



GEONETCast for and by  
Developing Countries

# DevCoCast

## AGRICULTURE MONITORING IN BRAZIL



UNICAMP



**GEO**



**Conab**  
Companhia Nacional de Abastecimento  
Ministério da Agricultura, Pecuária e Abastecimento

**GEO SAFRAS**



IBGE – Brazilian Institute fo Geography and Statistics (Ministry of Planning)

- Agricultural Census (+ all other statistical census)
- Crop area / Yield / Production estimates at municipality level
- Subjective survey
- Doesn't use remote sensing
- Data available at [www.ibge.gov.br](http://www.ibge.gov.br) (SIDRA / PAM)



CONAB – National Food Supply Company (Ministry of Agriculture)

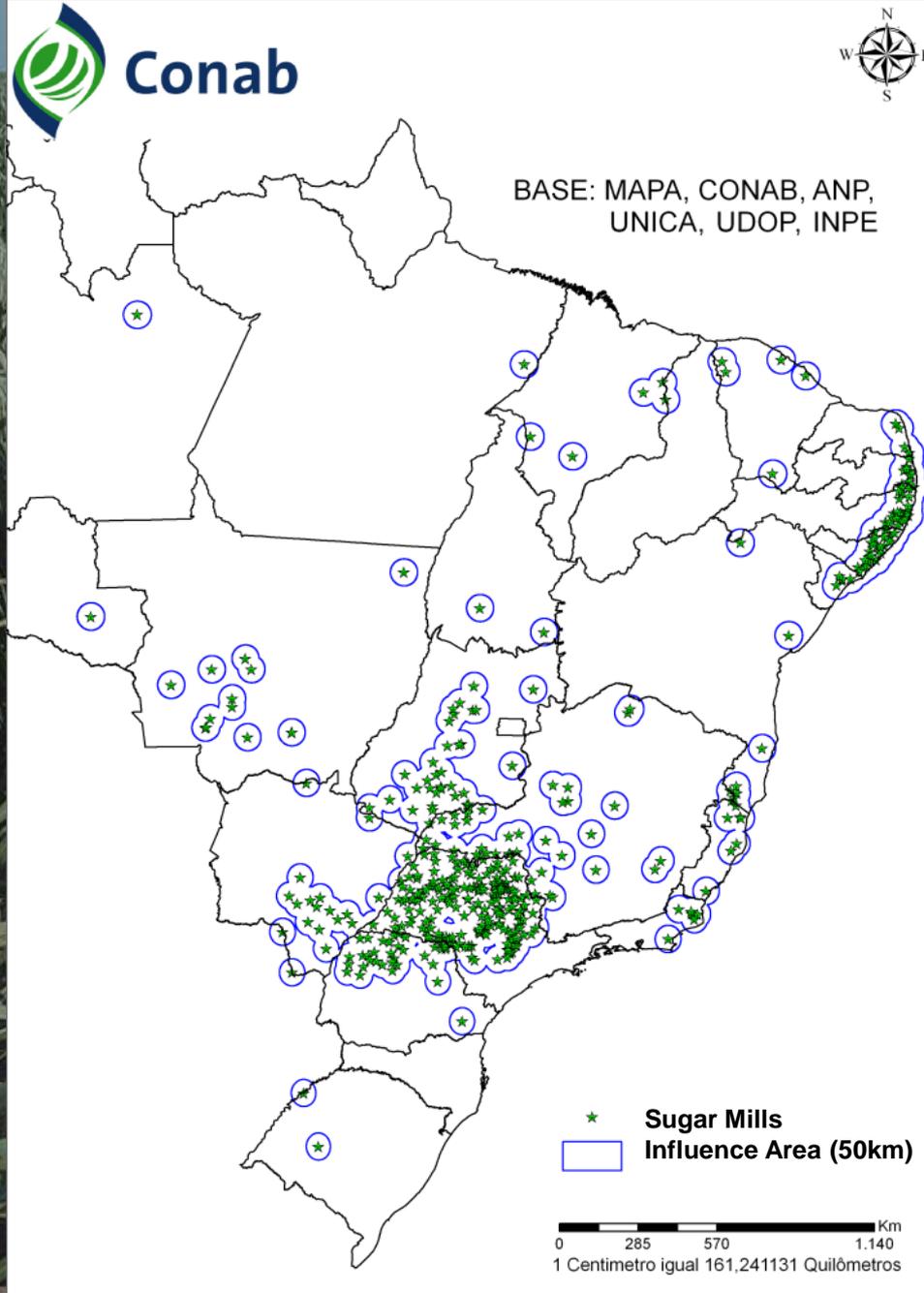
- Crop area / Yield / Production estimates at state level
- Subjective survey + Geotechnology support
- Remote Sensing for cropland masks and vegetation condition assessment
- Bulletins available at [www.conab.gov.br](http://www.conab.gov.br) (levantamento de safras / geosafras)

## Remote sensing activities:

- land use mapping / monitoring in indigenous land and border with amazon
- pasture monitoring in new agricultural borders
- eucalyptus mapping
- coffe mapping
- sugar mills mapping and sugarcane masks
- cropland masks
- monitoring vegetation index for crop condition assessment (bulletins)



# Sugar mills mapping



## MAPA INTERATIVO DE PROJETOS APOIADOS PELO BNDES

sobre a plataforma BNDES | login

Filtrar por...

Tipo de projeto

Localização

Valor da operação (R\$)

Fonte das informações

Busca livre:

Formato do resultado

Mapa  Lista

Visualizar...

Produção de cana

Produção de grãos

Ter. Indígenas

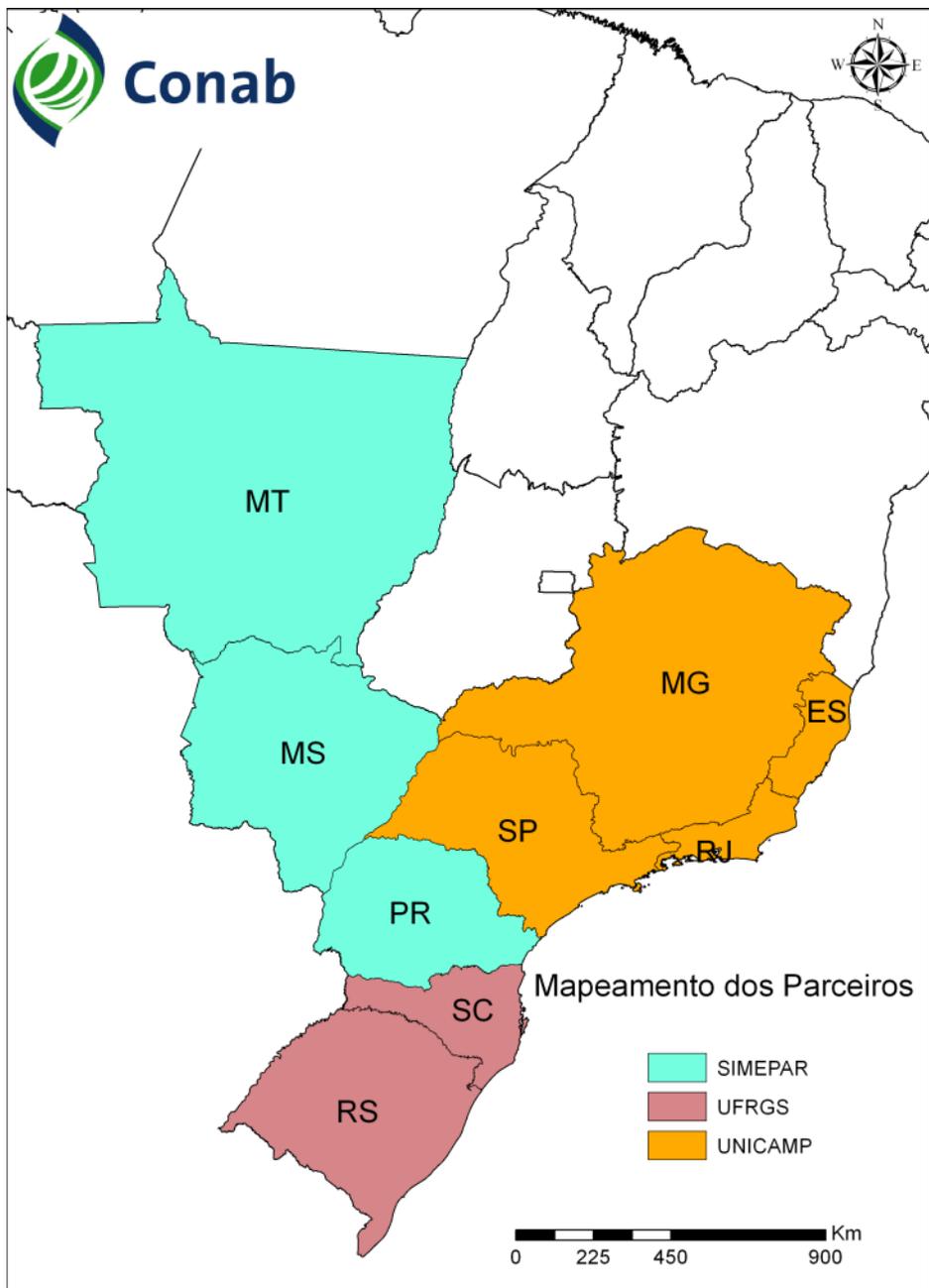
Nomes Ter. Indíg.

Áreas protegidas

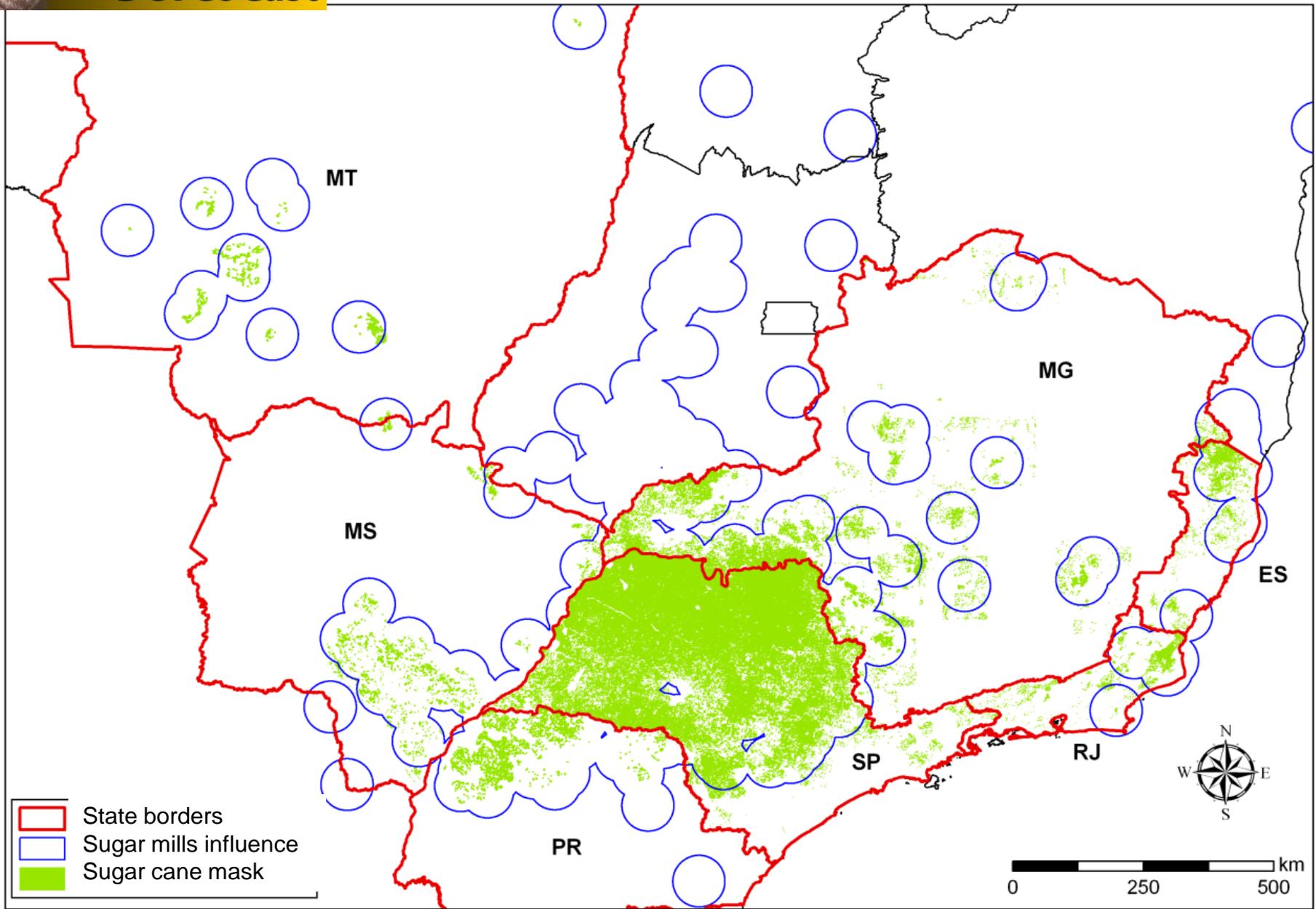
Biomas



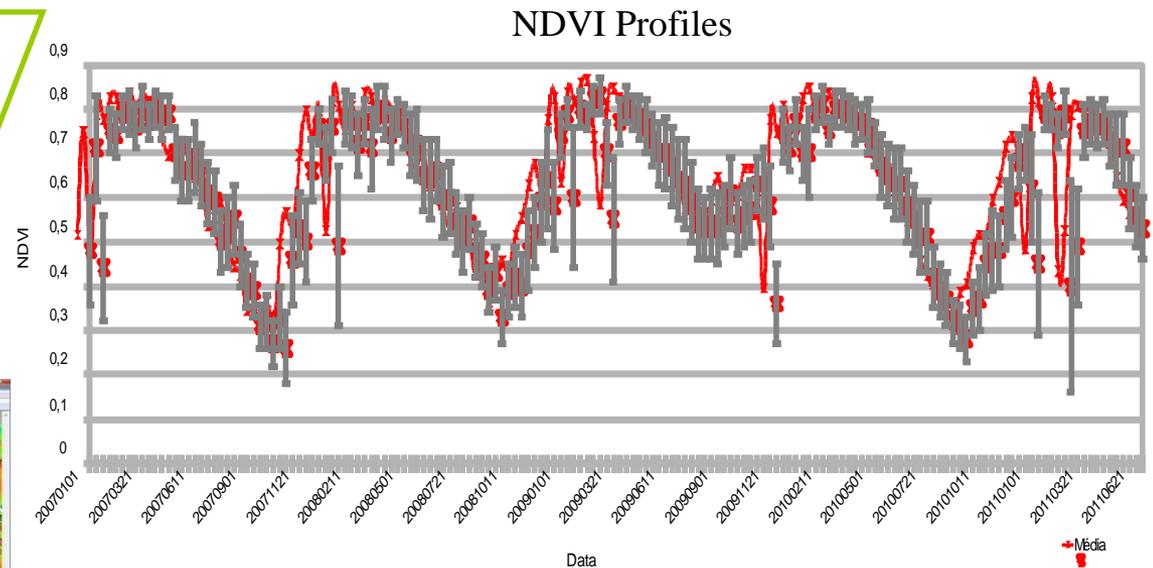
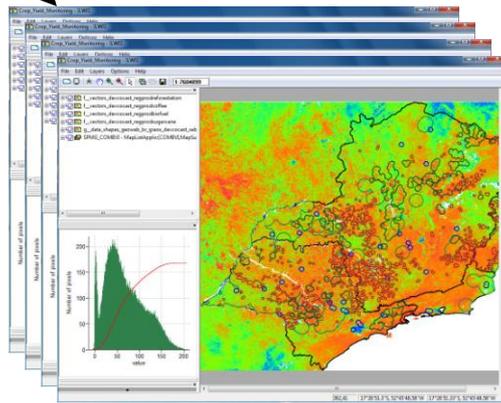
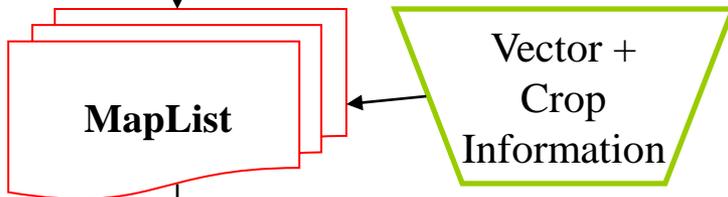
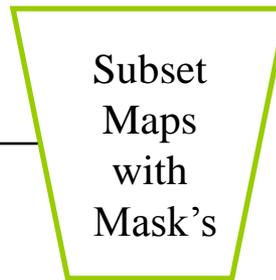
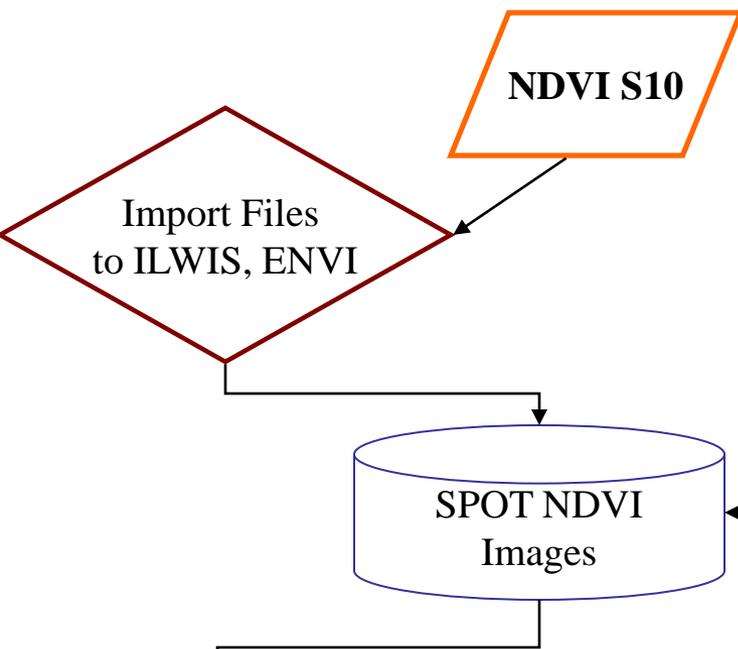
# Sugarcane masks

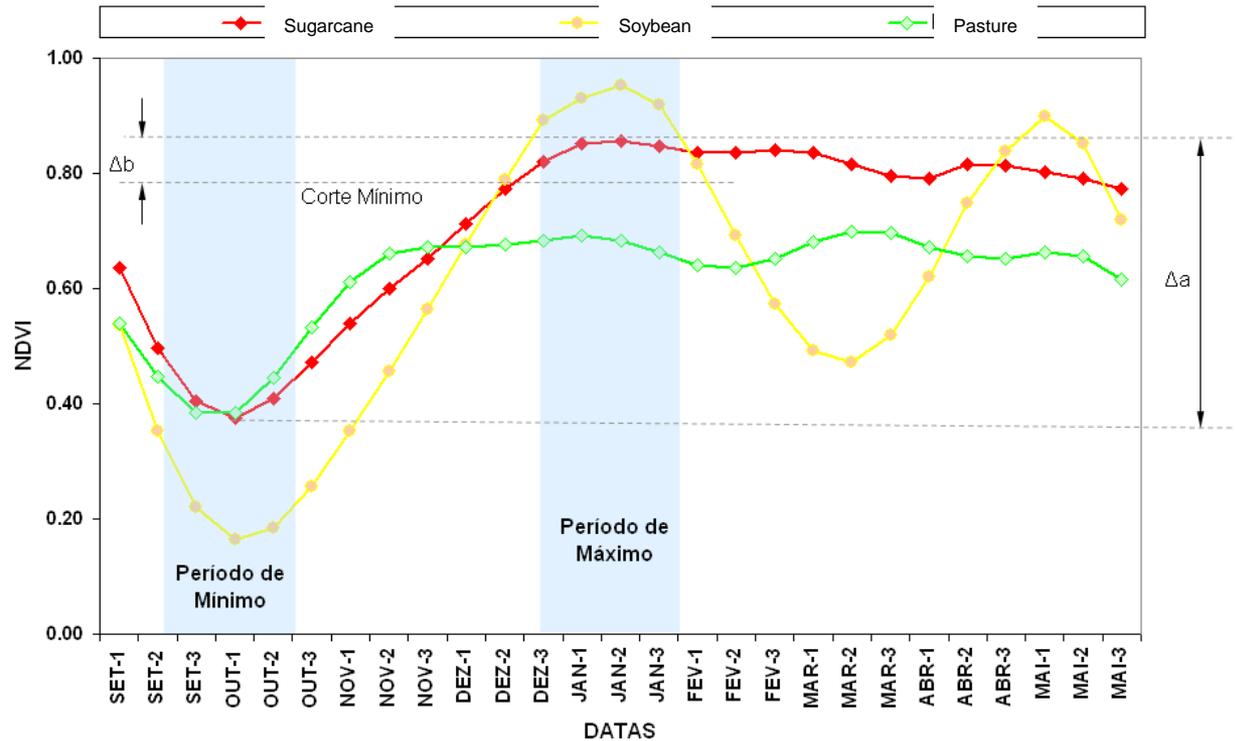
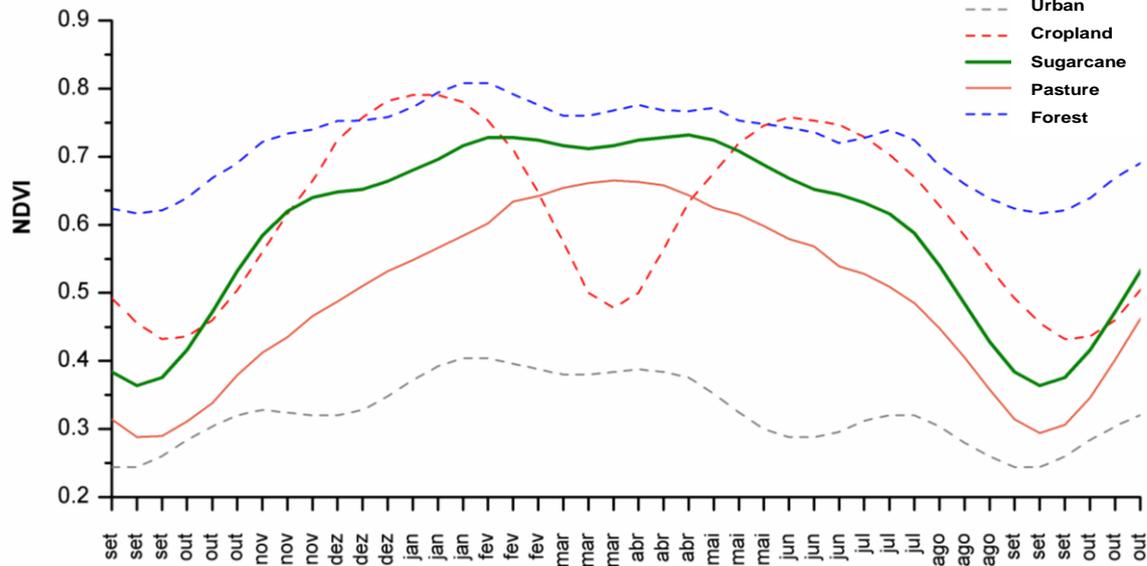


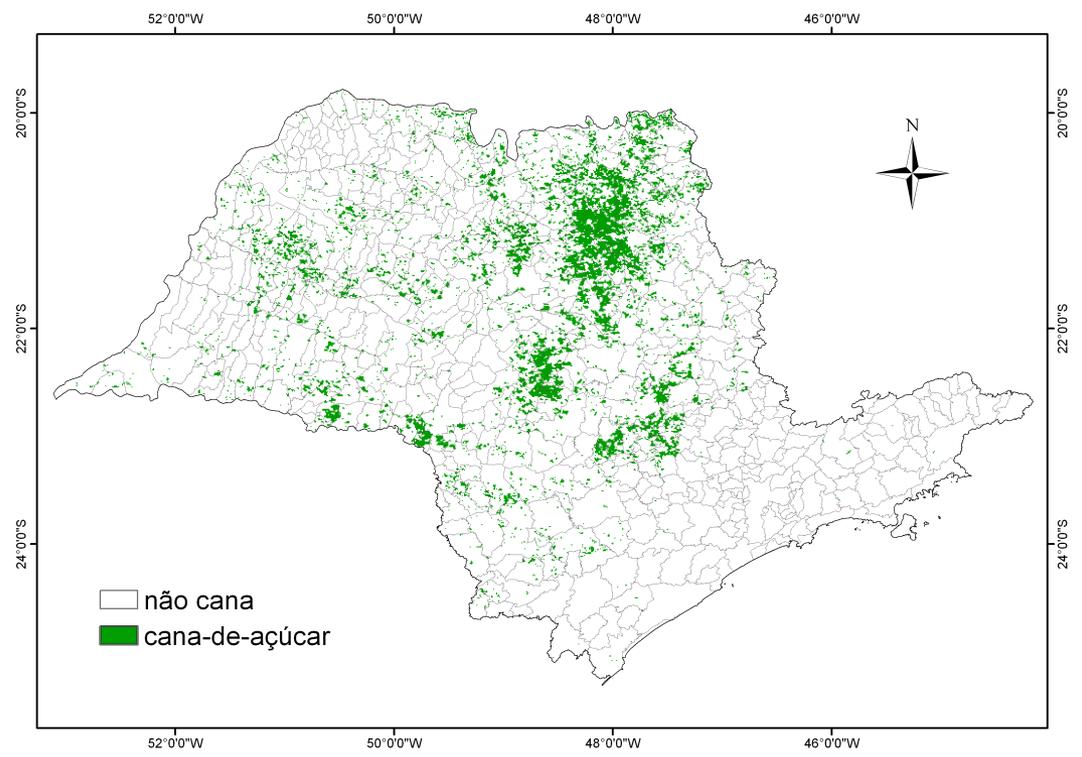
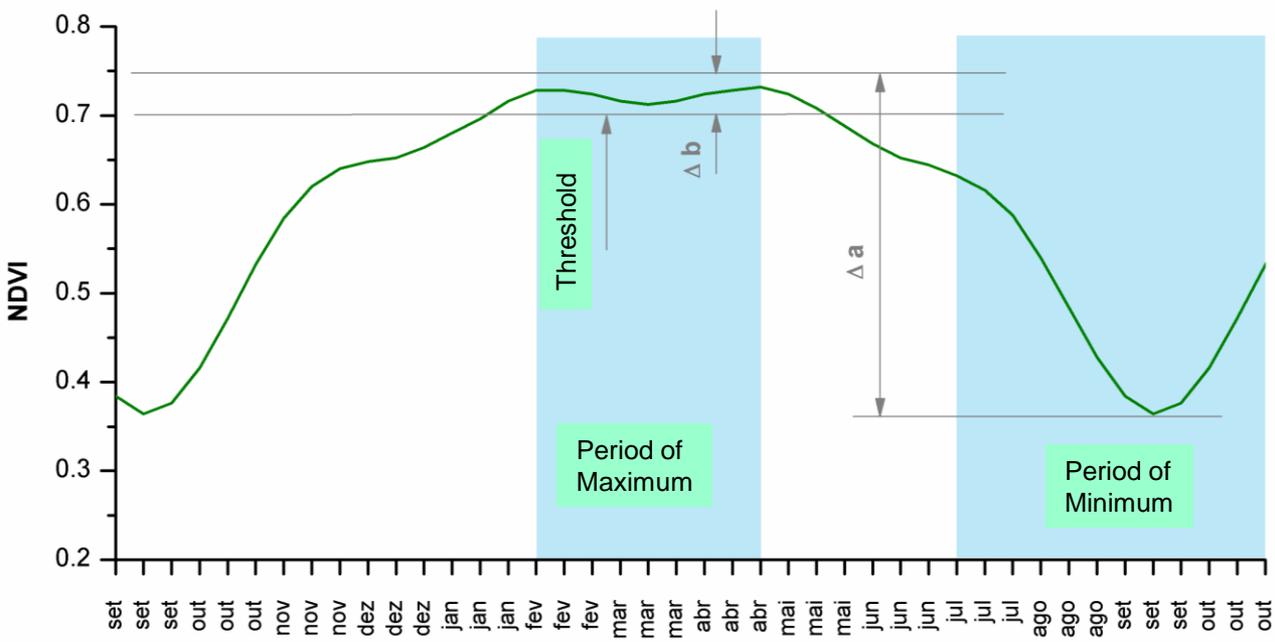
# Sugarcane masks (vectors)

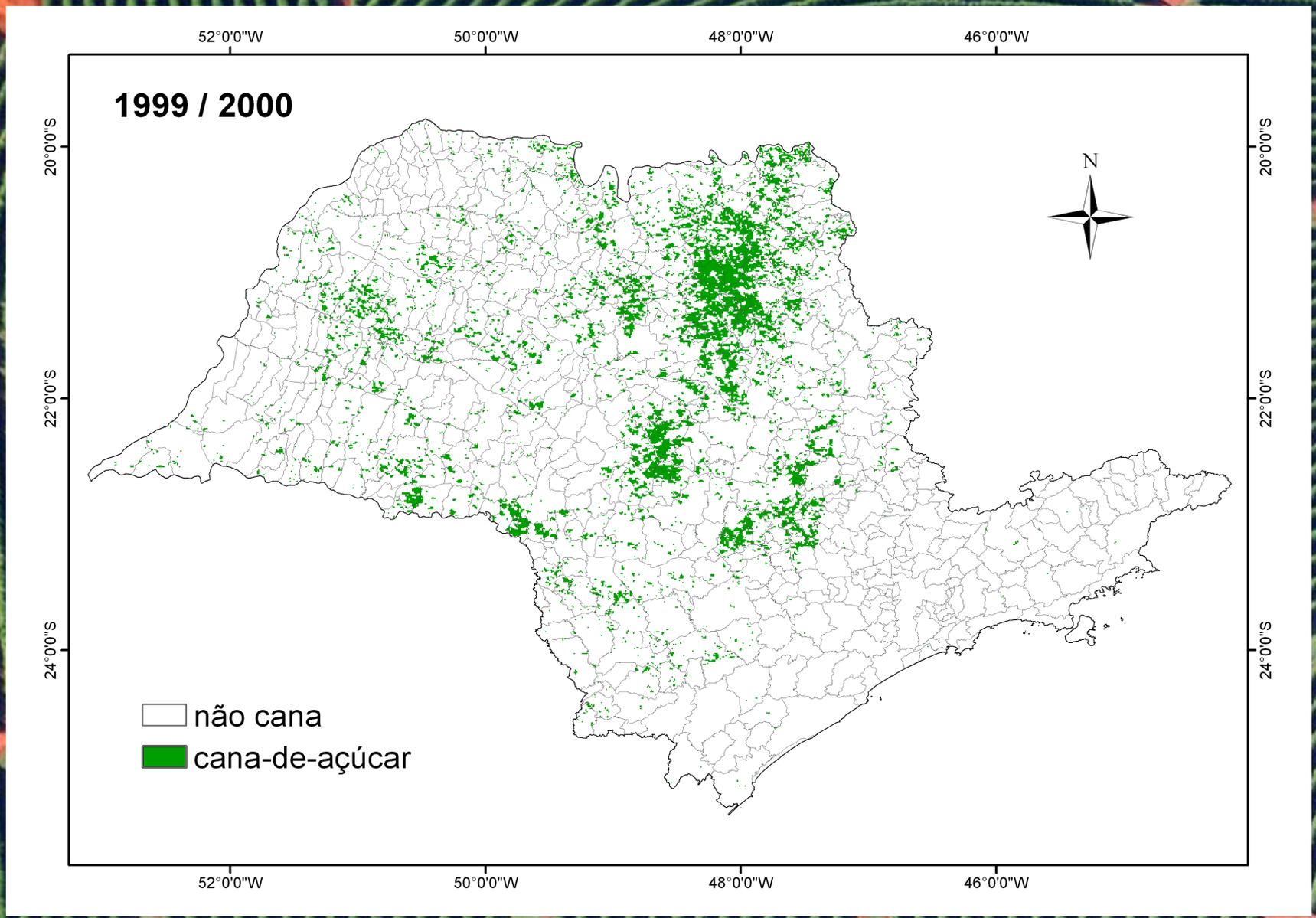


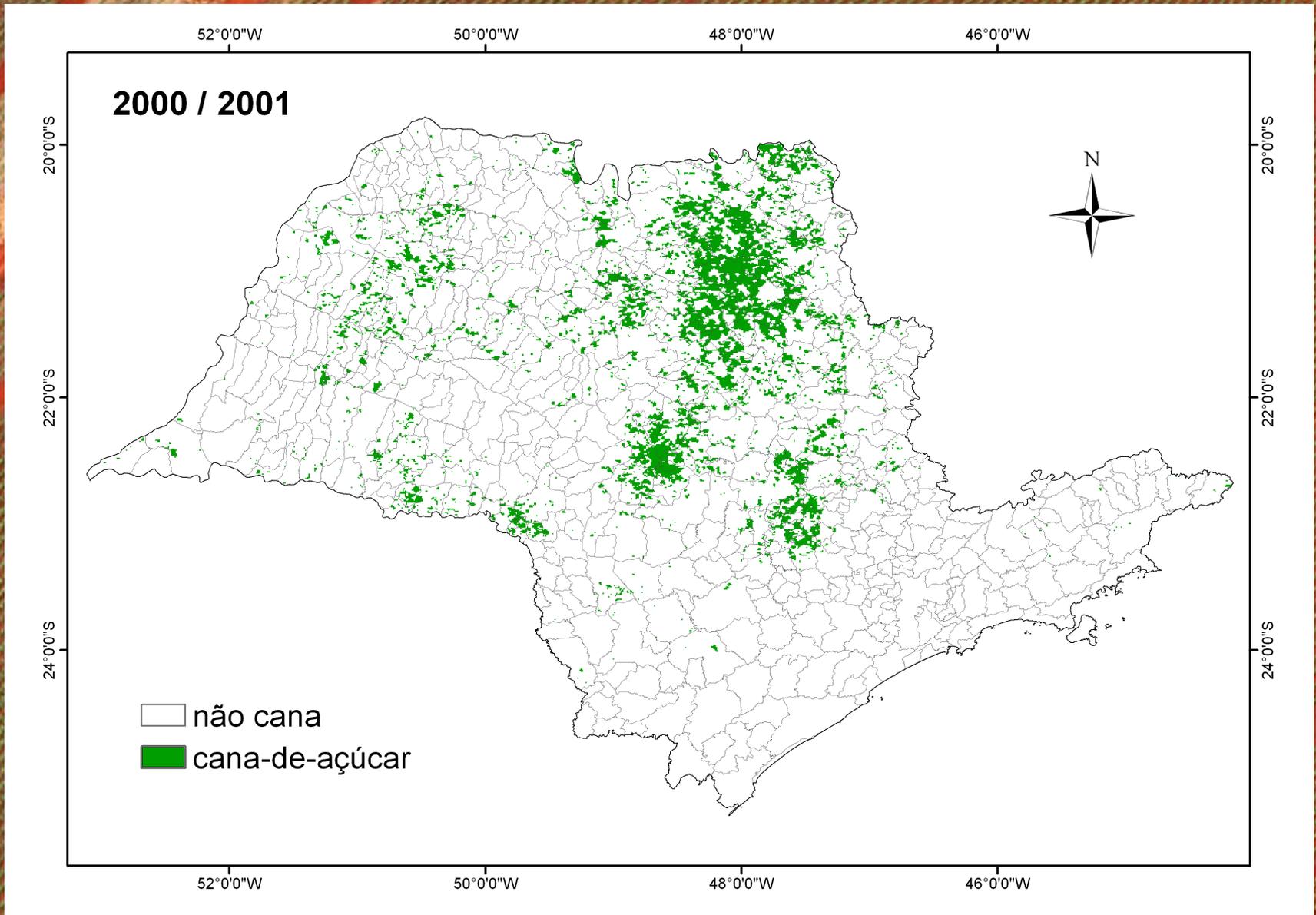
# Crop Monitoring with VGT NDVI

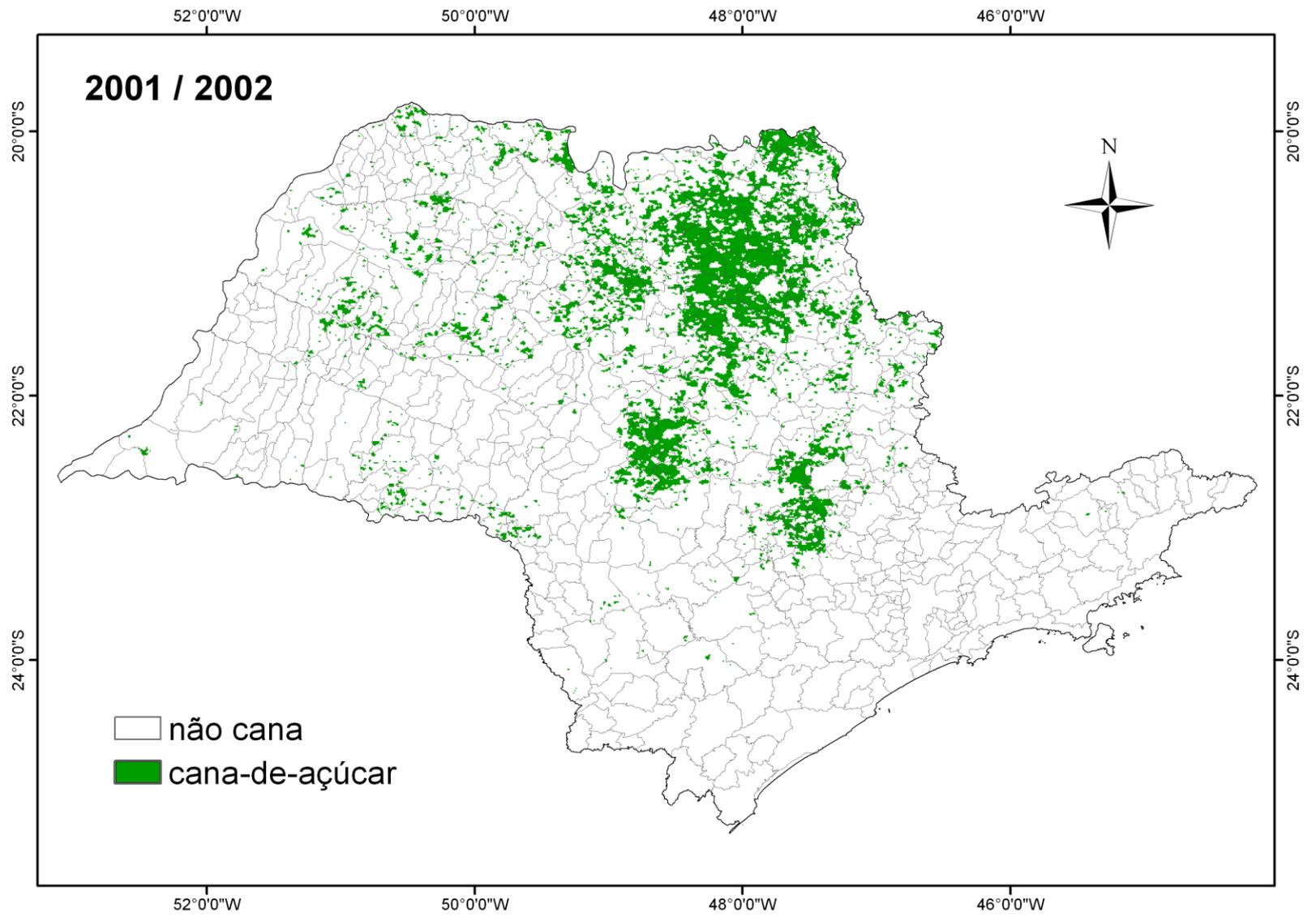


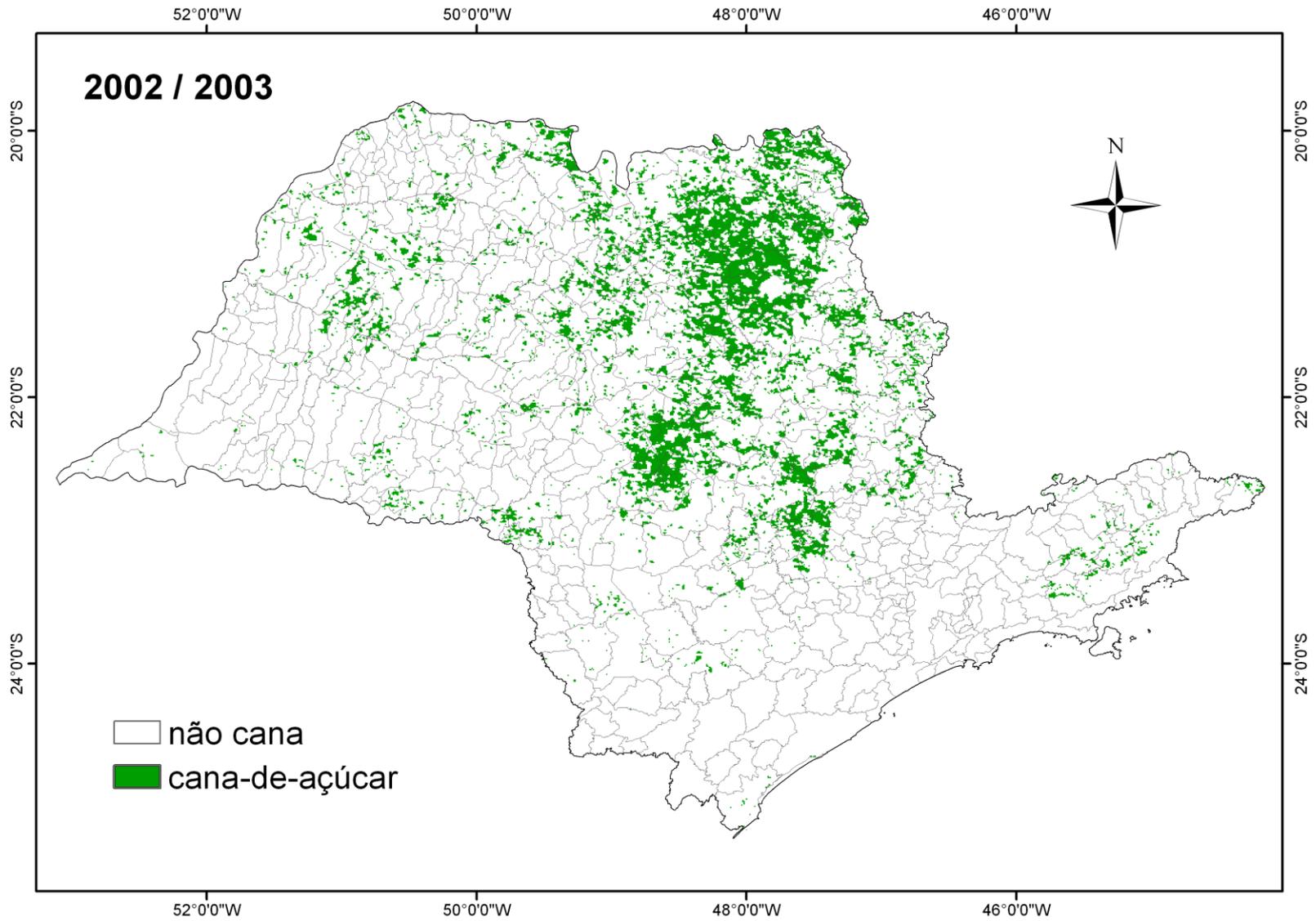


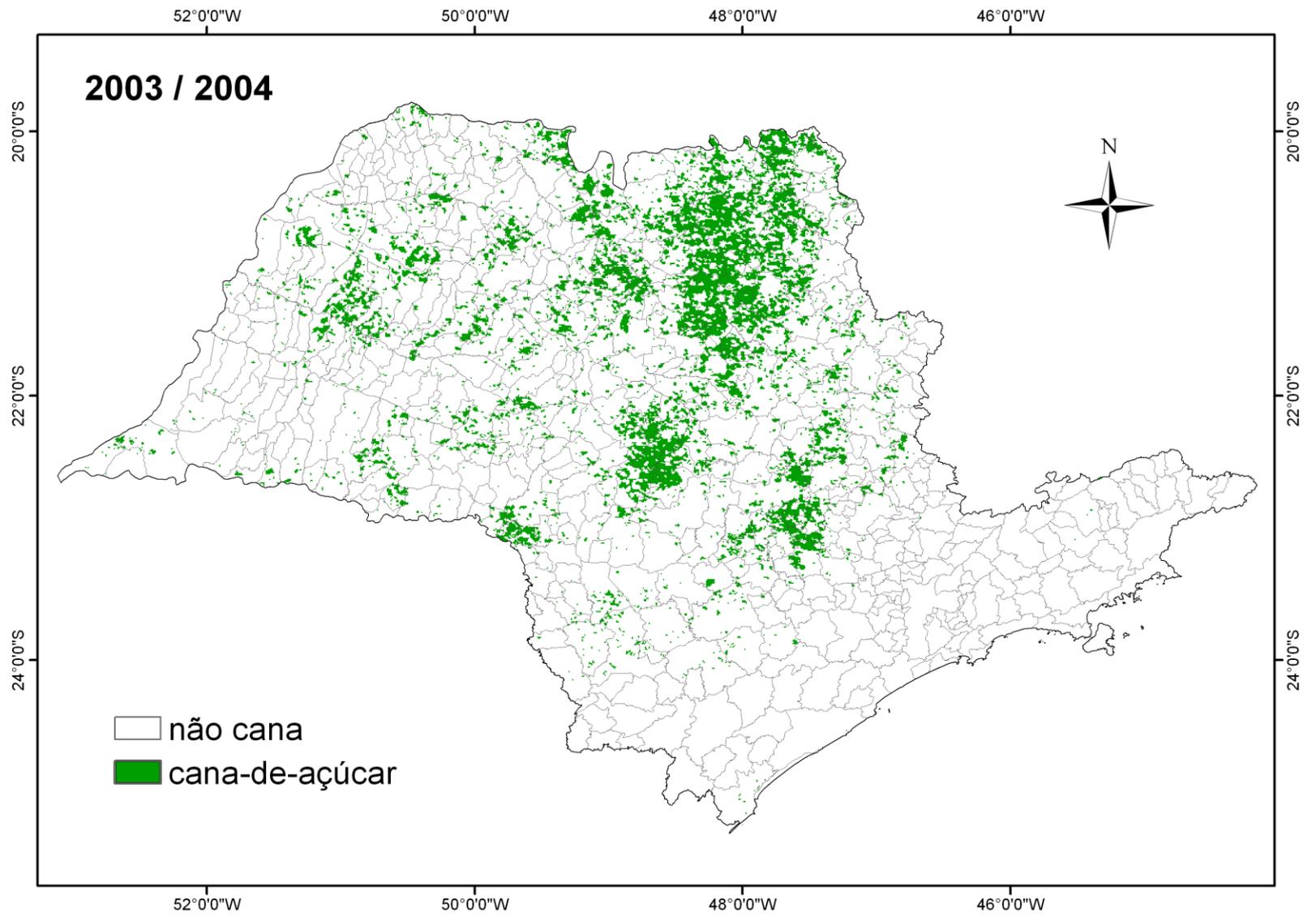


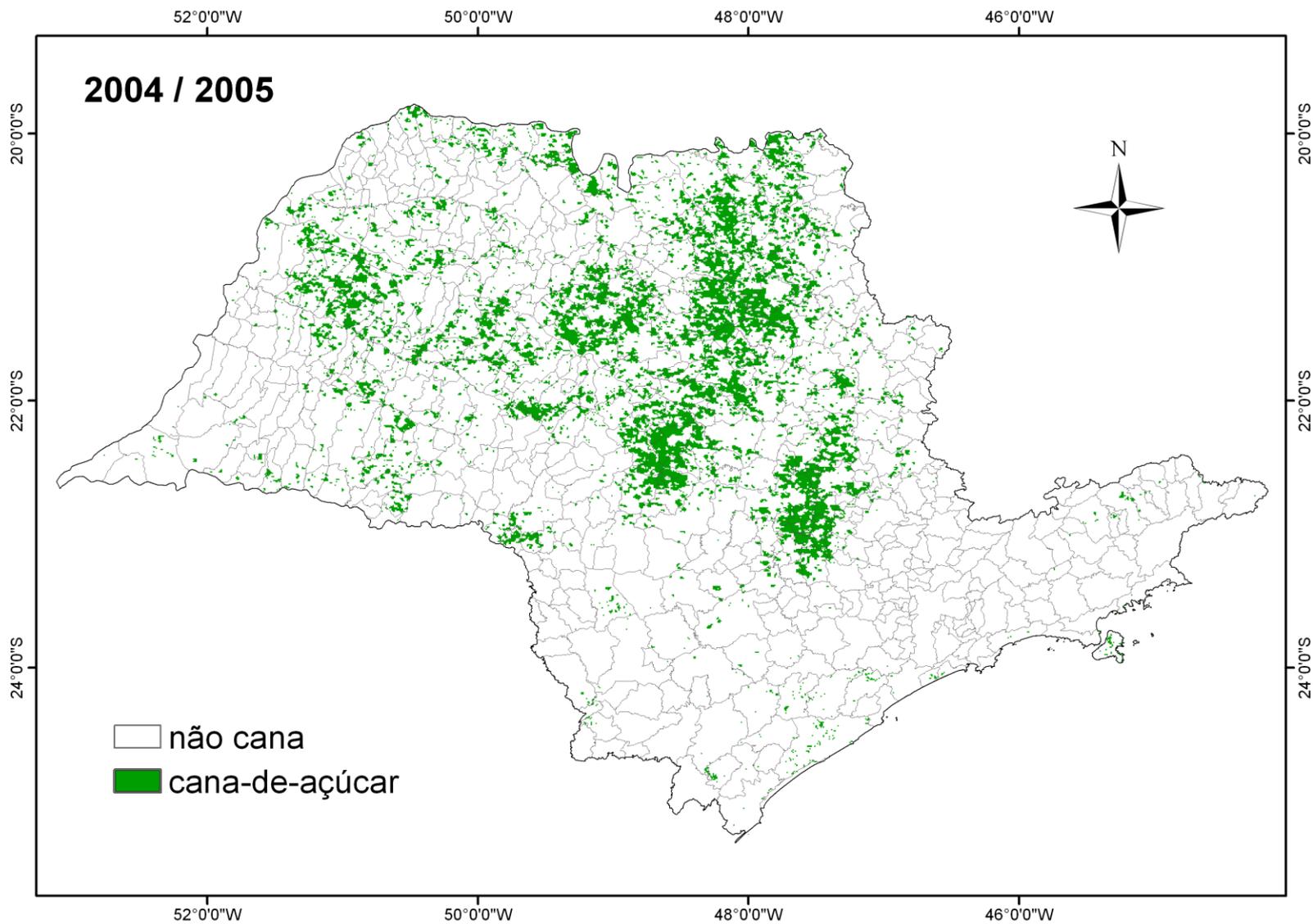


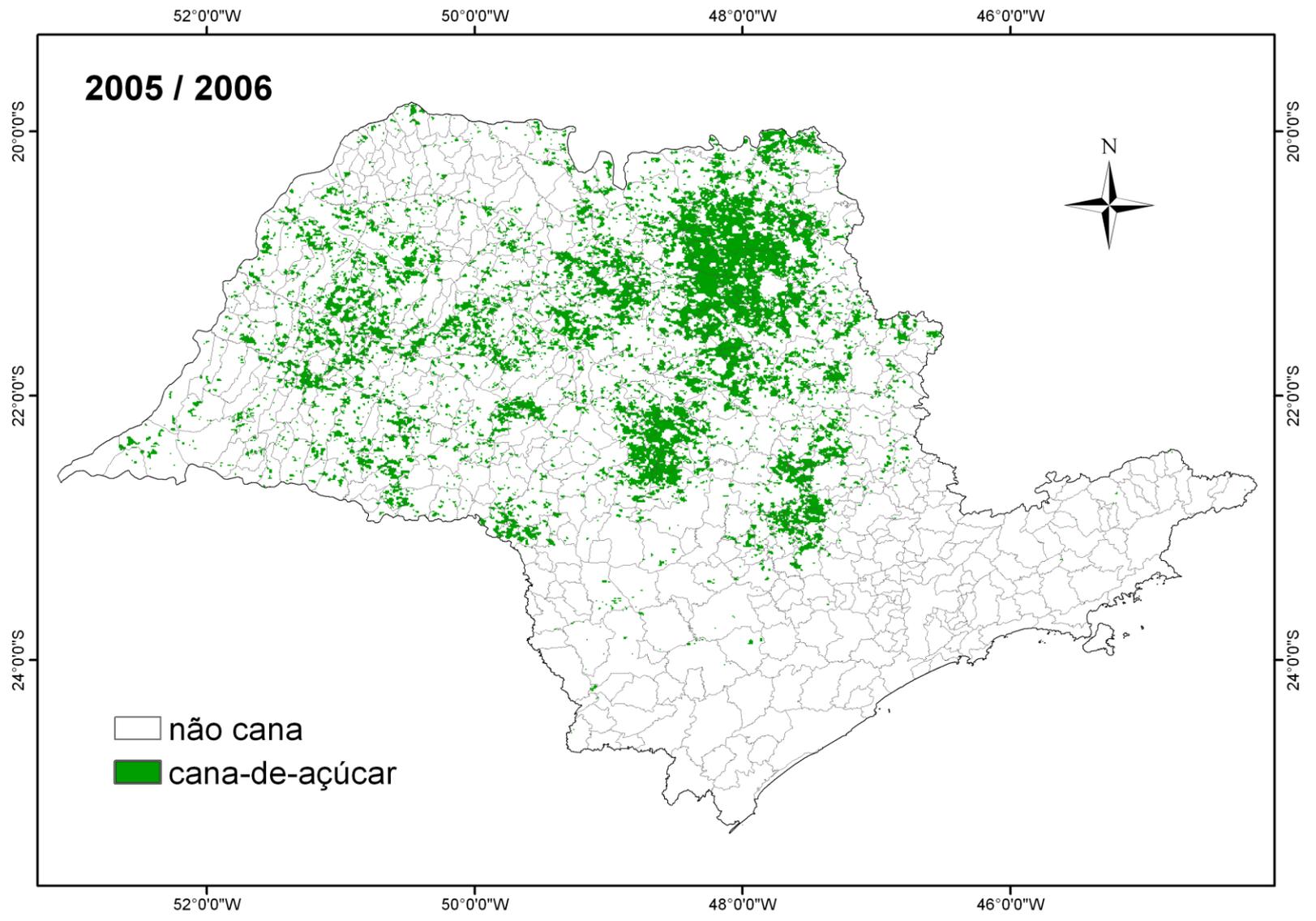






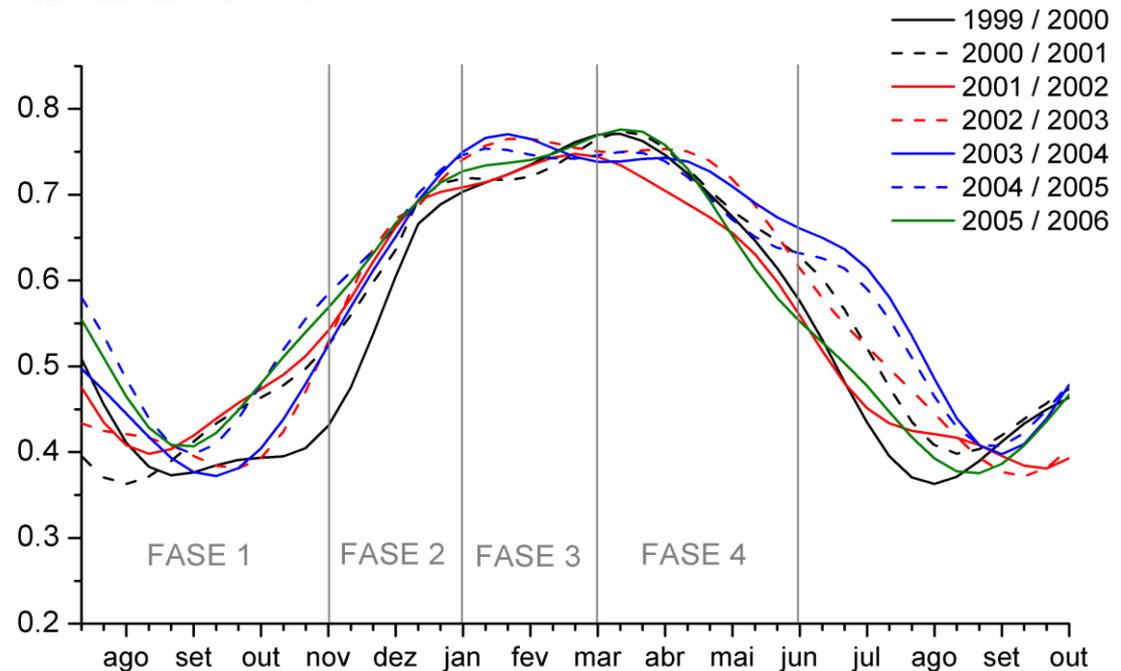
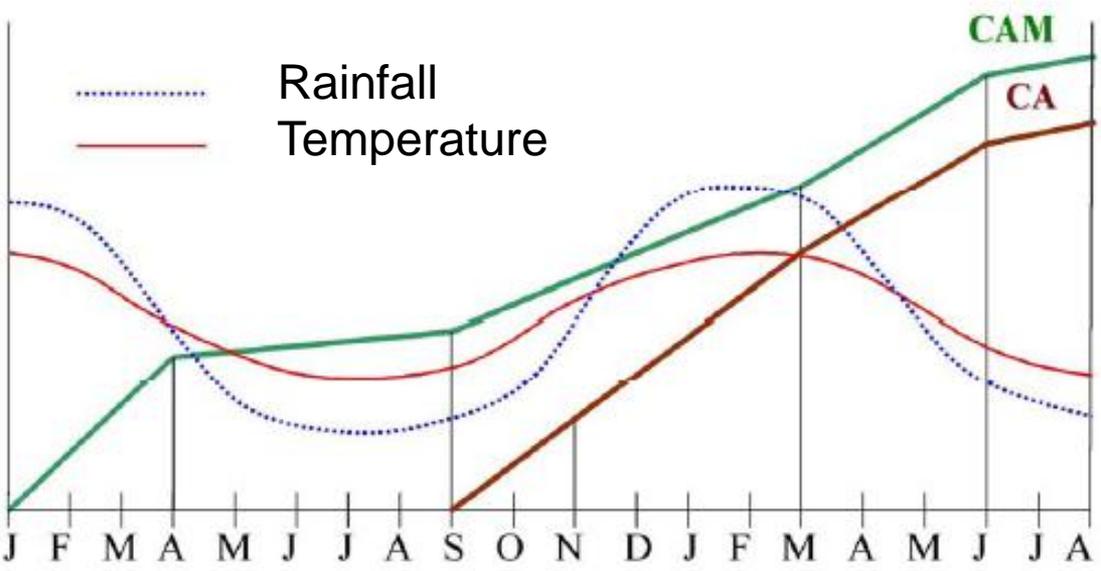






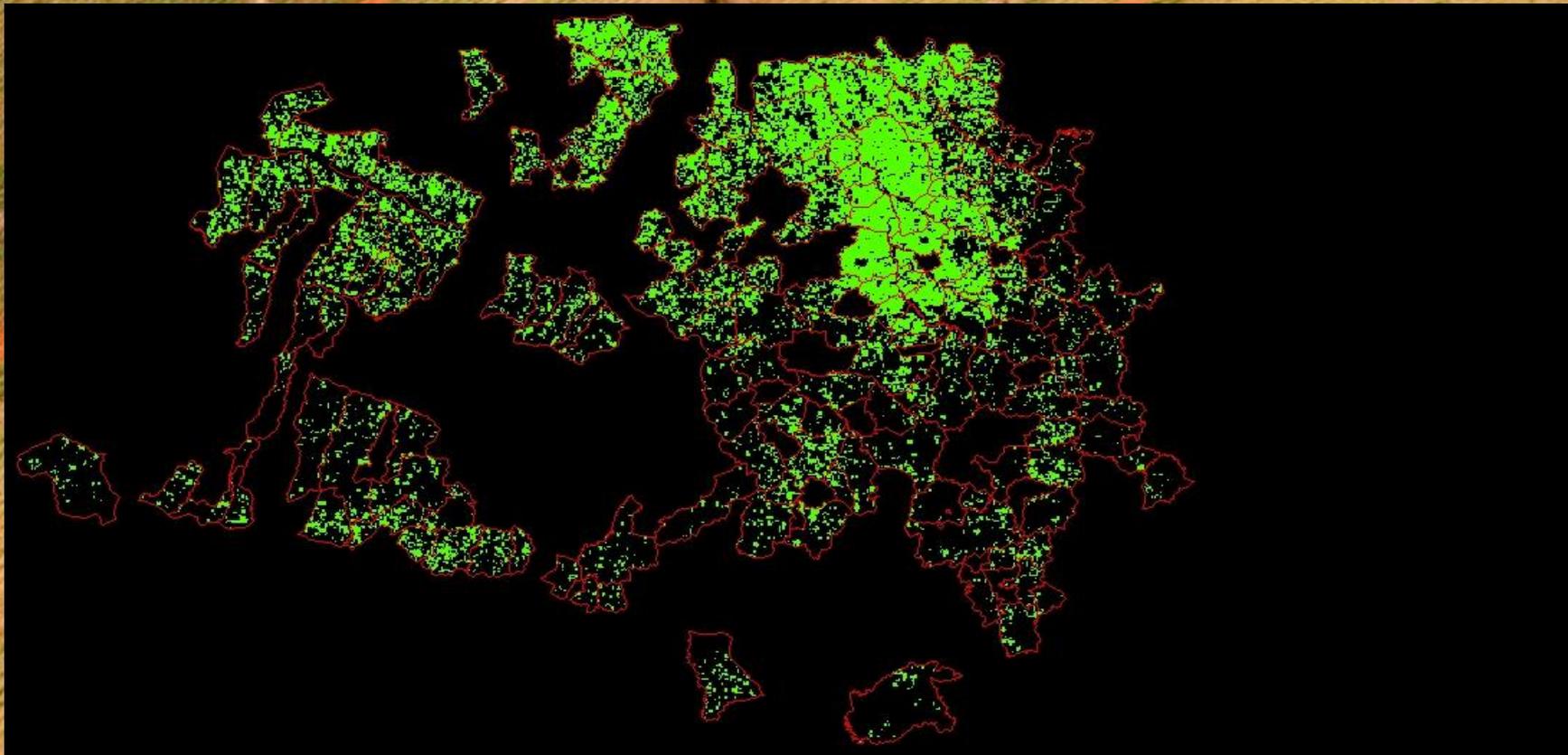


# Monitoring





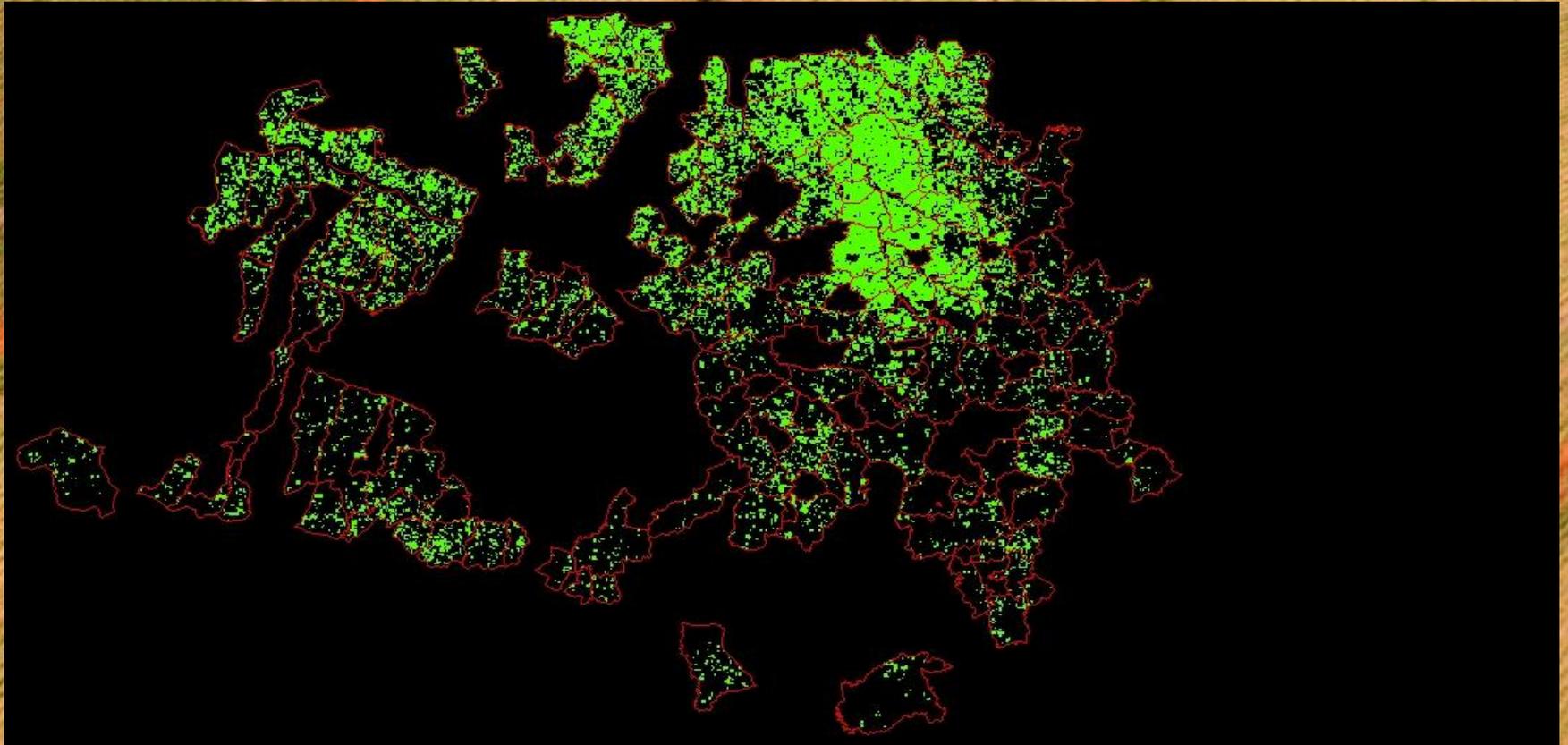
## Sugarcane Mask 2008-2009





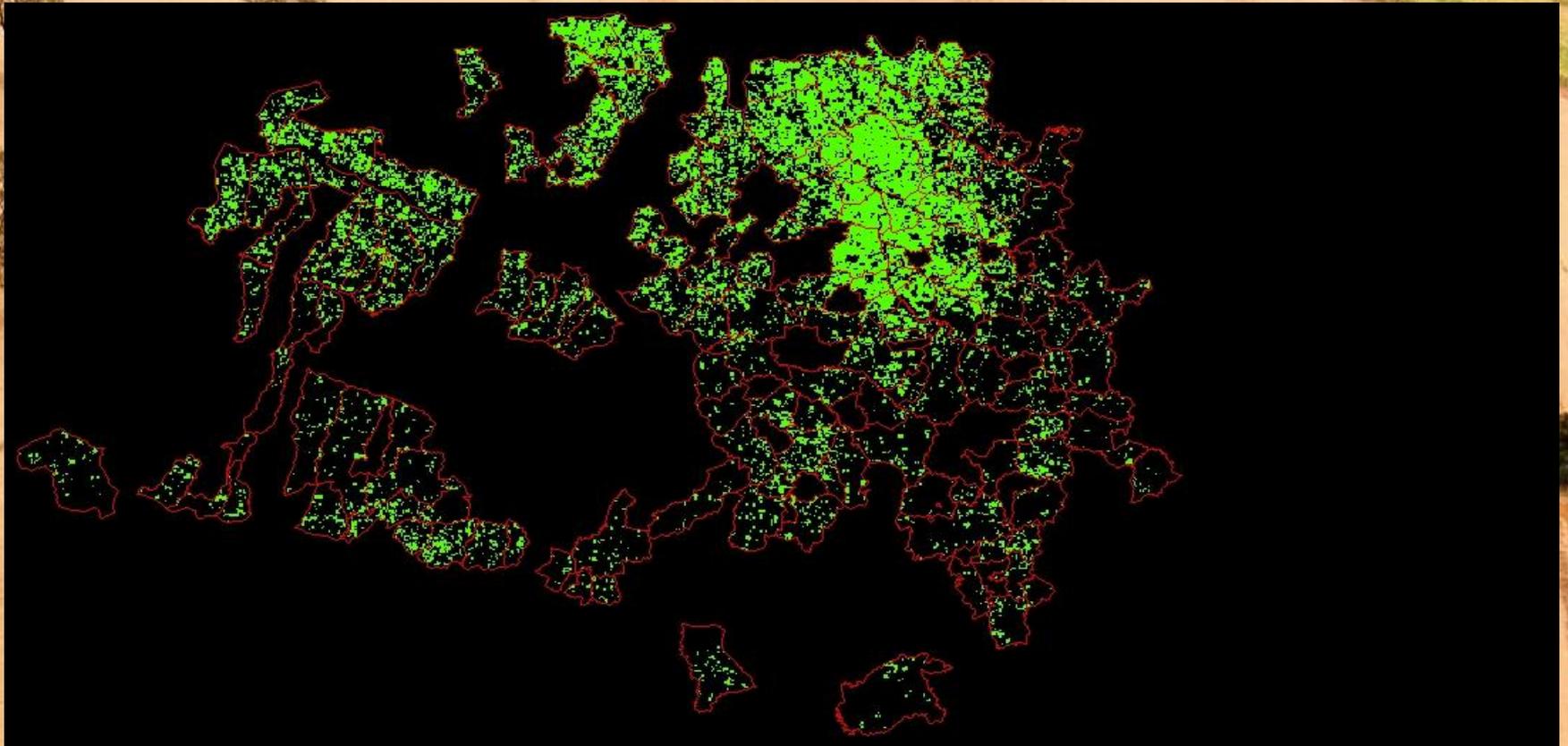
# Sugarcane Mask

April/2010



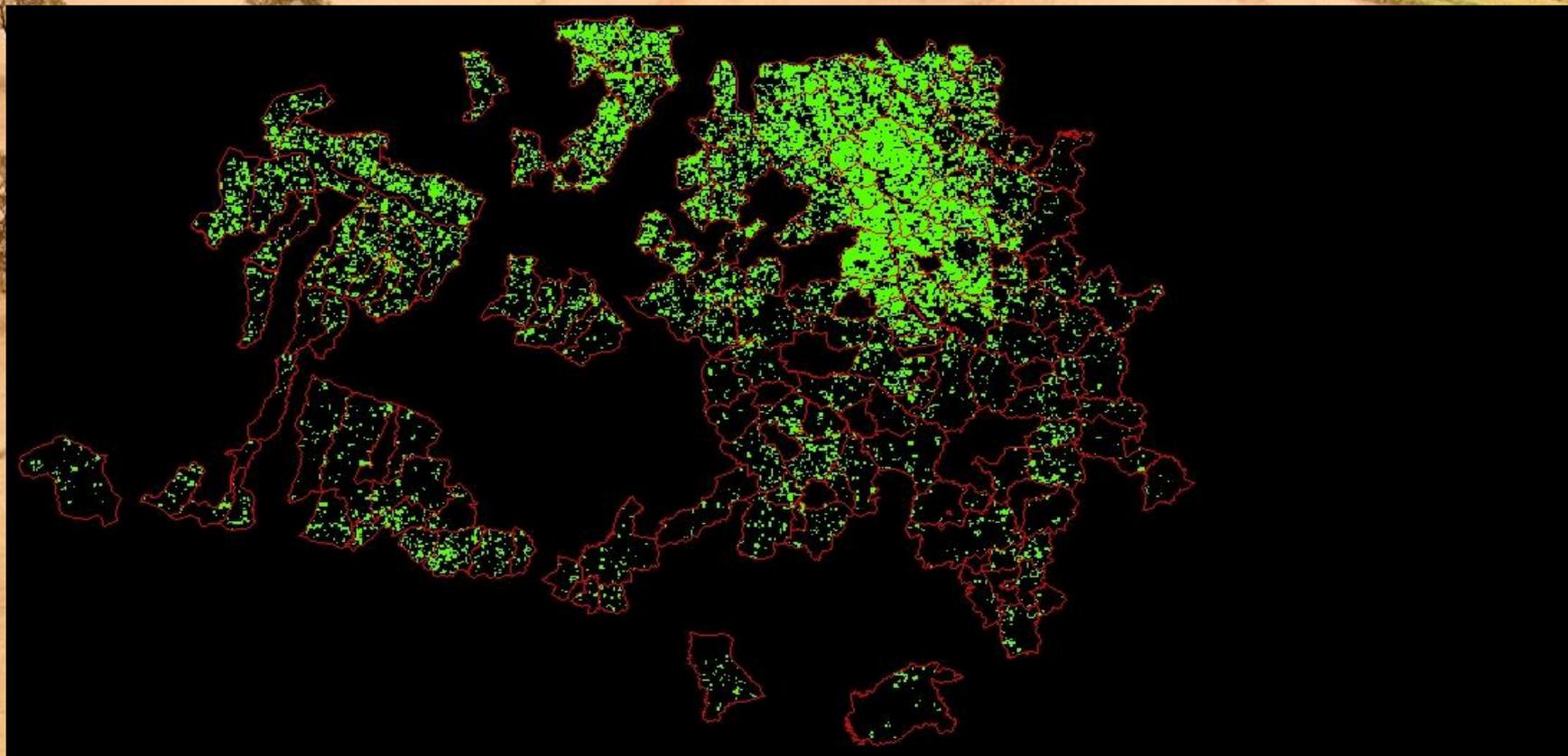
# Sugarcane Mask

May/2010



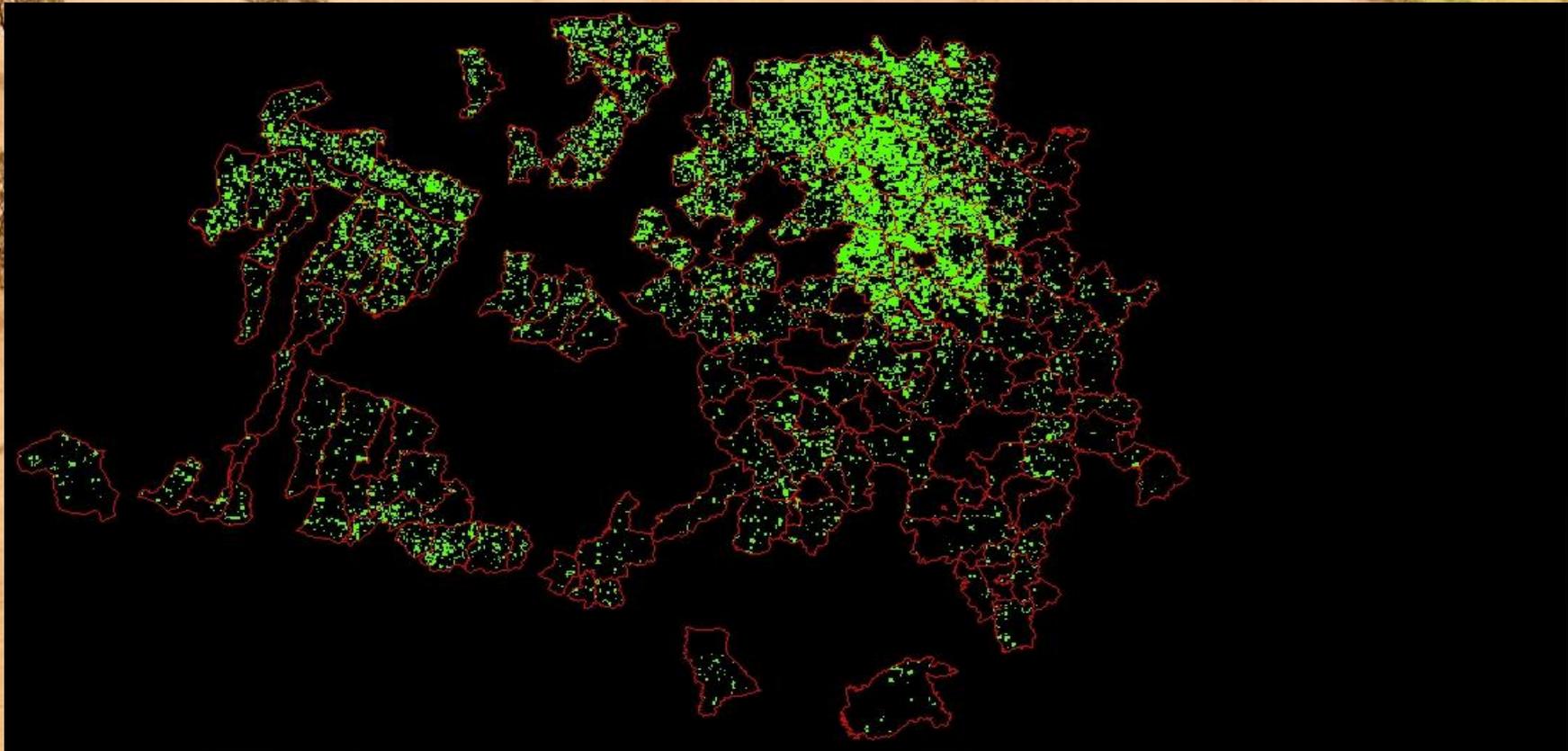
# Sugarcane Mask

June/2010



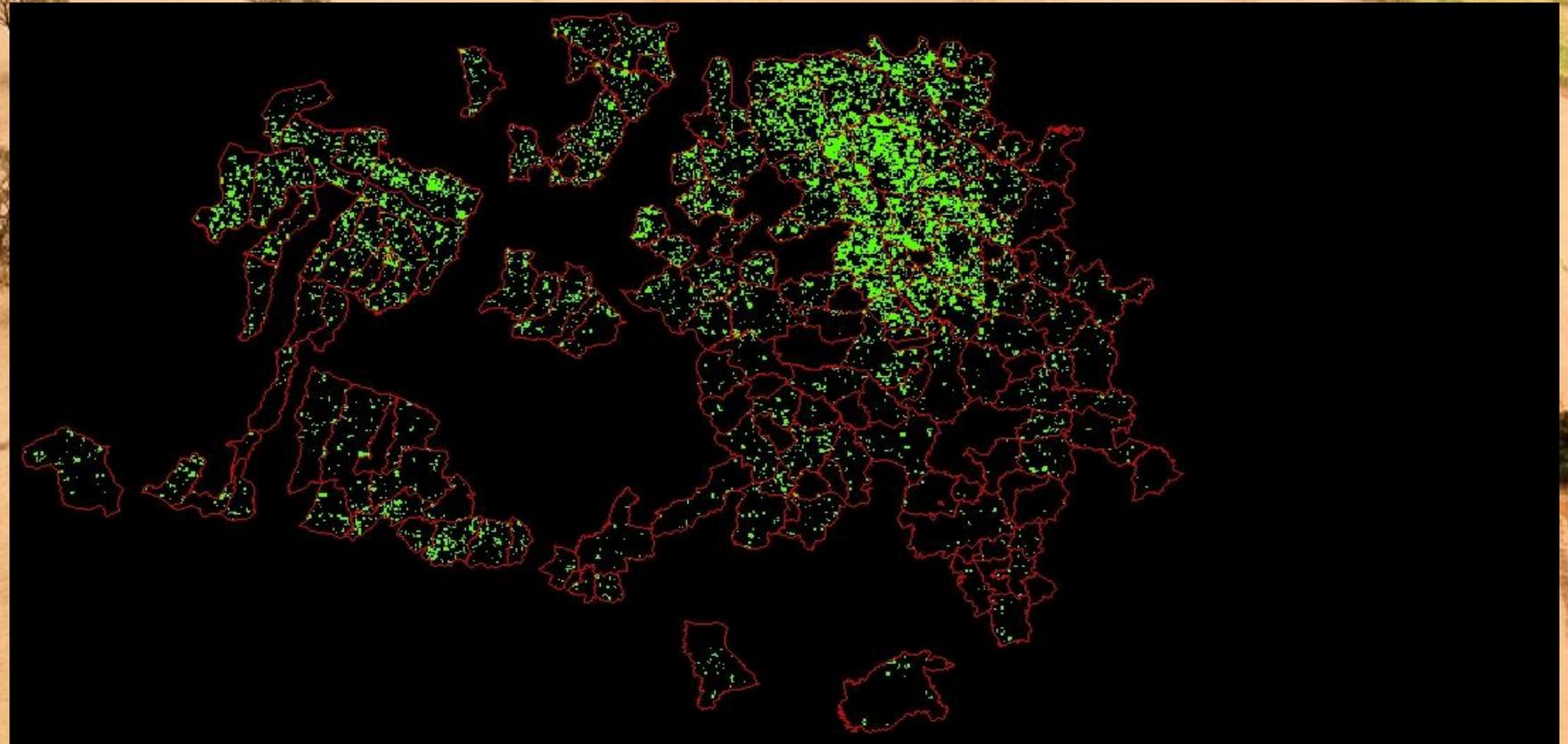
# Sugarcane Mask

July/2010

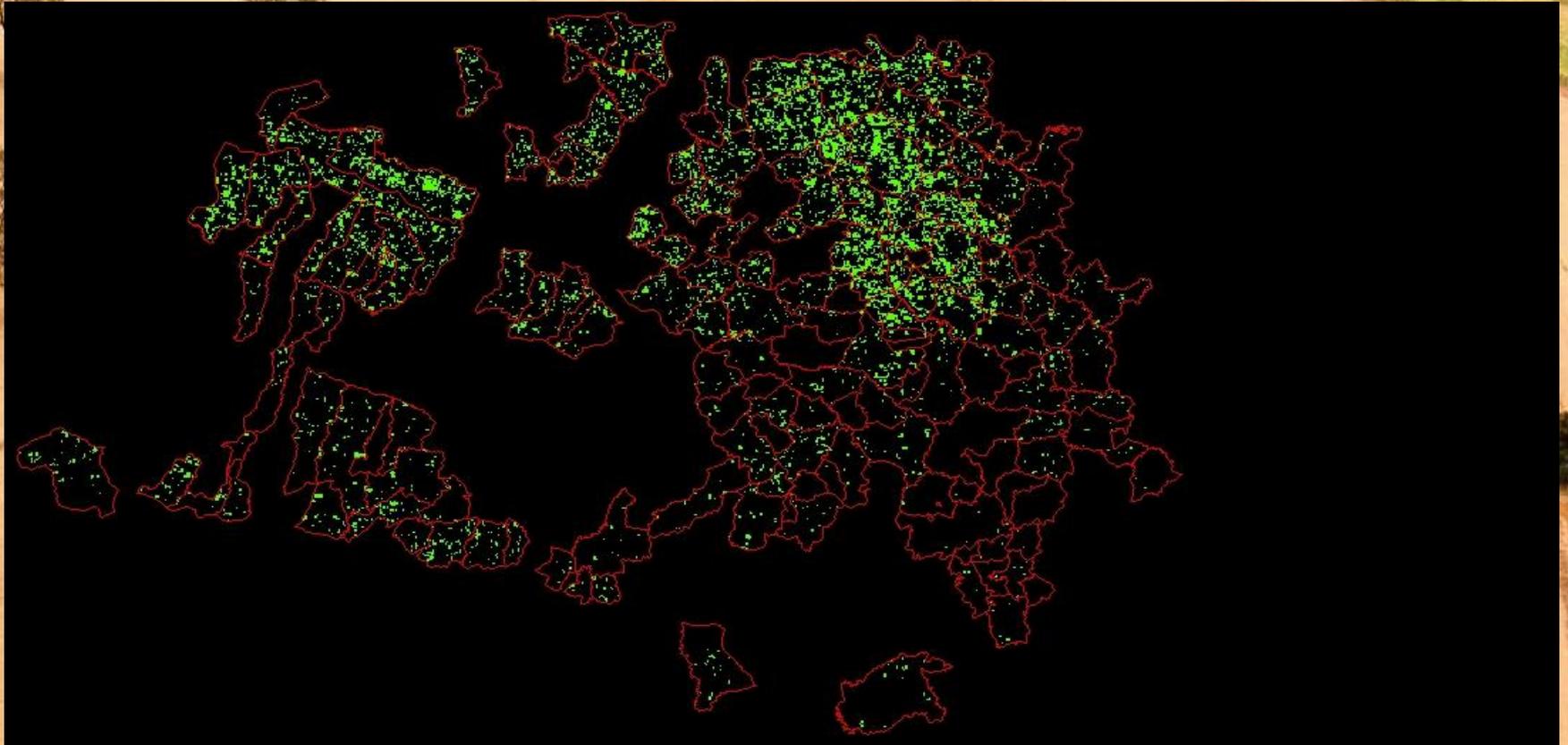


# Sugarcane Mask

August/2010

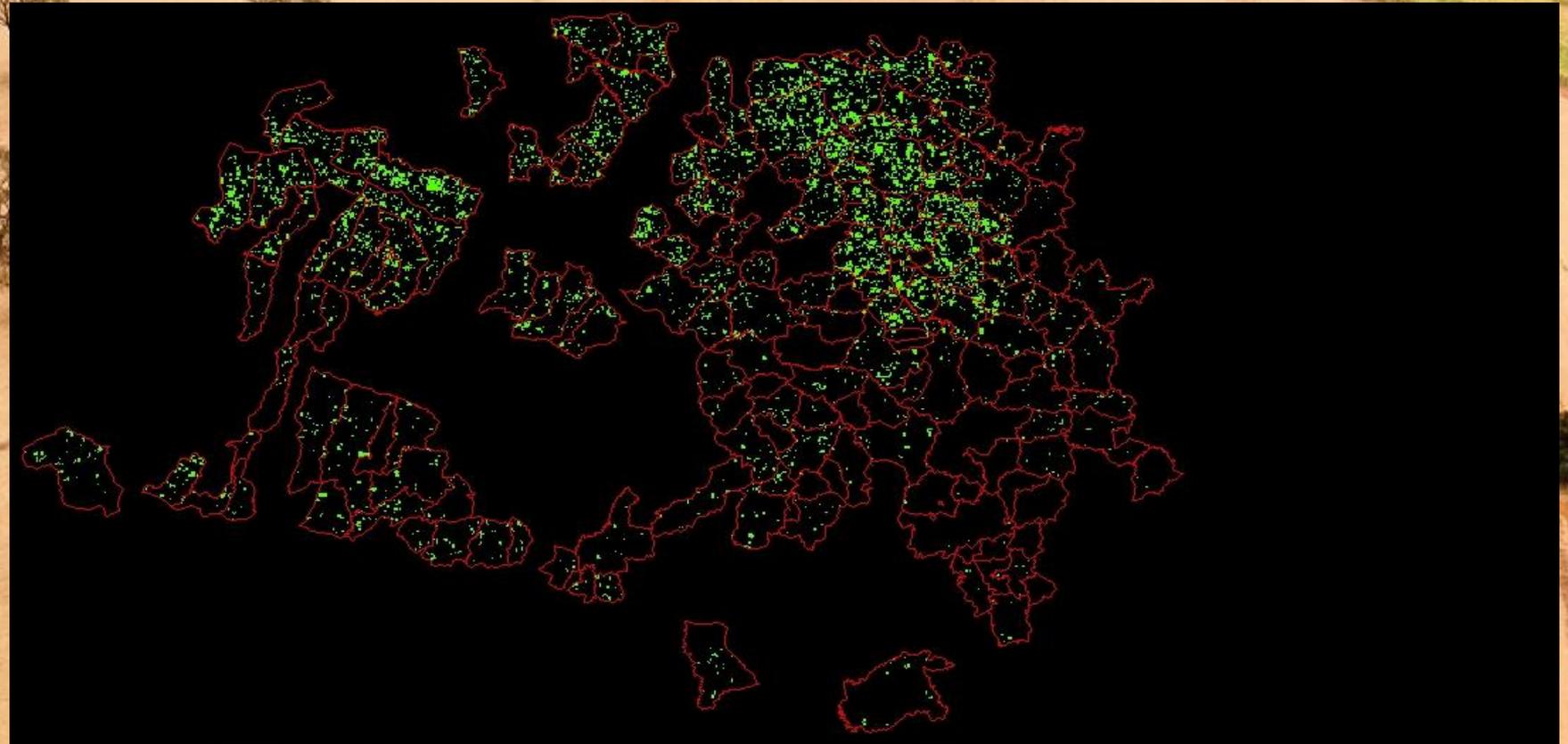


# Sugarcane Mask September/2010



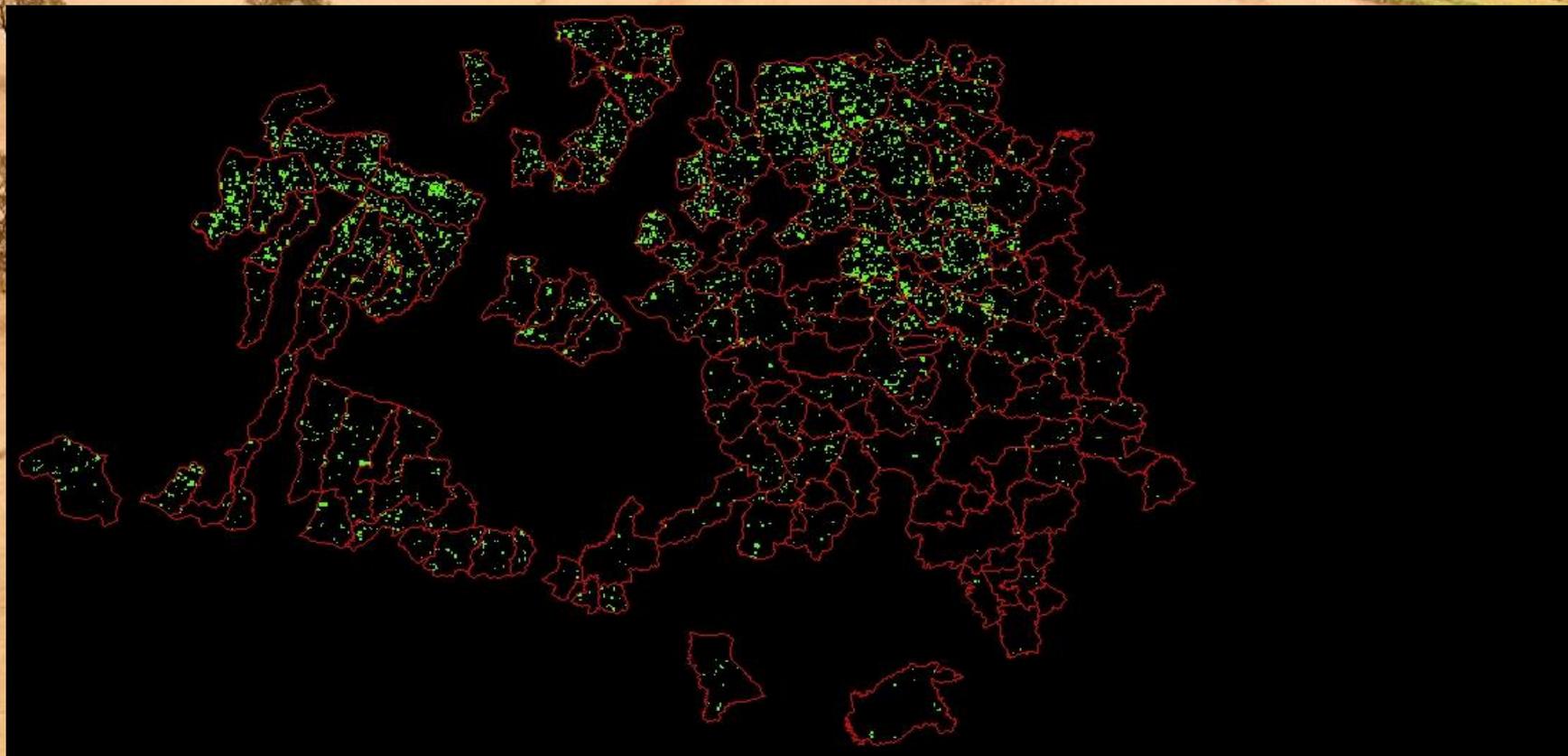
# Sugarcane Mask

October/2010

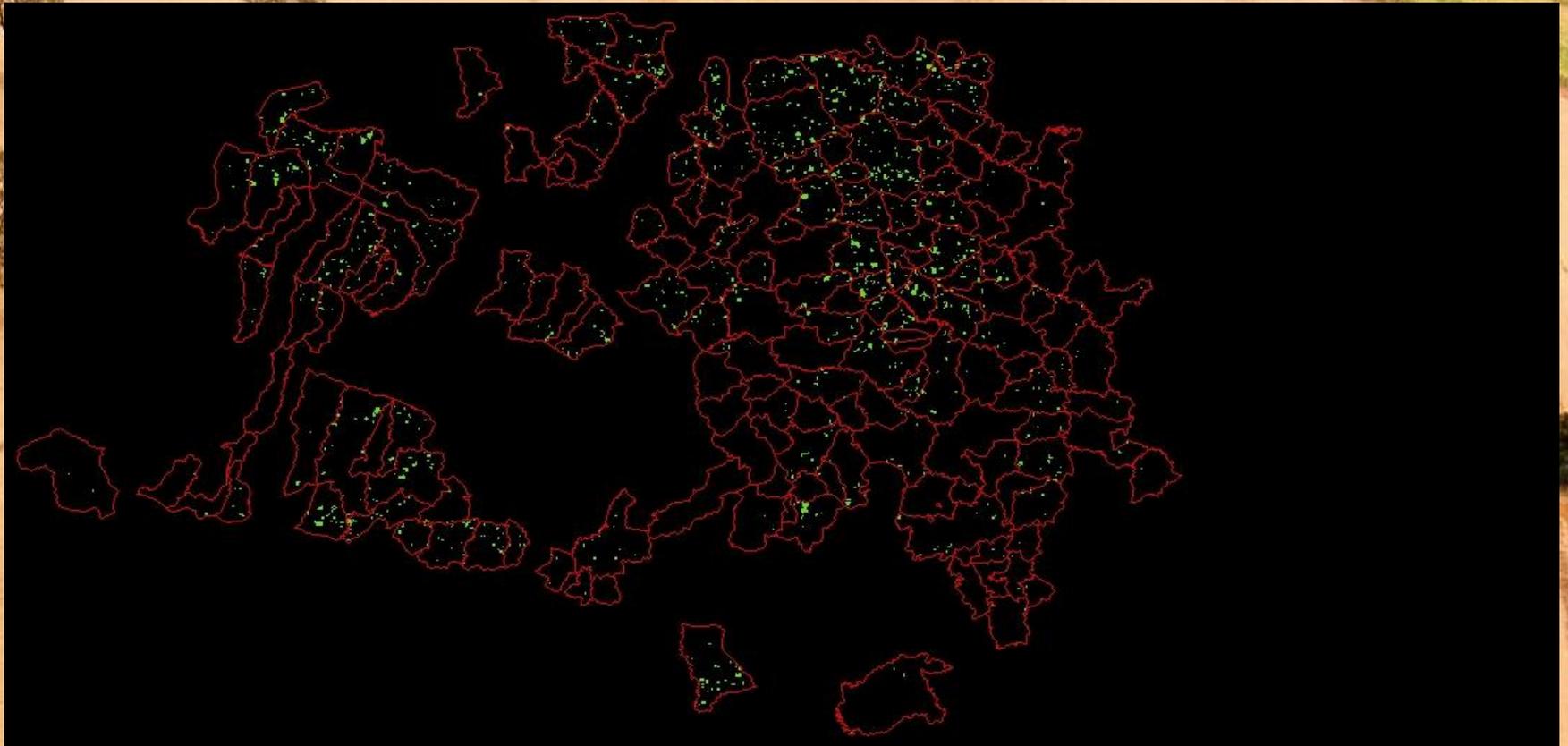


# Sugarcane Mask

November/2010

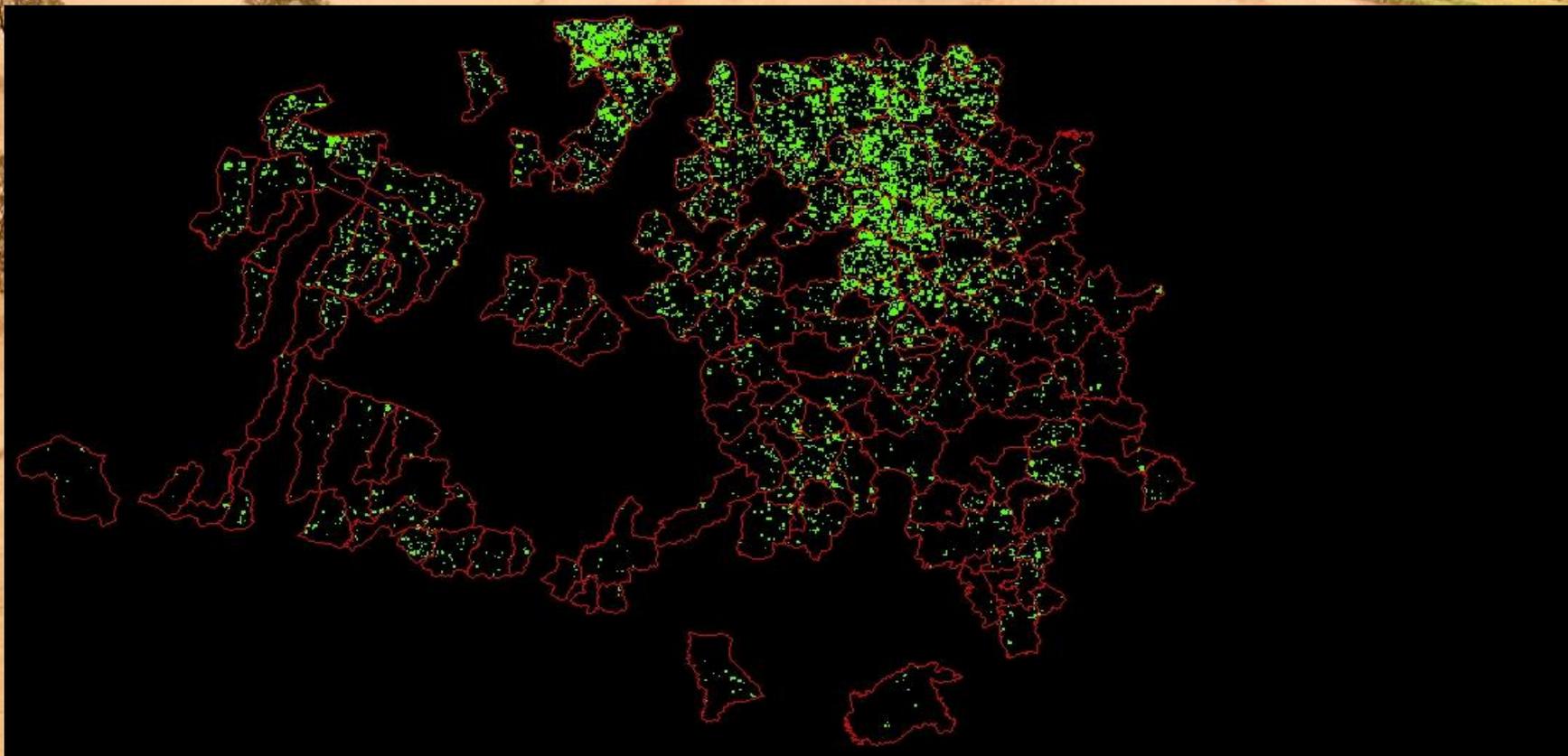


# Sugarcane Mask Early Harvesting



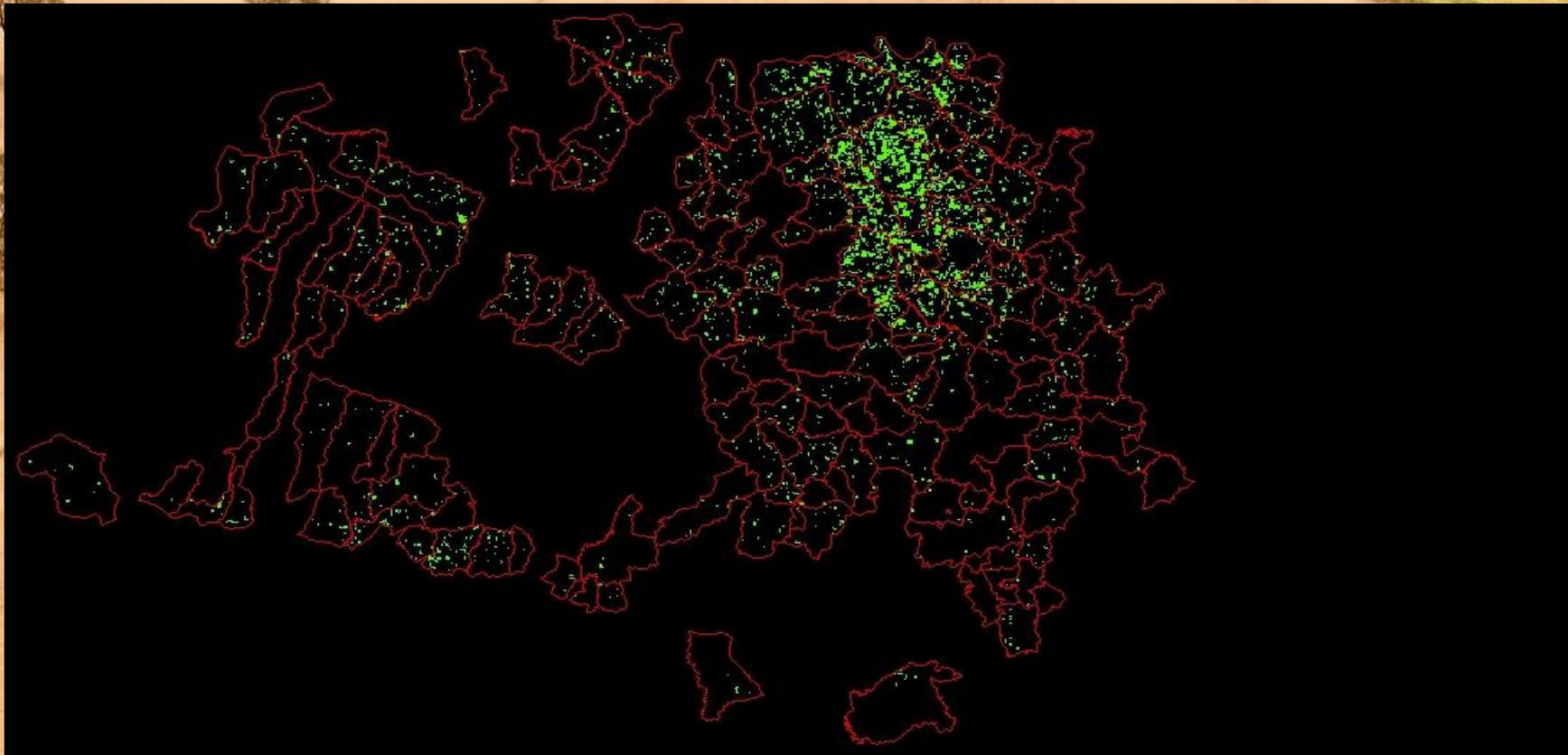
# Sugarcane Mask

## Mid season harvesting

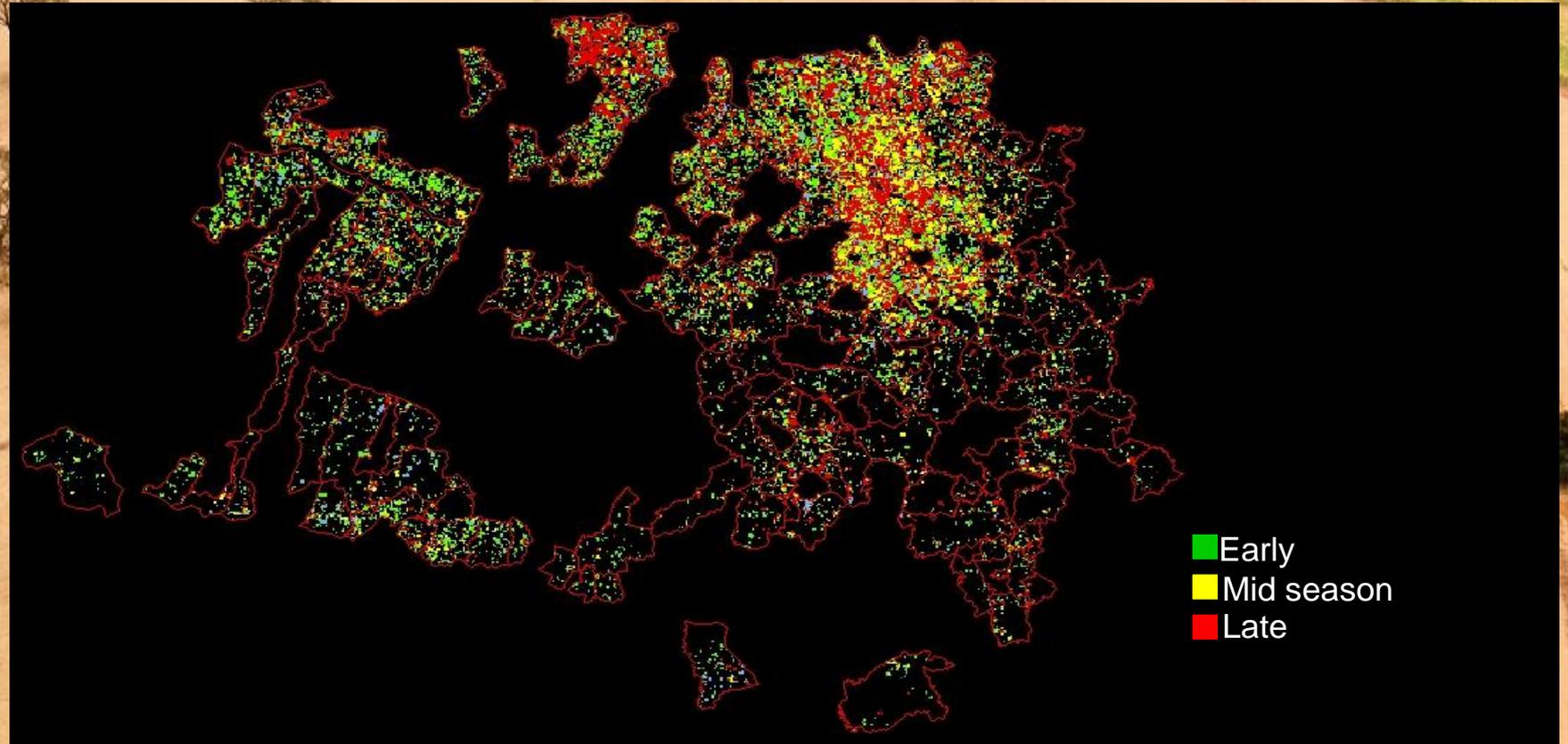


# Sugarcane Mask

## Late harvesting

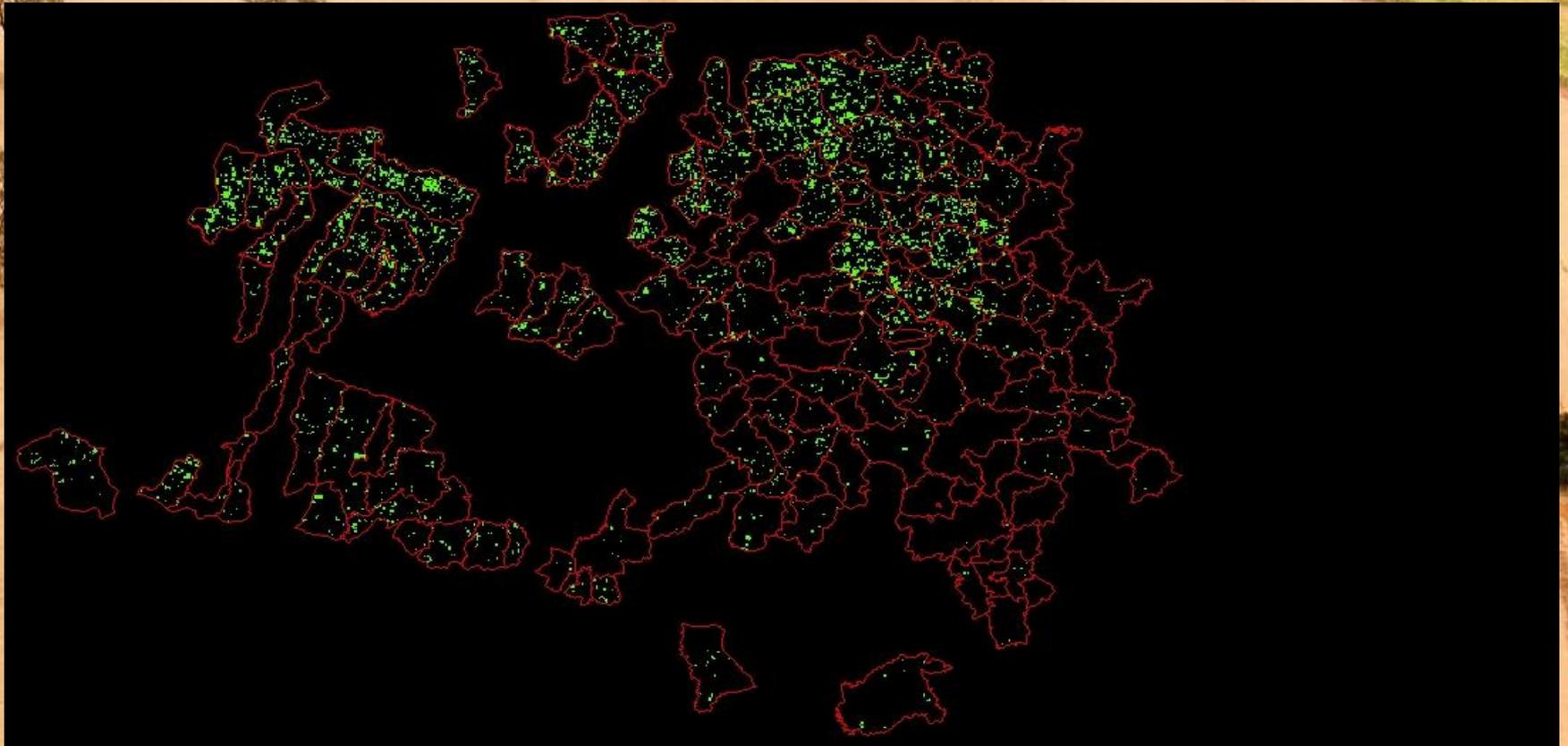


# Sugarcane Mask

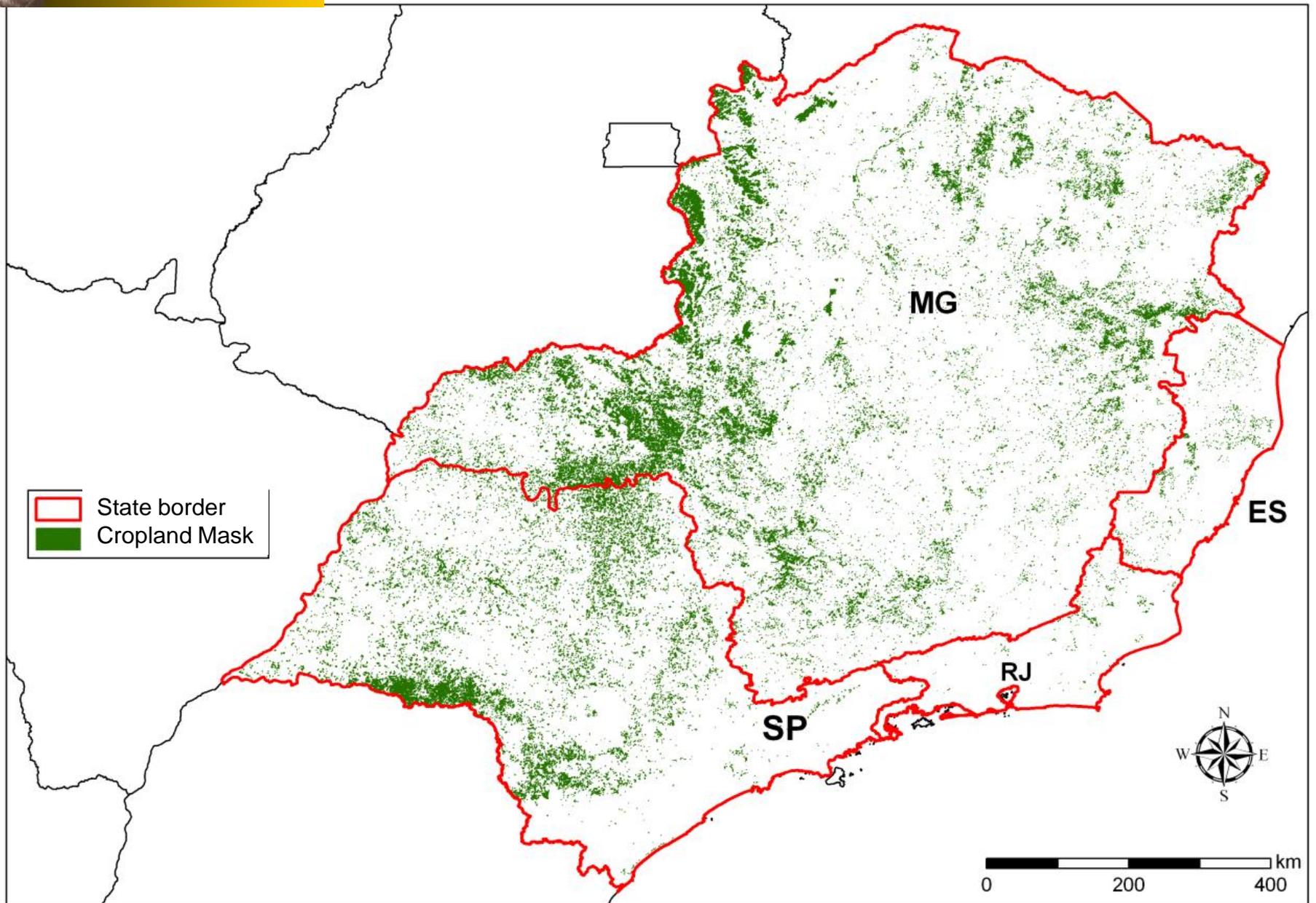


# Sugarcane Mask

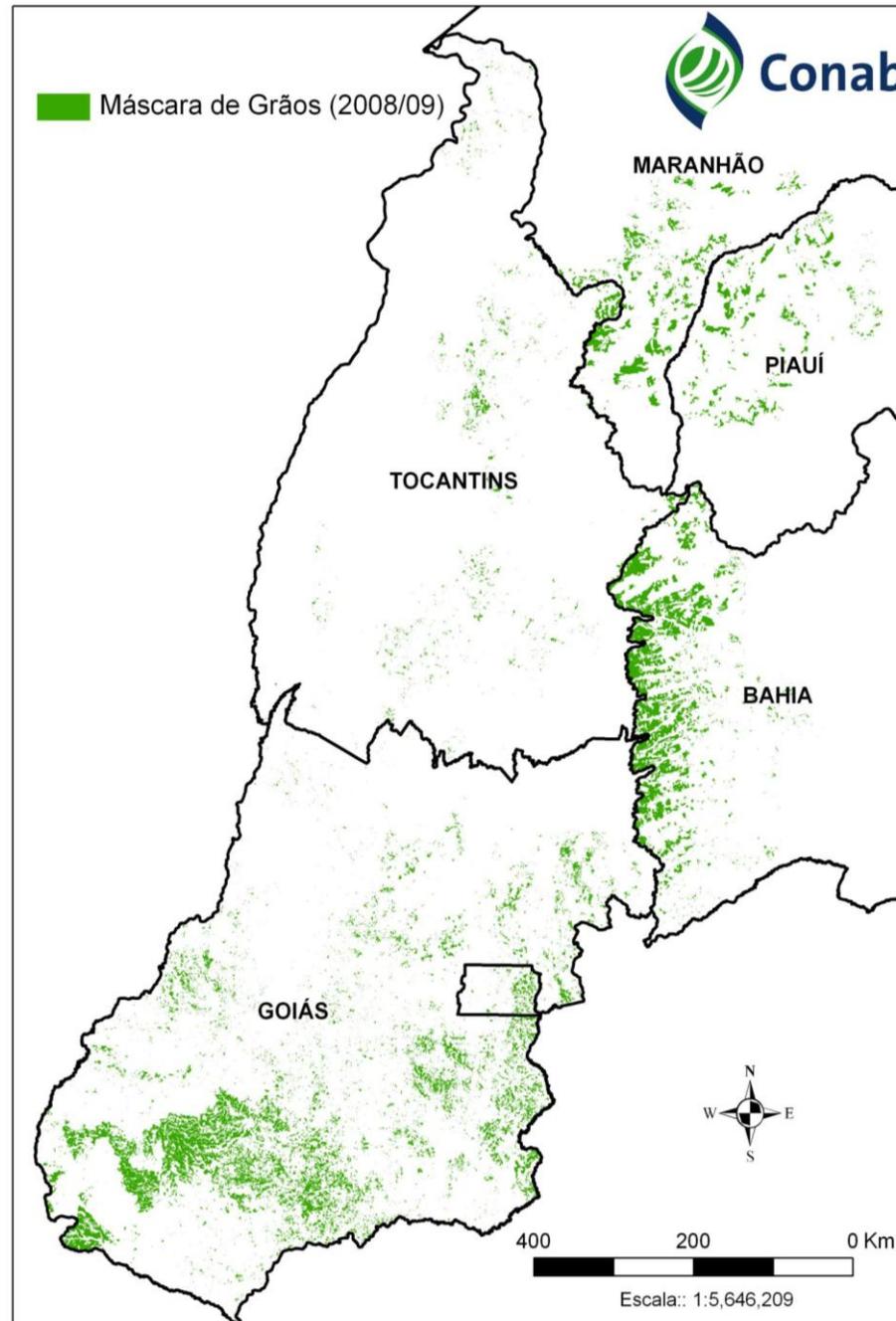
## Non-harvested



# Cropland masks

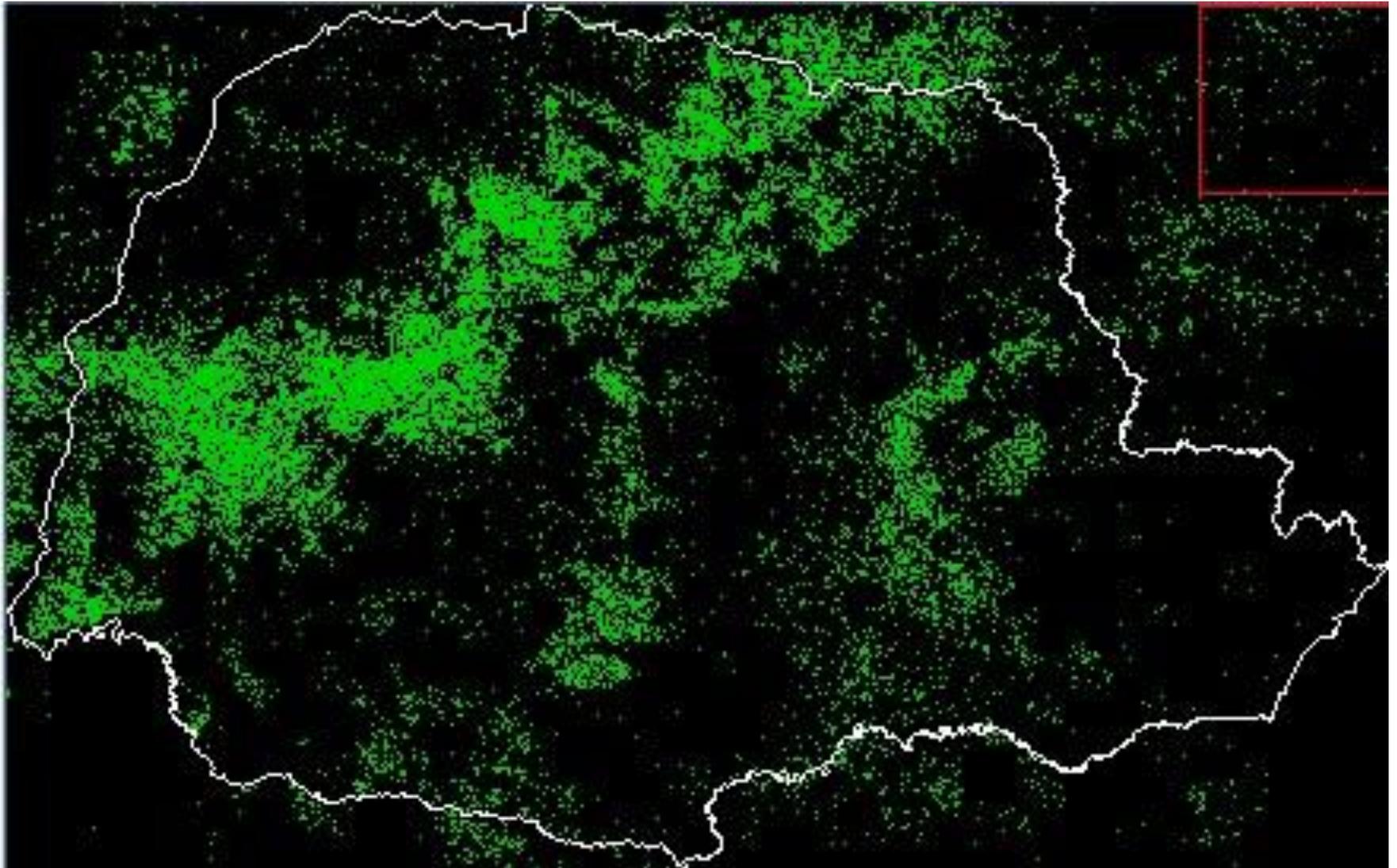


# Cropland masks





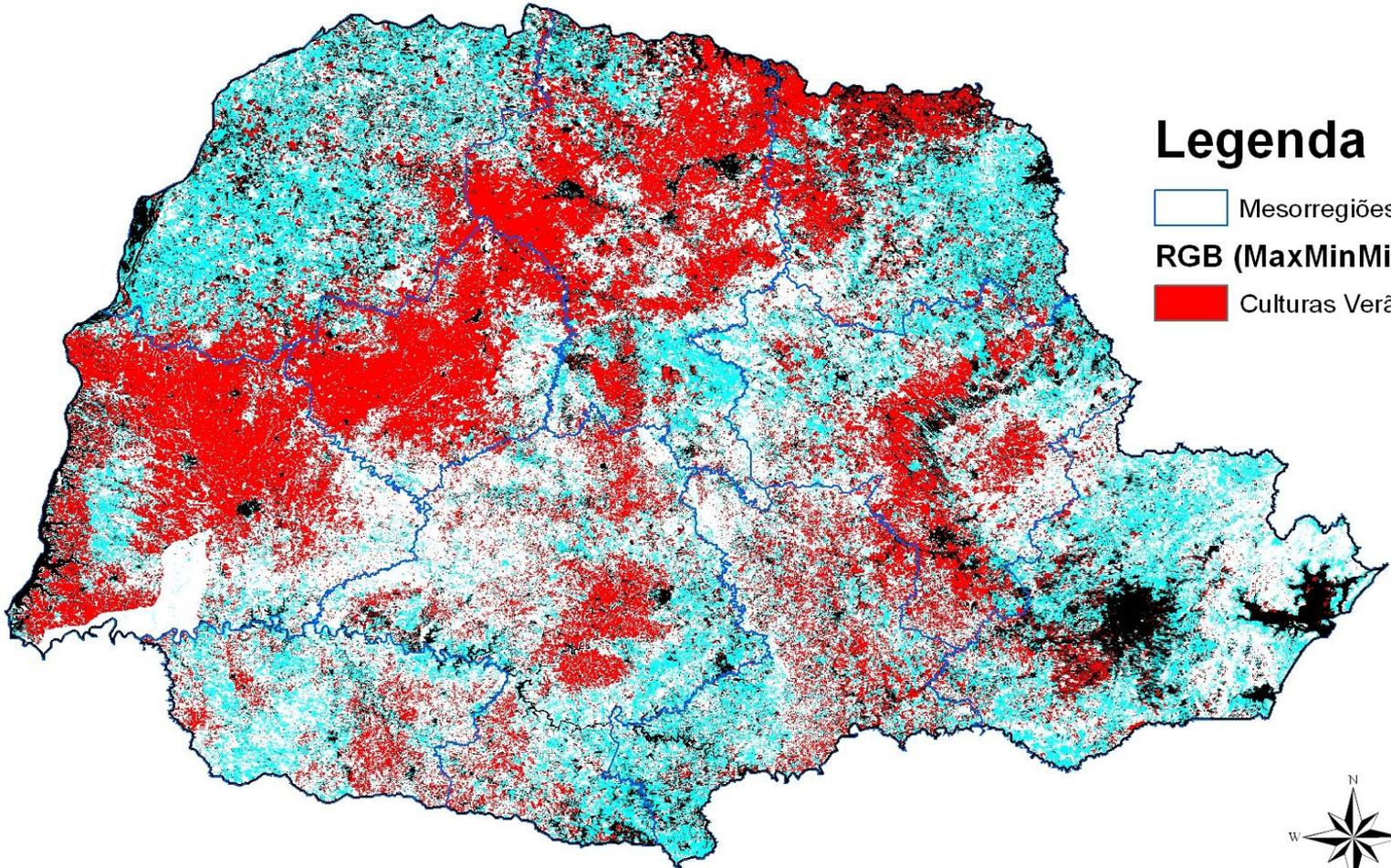
# Improving cropland masks



# Improving cropland masks

(RGB composite of different dates)

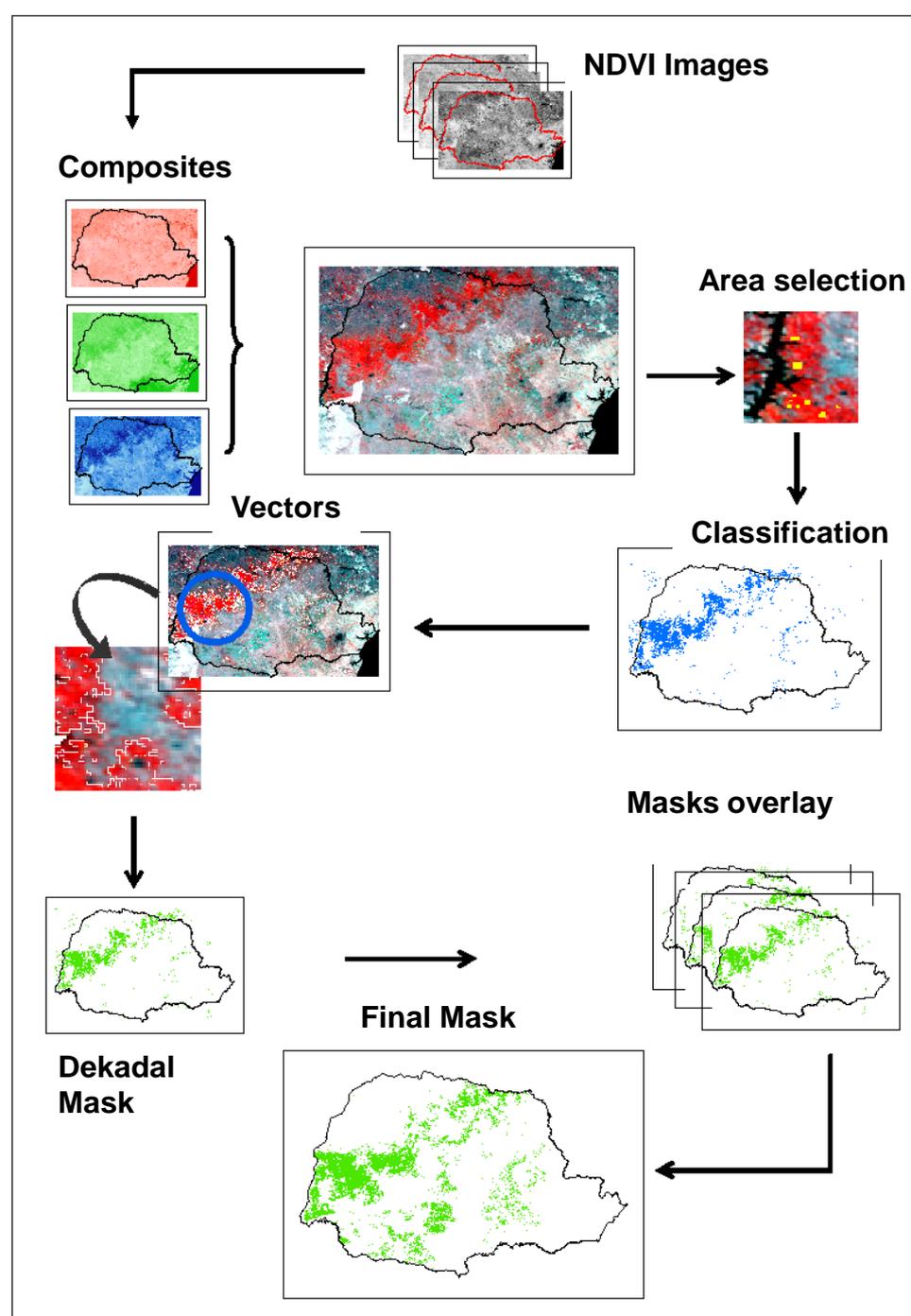
## Cropland Mask 2006/07

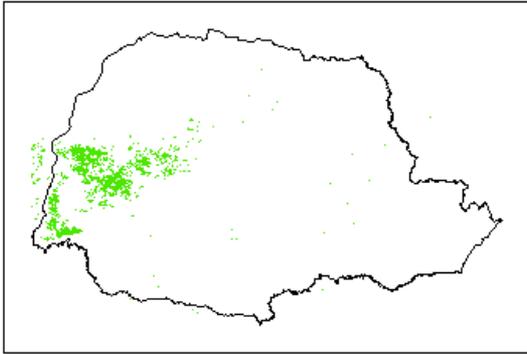


### Legenda

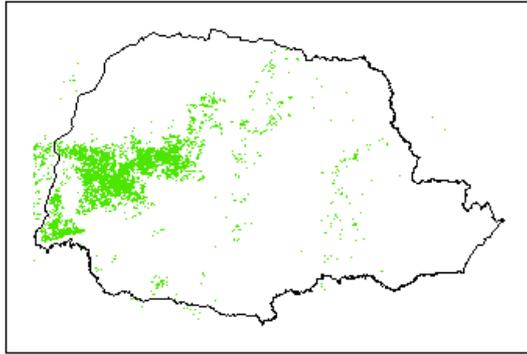
-  Mesorregiões
- RGB (MaxMinMin)
-  Culturas Verão



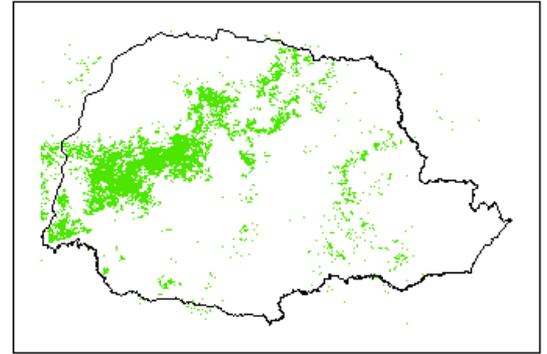




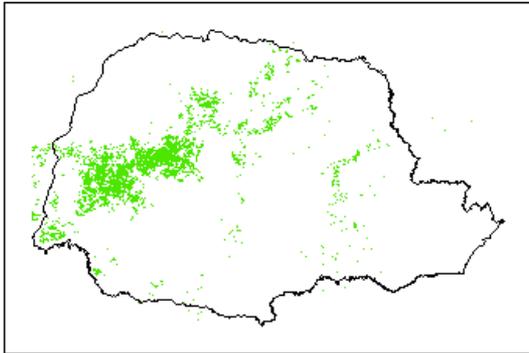
Max: 20061221 Min: 20061001



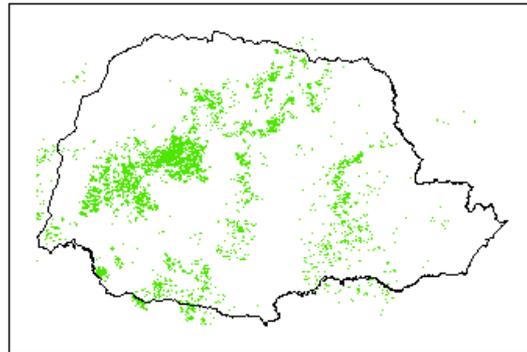
Max: 20070101 Min: 20061011



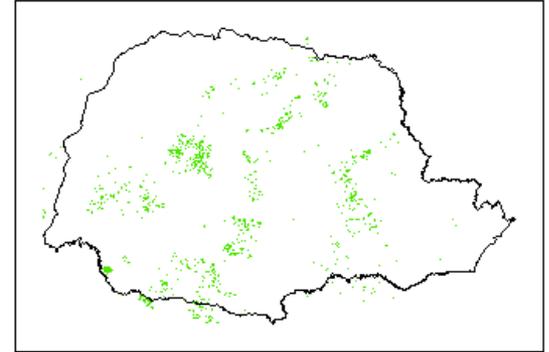
Max: 20070111 Min: 20061011



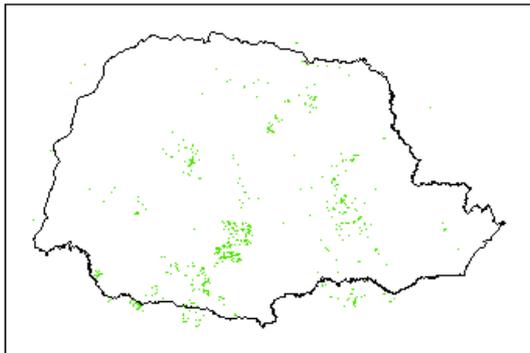
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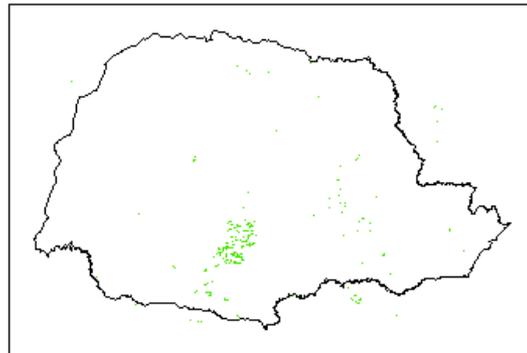
Max: 20070121 Min: 20061101



Max: 20070201 Min: 20061111



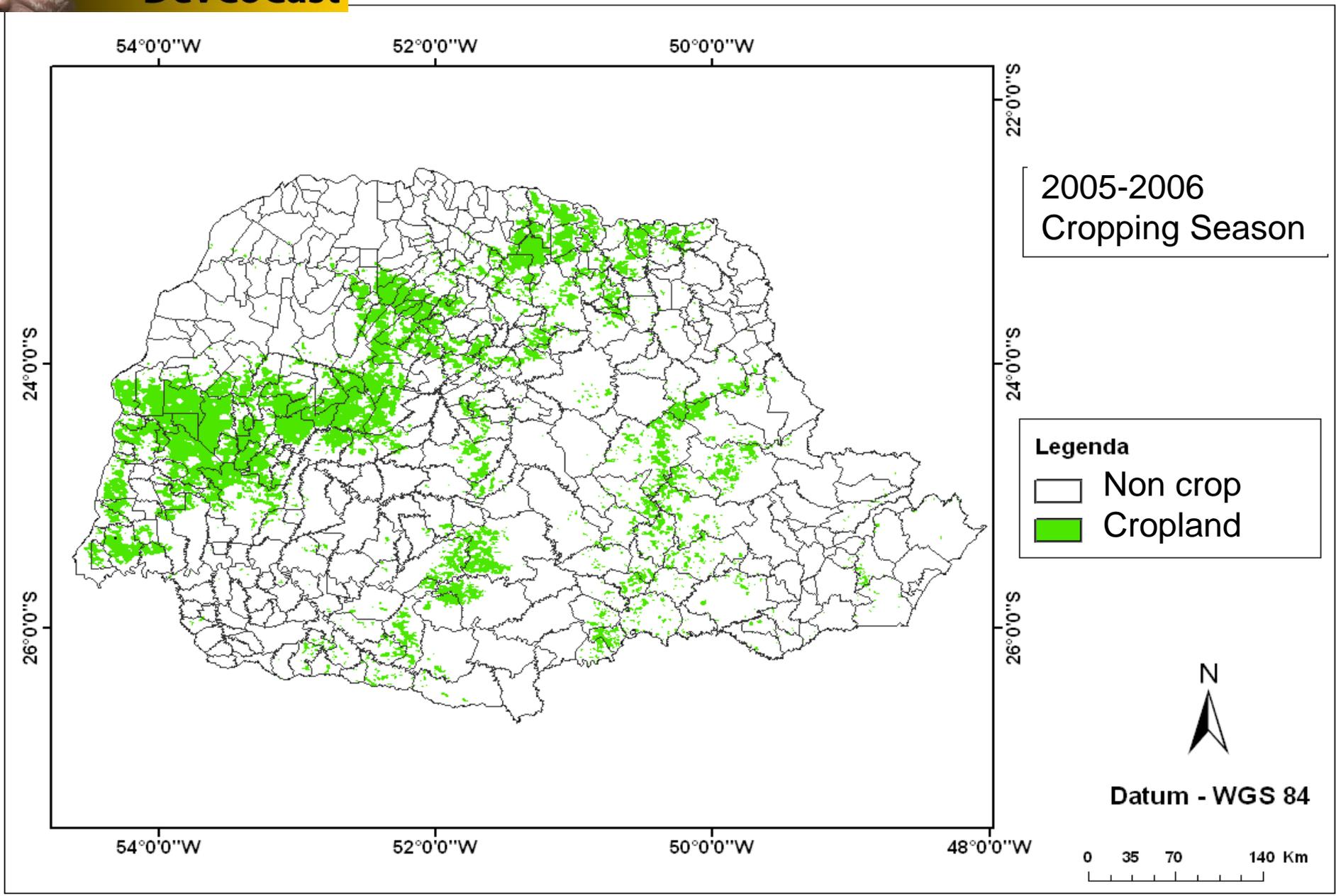
Max: 20070211 Min: 20061121



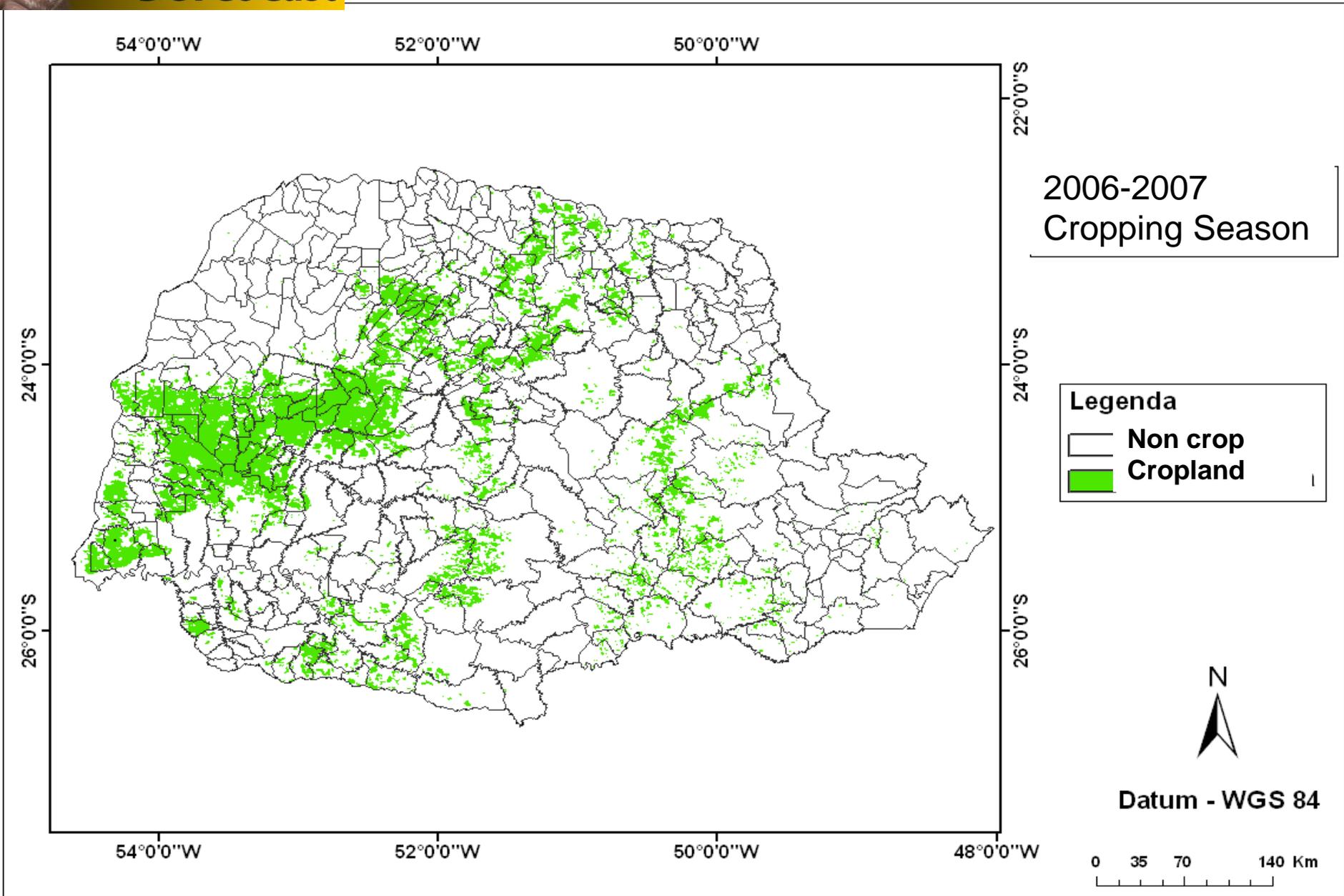
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2006-2007 Cropping  
Season

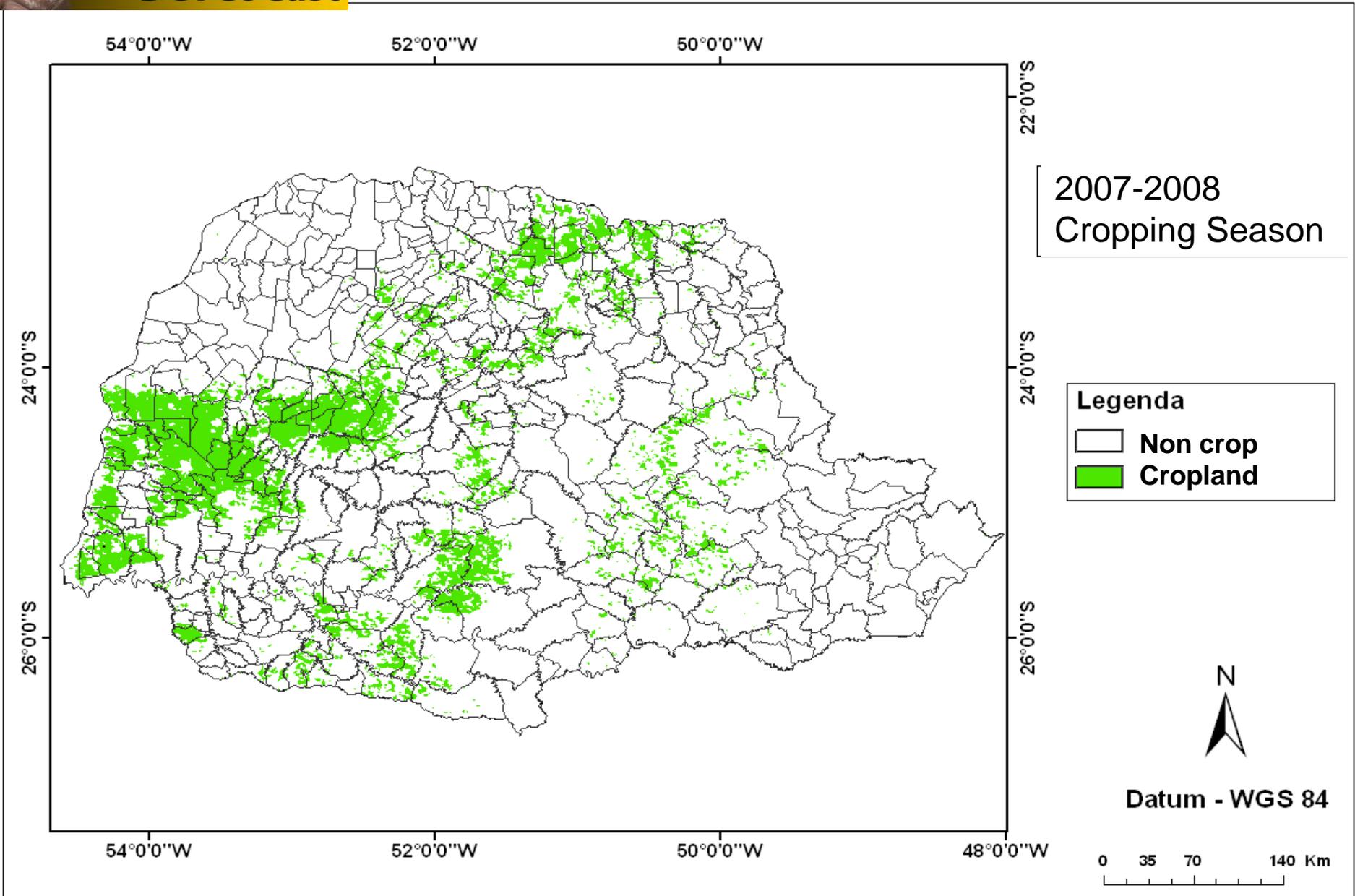
# Improving cropland masks



# Improving cropland masks

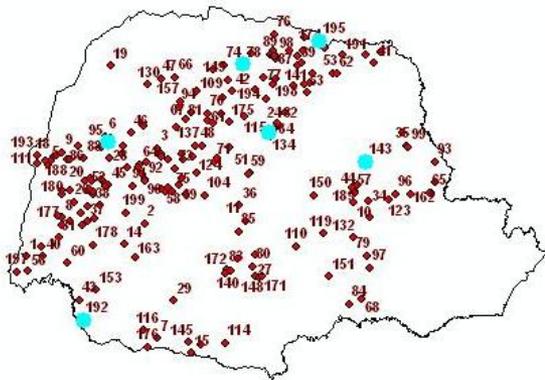
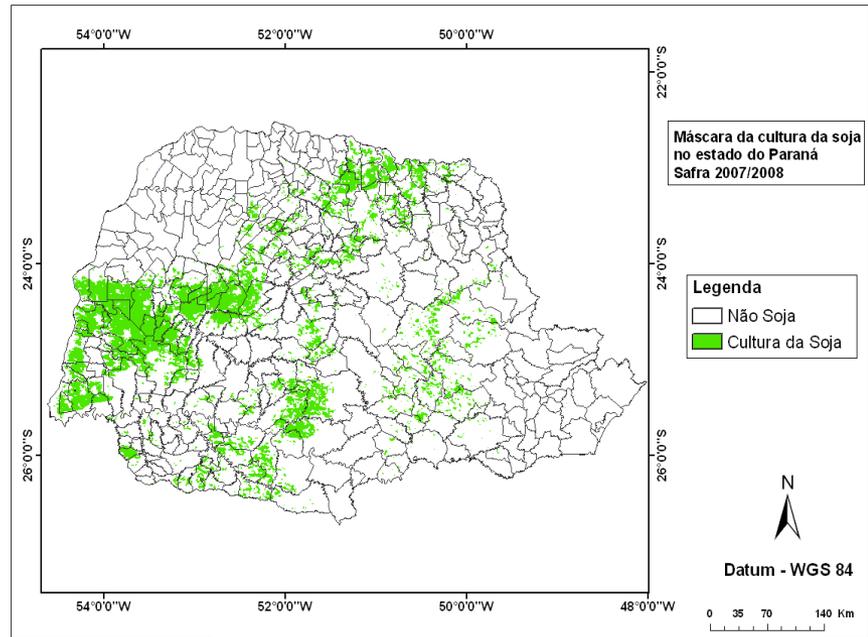


# Improving cropland masks



# Field survey stratified random sampling

- 200 samples/stratum
- 2 strata (mask/non-mask);



Samples within mask



Samples outside mask

## Error matrix

Mask	Ground Data		Total geral
	Cropland	Others	
Cropland	192	8	200
Others	21	179	200
Total geral	213	187	400

**Comission Error**

**4.0%**

**10.5%**

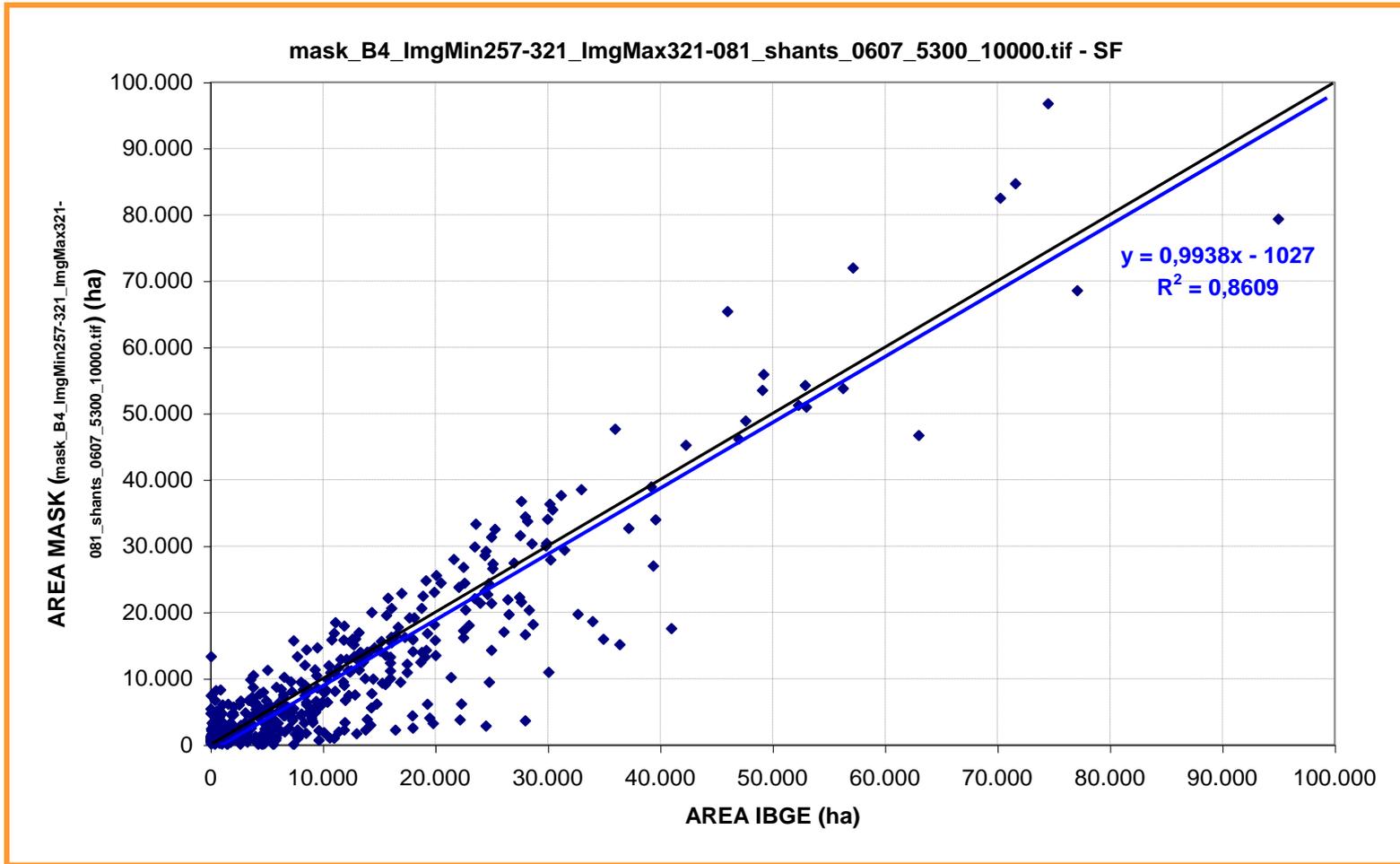
**Omission error**

**9.9%**

**4.3%**

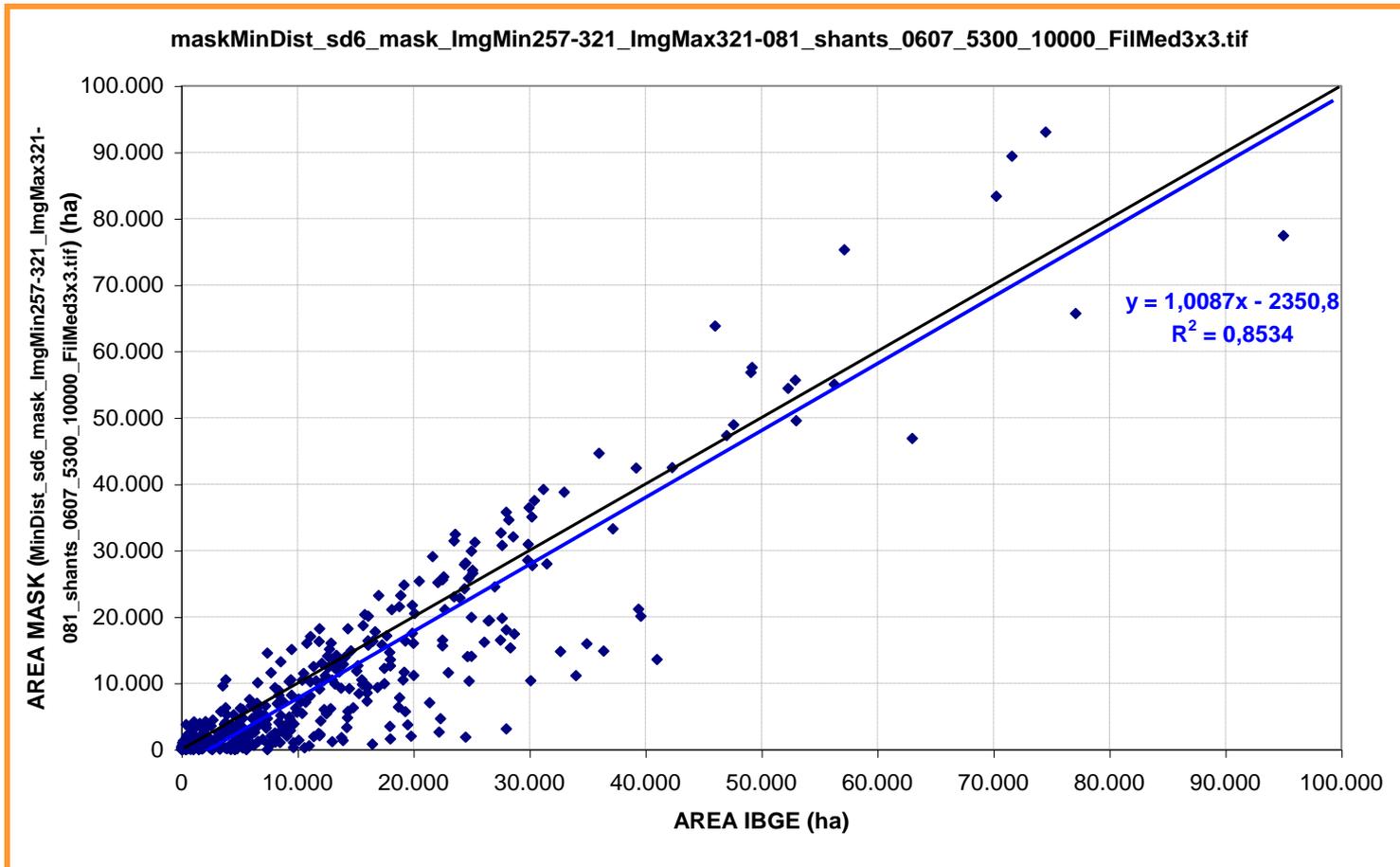
**Overall accuracy:92.75%**  
**Kappa:85.50%**

# IGBE x Mask (2006/2007)

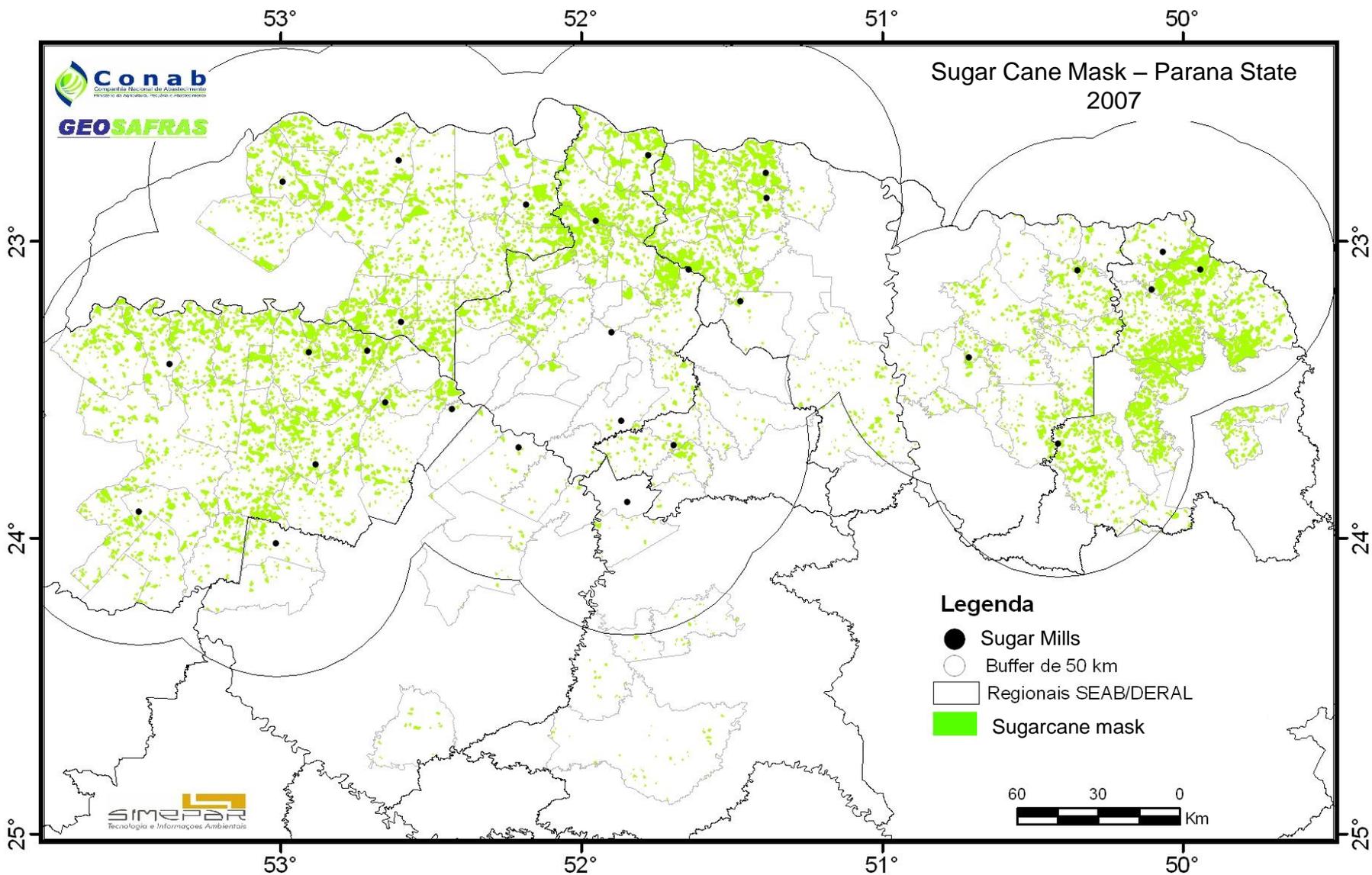


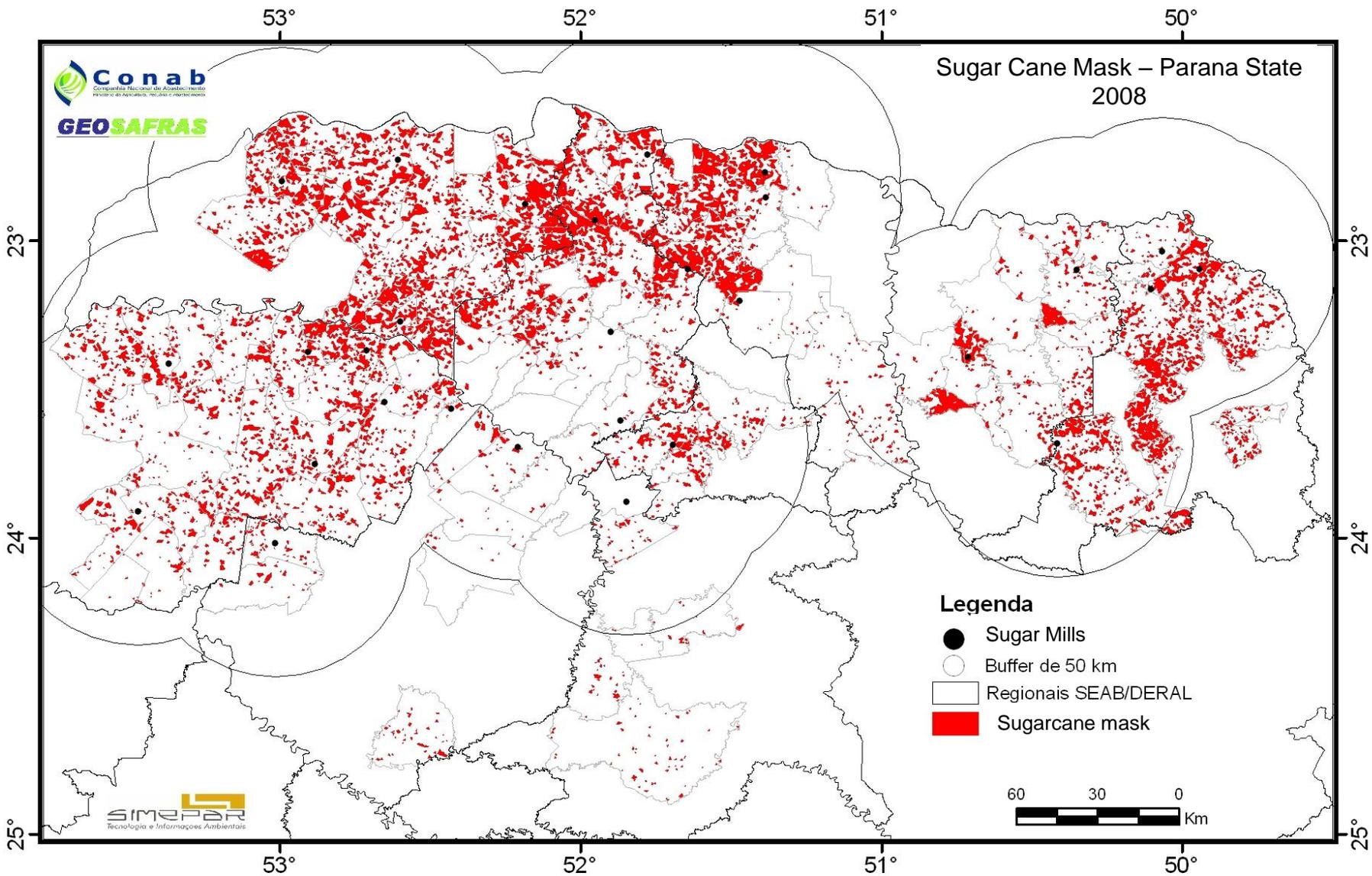
**R = 0,9278**

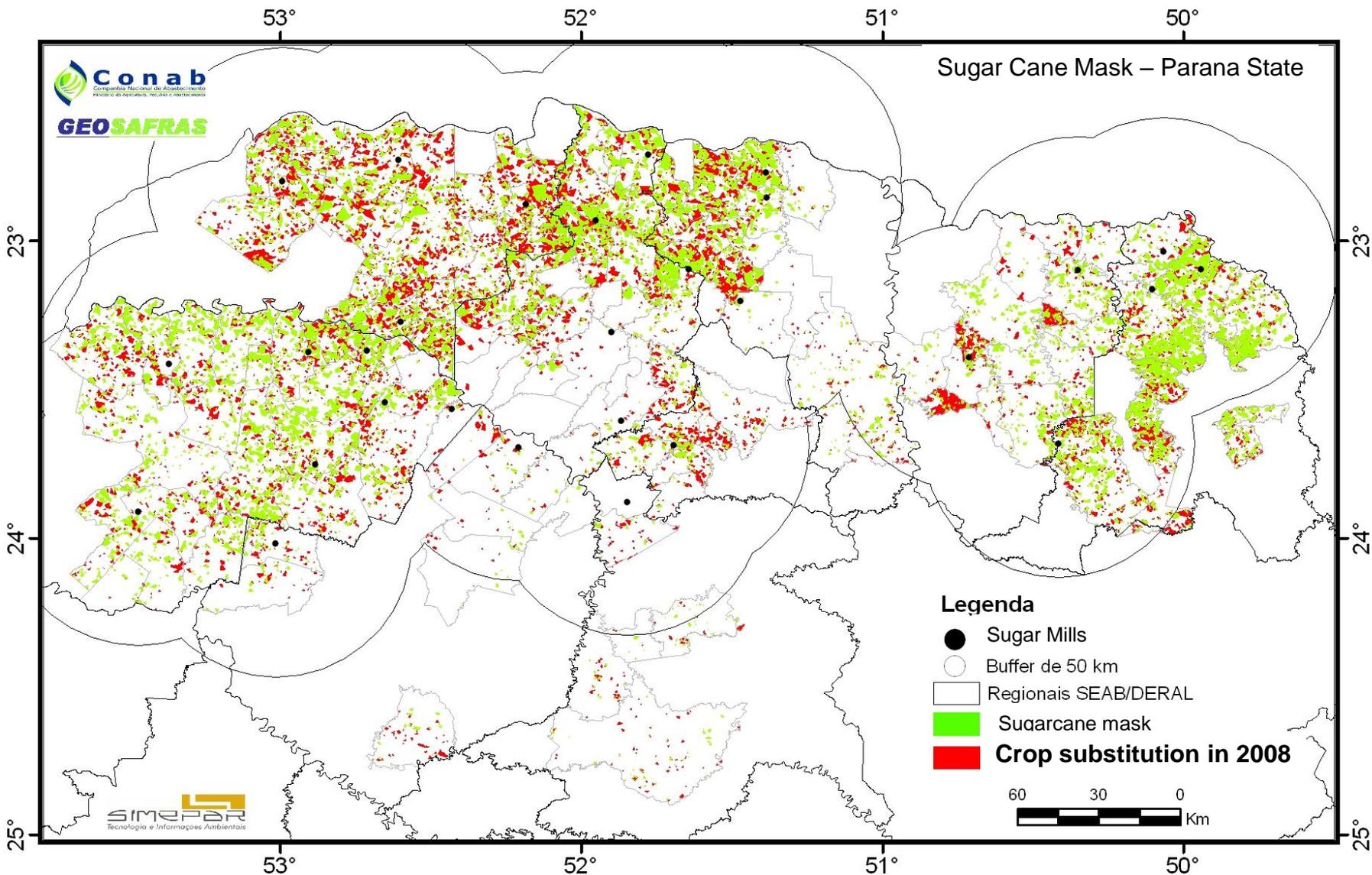
# IGBE x Mask (2007/2008)



**R = 0,9238**



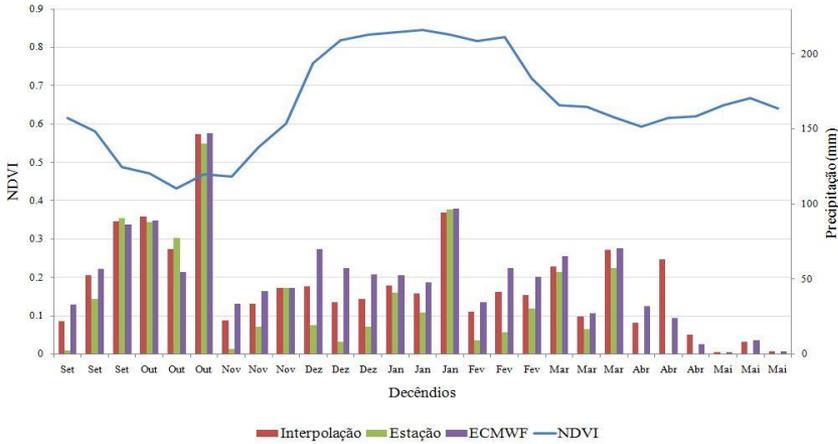




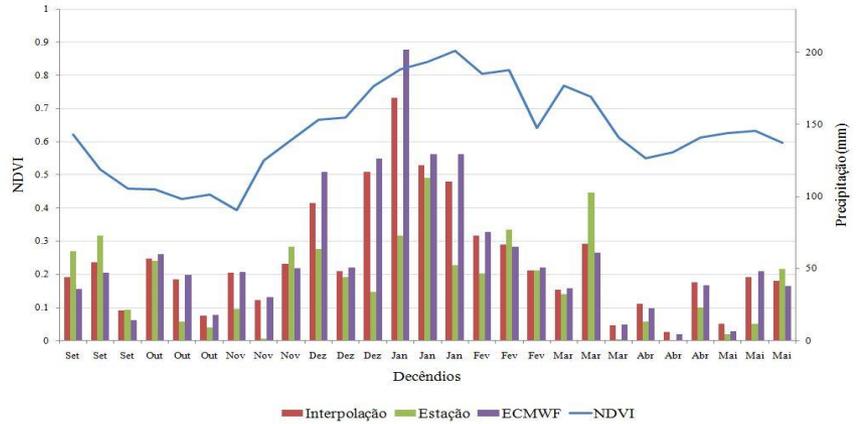
# Improving cropland masks

(mixing NDVI and precipitation to map planting dates)

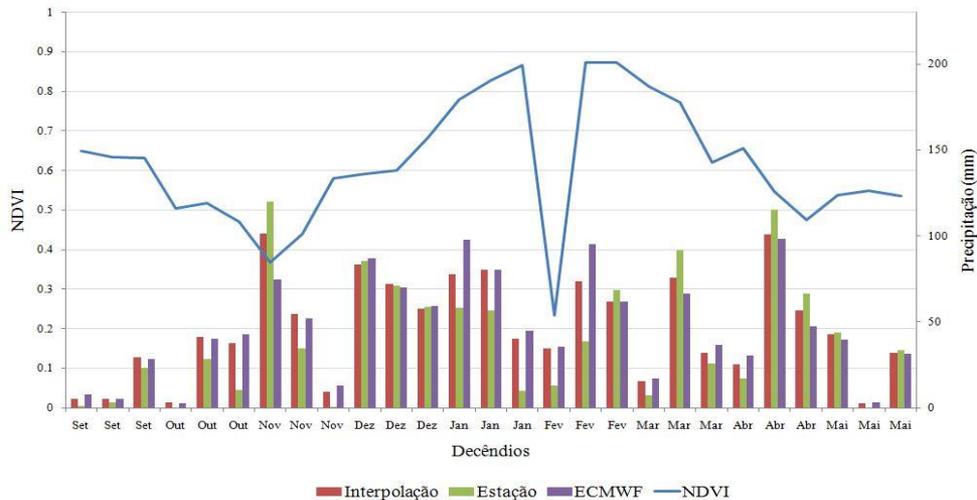
○ 2005/2006



○ 2006/2007



2007/2008



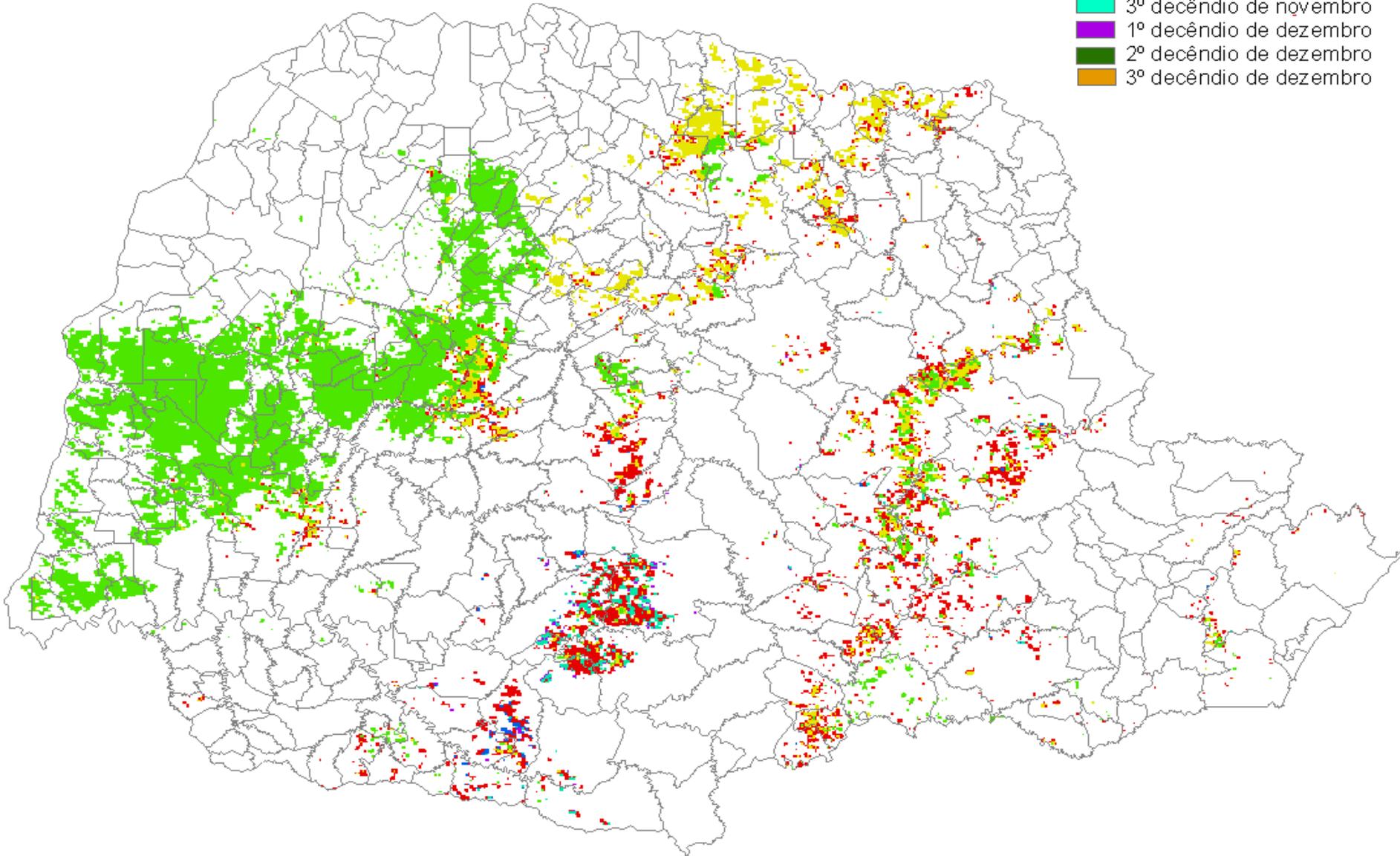


# Planting dates

2005/2006

Rainfall interval 50mm e 75mm

- 1º decêndio de outubro
- 2º decêndio de outubro
- 3º decêndio de outubro
- 1º decêndio de novembro
- 2º decêndio de novembro
- 3º decêndio de novembro
- 1º decêndio de dezembro
- 2º decêndio de dezembro
- 3º decêndio de dezembro

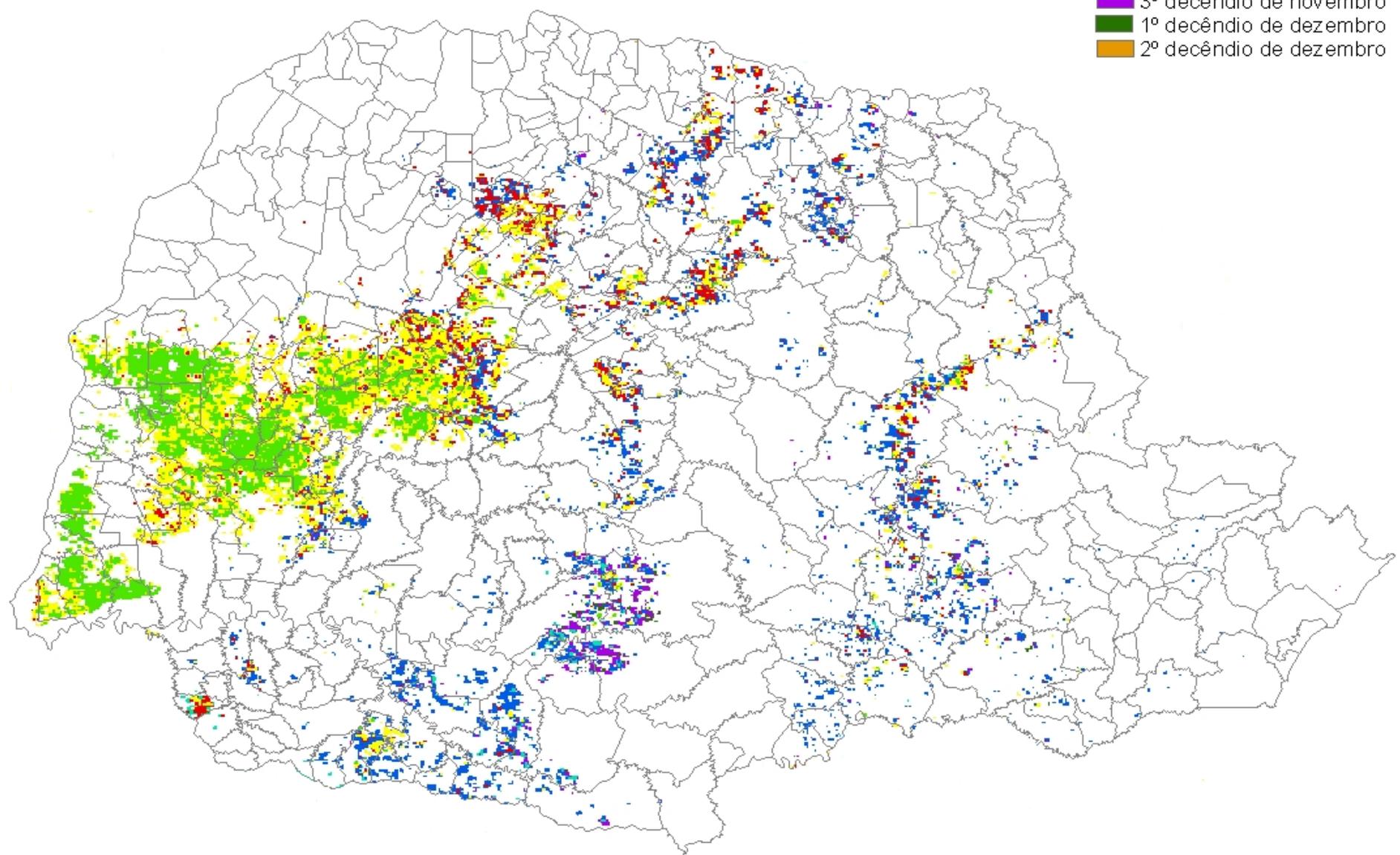




# Planting dates 2006/2007

Rainfall interval 30mm e 75mm

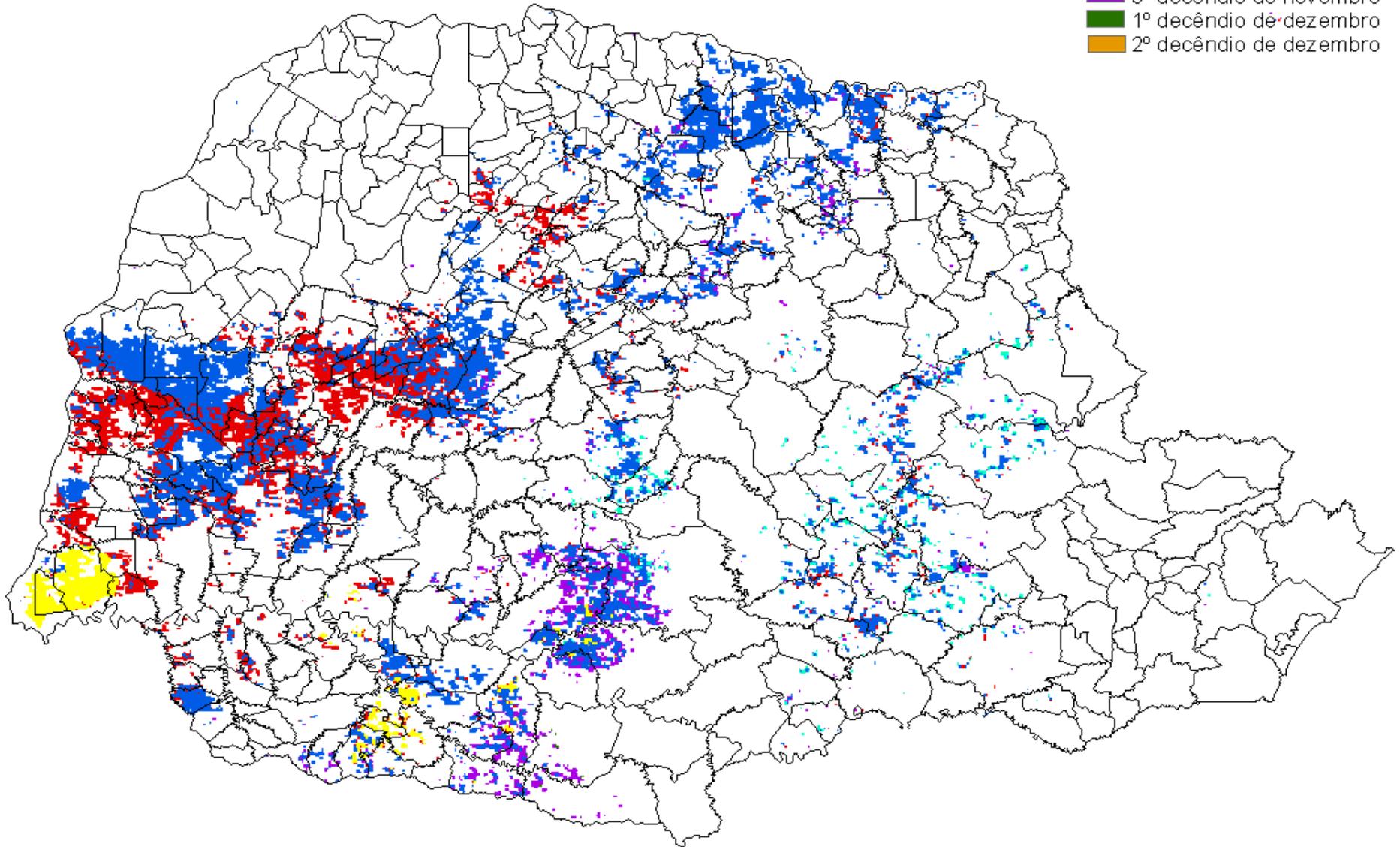
- 1º decêndio de outubro
- 2º decêndio de outubro
- 3º decêndio de outubro
- 1º decêndio de novembro
- 2º decêndio de novembro
- 3º decêndio de novembro
- 1º decêndio de dezembro
- 2º decêndio de dezembro



# Planting dates 2007/2008

**Rainfall > 75mm**

- 1º decêndio de outubro
- 2º decêndio de outubro
- 3º decêndio de outubro
- 1º decêndio de novembro
- 2º decêndio de novembro
- 3º decêndio de novembro
- 1º decêndio de dezembro
- 2º decêndio de dezembro



## General Conclusion:

- VGT NDVI products are suitable for national scale sugarcane/cropland mask generation and monitoring
- association with meteorological data could improve the masks and provide new information such as planting period

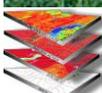
## Constraints:

- frequent updates and timely availability of VGT products for South America
- availability of historical time series of all data (vgt and meteo)

## Potential:

- With historical database and updates it is possible to detect patterns in agricultural land use dynamics and possible correlation with climate change

# THANK YOU!!!



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