Combining satellite, aerial and ground measurements to assess forest carbon stocks in Democratic Republic of Congo

Benjamin Beaumont (1, 2), Tom Akkermans (1), Alban Bouvy (1), Nathalie Stephenne (2), Pierre Mathoux (3), Jean-François Bastin (4,5) and Yves Baudot (6)

1) WALPHOT S.A., Jambes, Belgium, (2) ISSeP, Liège, Belgium(3) Research Laboratory in Environmetrics and Geomatics, Université catholique de Louvain, Louvain-la-Neuve, Belgium, (4) Landscape Ecology and Plant Production Systems Unit, Université libre de Bruxelles, Brussels, Belgium, (5) BIOSE de Liège, Gembloux, Belgium, (6) N.A.D.A.R. sprl, Huy, Belgium.







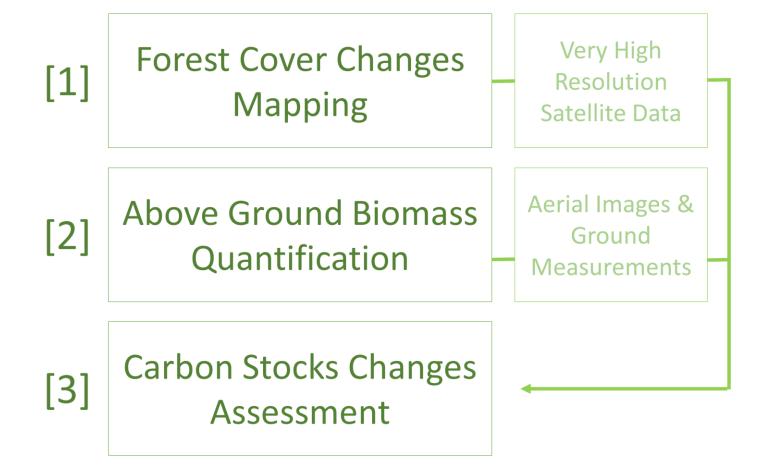




EO4REDD – BUILDING AN INNOVATIVE REDD+ MONITORING SERVICE

A SERVICE IN THREE STEPS

The EO4REDD project aims at developing a robust, operational and cost-effective service for monitoring carbon stocks changes at regional scale.



A CASE STUDY IN DEMOCRATIC REPUBLIC OF THE CONGO

- West of Maï Ndombe region North of Kinshasa, Capital city of DRC.
- Emission Reduction Program Idea Note (ER-PIN) & Program Document (ER-PD) development area of DRC.
- Many scientific studies.
- High pressure on the environment (proximity to Kinshasa) and high diversity of deforestation and forest degradation drivers.

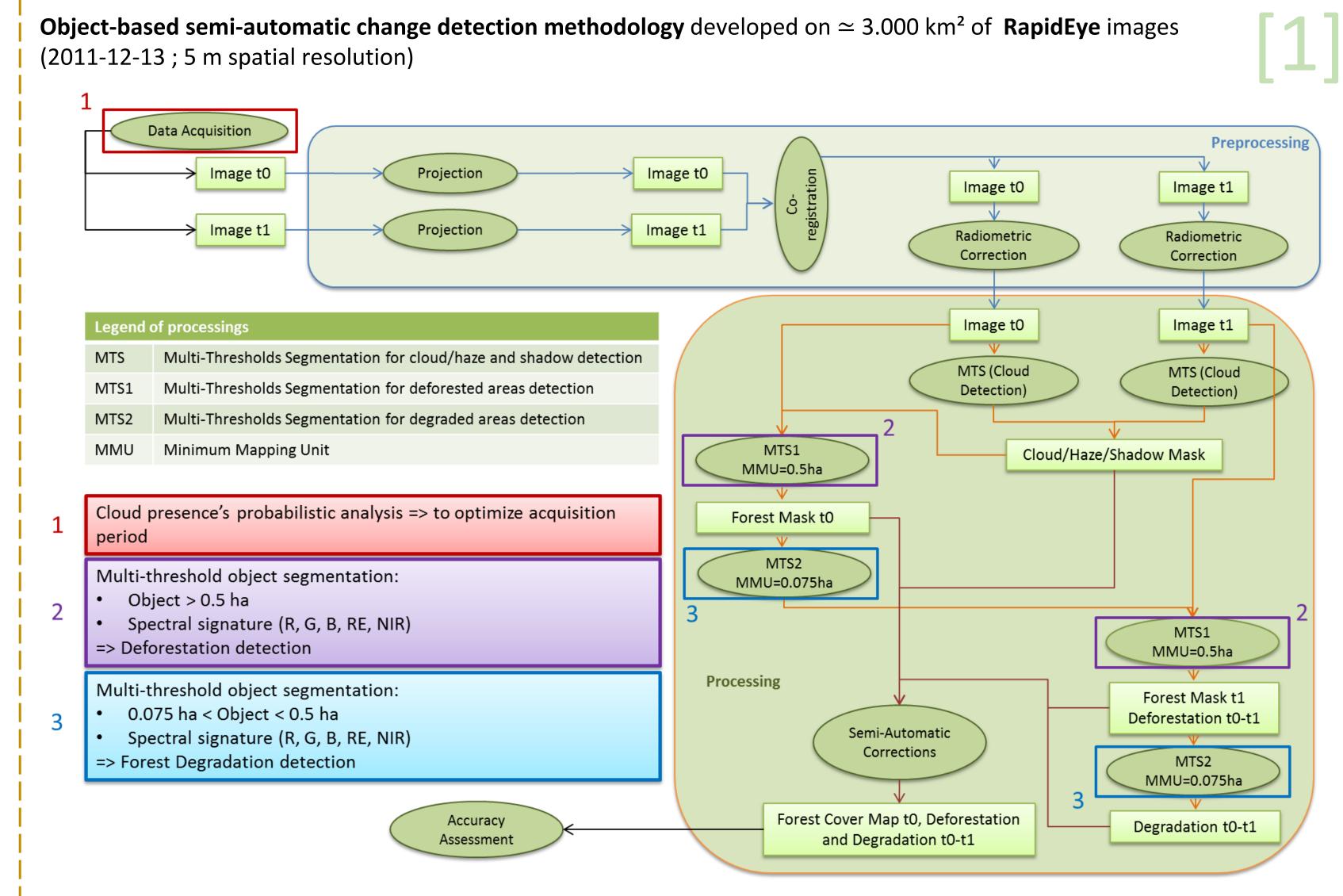




CONCLUSION & OUTLOOK

Given the high accuracies obtained in [1] (> 80% for deforestation and \simeq 77% for forest degradation) and the suitable model (R^2 of 0.7) obtained in [2]: EO4REDD products can be seen as a valid and replicable option for carbon stocks monitoring in tropical forests.

Further developments are needed to strengthen the cost effectiveness value and the REDD+ suitability of the service. These developments (including the use of Sentinel data time series, mapping of the "+" of REDD+, application to other geographical contexts ...) will be assessed in future projects.

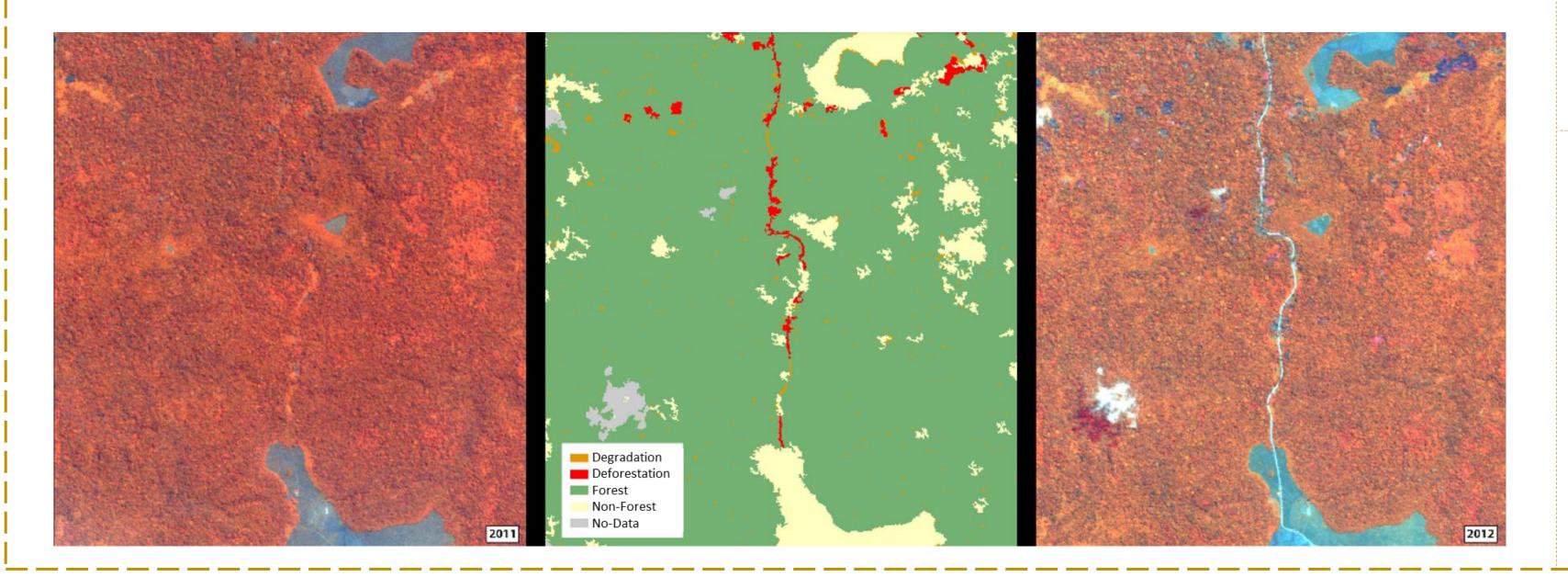


Detection of deforestation & forest degradation with high accuracies:

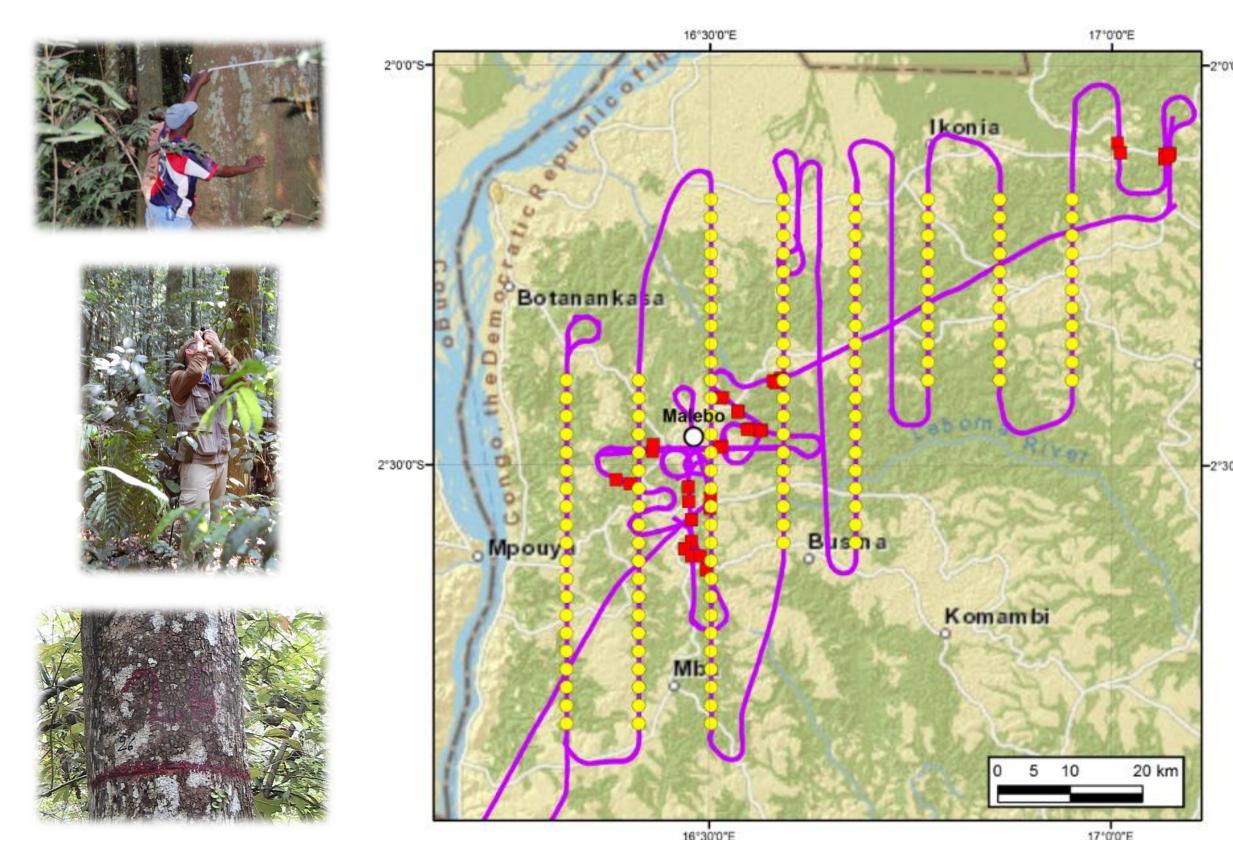
38.7 % of the forest cover losses are due to degradation

- Overall accuracy = 90.7 %; Producer and user accuracies > 80 % for deforestation and = 77% for degradation

Classes	Area (ha)	% of total area	% of forest area
Forest	156.193	54.03	
Non forest	103.673	35.86	
Deforestation (MMU = 0.5 ha)	438	0.15	0.28
Degradation (MMU = 0.075 ha)	276	0.10	0.18
No data (Cloud cover)	28.491	9.86	
Total	289,072	100	



Allometric linear model developed for Above Ground Biomass measurements in Maï Ndombe (with R² = 0.7) [UCL] based on dendrometric parameters (tree crown areas and heights) extracted from more than 1000 airborne stereoscopic image pairs acquired in September 2013 and calibrated using ground measurements of individual trees on a data set of 18 one hectare plots [ULg & ULB].





[2]

Combining [1] & [2] to measure carbon stocks changes at national/regional scale

egional

[1] Forest Cover Change Maps

[2] AGB Estimation using Aerial Images

[3] National/Regional
Estimation of Carbon
Stocks Changes

Using extrapolation by forest types