PART II: Practical

1. Test bfastSpatial function with different parameters on a prepared dataset
2. Post-processing and exploring results
3. Discuss results and the process of applying the algorithm
4. Discuss the future of BFAST: a faster algorithm for larger AOIs (SciDB)

Go to :

https://github.com/rosca002/FAO_Bfast_workshop

Input data:

- NDMI time stack (2000-2016)
- NDVI time stack (2000-2016)

Aditional data:

- Forest mask 2010
- Valodation Forest 2016

Parameters to test:

- **Vegetation index**
- **History period**
- **Monitoring approach**
- **Regression model**

How to get from Landsat scenes to a time stack:

Online tutorial
http://www.loicdutrieux.net/bfastSpatial/

Preparing the environment:

https://rosca002.github.io/FAO_Bfast_workshop/tutorial/tutorial_0.html

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Testing scenarios

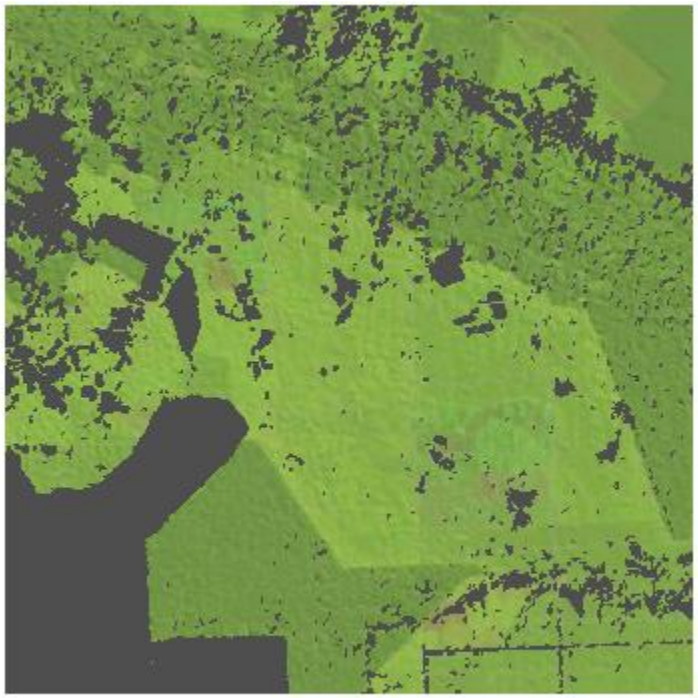
		Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Example 8	Example 9	Example 10
Vegetation index		NDMI	NDMI	NDMI	NDMI	NDMI	NDMI	NDMI	NDVI	NDVI	NDMI
History period	from-to	2000-2010	2000-2010	2005-2010	2005-2010	2000-2010	2008-2010	2005-2010	2005-2010	2000-2010	2008-2010
	option	"all"	"ROC"	c(2005,1)	"all"	"all"	"all"	"all"	"all"	"all"	"all"
	stack subset	no	no	no	yes (2005)	no	yes (2008)	yes (2005)	yes(2005)	no	yes(2008)
Monitoring period	from-to	2010-2016	2010-2016	2010-2016	2010-2016	2010-2016	2010-2016	2010-2016	2010-2016	2010-2016	2010-2016
	approach	Full mon	Full mon	Full mon	Full mon	Seq mon	Seq mon	Seq mon	Seq mon	Full mon	Full mon
Regression model		Harm ord. 1	Harm ord. 1	Harm ord. 1	Harm ord. 1	Harm ord. 1	Harm ord. 1	Harm ord. 1	Harm ord. 1	Harm ord. 1	Harm ord. 1
Trend		no	no	no	no	no	no	no	no	no	no

To open the tutorial for each example: https://github.com/rosca002/FAO_Bfast_workshop

Example 1

- time to proccess on 36 CPU cores: 1.9 min
- Overall accuracy: 90%

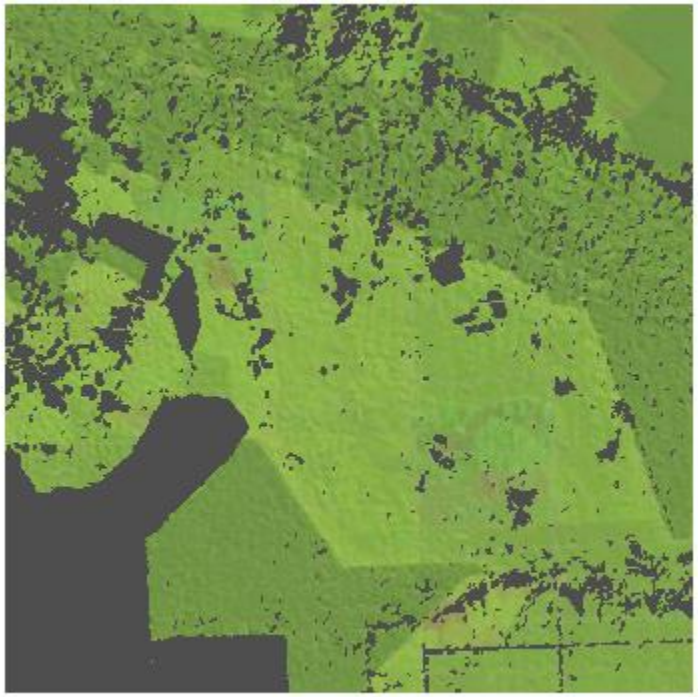
Vegetation index: NDMI
History period: 2000-2010
option: “all”
stack subset: no
Monitoring approach: 2010-2016
option: Full monitoring period approach
Regression model: harmonic order 1
Trend: no



Example 2

- time to proccess on 36 CPU cores: 2.3 min
- Overall accuracy: 88%

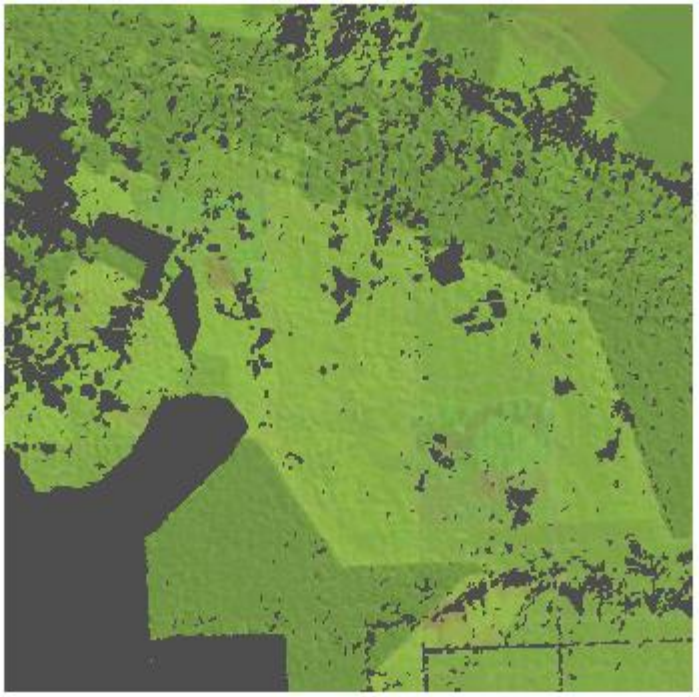
Vegetation index: NDMI
History period: 2000-2010
option: “ROC”
stack subset: no
Monitoring approach: 2010-2016
option: Full monitoring period approach
Regression model: harmonic order 1
Trend: no



Example 3

- time to proccess on 36 CPU cores: 2.1 min
- Overall accuracy: 90%

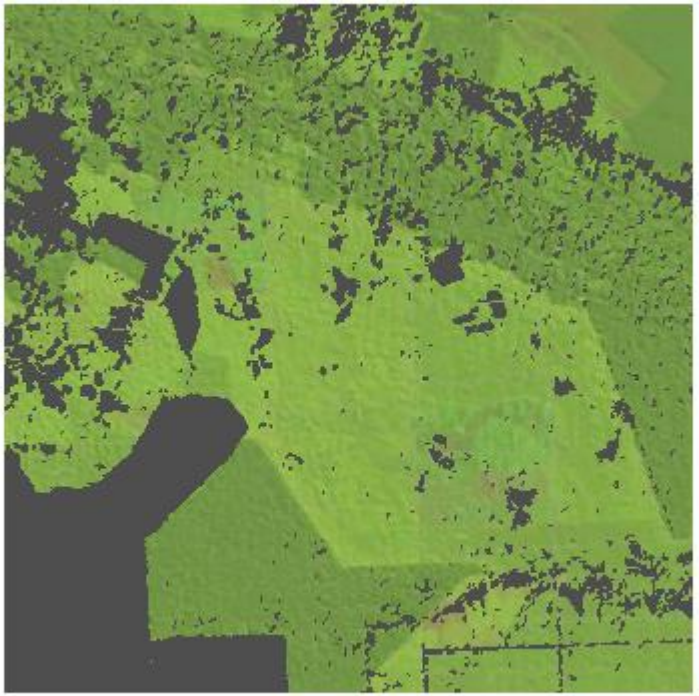
Vegetation index: NDMI
History period: 2005-2010
option: “c(2005,1)”
stack subset: no
Monitoring approach: 2010-2016
option: Full monitoring period approach
Regression model: harmonic order 1
Trend: no



Example 4

- time to proccess on 36 CPU cores: 1.6 min
- Overall accuracy: 89%

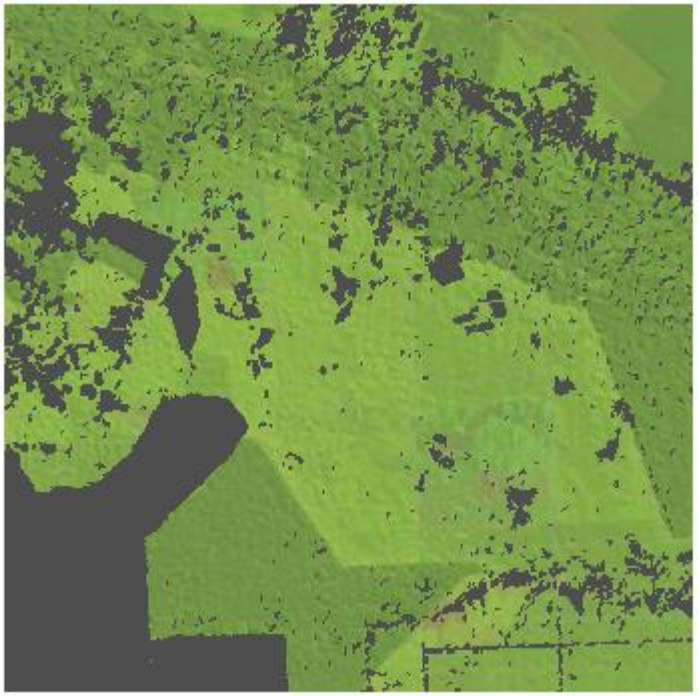
Vegetation index: NDMI
History period: 2005-2010
option: “all”
stack subset: yes (from 2005)
Monitoring approach: 2010-2016
option: Full monitoring period approach
Regression model: harmonic order 1
Trend: no



Example 5

- time to proccess on 16 CPU cores: 27.7 min
- Overall accuracy: 92%

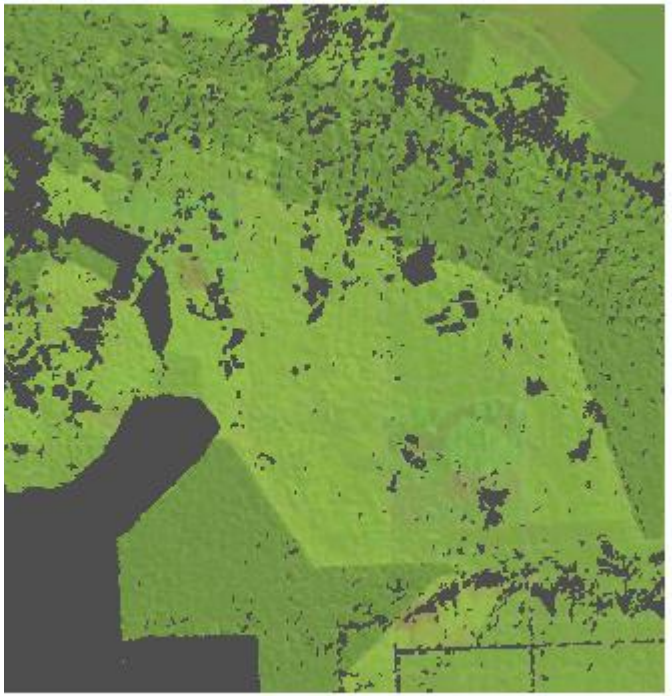
Vegetation index: NDMI
History period: 2000-2010
option: “all”
stack subset: no
Monitoring approach: 2010-2016
option: Sequential monitoring period approach
Regression model: harmonic order 1
Trend: no



Example 7

- time to proccess on 36 CPU cores: 11.0 min
- Overall accuracy: 93%

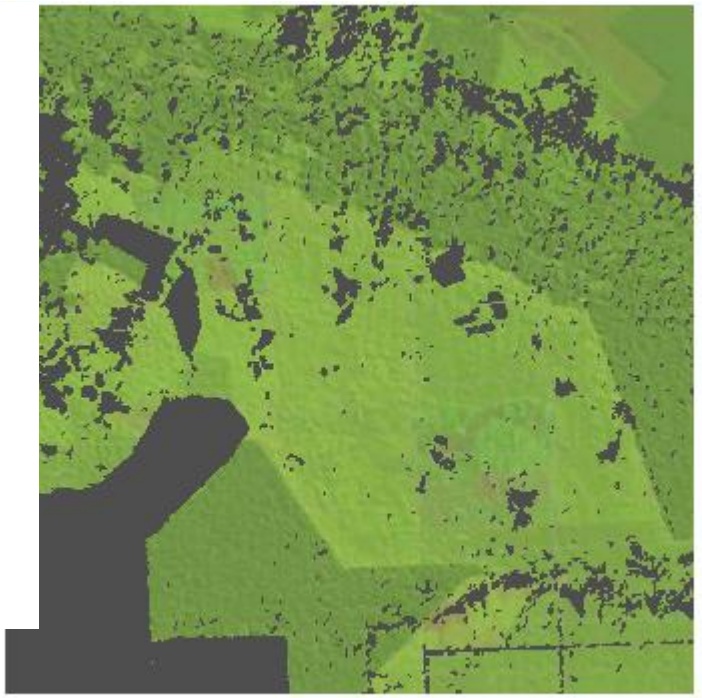
Vegetation index: NDMI
History period: 2005-2010
option: “all”
stack subset: yes (from 2005)
Monitoring approach: 2010-2016
option: Sequential monitoring period approach
Regression model: harmonic order 1
Trend: no



Example 6

- time to proccess on 36 CPU cores: 9.4 min
- Overall accuracy: 91%

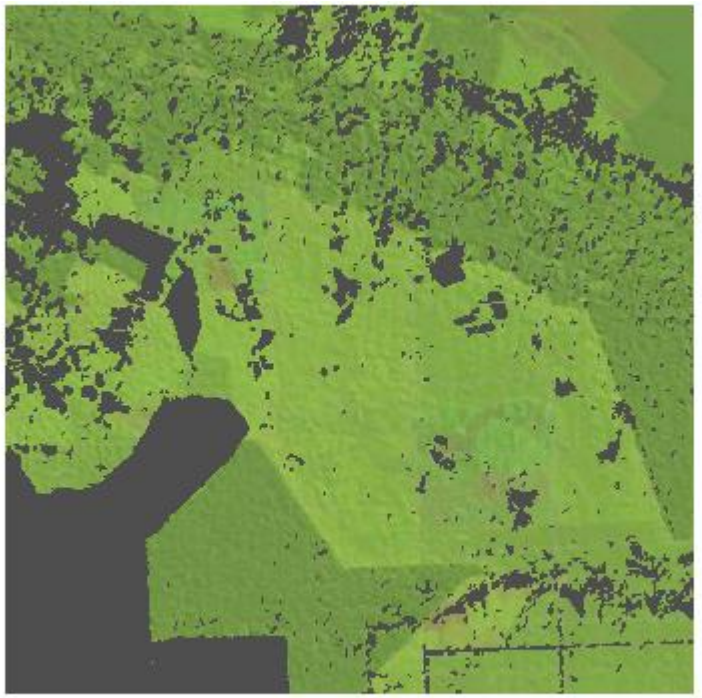
History period: 2008-2010
option: “all”
stack subset: yes (from 2008)
Monitoring approach: 2010-2016
option: Sequential monitoring period approach
Regression model: harmonic order 1
Trend: no



Example 10

- time to proccess on 36 CPU cores: 1.4 min
- Overall accuracy: 83%

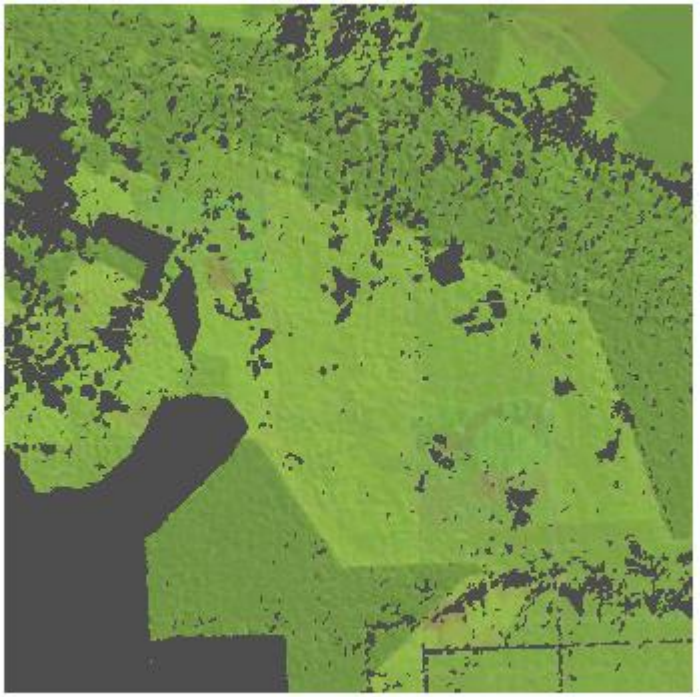
Vegetation index: NDMI
History period: 2008-2010
option: “all”
stack subset: yes (from 2008)
Monitoring approach: 2010-2016
option: Full monitoring period approach
Regression model: harmonic order 1
Trend: no



Example 8

- time to proccess on 36 CPU cores: 10,4 min
- Overall accuracy: 71%

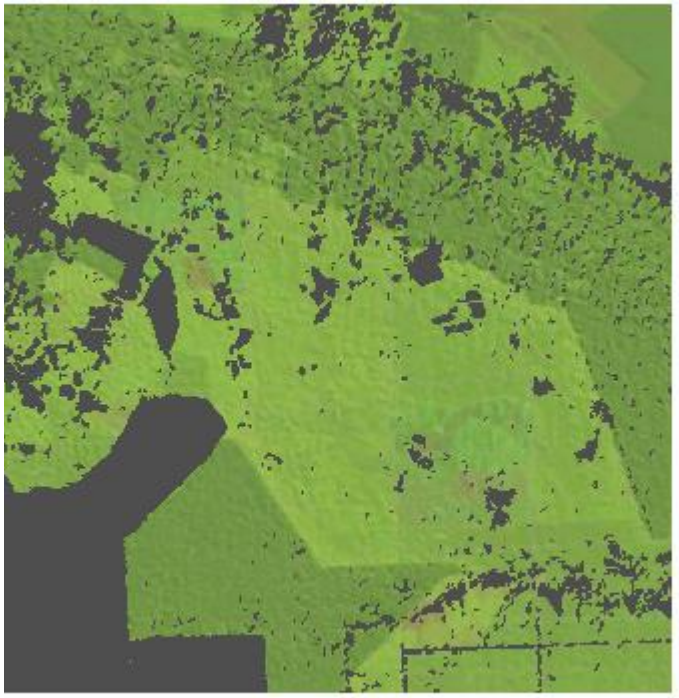
Vegetation index: NDVI
History period: 2005-2010
option: “all”
stack subset: yes (from 2005)
Monitoring approach: 2010-2016
option: Sequential monitoring period approach
Regression model: harmonic order 1
Trend: no



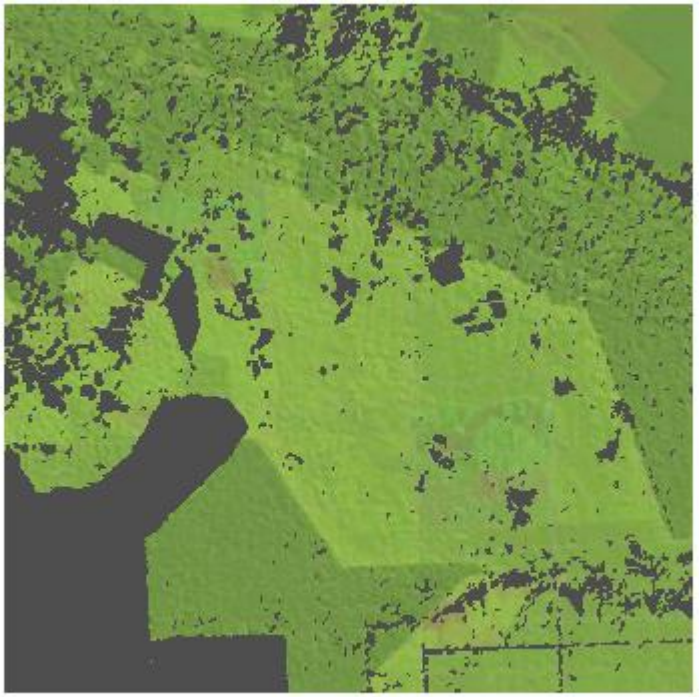
Example 9

- time to proccess on 8 CPU cores: 7.7 min
- Overall accuracy: 51%

Vegetation index: NDVI
History period: 2000-2010
option: “all”
stack subset: no
Monitoring approach: 2010-2016
option: Full monitoring period approach
Regression model: harmonic order 1
Trend: no

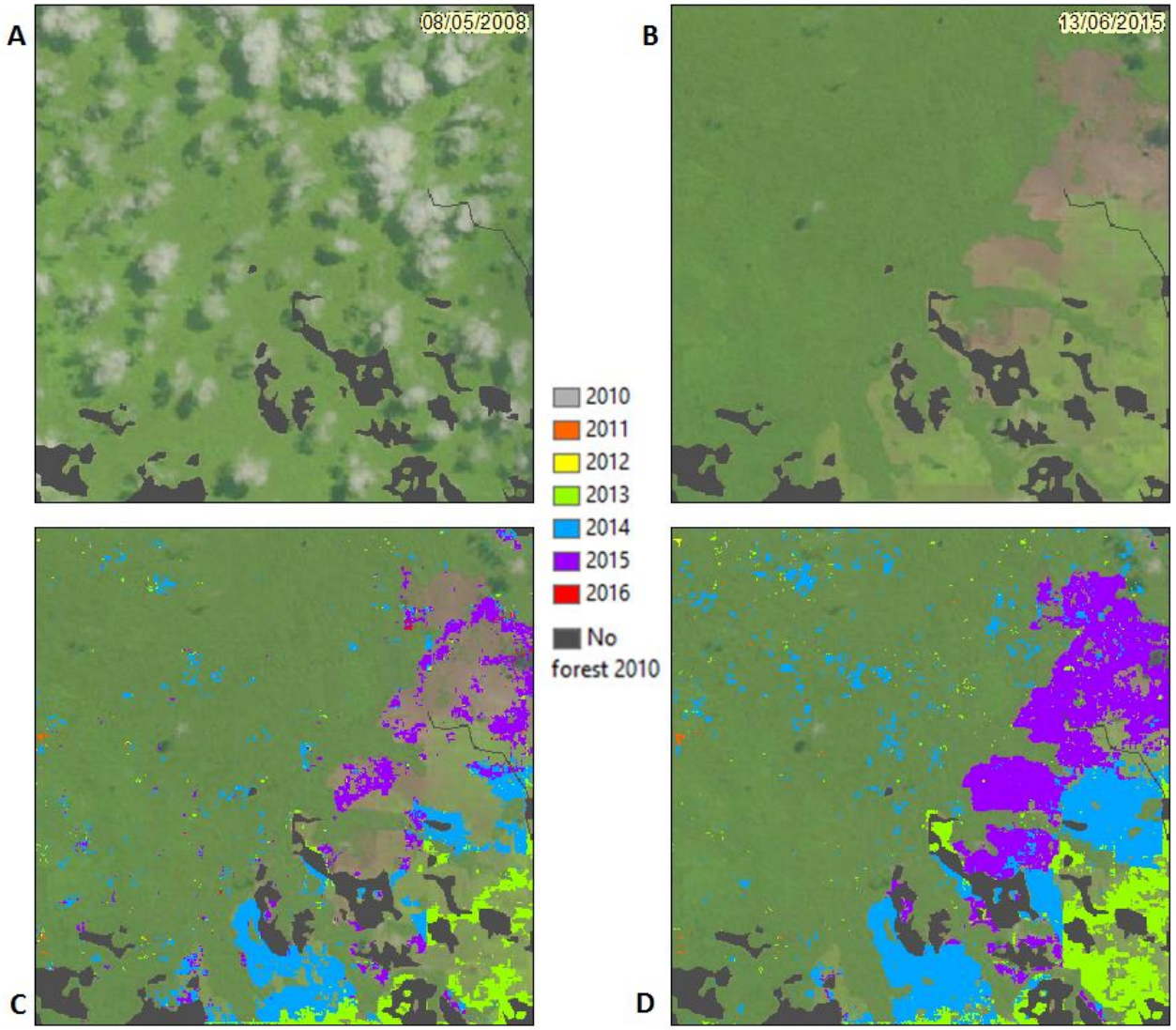


Validation

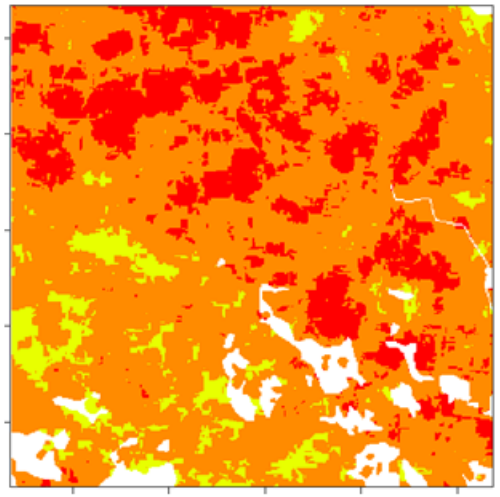


Extra discussion: Case of Gabon

*2 min if time allows

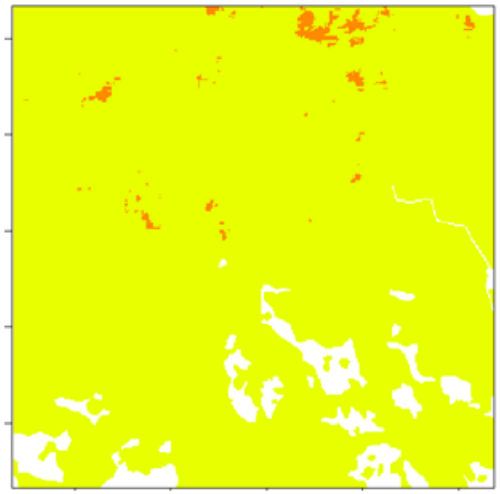


History period (2000-2010)



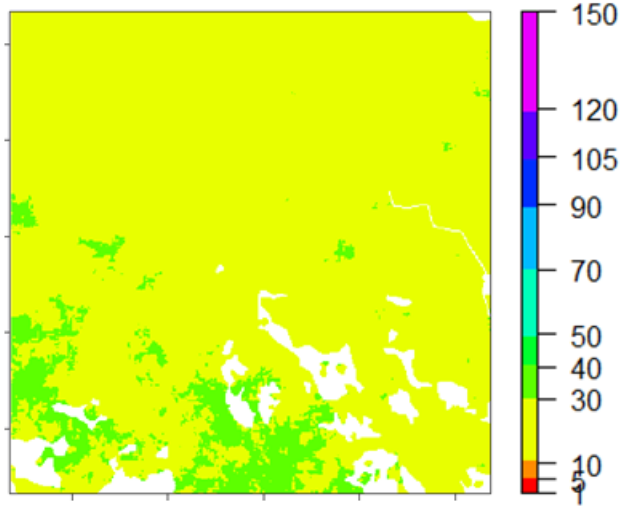
Min: 1
Max: 15

Monitoring period (2010-2015)

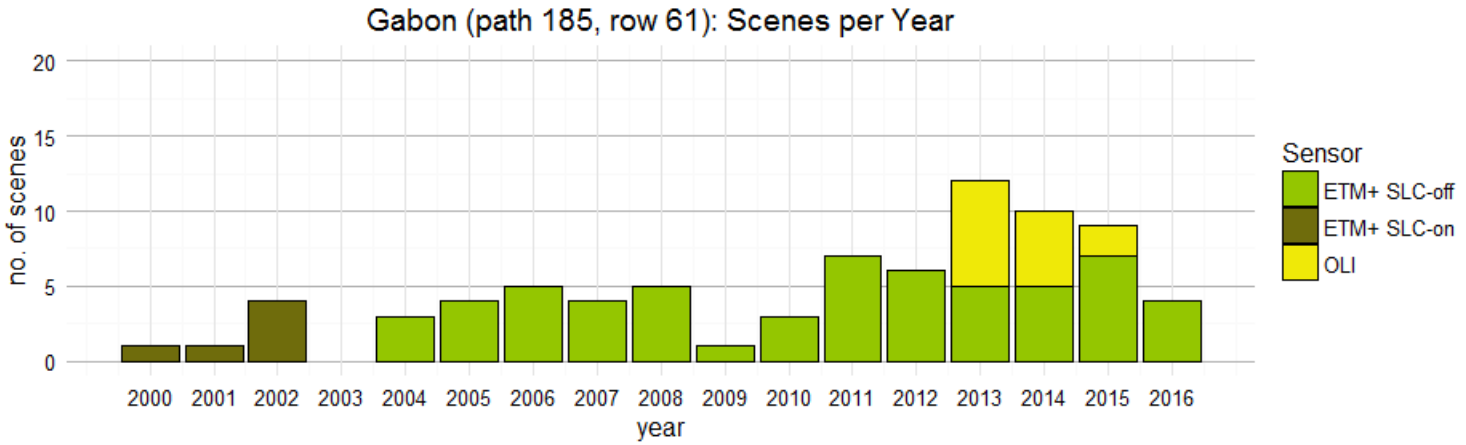


Min: 7
Max: 27

All observations (2000-2015)



Min: 11
Max: 37



Step by step towards detecting deforestation in your next AOI

1. Understand how Bfast works

2. Read the Bfast guide on how to choose the parameters of the bfastSpatial function

3. Assess your AOI. What is the phenology of the forest? How frequent/ many cloud free scenes are in that area?

4. Based on this information choose the appropriate VI, length of history period, monitoring approach, and regression model.

5. Decide on the data that needs to be acquired and acquire the data.

6. Test the algorithm with the above decided settings on just some sample pixels or/and a small test area (e.g.10 x 10 km) in your AOI following the Introduction to bfastSpatial tutorial.

7. Depending on the results, if needed, change and test again settings.

8. Apply algorithm with final settings on entire AOI.

Discuss the future of BFAST: a faster algorithm for larger AOIs (SciDB)

https://github.com/appelmar/scalbf-wur/

Thank you for your attention!

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