



National Research Council
Institute of Atmospheric Sciences and Climate



DESMED

Short activity report

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Study Area

Southern Italy,
Apulia region

($41^{\circ}17'N$ $16^{\circ}32'E$,
 $39^{\circ}23'N$ $18^{\circ}51'E$)



Land Cover Characteristics

- Olive trees (*olea europaea*) in both biological and standard cultivations
- Mediterranean 'maquis' and other less common forest trees
- Seasonal agriculture (mainly belonging to 2 sub-types)
- 'Seminativi' (sowable land fields)
- Bare soil and stone mine areas
- Humid areas
- Lake and urban / infrastructural / industrial areas

Land Cover Characteristics

Olive trees cultivations (*olea europaea*) in both biological and standard cultivations



Land Cover Characteristics

Mediterranean 'maquis' and other less common forest



Land Cover Characteristics

Seasonal agriculture (this kind of cover differs in function of the product cultivate and the technique applied - we distinguish 2 main sub classes)

‘Seminativi’ (sowable)



Land Cover Characteristics

Bare soil and stone mine areas

Humid areas



Possible Desertification Causes

- Extensive use of not sustainable agriculture (see CEE 2078/92)
- Extensive use of water resources (long and diffuse exploiting of underground water resources, i.e. artesian wells)
- Other climate related causes
- Other human related causes

EO Data Available

- ✓ Two high resolution Landsat images of Apulia region (187-31) for dates: July 6, 2001 (ETM) and May 10, 1989 (TM) (from USGS archive)
- ✓ Weekly NOAA NDVI dataset from July 1994 to October 2005 (from DLR archive)

Firth investigation period

We choose the time span between March 2000 and November 2002, which includes the first high resolution Landsat image date and a period covering a complete annual vegetation cycle.

EO Data Preprocessing

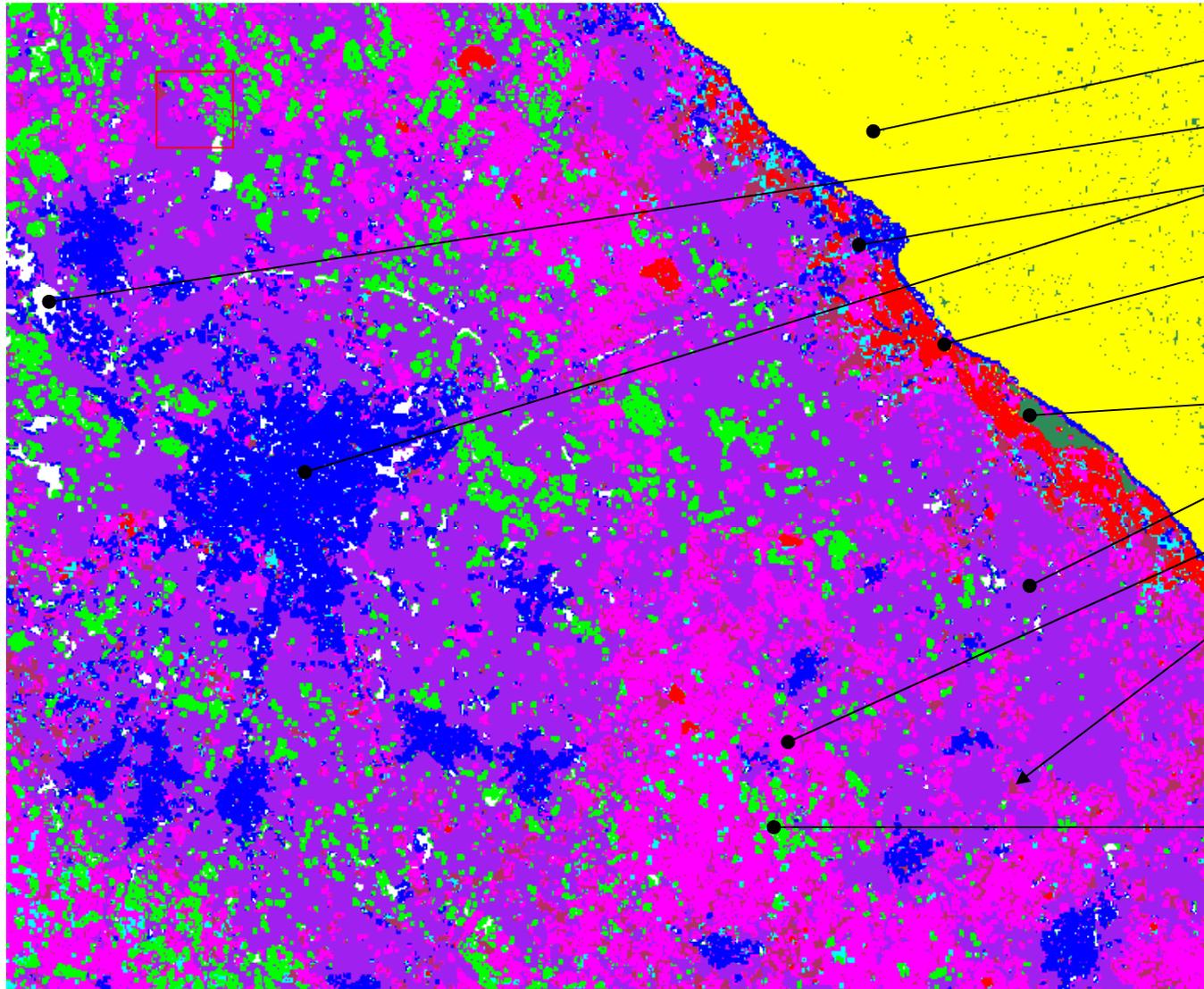
First, the Landsat image of the 2001 was classified in order to obtain the “ground truth” to be used for the NOAA image classification.

The classification was performed using a supervised, maximum likelihood algorithm and considering the above described land classes which can be summarized as:

EO Data Preprocessing

1. Forest (Mediterranean maquis and others similar land cover)
2. Cities and other infrastructures
3. Sea and lakes
4. Seasonal agriculture (1th kind)
5. Sowable agriculture
6. Olive trees cultivations
7. Bare soil and stone mines
8. Biological Olive trees cultivations
9. Humid areas
10. Seasonal agriculture (2th kind)

EO Data Preprocessing



- 3 Sea, lakes
- 7 Bare soil, stone mines
- 2 Cities, infras.
- 1 Med. maquis, forest
- 9 Humid areas
- 10 Seasonal 2th
- 6 Olive trees
- 6 Bio. olive trees
- 4 Seasonal 1th

EO Data Preprocessing

NOAA sequence was preprocessed using the software developed at INRIA; in detail, up to now the following tasks were performed:

- the sequence of weekly NDVI maps for the time span from 2000-03-06 to 2002-10-28 was built,
- the proportion image according to the Landsat classification was computed (masking the sea area).

EO Data Preprocessing

The performances of the the computed proportion image are as follows:

EO Data Preprocessing

Class	N° of pure pixel	threshold
Forest	16	60%
Cities and other inf.	16	90%
Sea / lake	2913	90%
Seasonal a. 1th kind	26	60%
Sowable a.	-	-
Olive trees	63	90%
Bare soil / stone mine	8	50%
Biological olive trees	13	70%
Humid areas	3	50%
Seasonal a. 2th kinf	20	90%

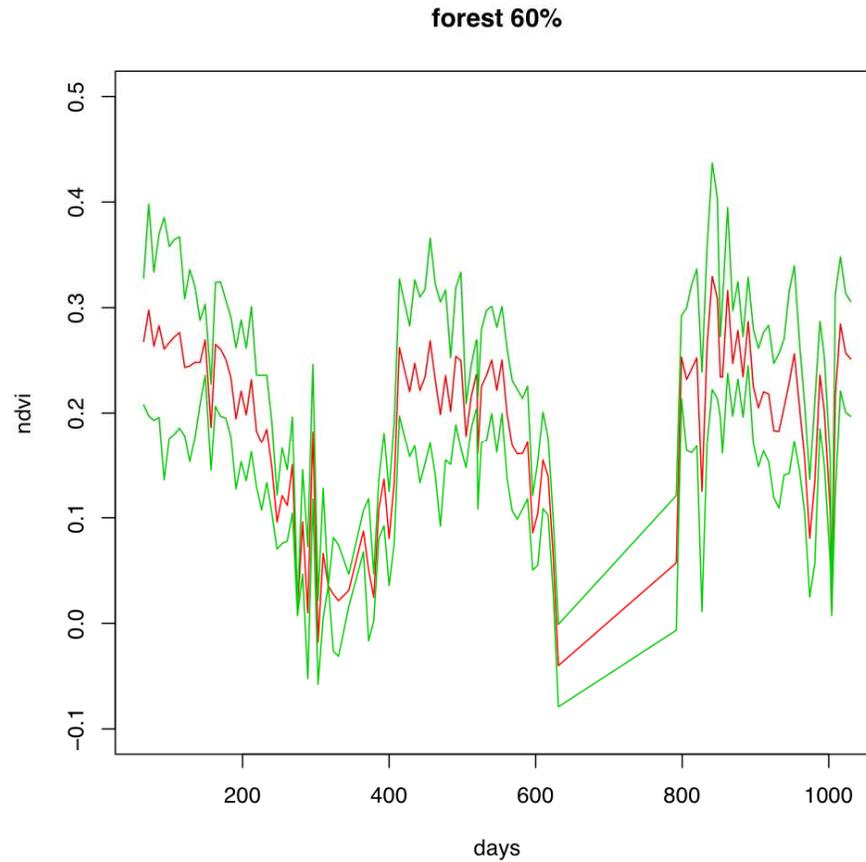
EO Data Preprocessing

The profiles for each class can now be visualized.

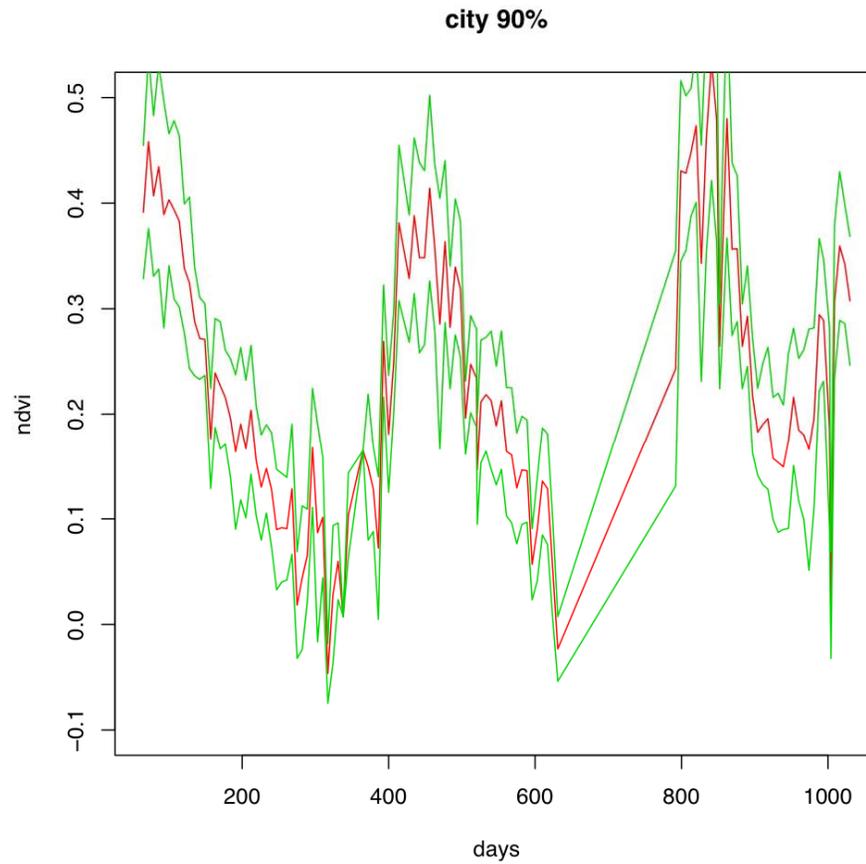
In the following slides we will display the profile in terms of mean and \pm standard deviation.

The profile will be used to validate the goodness of classification on NOAA NDVI maps and to find those classes that should be split/merged ...

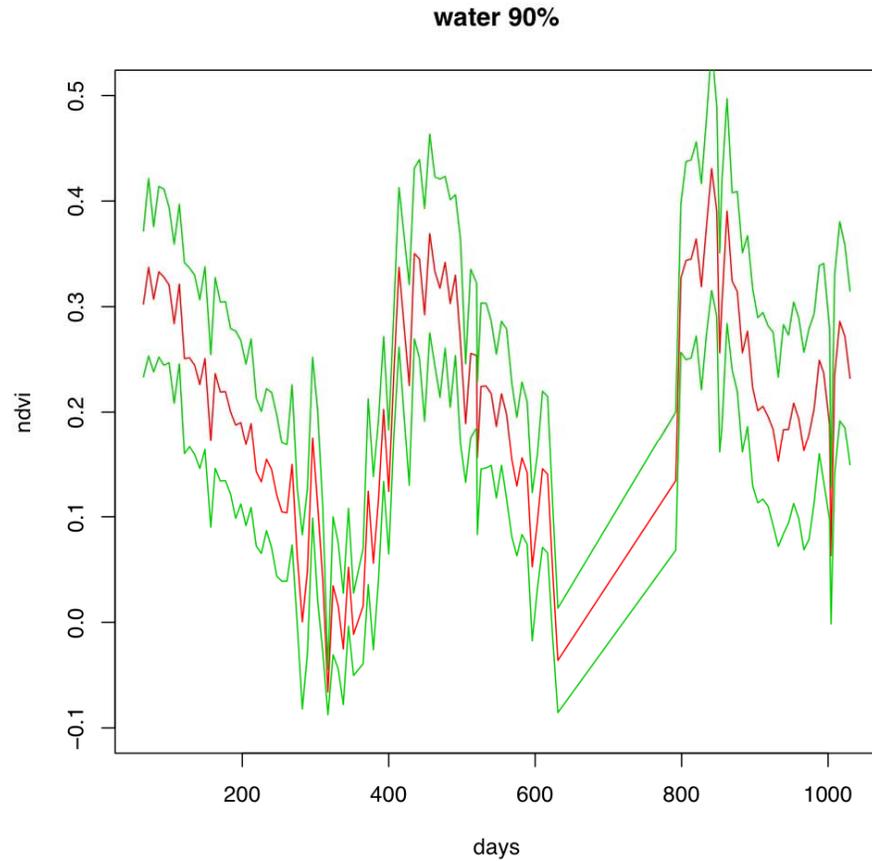
EO Data Preprocessing



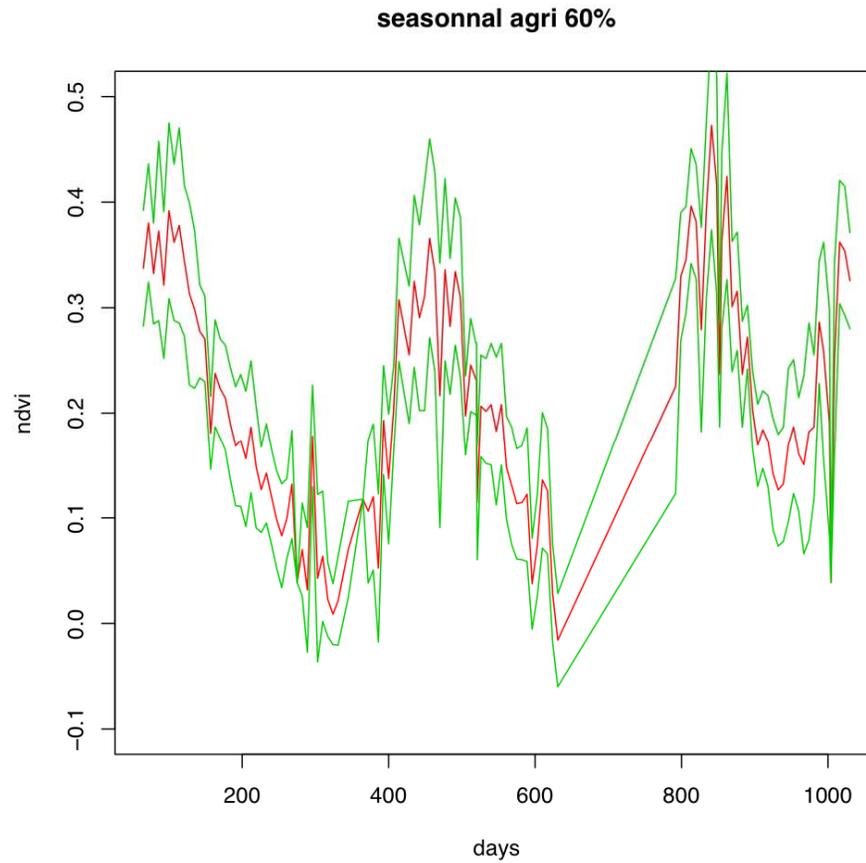
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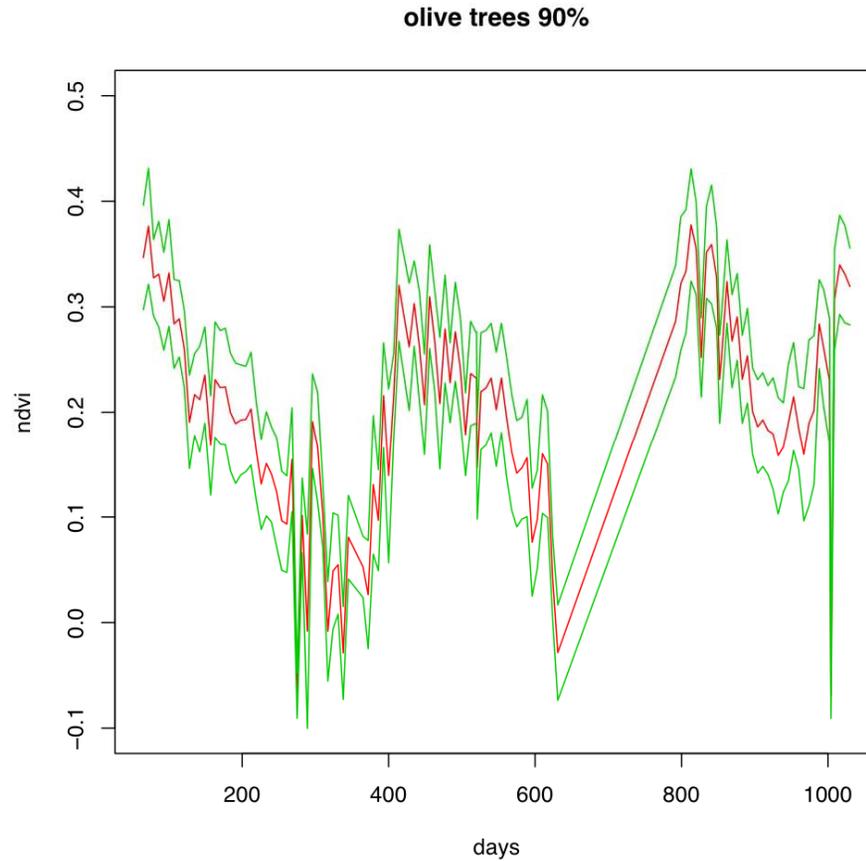
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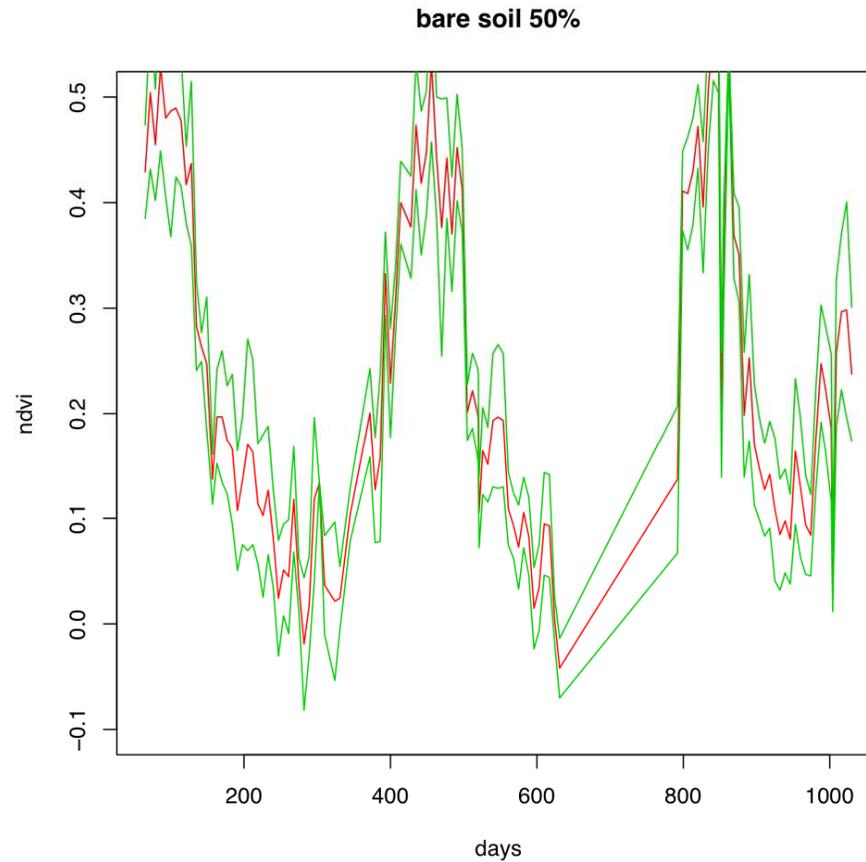
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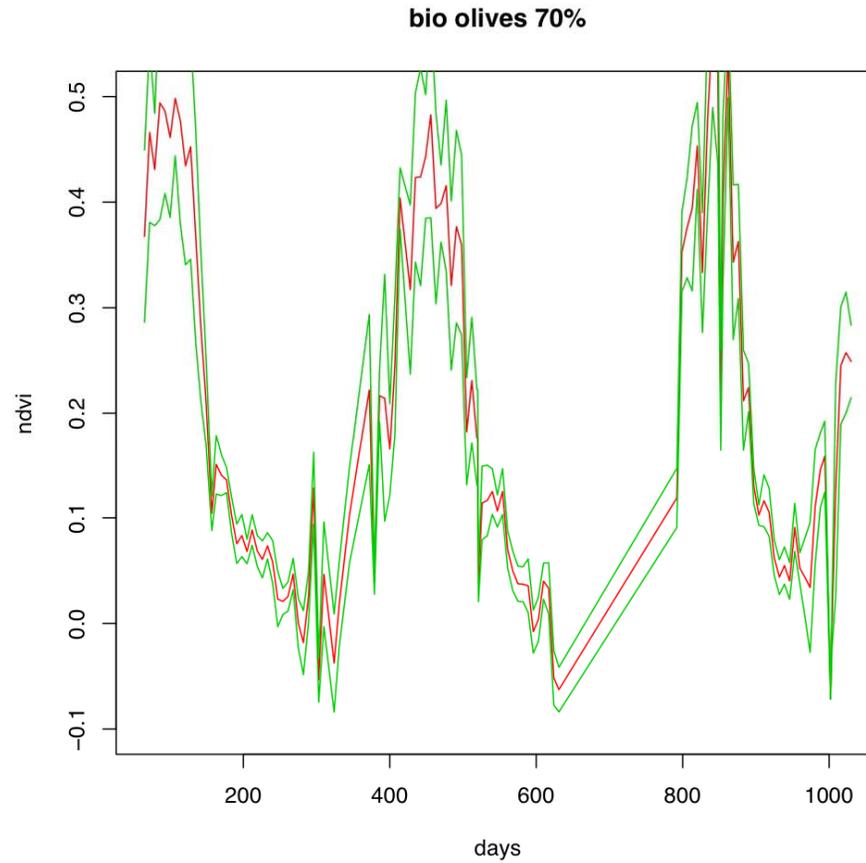
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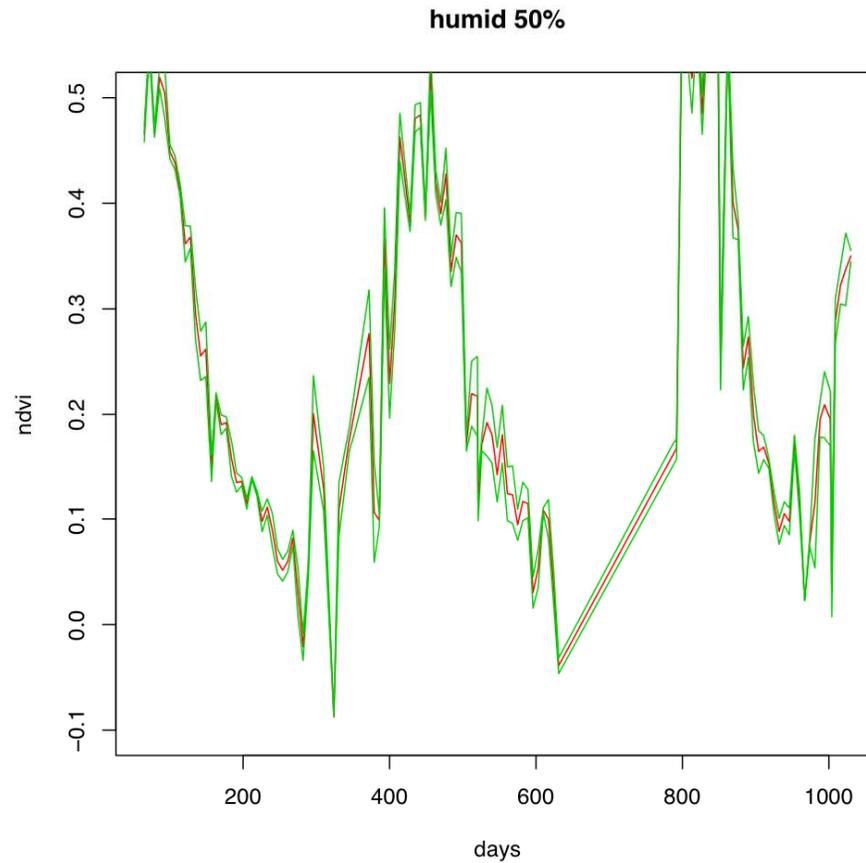
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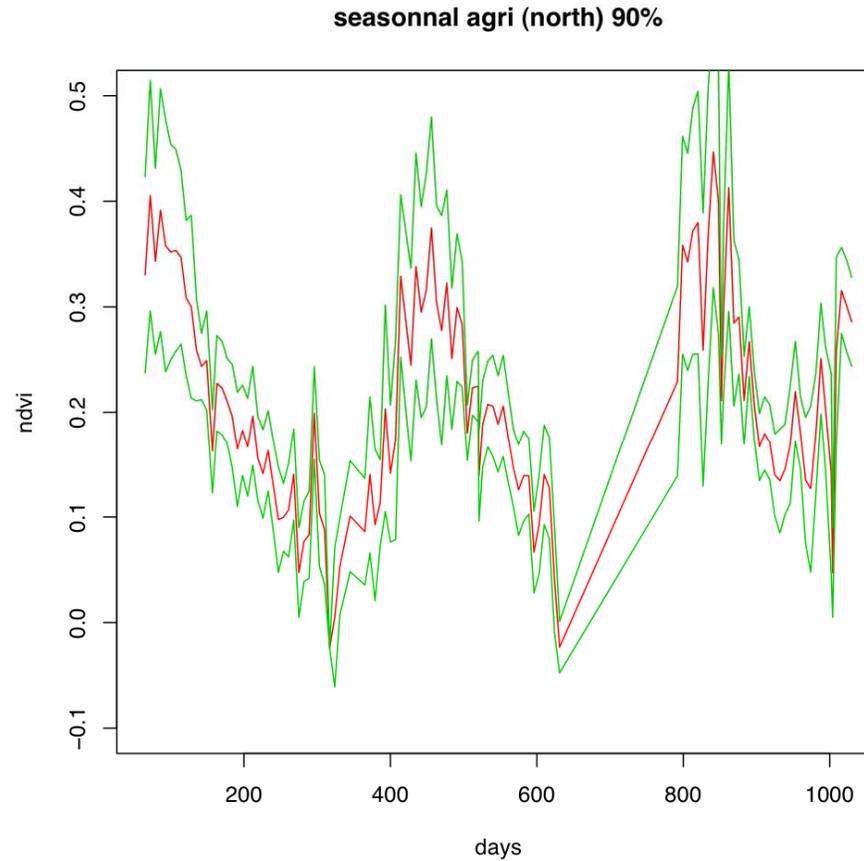
EO Data Preprocessing



EO Data Preprocessing



EO Data Preprocessing



Preliminary conclusions

The results demonstrate the difficulty of obtaining a clear distinction between classes which strongly differ in terms of land cover

This is due to the low resolution of NOAA NDVI maps and to their inability to classify the corresponding classes in NOAA images

Consequently, it was decided to carry out the same kind of analysis using the more accurate MODIS NDVI maps which have a resolution of about 250 meters