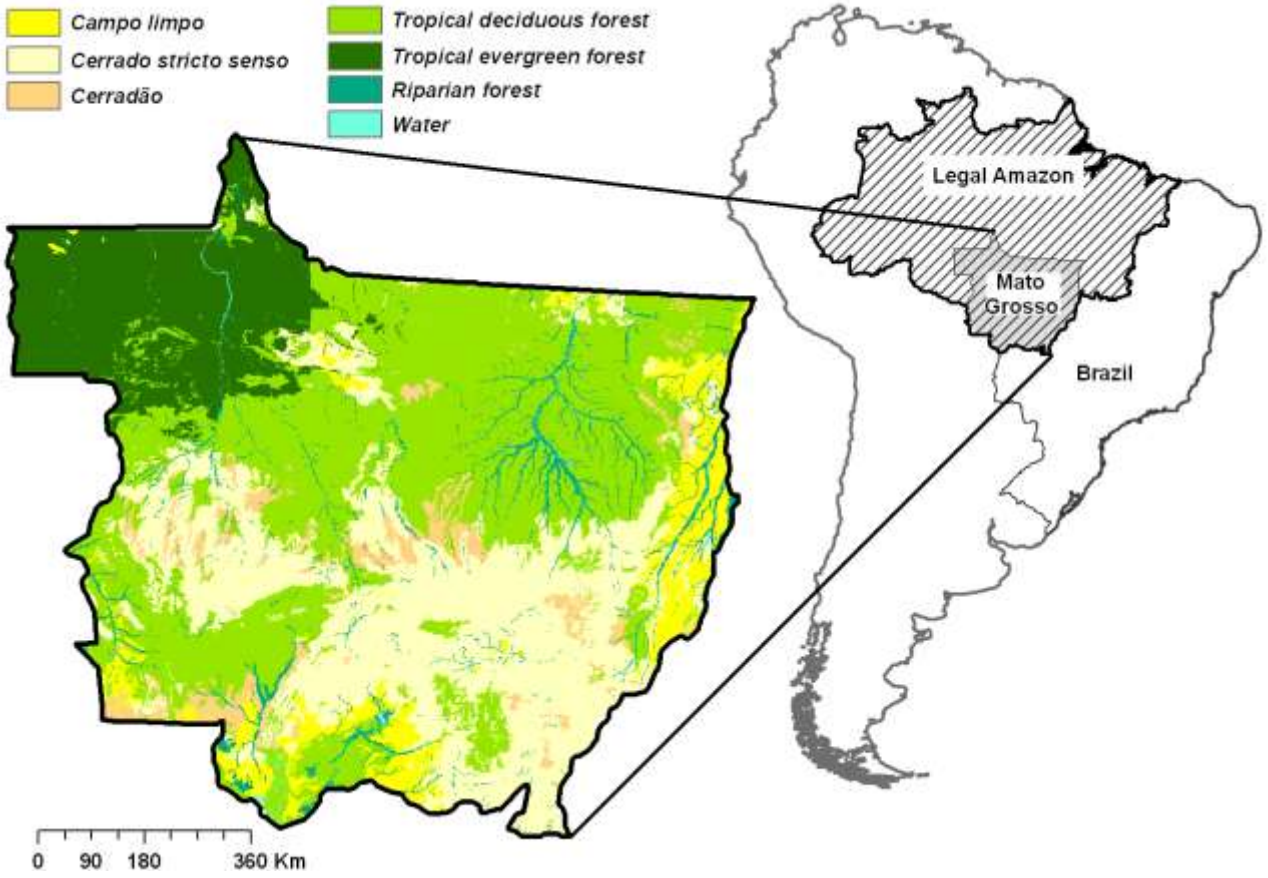
ftp://ftp.fao.org/agl/agll/docs/fertusebrazil.pdf

“Brazil is poised to become one of the few countries to achieve the transition to **a major economic power without destroying tropical forests**.” – Davidson et al., 2012

Field Site: Mato Grosso, Brazil



Brazil: 3rd in world grain exports

Mato Grosso: Comparable to the American Midwest

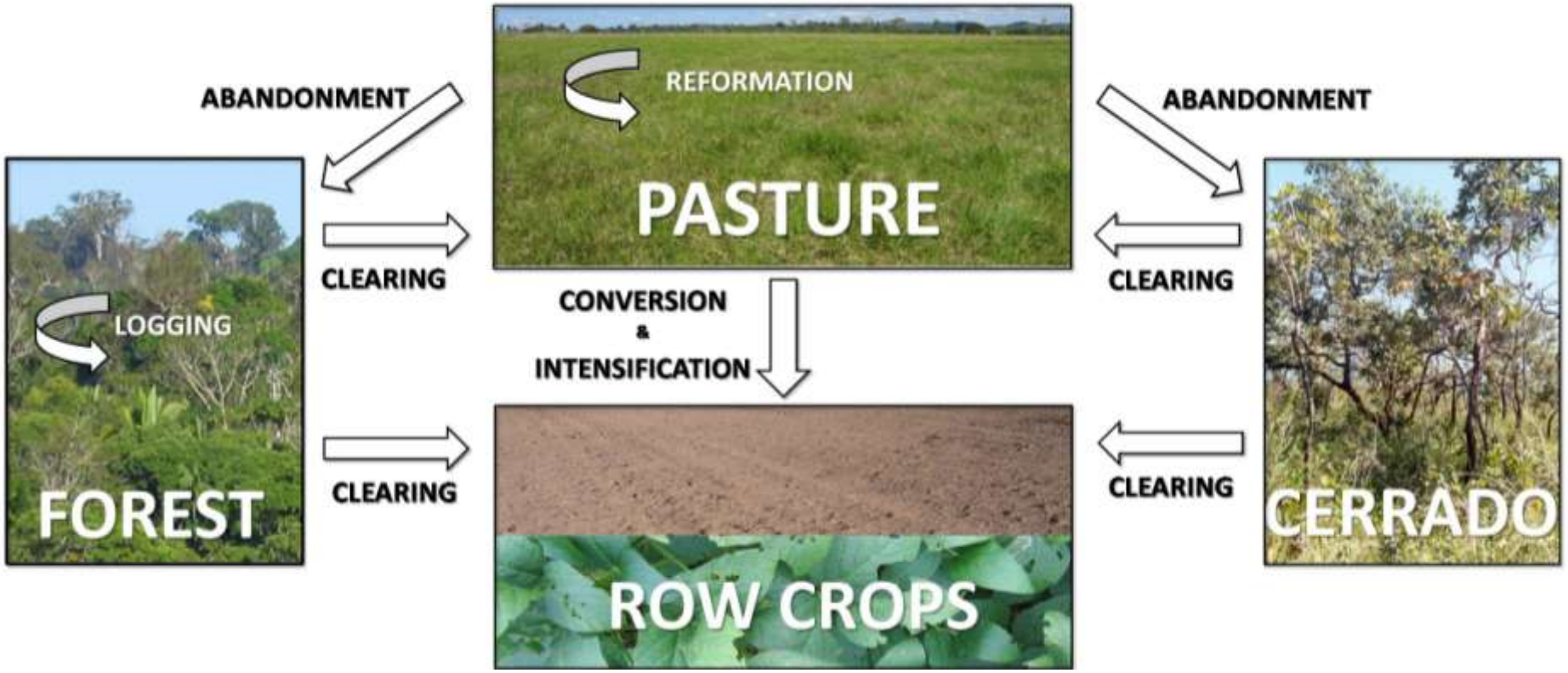
Research Goal

Explain and attribute land-use land-cover change by determining the spatially and temporally variable drivers of intensification

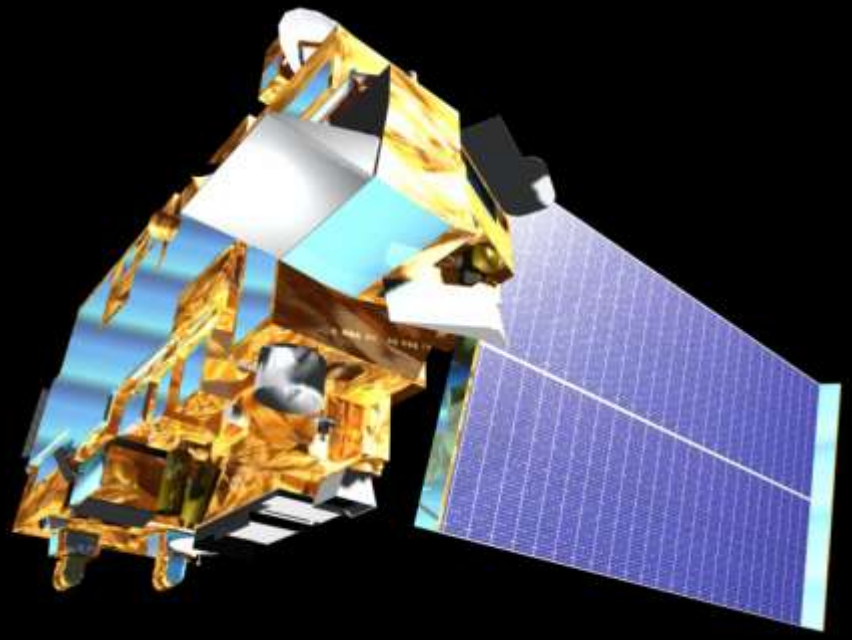
Step 1

Determine the nature of cropland expansion and intensification in Mato Grosso, Brazil between 2001-2012

Determine the Nature of Cropland Expansion and Intensification



Galford, 2012



Terra - MODIS

$$EVI = G \times \frac{(NIR - RED)}{(NIR + C1 \times RED - C2 \times Blue + L)}$$

Vegetation Index

high vegetation

1.0

0.8

0.6

0.4

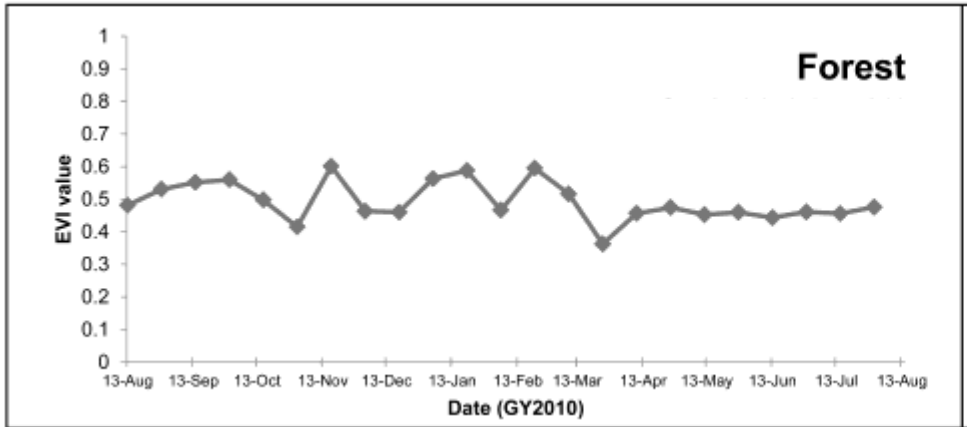
0.2

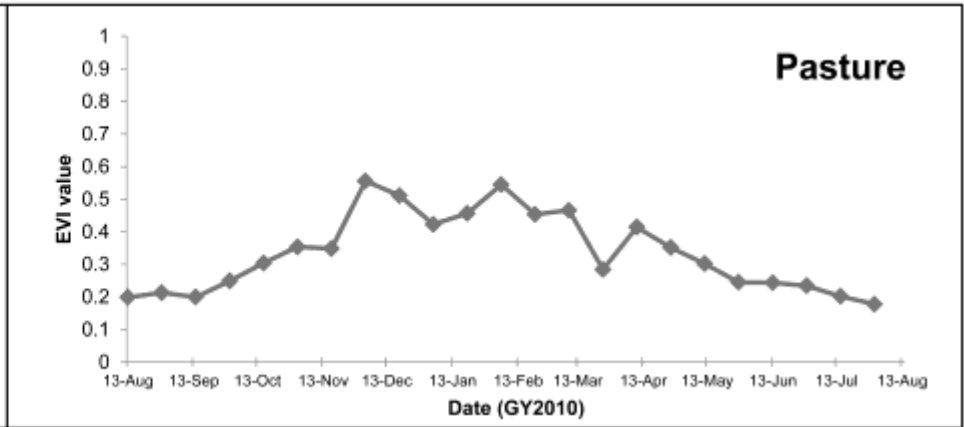
0.0

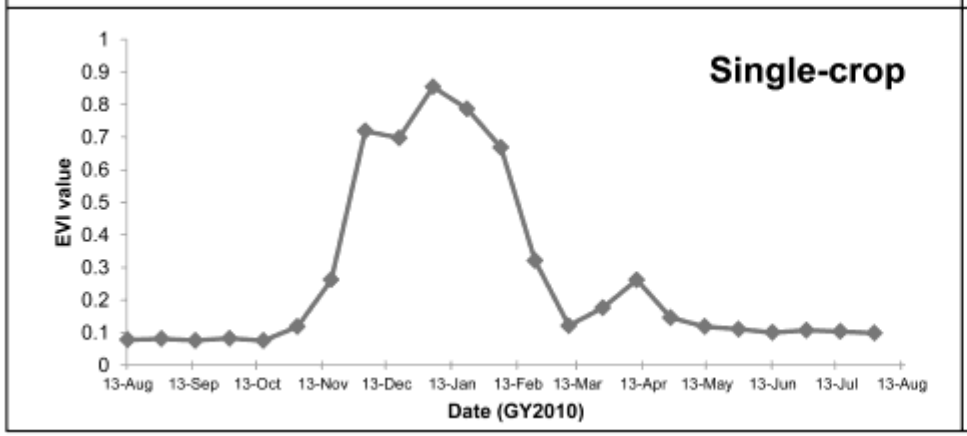
low vegetation

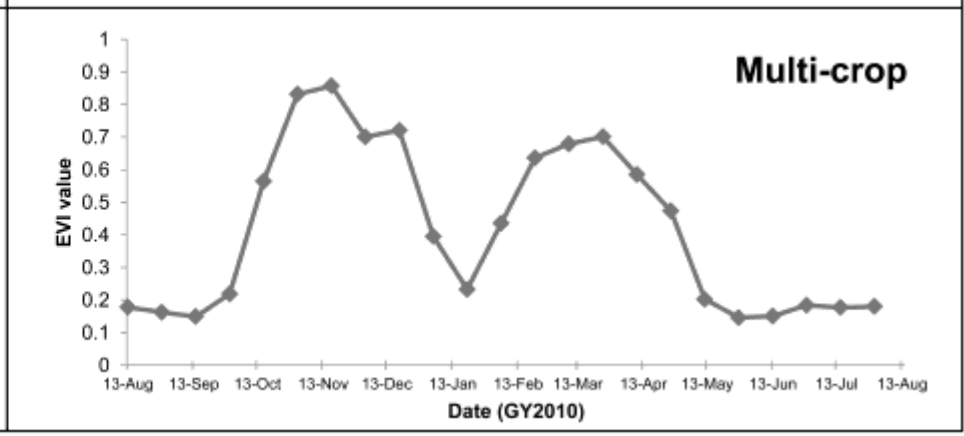
Mahr, 2011

Typical Phenology Patterns



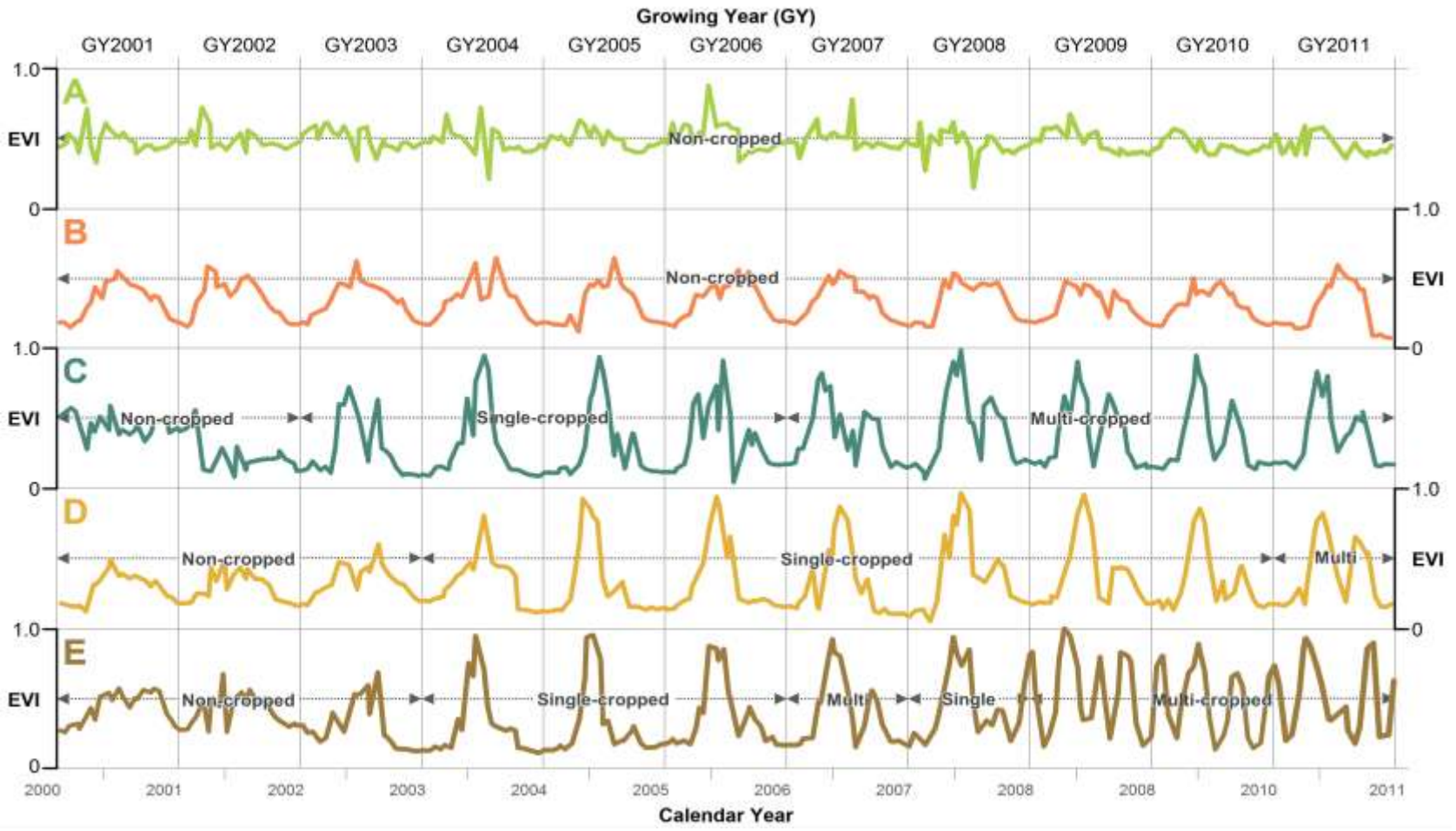






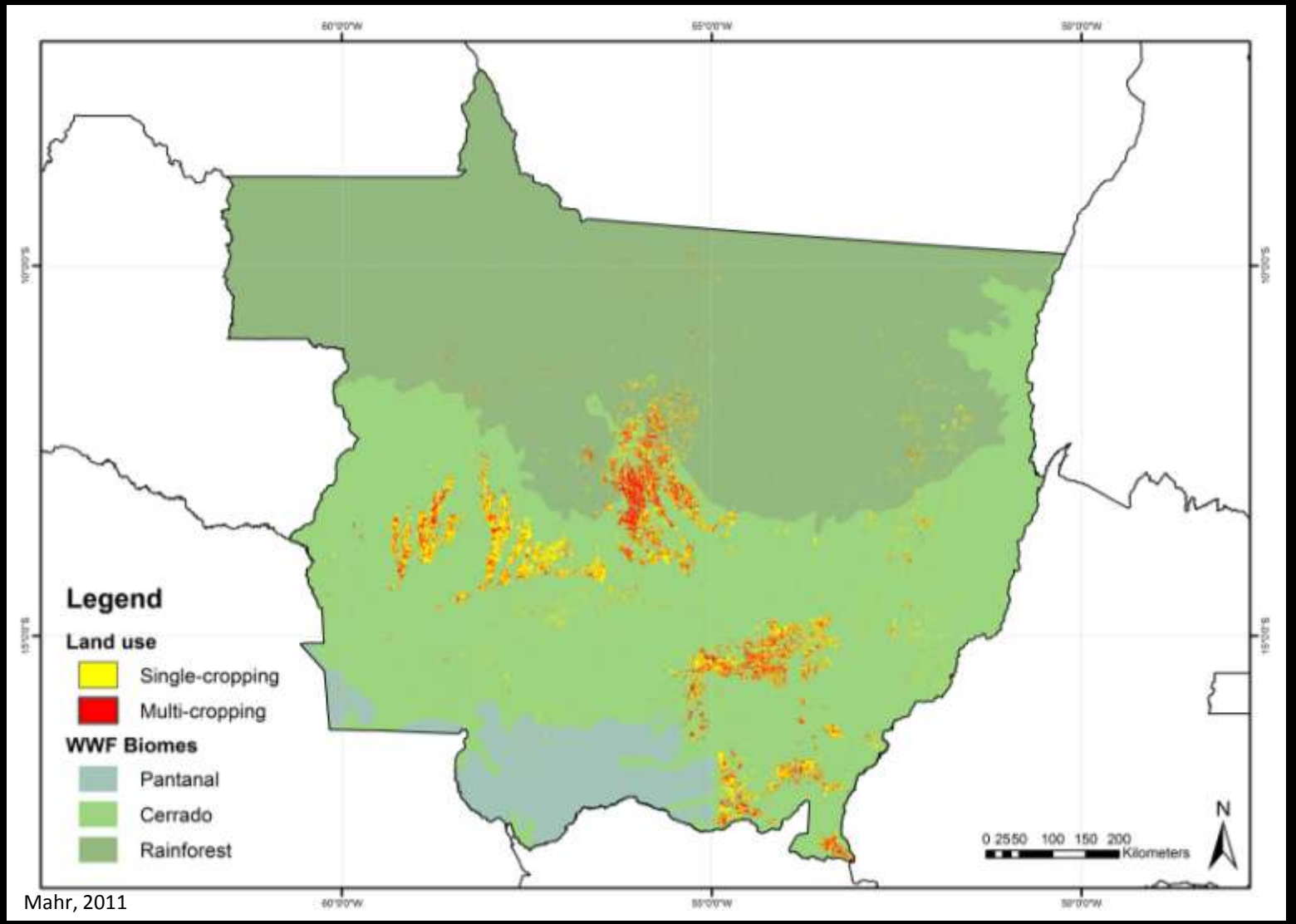
Mahr, 2011

Land Use Transitions: As Seen from Space



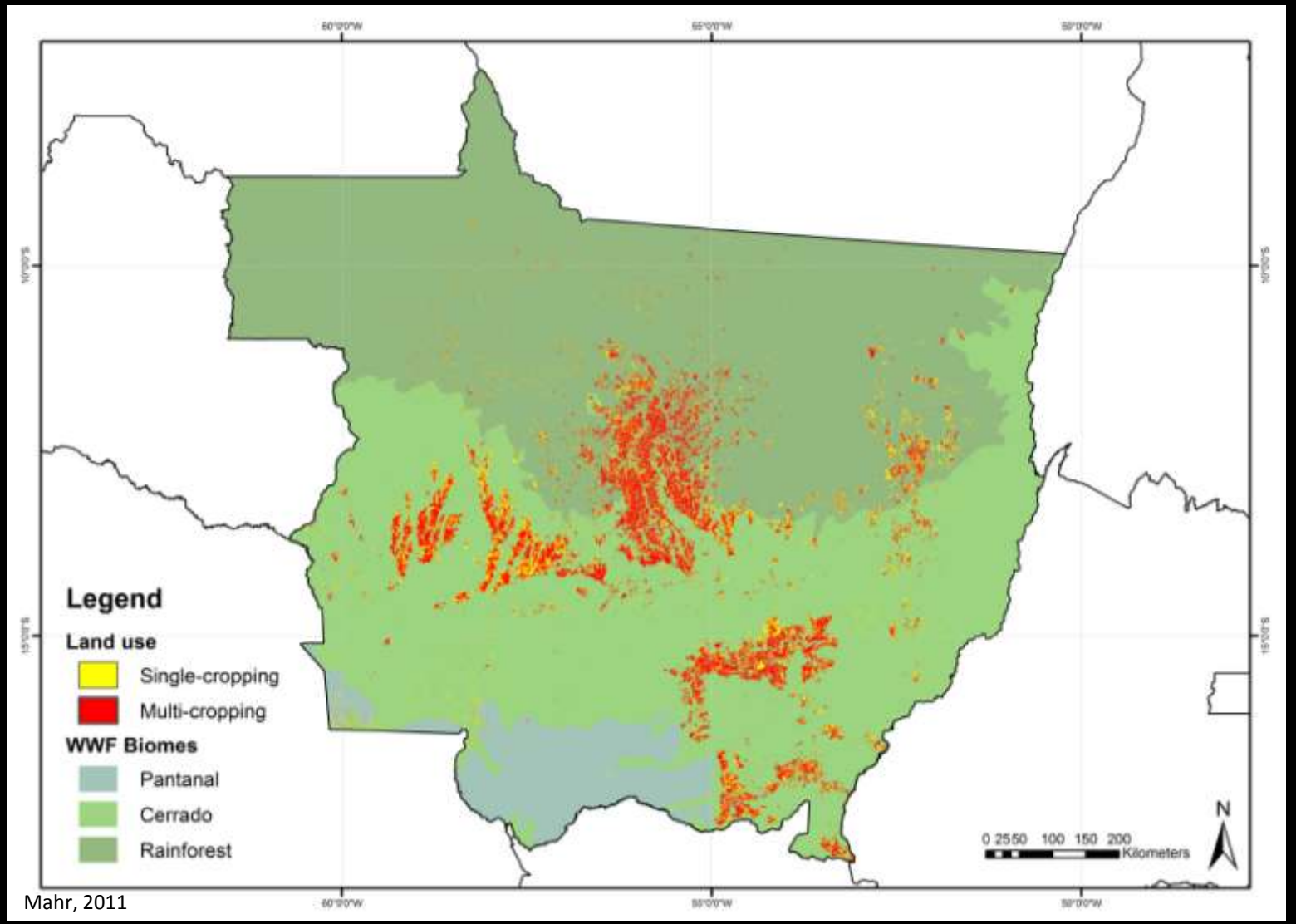
Mahr, 2011

Mato Grosso Land Use 2000



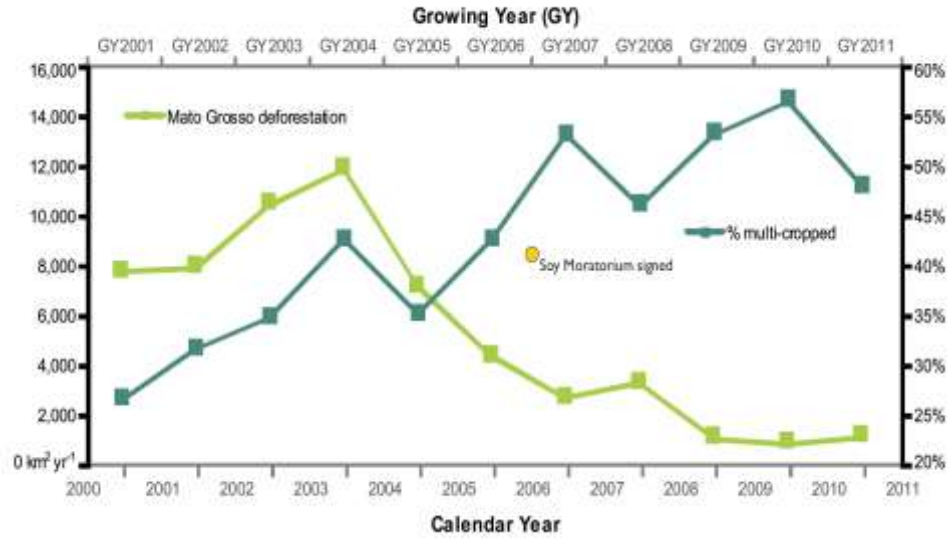
Mahr, 2011

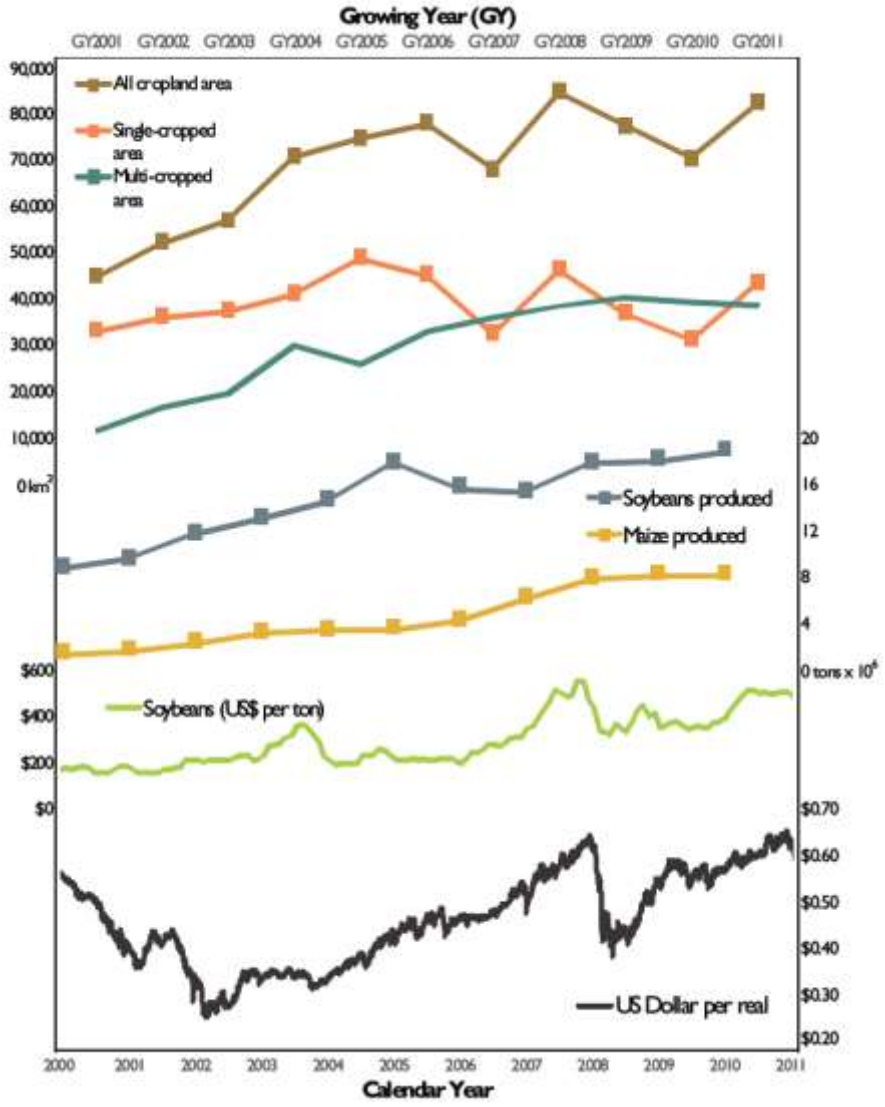
Mato Grosso Land Use 2010



Mahr, 2011

Socioeconomic Trends

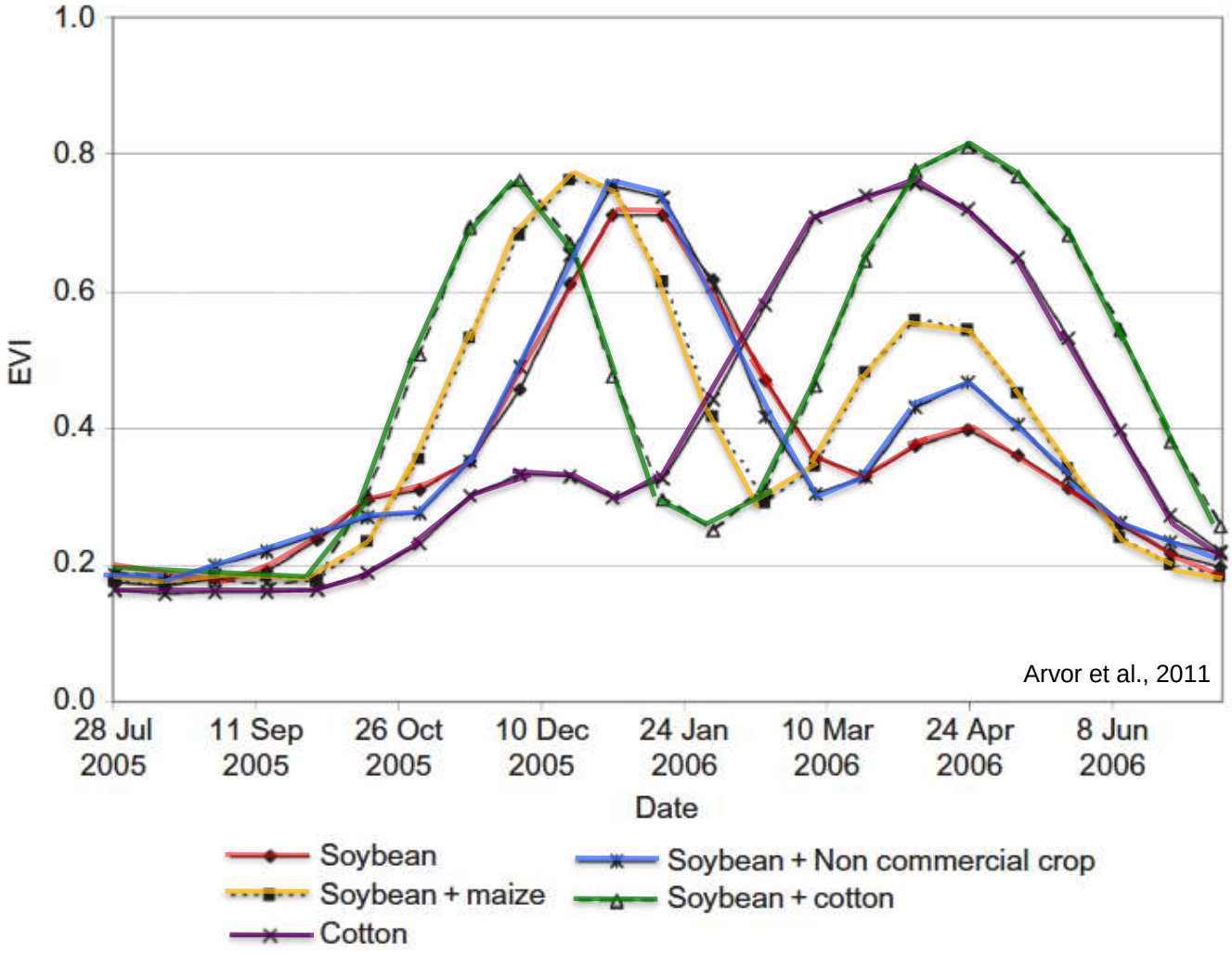




Step 2

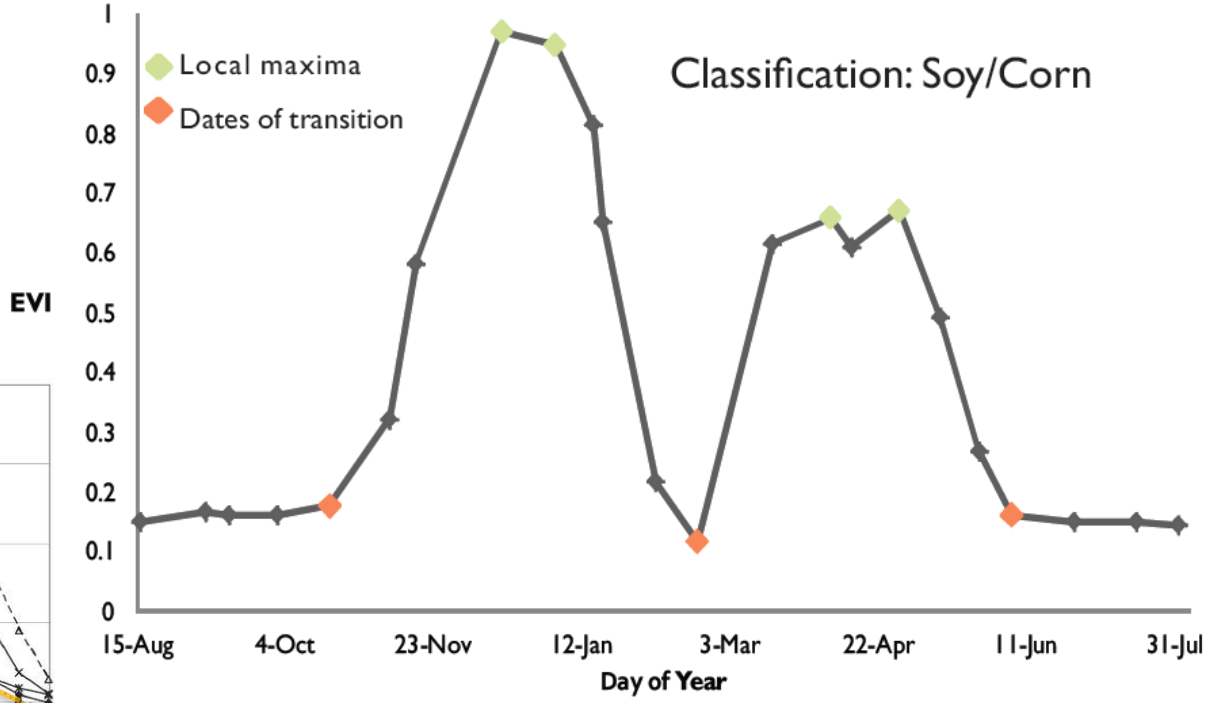
Determine the types of crops and their spatial distribution

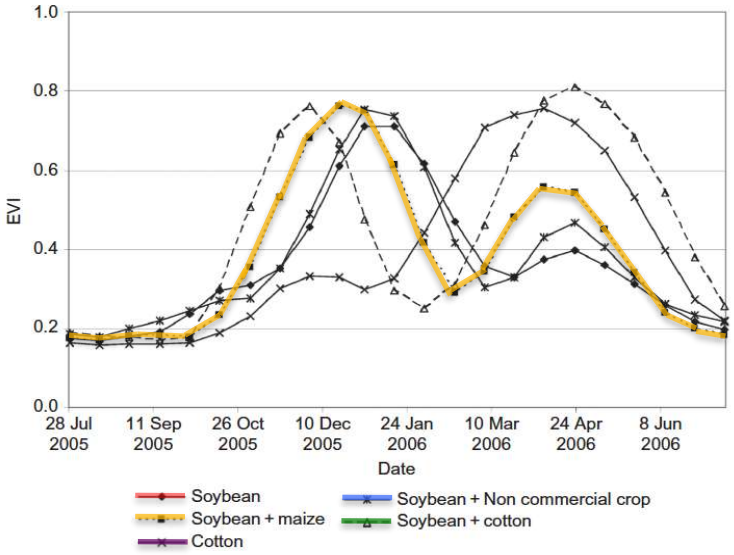
Determining the types of crops and their spatial distribution



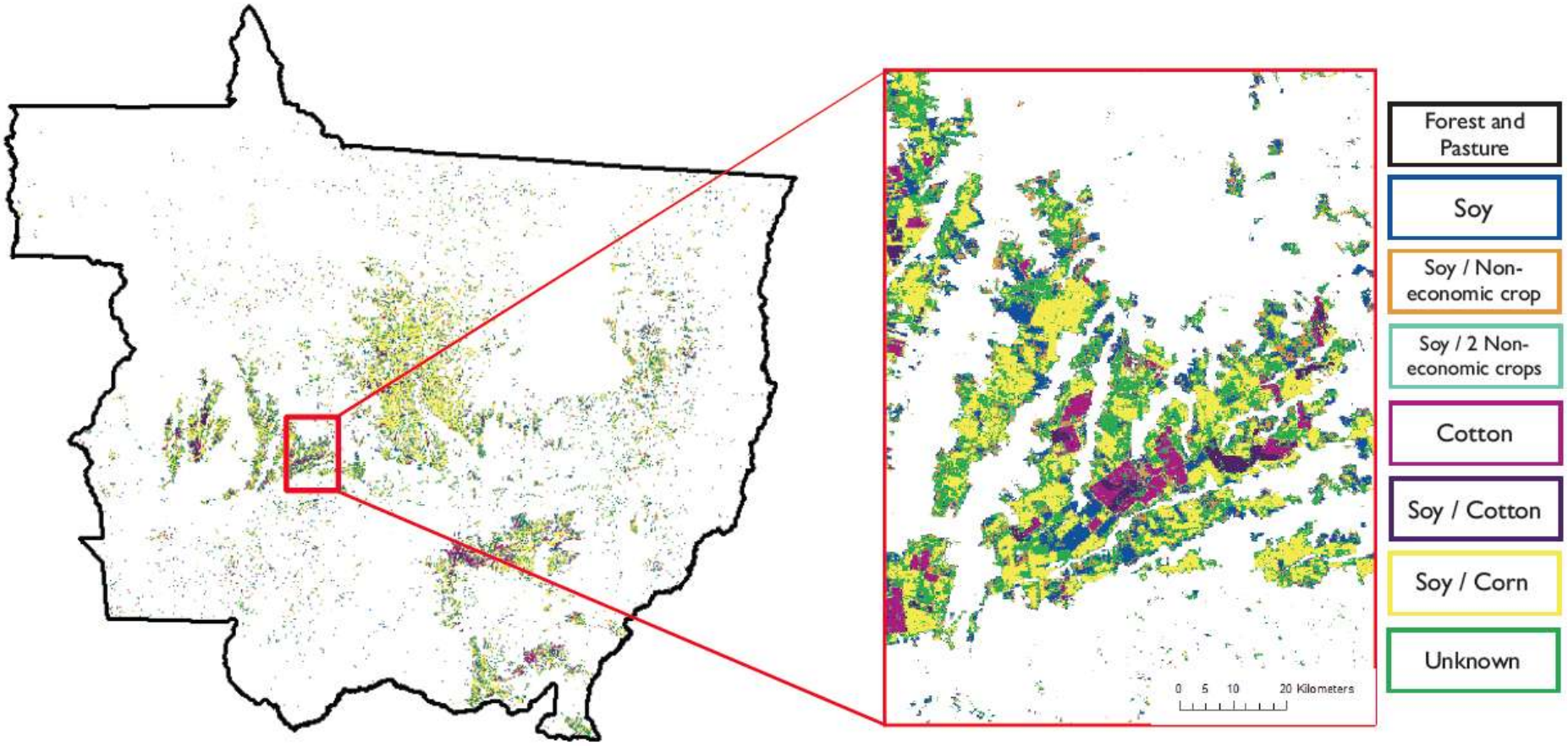
Determine the types of crops and their spatial distribution

- Thresholds
- Crop calendar





2011 Growing Year Results



Validation

REFERENCE DATA										
Classification	Soy	Cotton	Soy/Corn	Soy/Cotton	Sugarcane	Pasture	Soy/Millet	Forest	Unknown	Row Total
Soy	3									3
Cotton		3								3
Soy/Corn			45	7			1			53
Soy/Cotton		1		11						12
Sugarcane					0					0
Pasture						1				1
Soy/Millet										0
Forest								6		6
Unknown	4		3		1	1				9
Column Total	7	4	48	18	1	2	1	6	0	87
OVERALL ACCURACY = 79.3%							**K_{HAT} = .67**			

K_{hat} Statistic: Measure of distance between the actual agreement between the reference data and the result of classification, and the chance agreement between the reference data and a random classifier

Step 2.5

- Determine the nature of cropland expansion and multi-cropping intensification in Mato Grosso, Brazil between 2001-2012
- Determine the types of crops and their spatial distribution **with field work**
- Explain and attribute land-cover land-use change by determining the spatially and temporally variable drivers of intensification

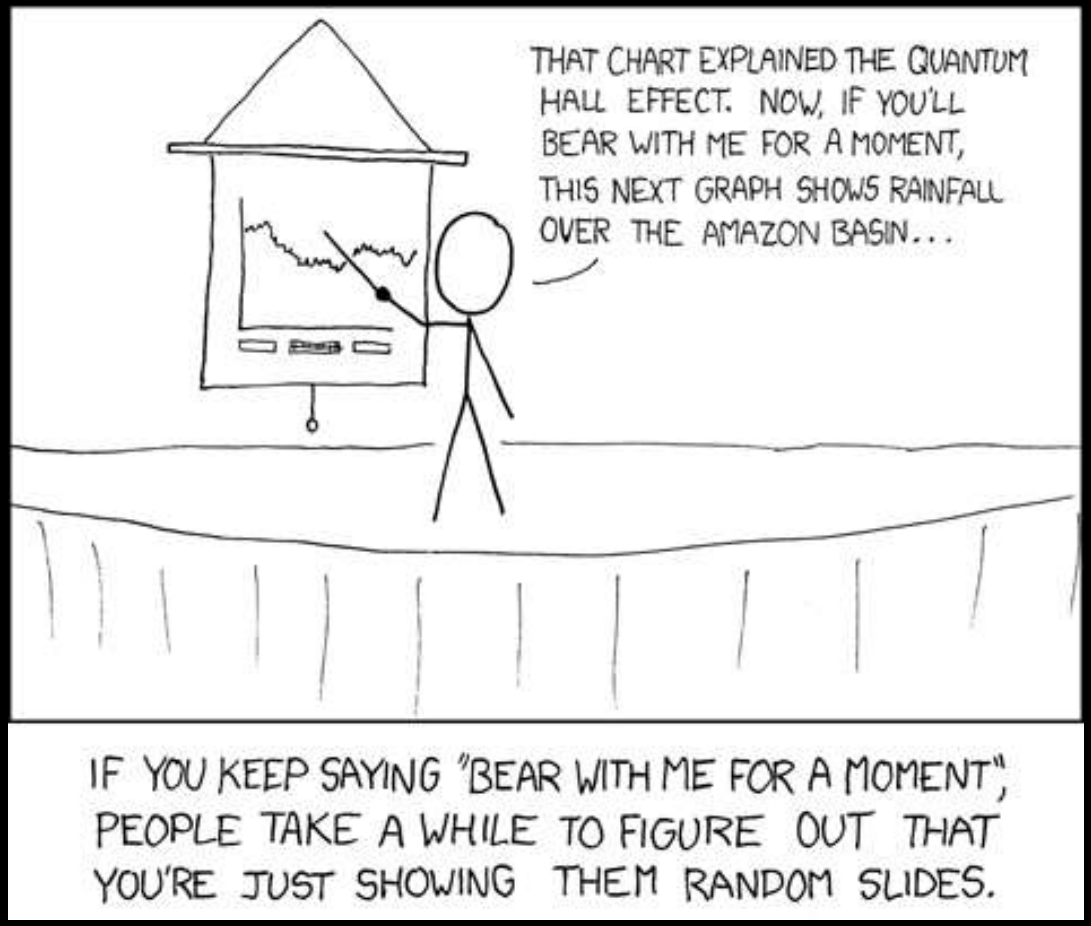
Field Work

Agricultural Land

Validation Points

Field Work, Summer 2012

THANKS



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