Characterizing post-deforestation land use intensity in the Brazilian Amazon using dense Landsat time series

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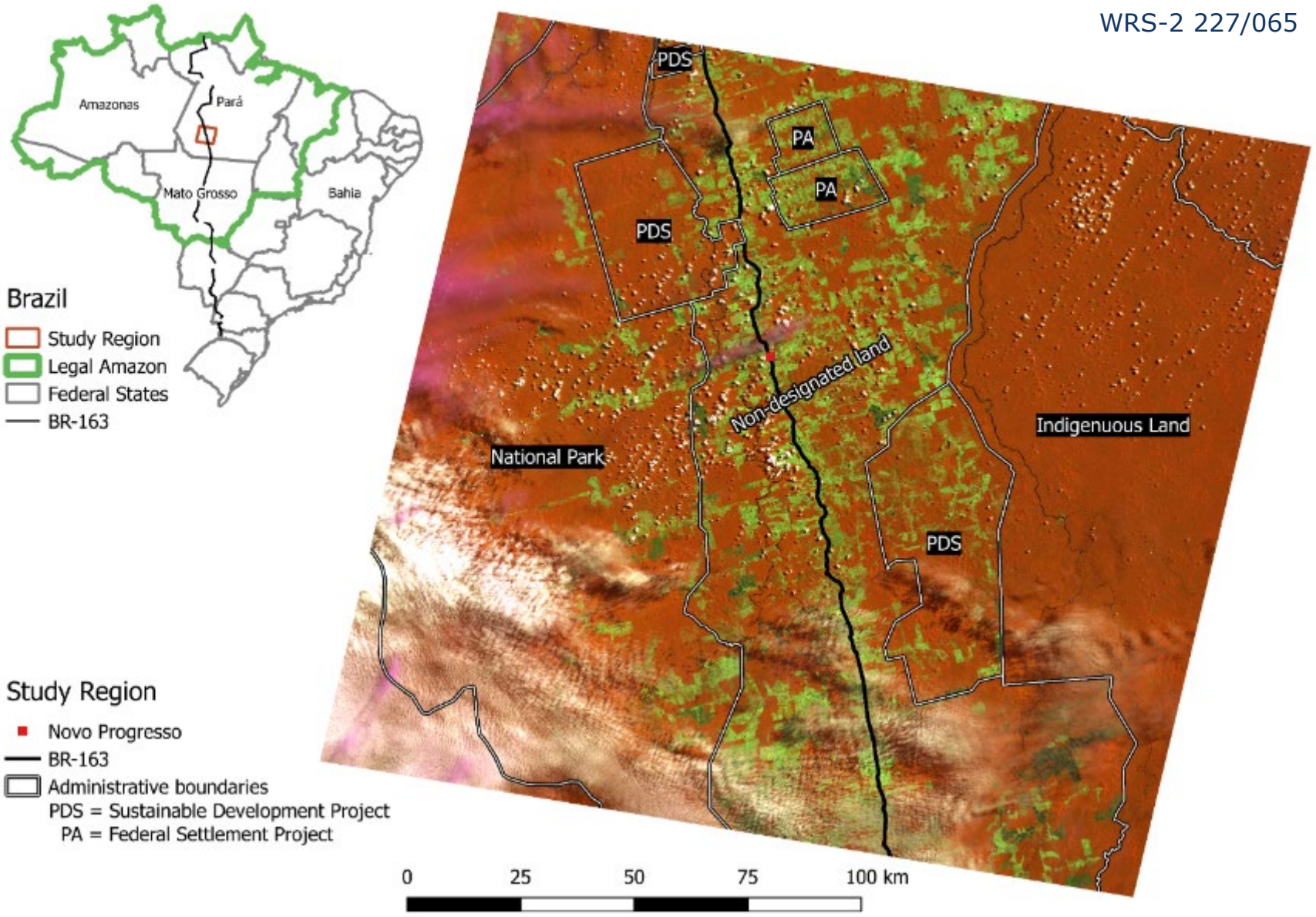
Study region Novo Progresso, Pará, Brazil



Background: Agricultural Intensification

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Barbosa, F. A., et al. (2015). *Cenários para a pecuária de corte amazônica*. Belo Horizonte, Centro de Sensoriamento Remoto da Universidade Federal de Minas Gerais.

Strassburg et al. (2014). *When enough should be enough:* ***Improving the use of current agricultural lands could meet production demands and spare natural habitats in Brazil.*** *Global Environmental Change, 28*, 84-97

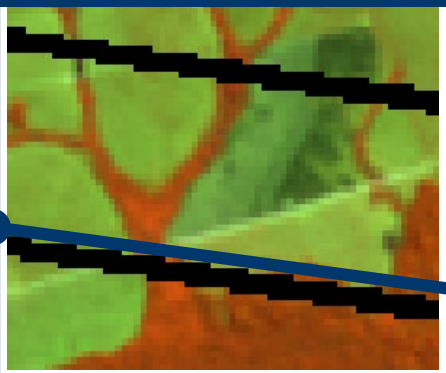
Management on pasture land

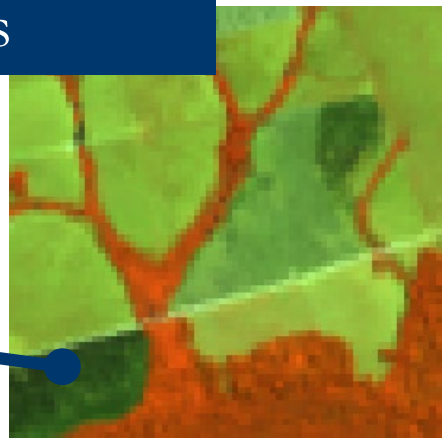
2014-07-18 (L7)

2014-07-26 (L8)

R-G-B

We classified burning and tillage from short dense image sequences, i.e. 3 subsequent clear observations

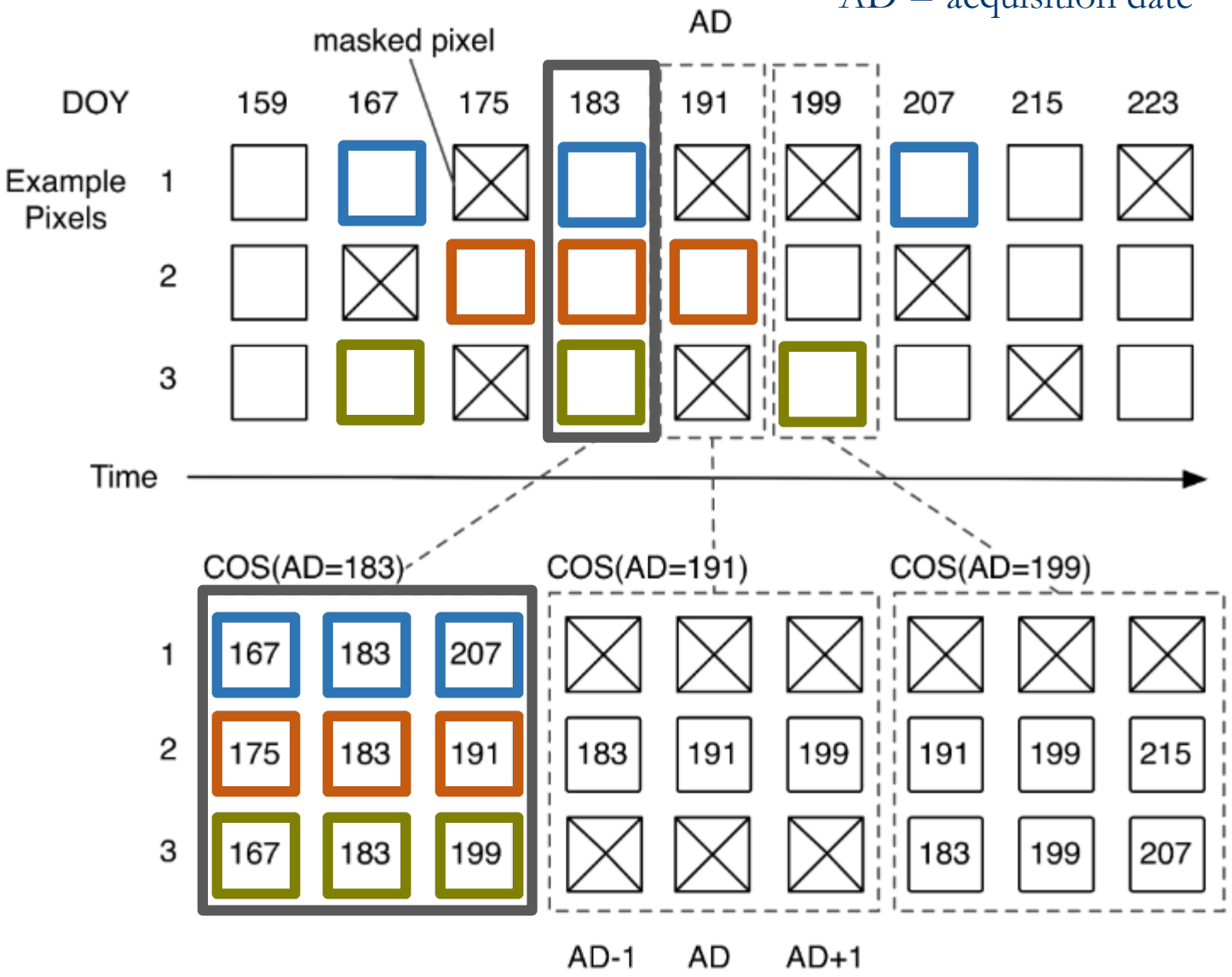




NIR-SWIR-R

Clear Observation Sequences (COS)

AD = acquisition date



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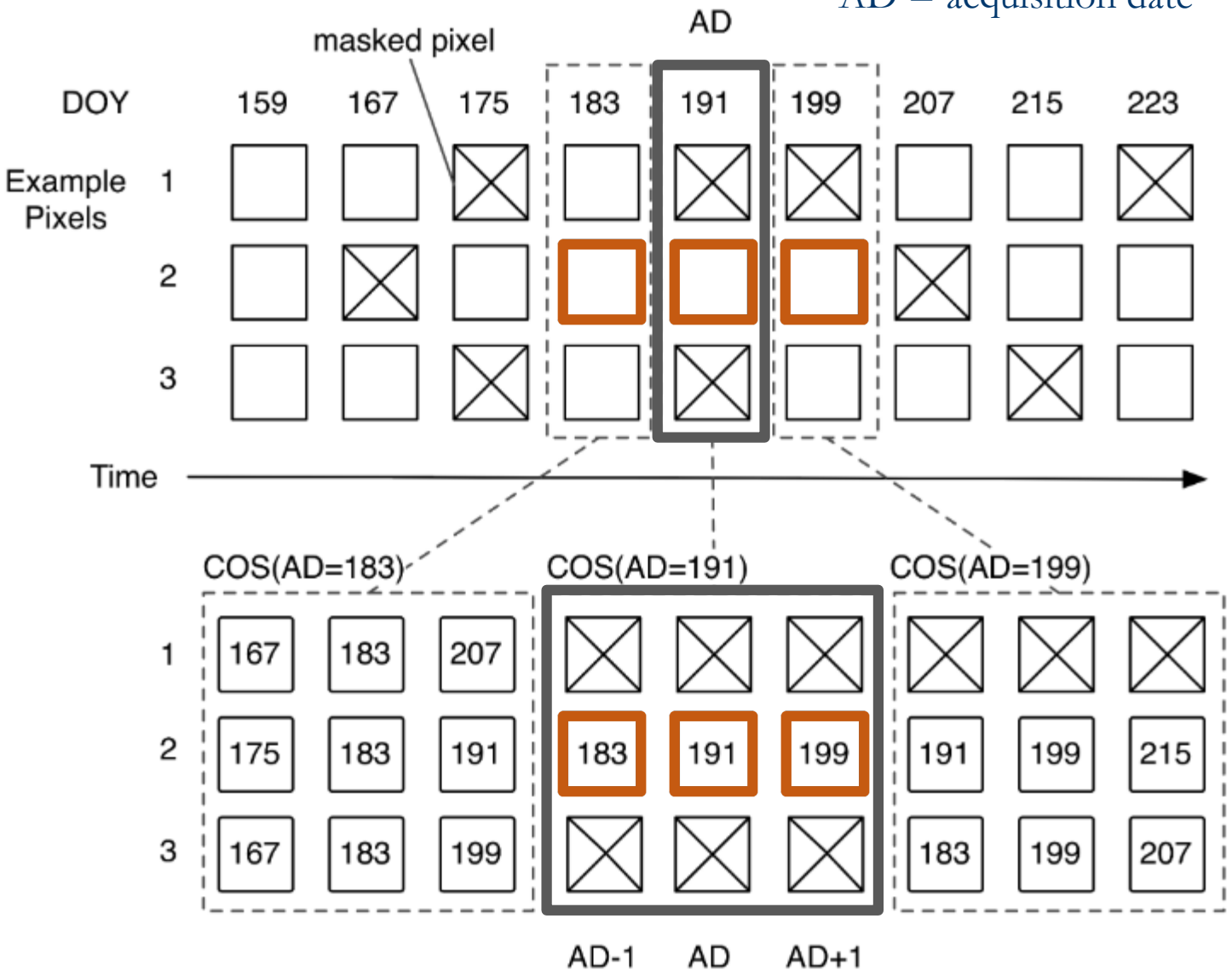

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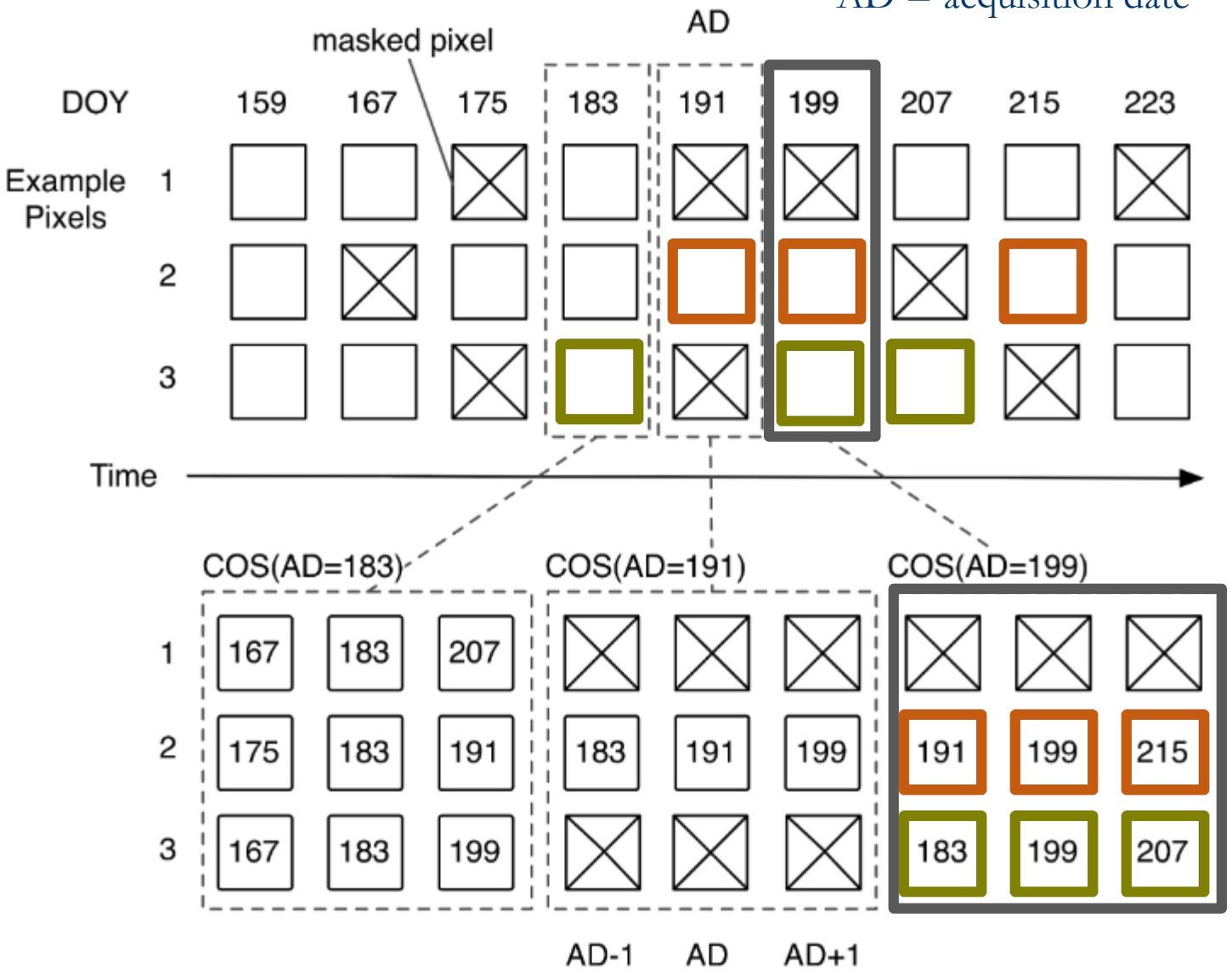
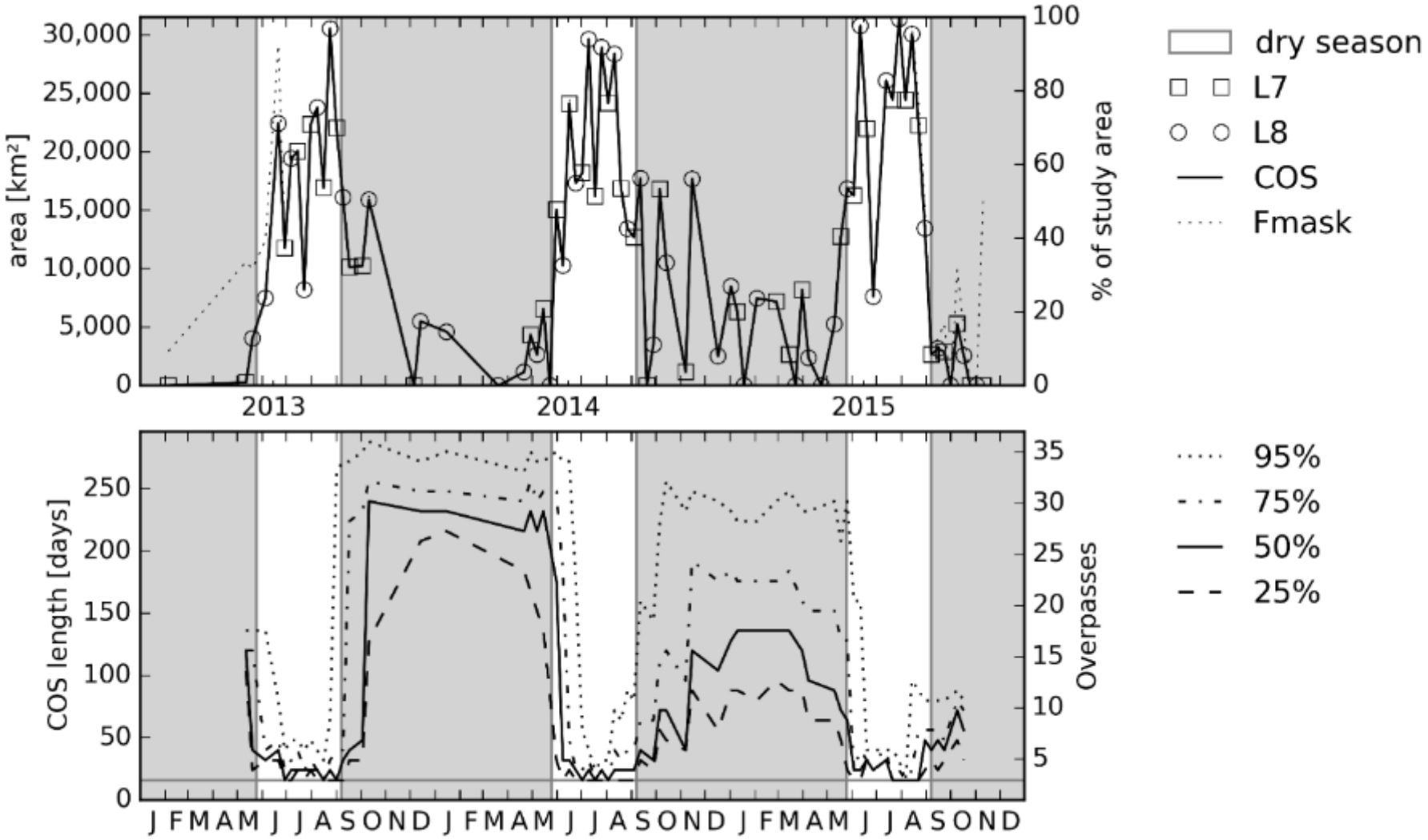


Clear Observation Sequences (COS)



Features extracted to describe each COS

13 Spectral Features derived for each of the 3 observation in the COS

NDVI, EVI, EVI2, SAVI, GEMI, NDMI	Vegetation indices
NBR, NBR2, MIRBI, BAIM	Burned area indices
TCB, TCG, TCW	Tasseled Cap Transformation components for brightness, greenness and wetness

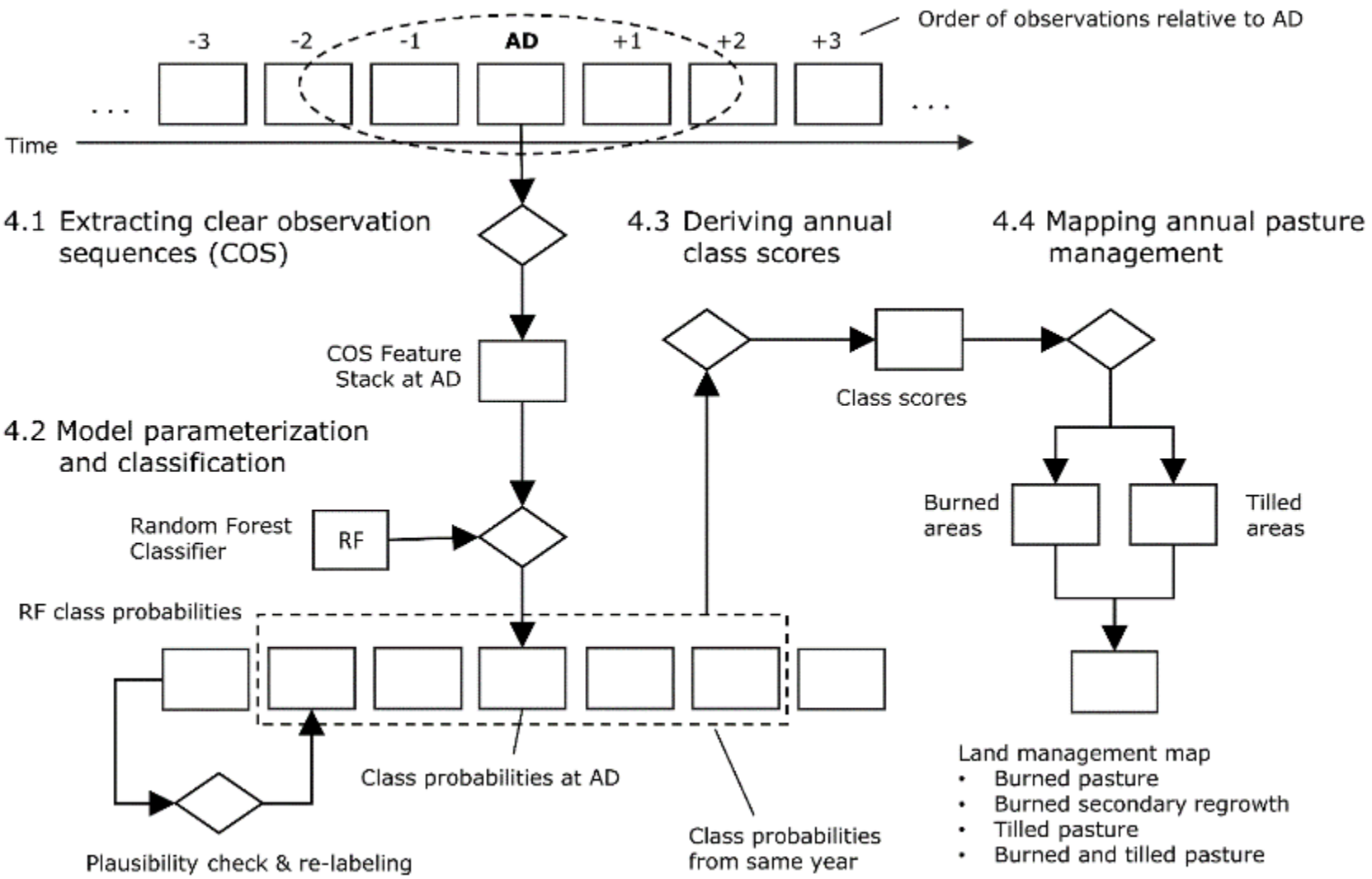
COS Feature Stack
= 3 x 13 spectral features
+ 3 temporal features
= 42 Raster Bands

3 Temporal Features

DTIME-1	# days between AD and preceding clear observation
DTIME+1	# days between AD and following clear observation
DOY	Day of Year of the AD

AD = Acquisition date

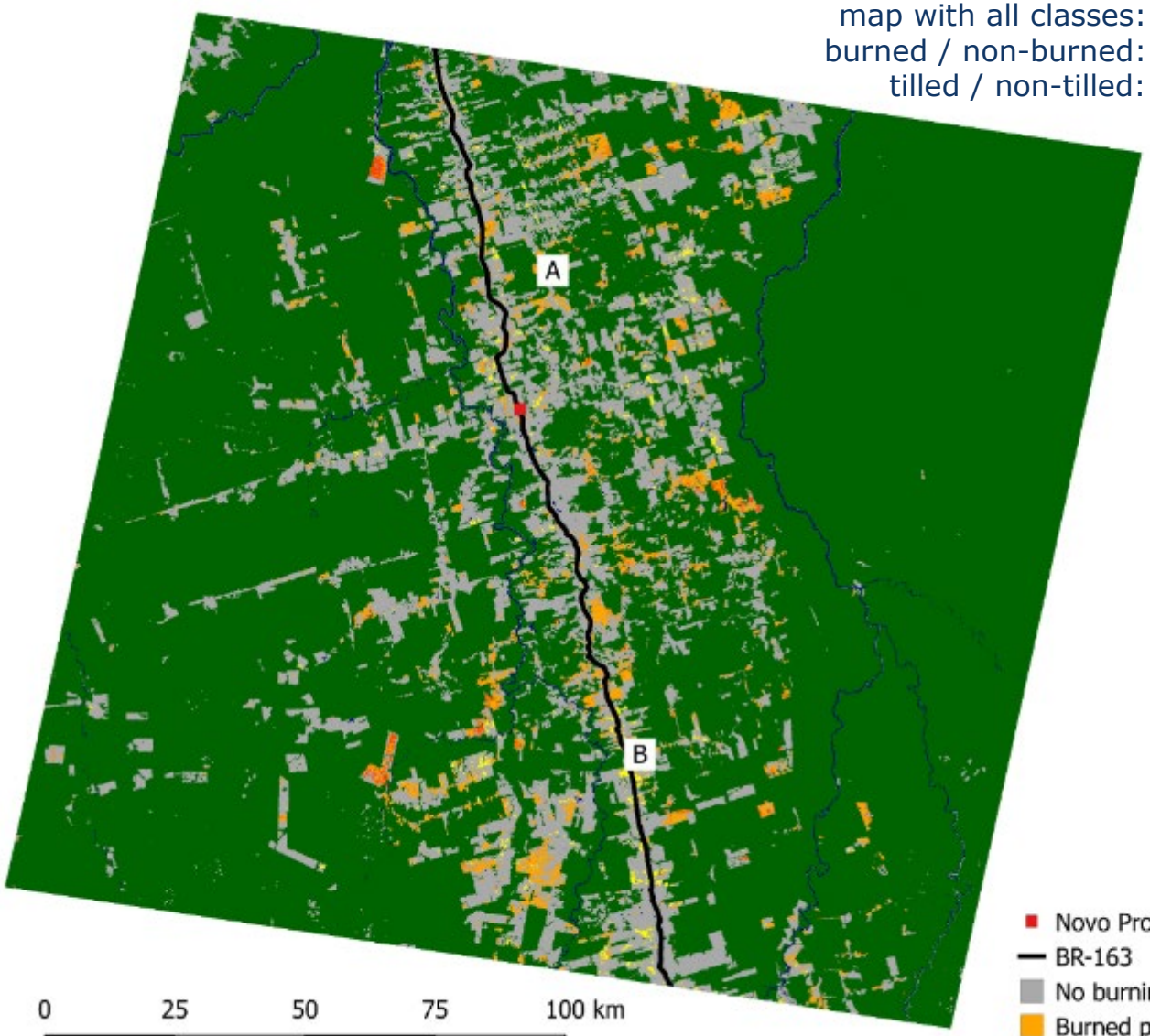
Workflow

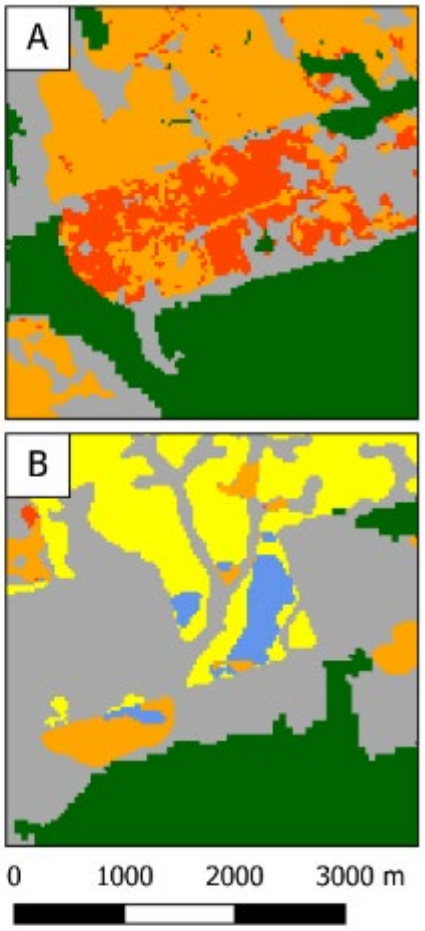


Jakimow, B., et al. (2018)

Land management on deforested land (2014)

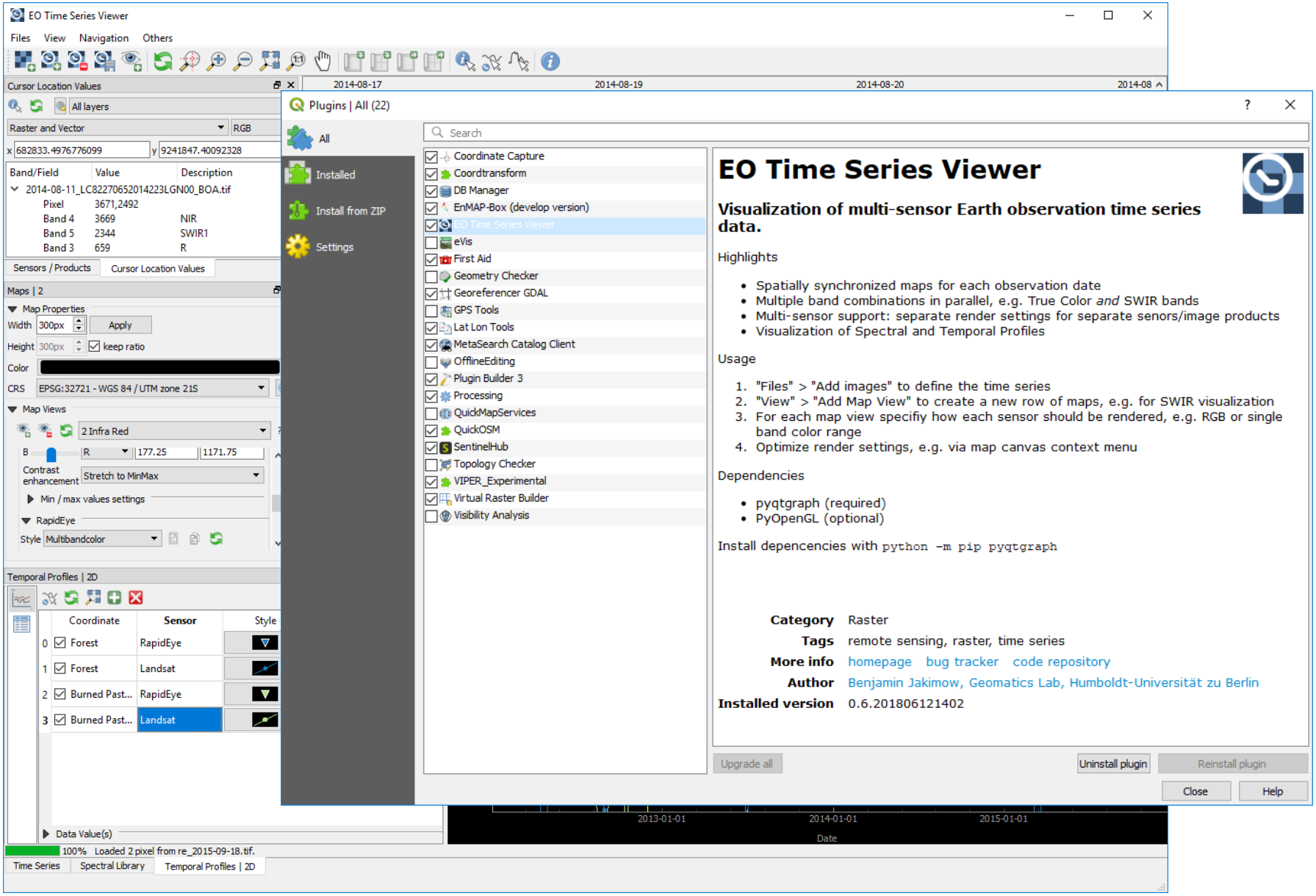
Area adjusted overall accuracies
map with all classes: 85 %
burned / non-burned: 99 %
tilled / non-tilled: 98 %





- Novo Progresso
- BR-163
- No burning/tillage
- Burned pasture
- Burned secondary regrowth
- Tilled pasture
- Burned and tilled pasture
- Primary Forest
- Water

Visualizing multi-sensor time series data



Conclusion & Outlook

- COS approach uses all useful observations
- Mapped patterns are in good accordance with field observations
- Better effective temporal resolution → better detection of short-term processes
- EO Time Series Viewer helps to visualize and label dense time series data efficiently

Next Steps

- Multi-Sensor approach: Landsat 7/8 + Sentinel 2 A/B

Jakimow, B., et al. (2018). *Mapping pasture management in the Brazilian Amazon from dense Landsat time series.* Remote Sensing of Environment 205: 453-468.

Jakimow, B., et al. (in review). *Visualizing and labeling multi-sensor Earth observation data in QGIS: The EO Time Series Viewer.* Environmental Modelling and Software.

Jakimow, B., et al. (in prep.). *Patterns of land-use intensification in South-West Pará, Brazil.*