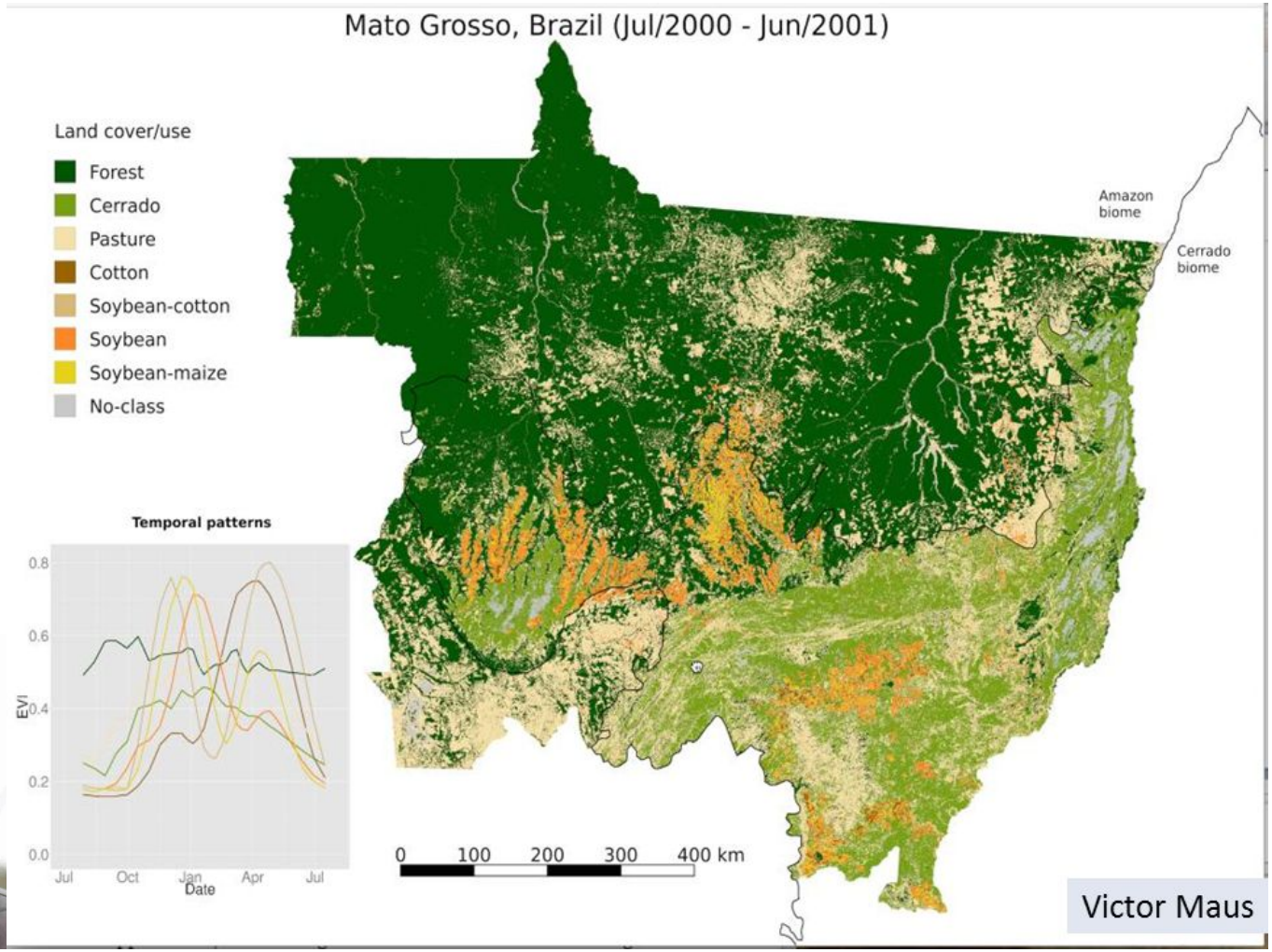
Land-use and land-cover classification of multi sensors time series: a TWDTW preview approach

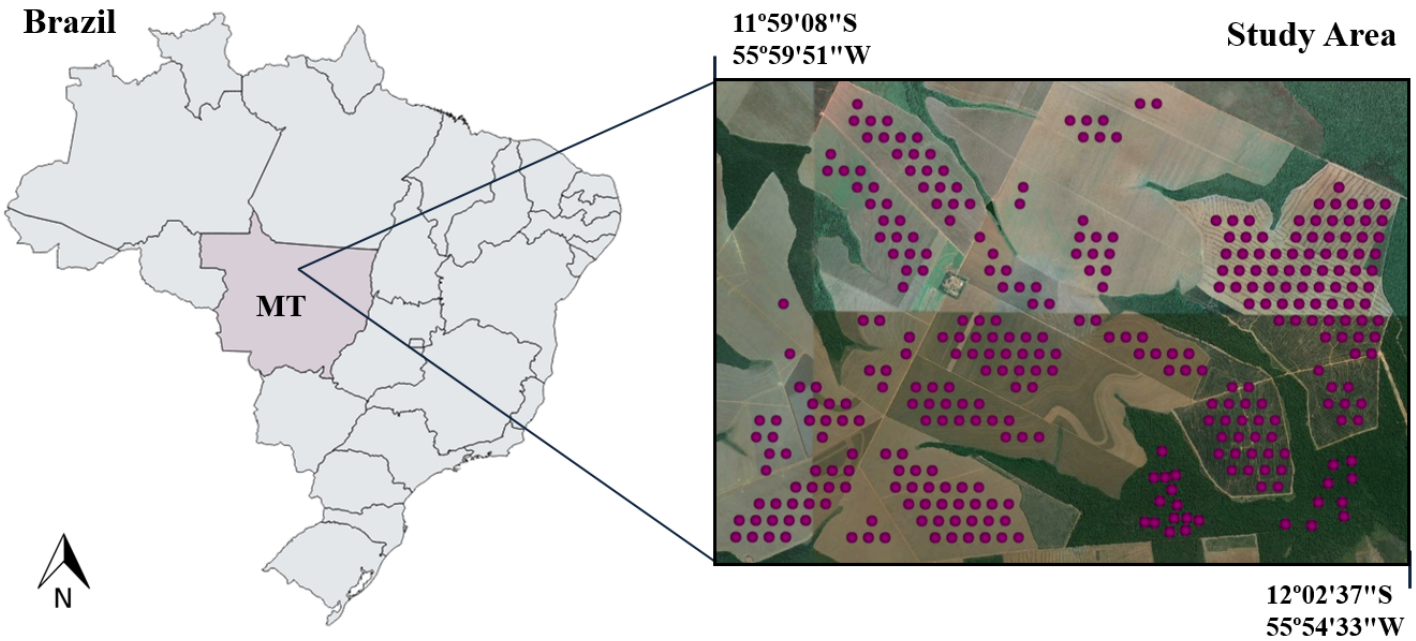
Rolf Simões, Mikhaela Pletsch e Lorena Santos

October 7, 2016

Motivation


Mato Grosso, Brazil (Jul/2000 - Jun/2001)
Land cover/use
Forest
Cerrado
Pasture
Cotton
Soybean-cotton
Soybean
Soybean-maize
No-class
Amazon biome
Cerrado biome
Temporal patterns
EVI
0.8
0.6
0.4
0.2
0.0
Jul
Oct
Jan
Apr
Jul
Date
0
100
200
300
400 km
Victor Maus

Studied area



$\approx 9.6Km \times 8.0Km$;

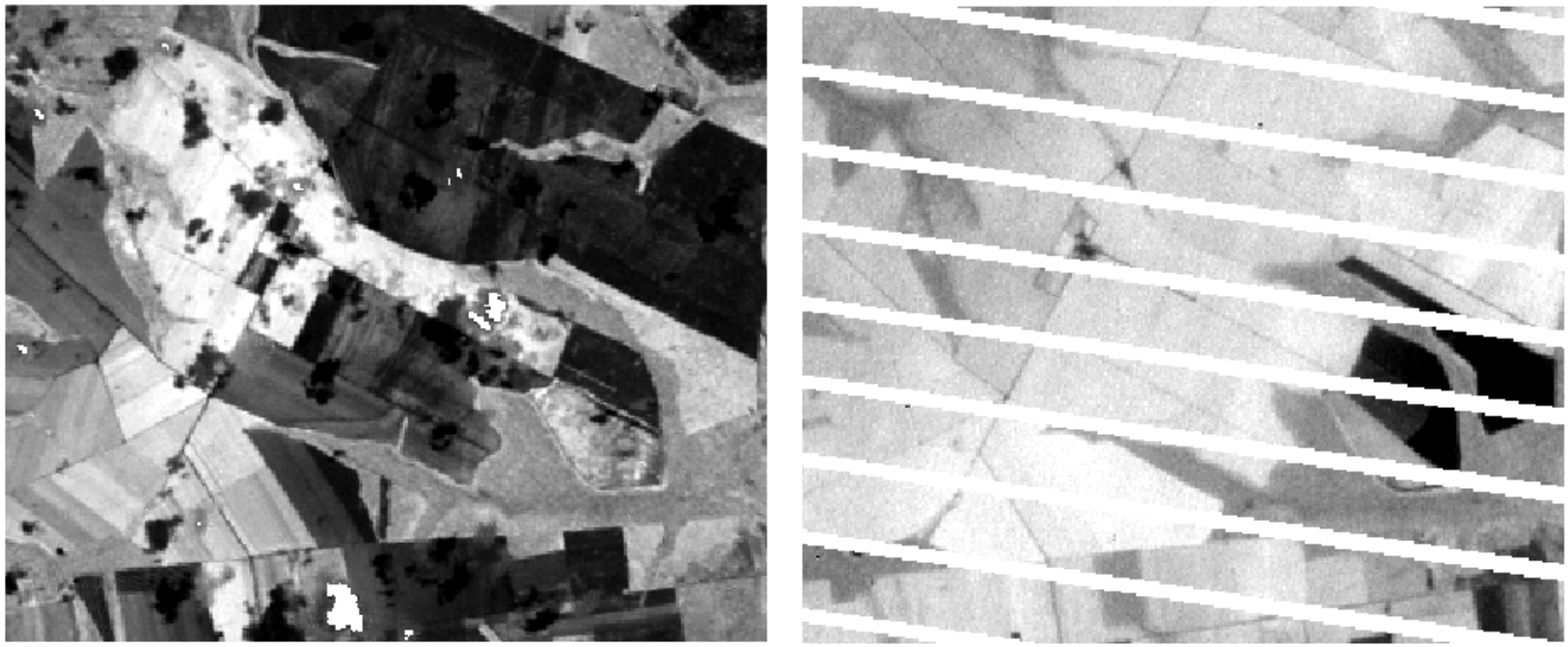
$320px \times 268px$

EVI and NDVI data sources

1. Landsat 5 (TM) - 202 images (2000-1-1 to 2011-12-31)
2. Landsat 7 (ETM+) - 333 images (2000-1-1 to 2016-07-31)
3. Landsat 8 (OLI/TIRS) - 72 images (2011-4-1 to 2016-07-31)
4. MODIS (MOD13Q1) - 379 images (2000-1-1 to 2016-07-31)

Total: 986 imagens
(All images downloaded from USGS.gov)

EVI images preview



(a) (b)

Figure : Landsat images. (a) Landsat 8; (b) Landsat 7.

Image pre-processing/processing

GDAL Shell (batch file processing)

GDAL Python (stacking)

MODIS reprojection

Pre-processing

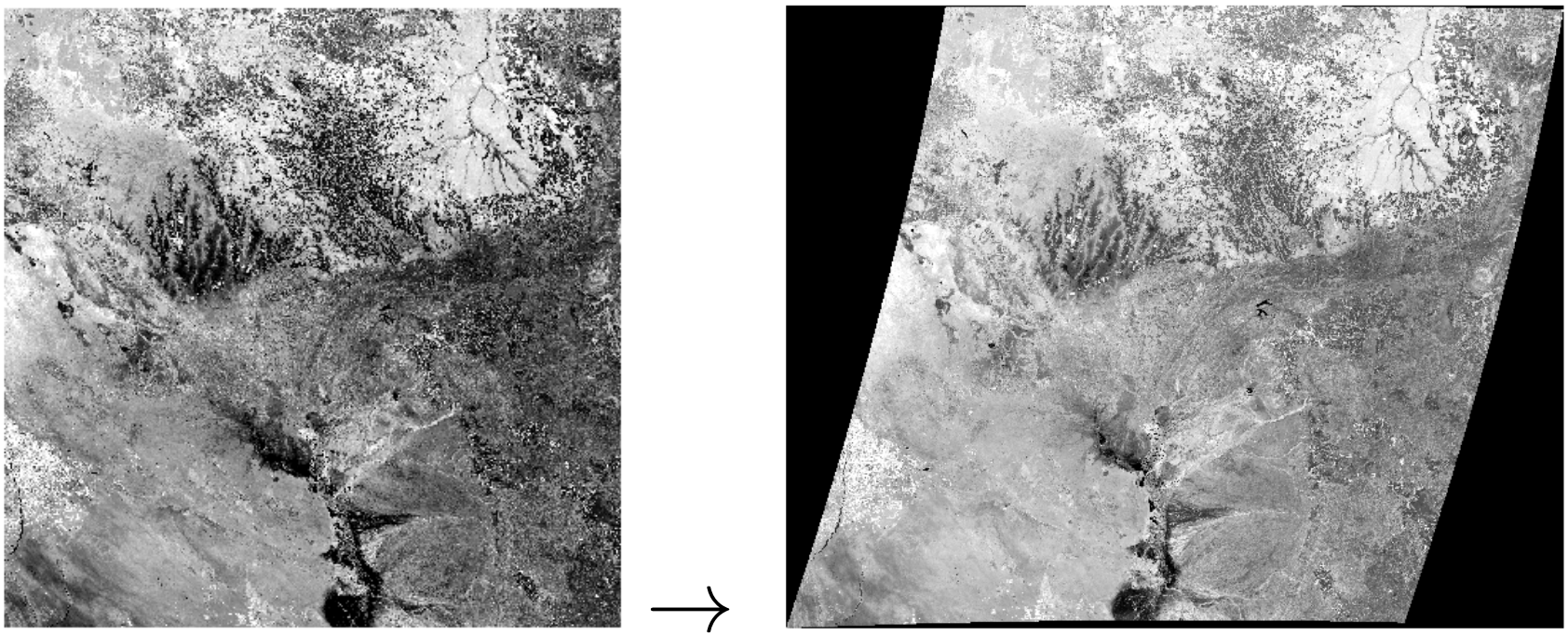


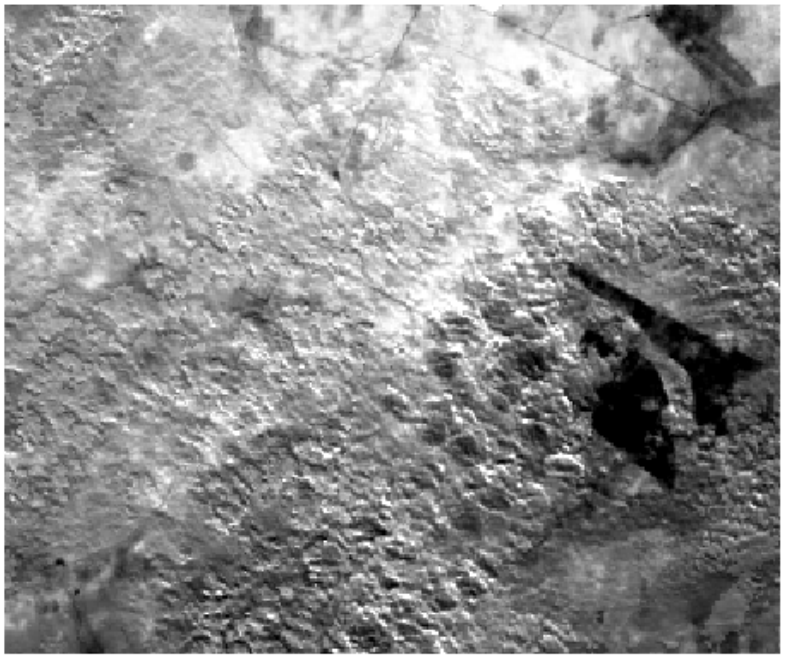
Figure : From Sinusoidal to UTM 21 projection

Image clipping

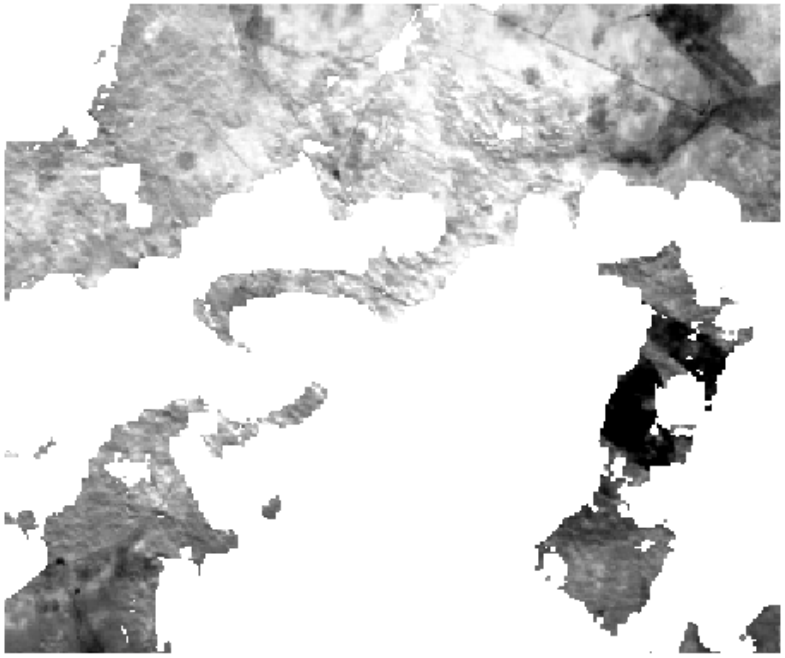
Pre-processing

Clouds removing

Pre-processing



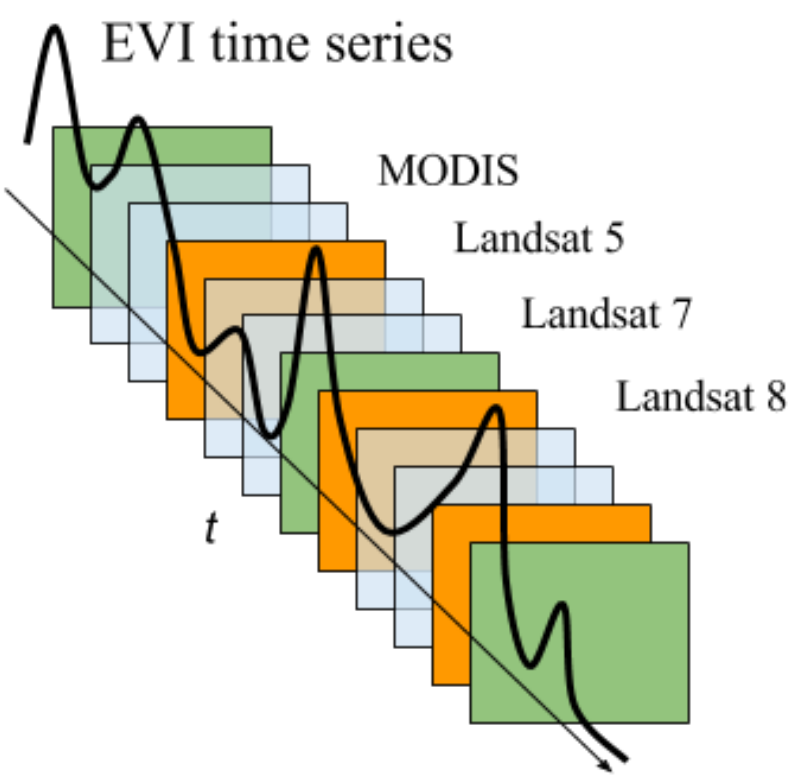
(a)

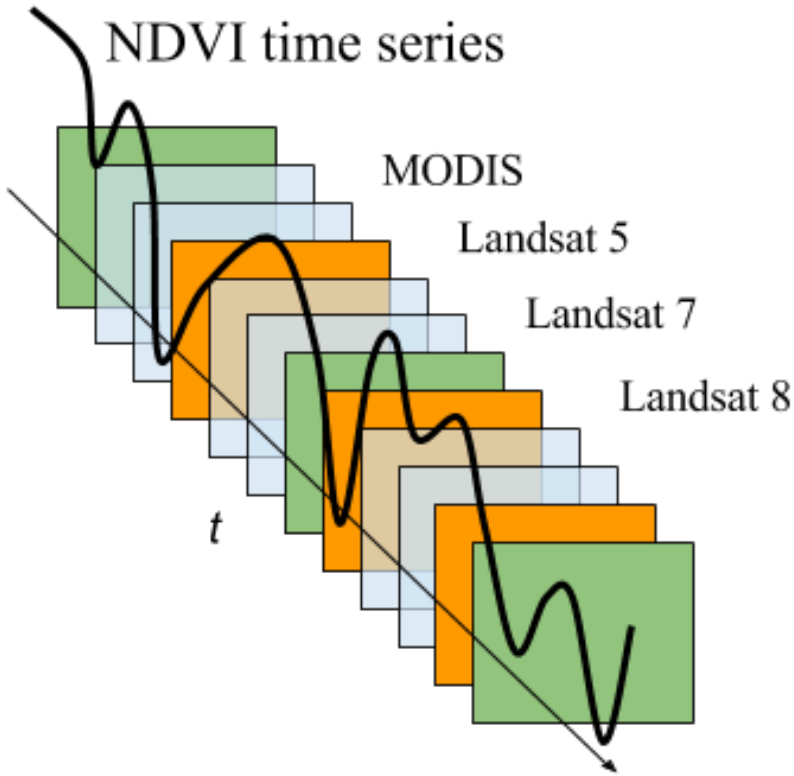


(b)

Raster stacking

Processing





Processing

dtwSat R package (MAUS, 2015)

Patterns extraction

Processing

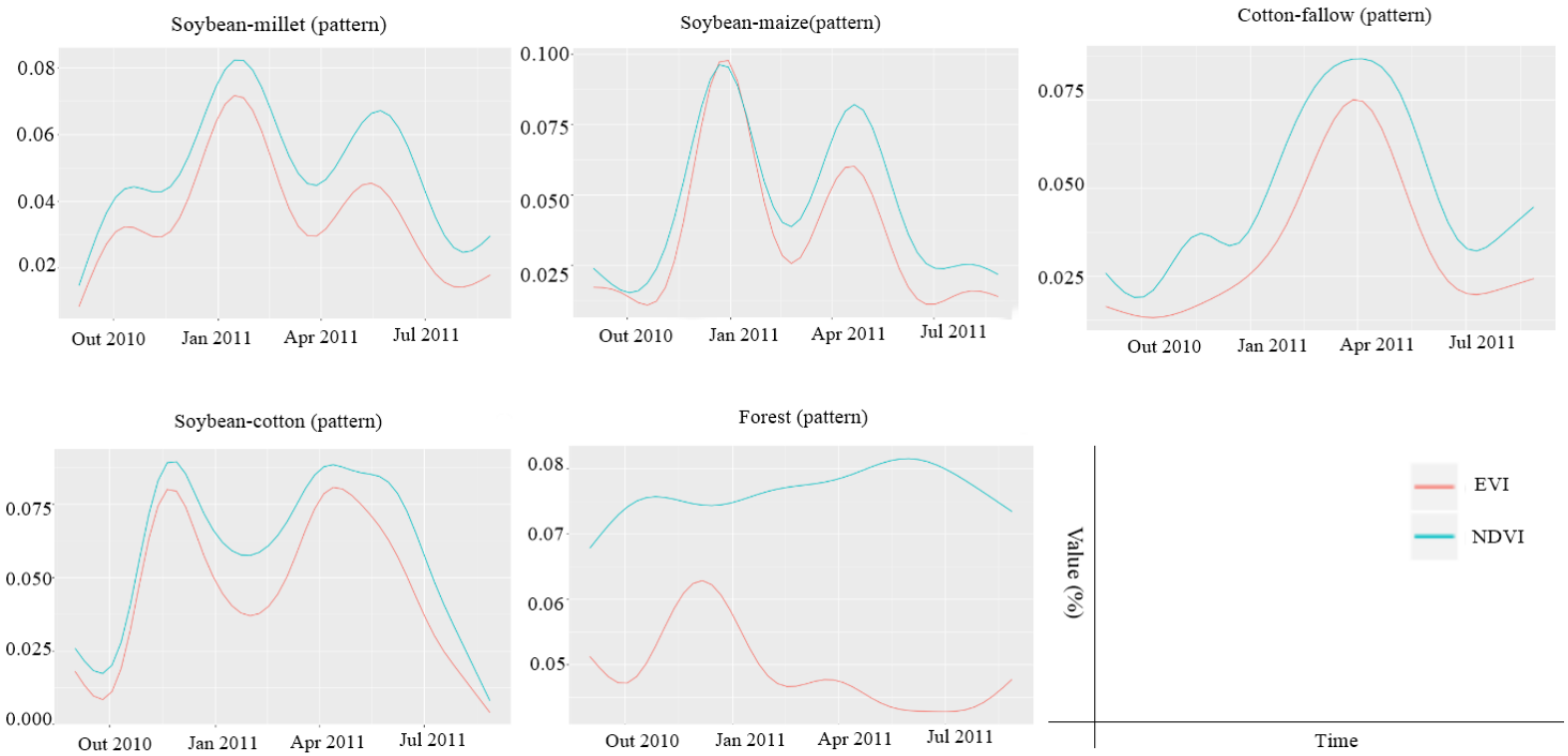
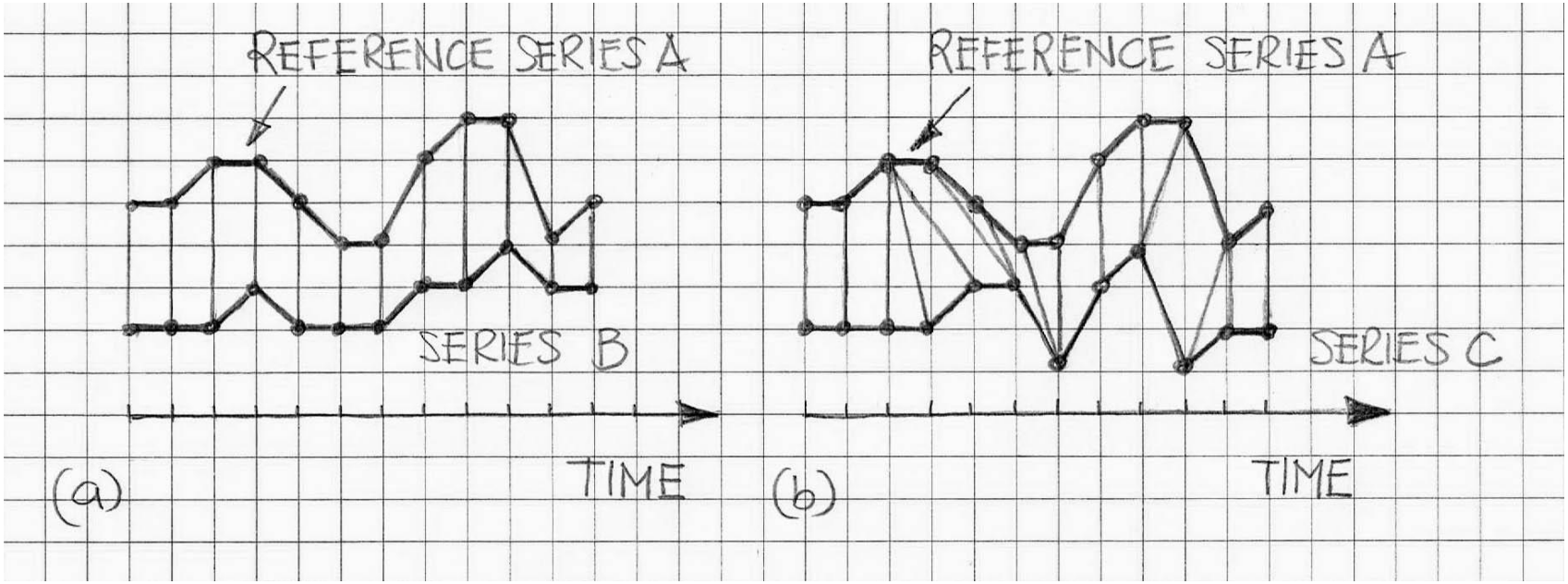


Figure : Spectro-temporal patterns extracted from samples using GAM

TWDTW algorithm

processing



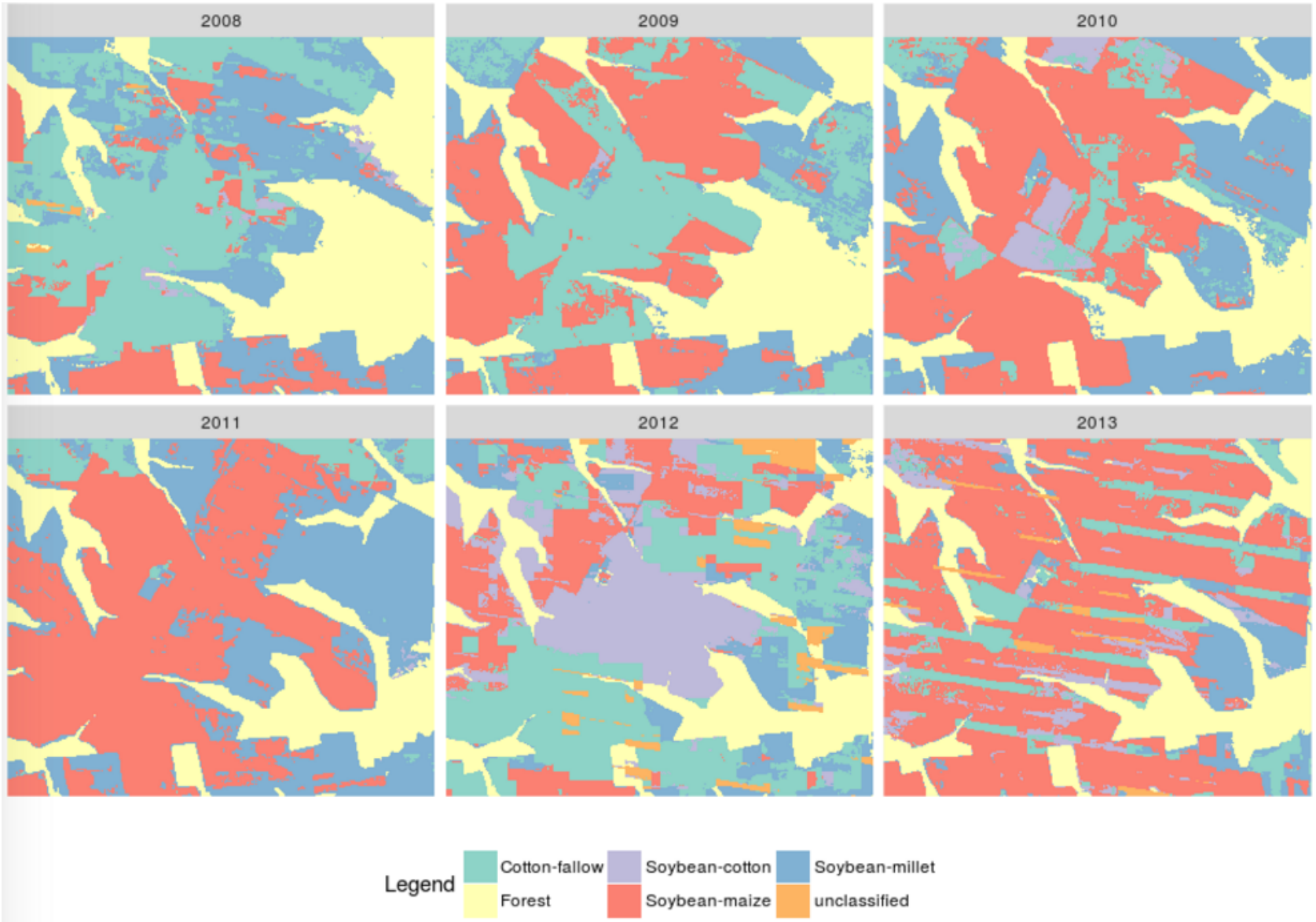


Figure : TWDTW algorithm results

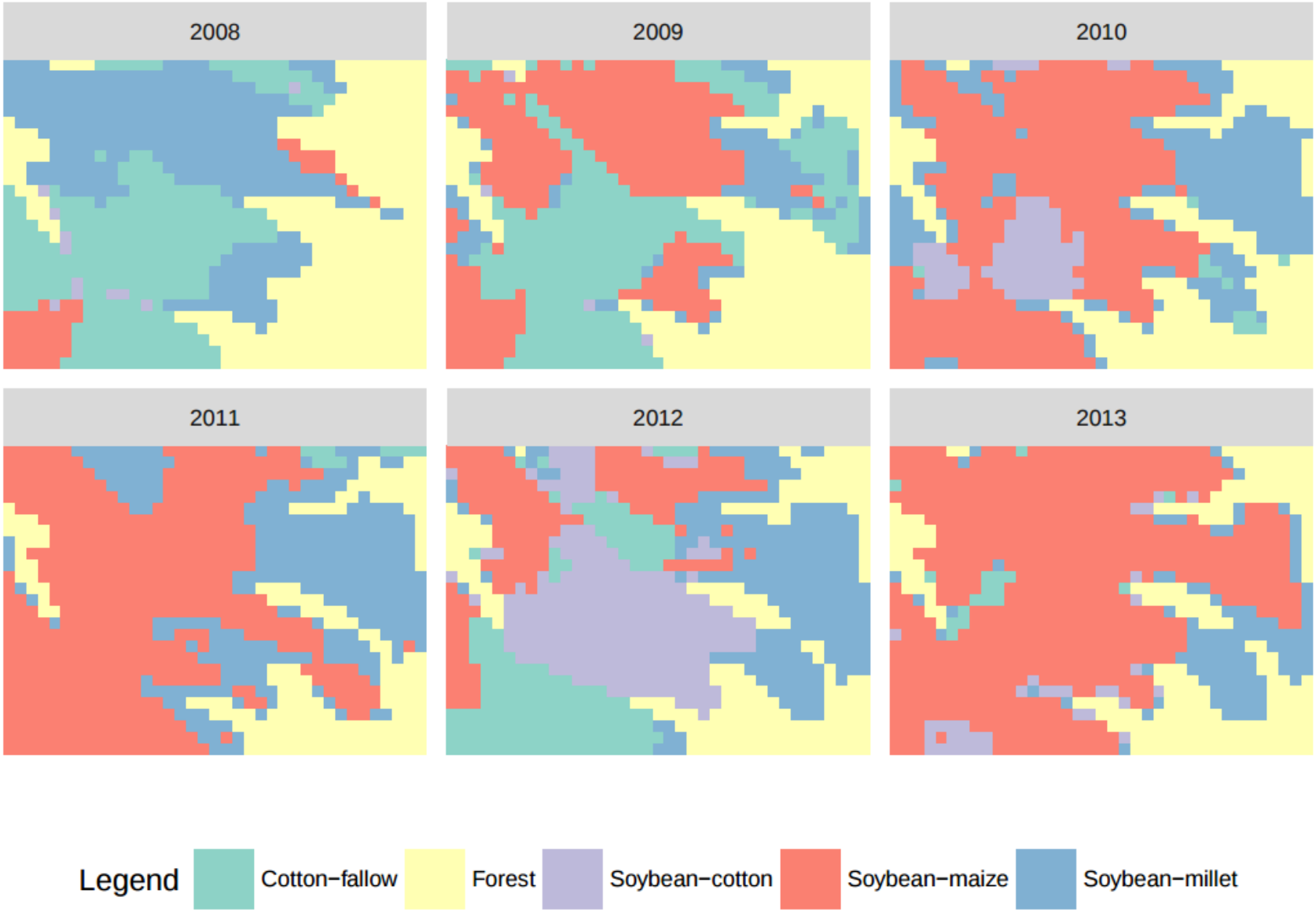


Figure : TWDTW results from Maus (2015)

Future works

LandSat images treatment;

SciDB-LandSat integration;

Class patterns datamining.

References

1. Maus V (2015). dtwSat: Time-Weighted Dynamic Time Warping for Satellite Image Time Series Analysis. R package version 0.1.0, URL http://CRAN.R-project.org/package=dtwSat.
2. Maus, V. (2016). Land use and land cover monitoring using remote sensing image time series. PhD Thesis. Instituto Nacional de Pesquisas Espaciais (INPE)