

## **K&C Phase 3 – Brief project essentials**

*Methodology development for MRV and Reference  
Emission Level for REDD+ in Vanuatu*

*SPC / GIZ Regional Project  
'Climate Protection through Forest Conservation  
in Pacific Island Countries'*

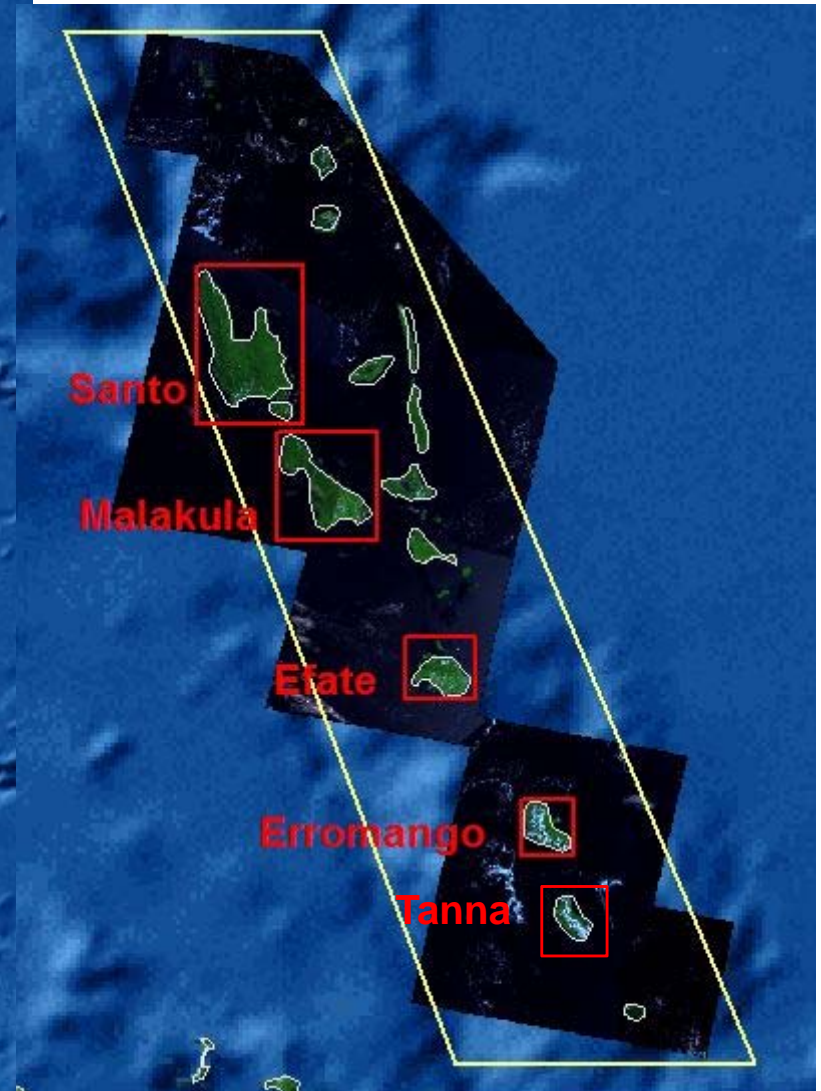
*Joerg Seifert-Granzin, mesa consult  
Dorys Mendez Zeballos, mesa consult*



## Project area(s)

Located approx. 2,200 km east of Australia Vanuatu consists of 83 islands. The country has ratified the UNFCCC and the CBD. It is committed to regional coordination on climate change mitigation under the lead of the Secretariat of the Pacific Community (SPC).

The program is focusing on 5 pilot islands:  
Santo, Malakula, Efate, Erromango, and Tanna





## Project objectives

### *Project goal*

The conservation of forest ecosystems in the Pacific island countries is supported in order to mitigate climate change and preserve biodiversity

**Outcome 1: Regional REDD+ policy framework.** The Pacific Island Countries have a joint, coherent regional framework for the implementation of REDD+

**Outcome 2: REDD+ Information and support platform.** The implementation of REDD+ activities in the PICs is strengthened through the use of a regional and supra-regional information and support platform

**Outcome 3: REDD+ readiness:** Substantial REDD+ components are implemented in 3 countries leading to a complete REDD+ Readiness in one country

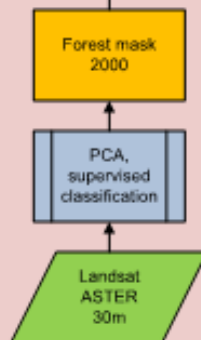
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## Vanuatu's MRV Approach

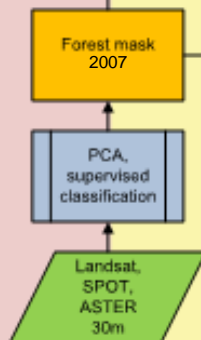
Medium resolution wall-to-wall deforestation mapping (Herold et al. 2007)



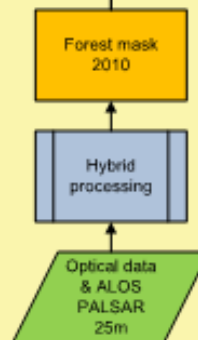
1990



2000



2007

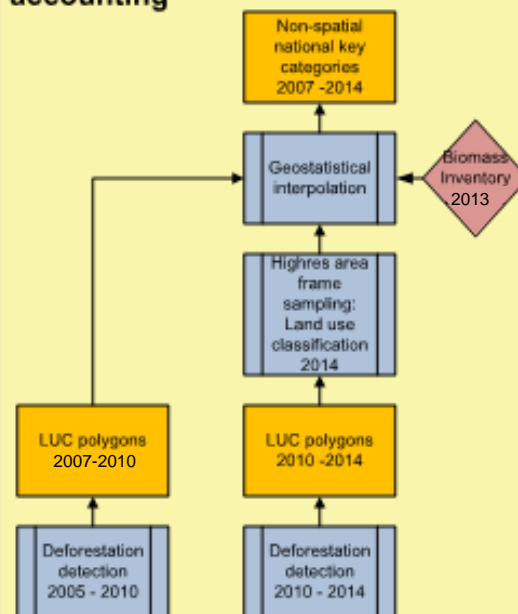


2010

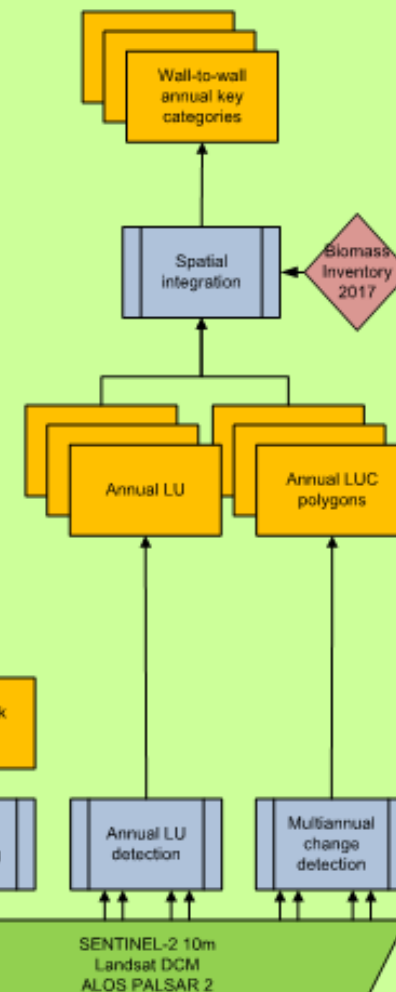


2014

Medium resolution wall-to-wall deforestation mapping combined with statistical LUC accounting



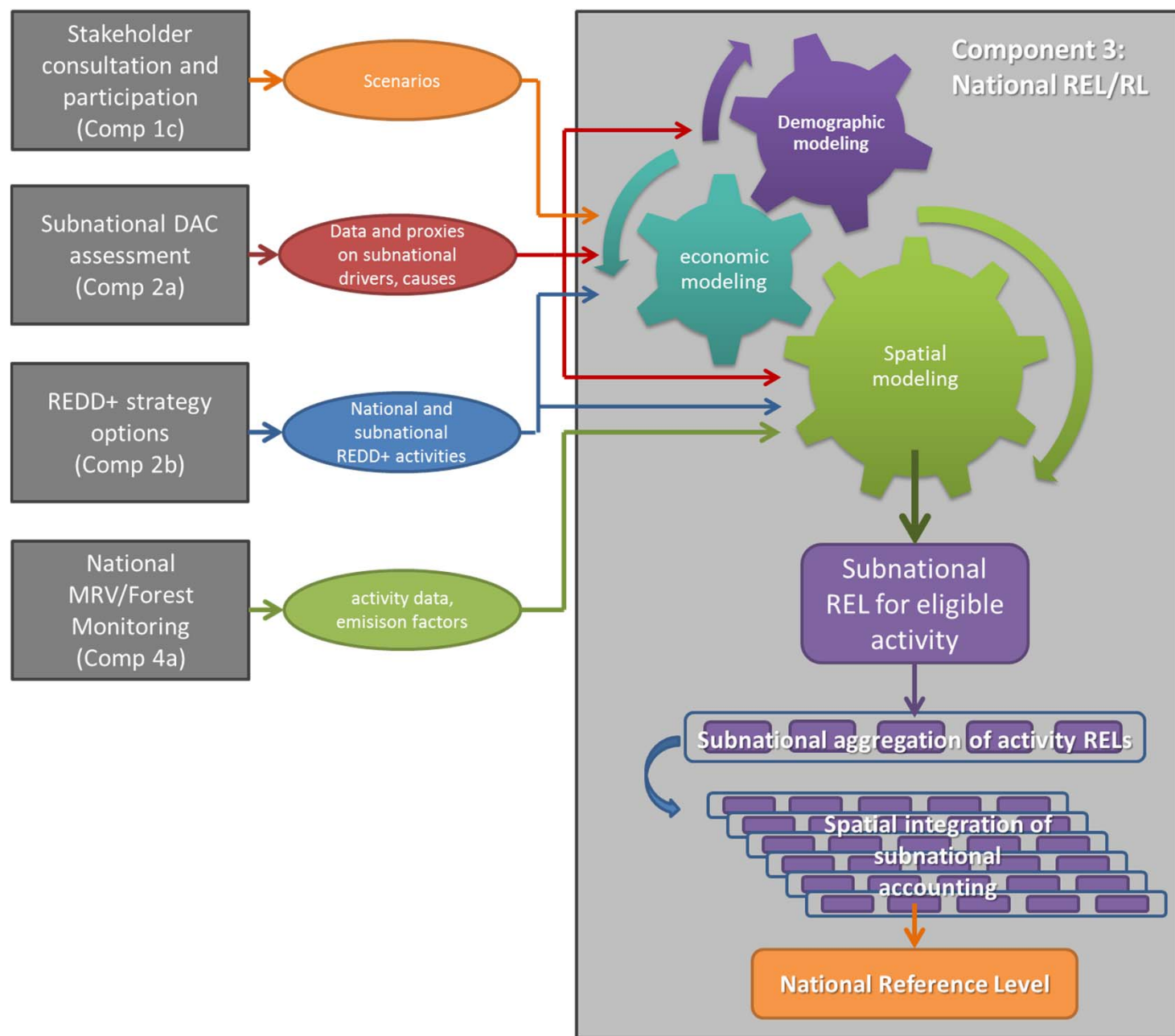
High resolution annual wall-to-wall deforestation and LUC mapping



## Vanuatu's Reference Emission Level (REL) Approach

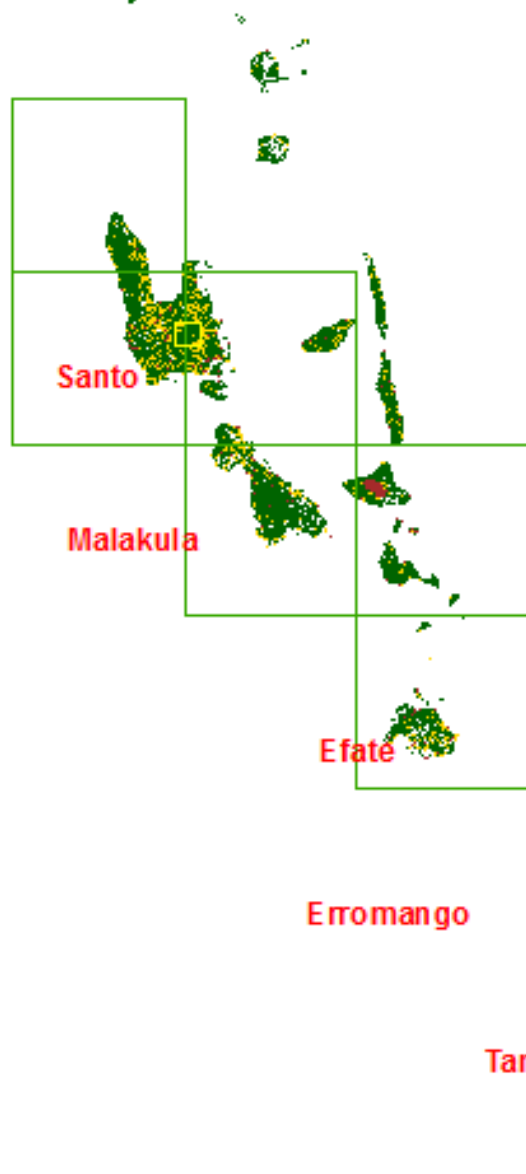
- Specific for each of the 5 REDD+ activities
- Subnational: adjusted for circumstances on 5 biggest islands
- Coupled deforestation modeling
- Calibrated over 1990-2000-2007-2010
- Outlined in Vanuatu's approved R-PP (March 2013)

@ [www.forestcarbonpartnership.org](http://www.forestcarbonpartnership.org)





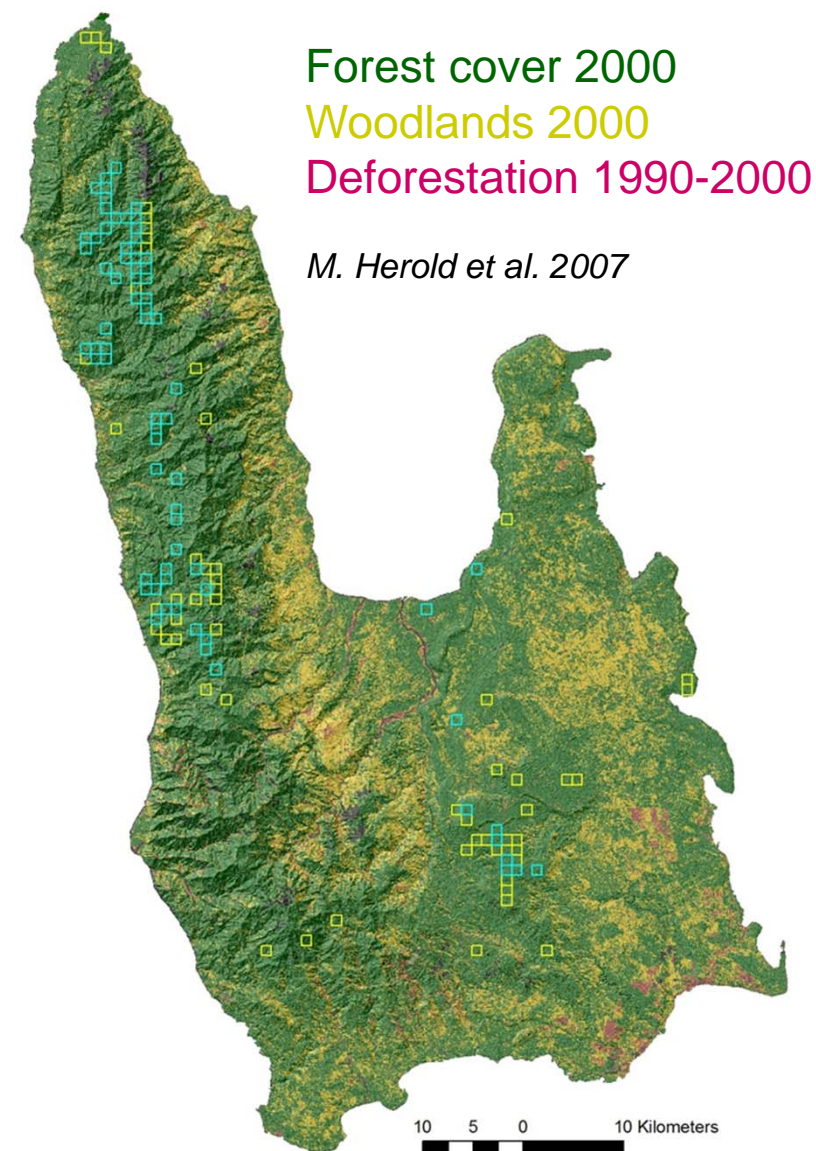
## Forest cover change detection 2007 – 2010: data inputs



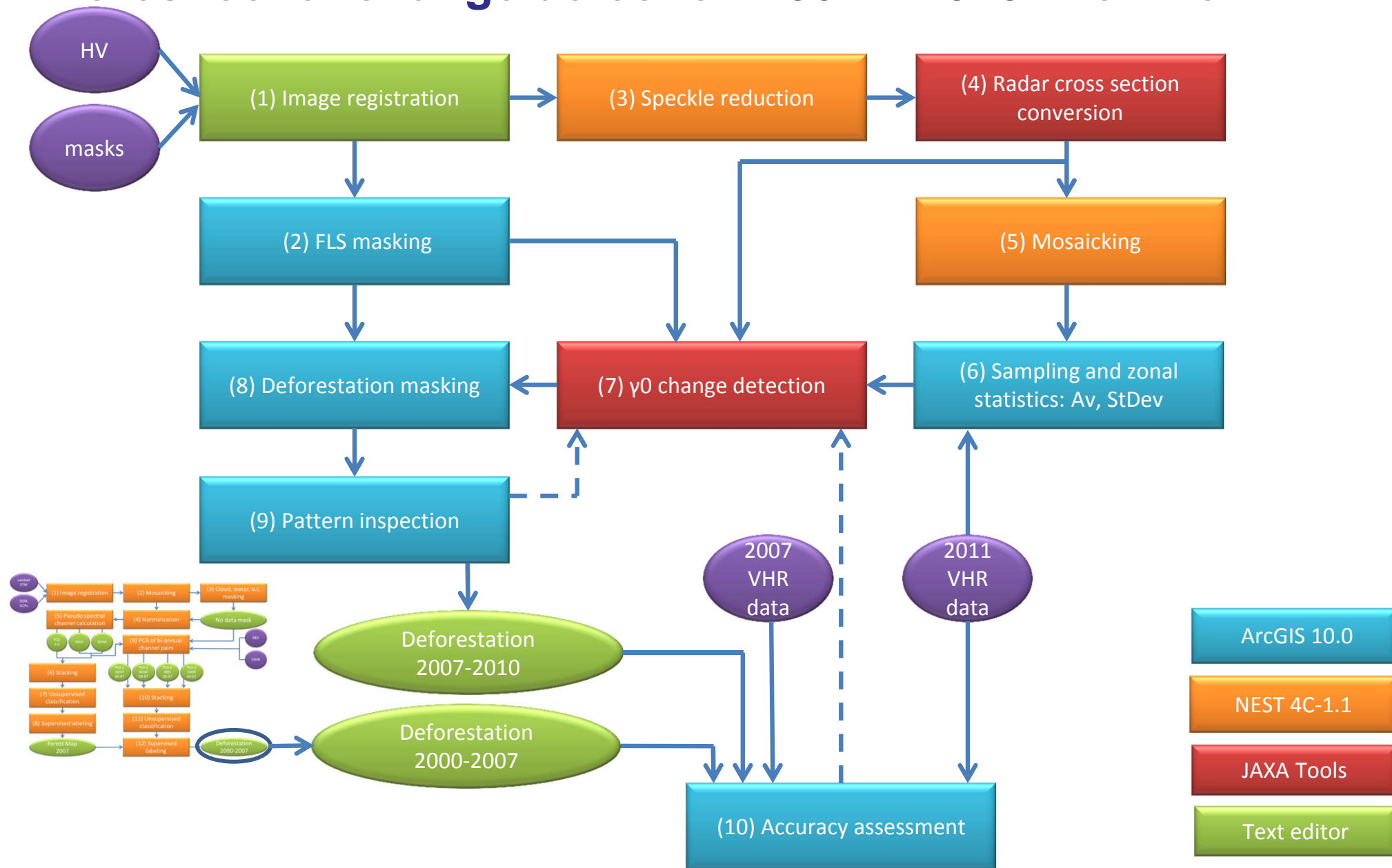
Sensor	Spatial resolution	Spatial Coverage	Temporal coverage
Landsat TM, ETM	30m	Wall-to-wall	GLC 1990, 2000
SPOT 3	20m	16 scenes	1992/1993
ASTER	15m	14 scenes	2000
NEXTMap® TopoSAR DSM	1.25m	Wall-to-wall	2003
ALOS Palsar	25m	4 islands	2007, 2008, 2009, 2010
WorldView 2	0.5/2m	Santo	2011/2012

## Piloting MRV & REL development on Santo Island

- Rough topography and steep slopes along the west coast
- Annual deforestation 1990-2000 468 ha/yr predominantly in the southeast.
- Main drivers: cattle ranching, coconut palms, subsistence agriculture
- Customary land rights, 70 year leases, land disputes, no cadastral system
- Subnational REDD+ pilot nested into national REDD+ framework

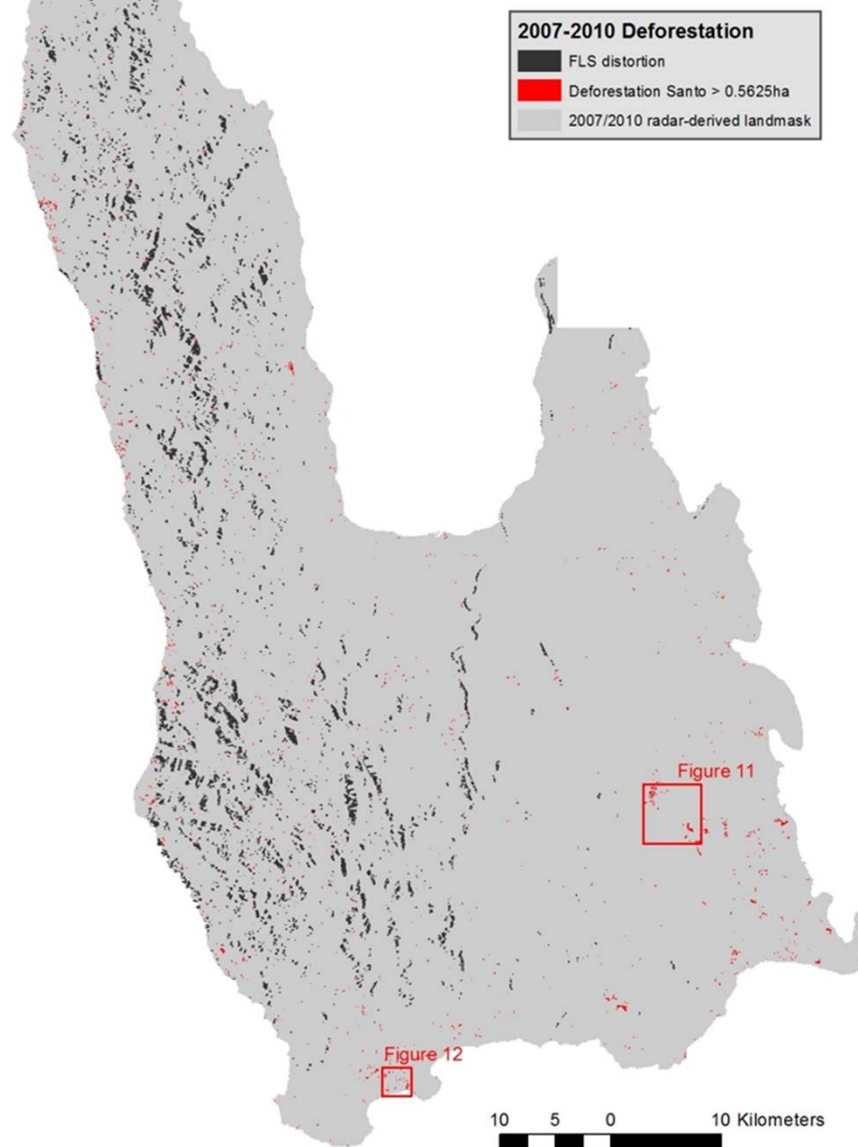


# Forest cover change detection 2007 – 2010: workflow

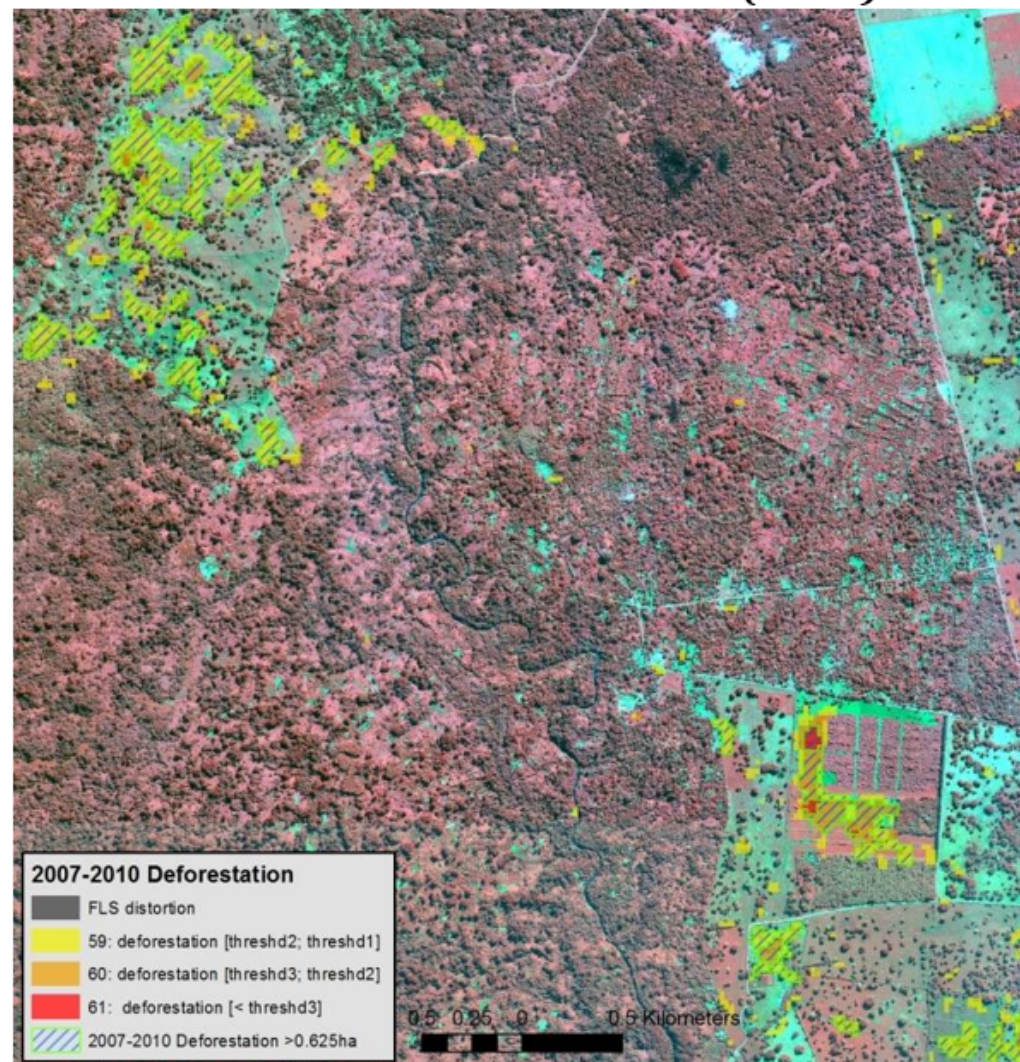




## Forest cover change detection 2007 – 2010: initial results

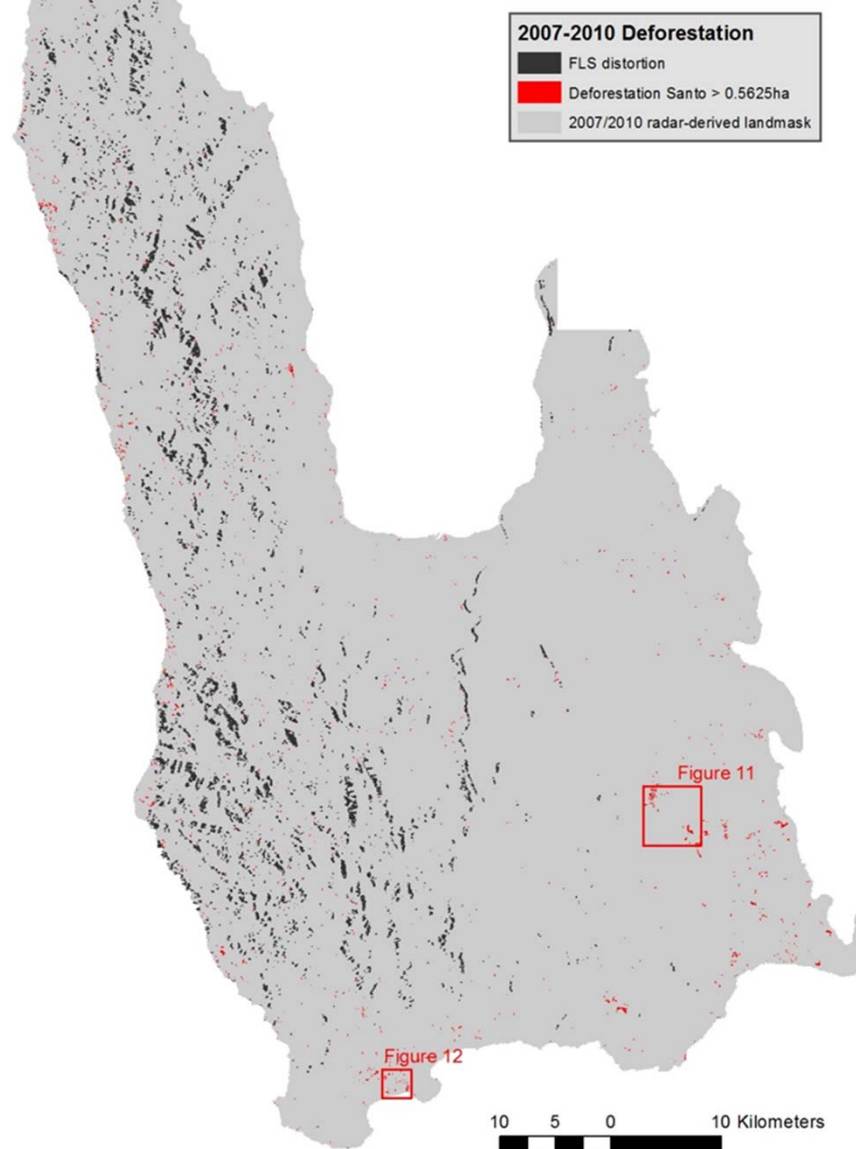


*Figure 11: Deforestation pattern in the Southeast over WorldView-2 band 7-5-2 scene (2011)*

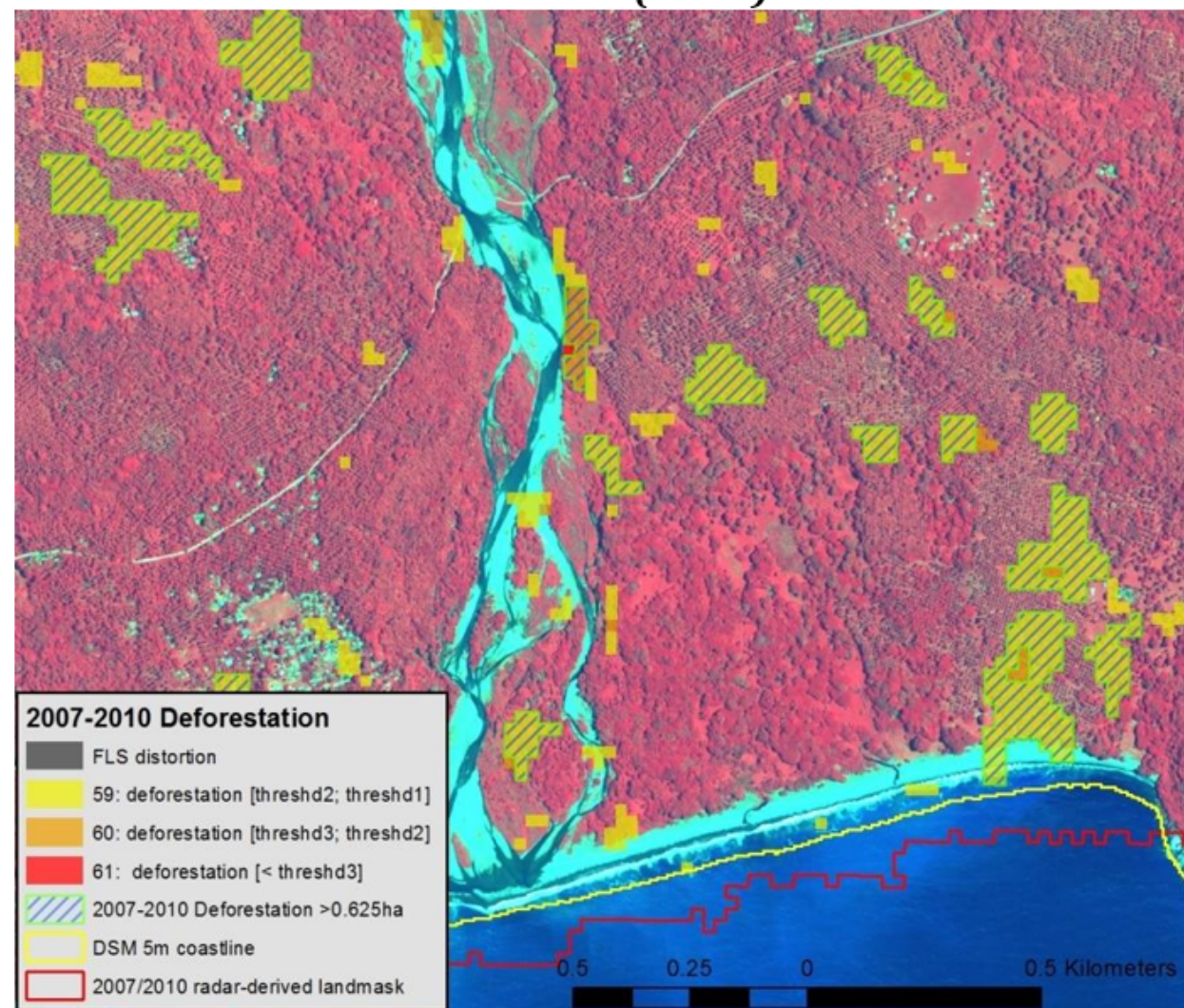




## Forest cover change detection 2007 – 2010: initial results



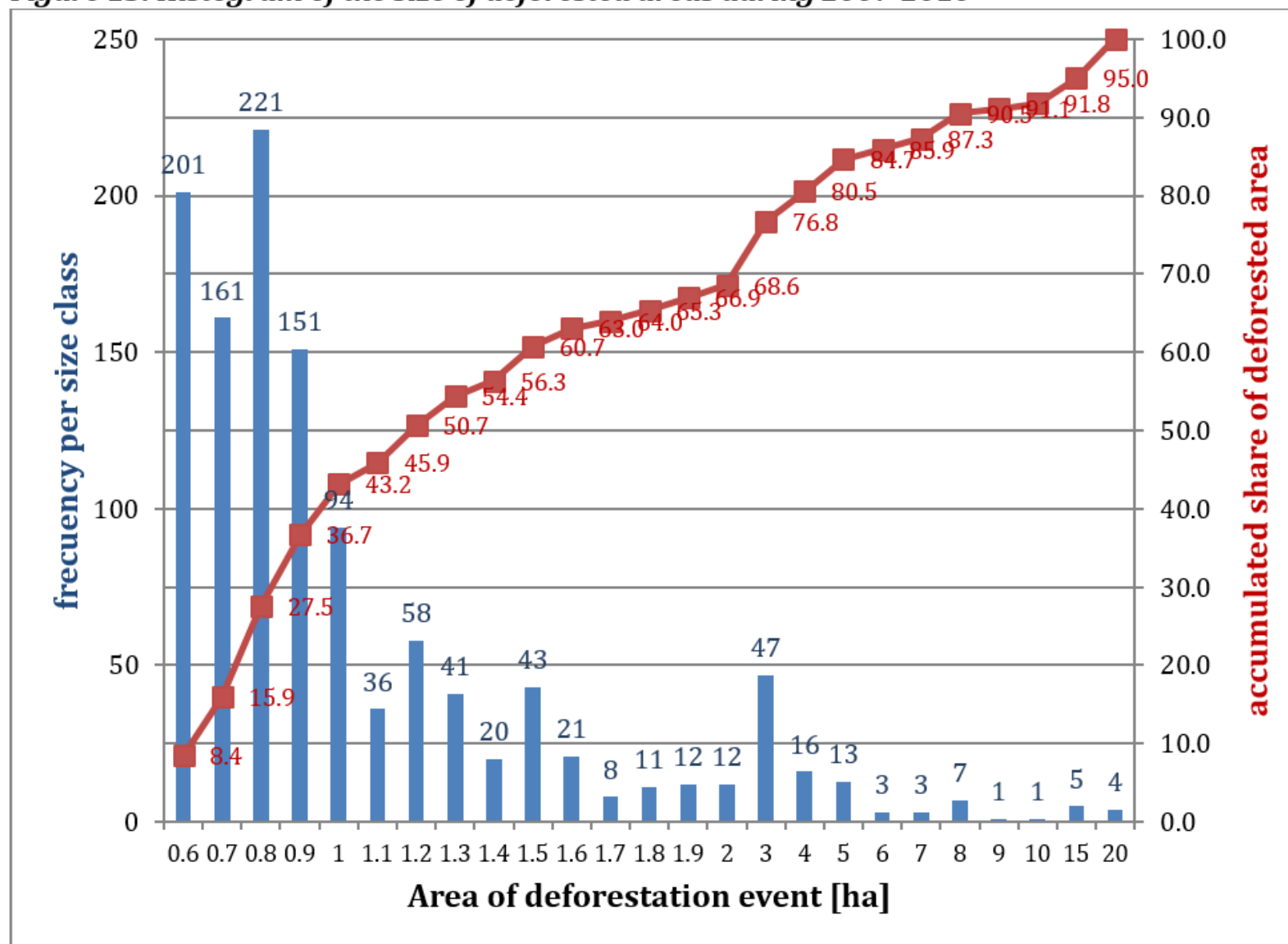
*Figure 12: Deforestation pattern in the Southwest over WorldView-2 band 7-5-2 scene (2011)*



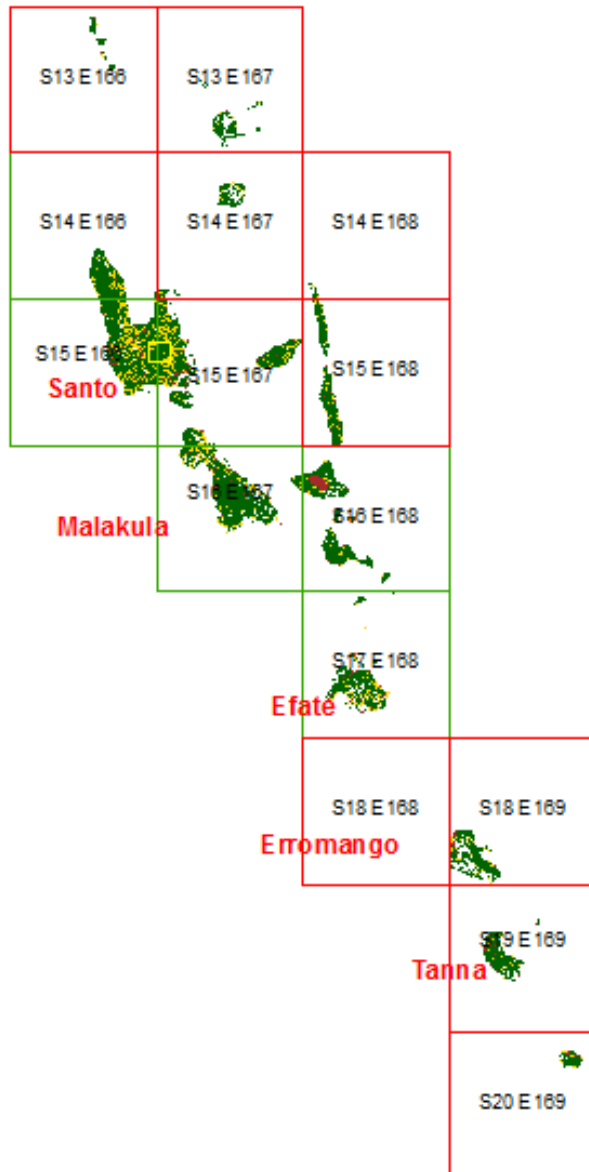


## Forest cover change 2007 – 2010: 1,397 ha (MMU = 0.56 ha)

Figure 13: Histogram of the size of deforested areas during 2007-2010



## Forest cover change detection 2007 – 2010: pending tasks



*Improved calibration of  $y^0$  change assessment*

*Improved image registration* using Landsat 7 (band 8)

*Coconut stand delineation* applying OBIA

*Cross-calibration of the optical and radar-based processing chain for 2007.* Consistent forest-non forest detection over multiple periods required for REL calibration and reporting.

*Accuracy assessment* using WorldView 2 2011 coverage

*FLS Gap processing* using WorldView 2 2011 coverage

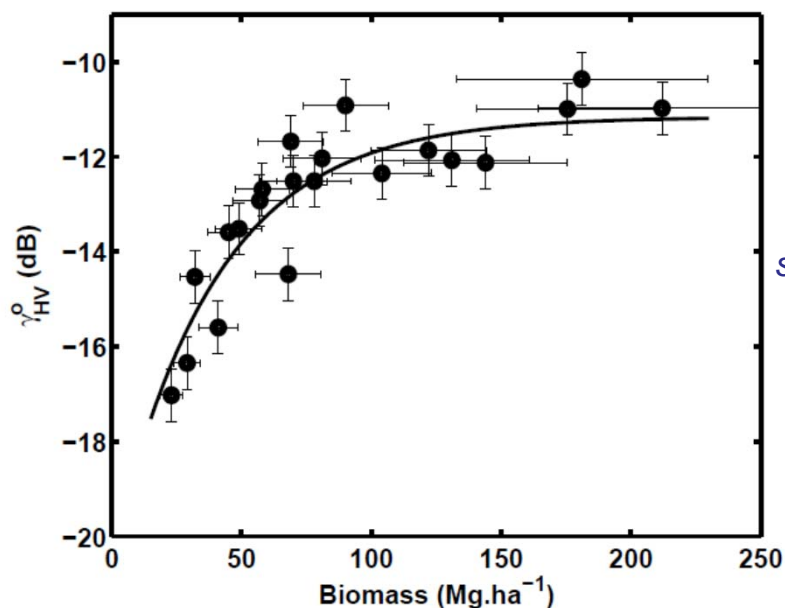
*Inclusion of **further** ALOS Palsar scenes*



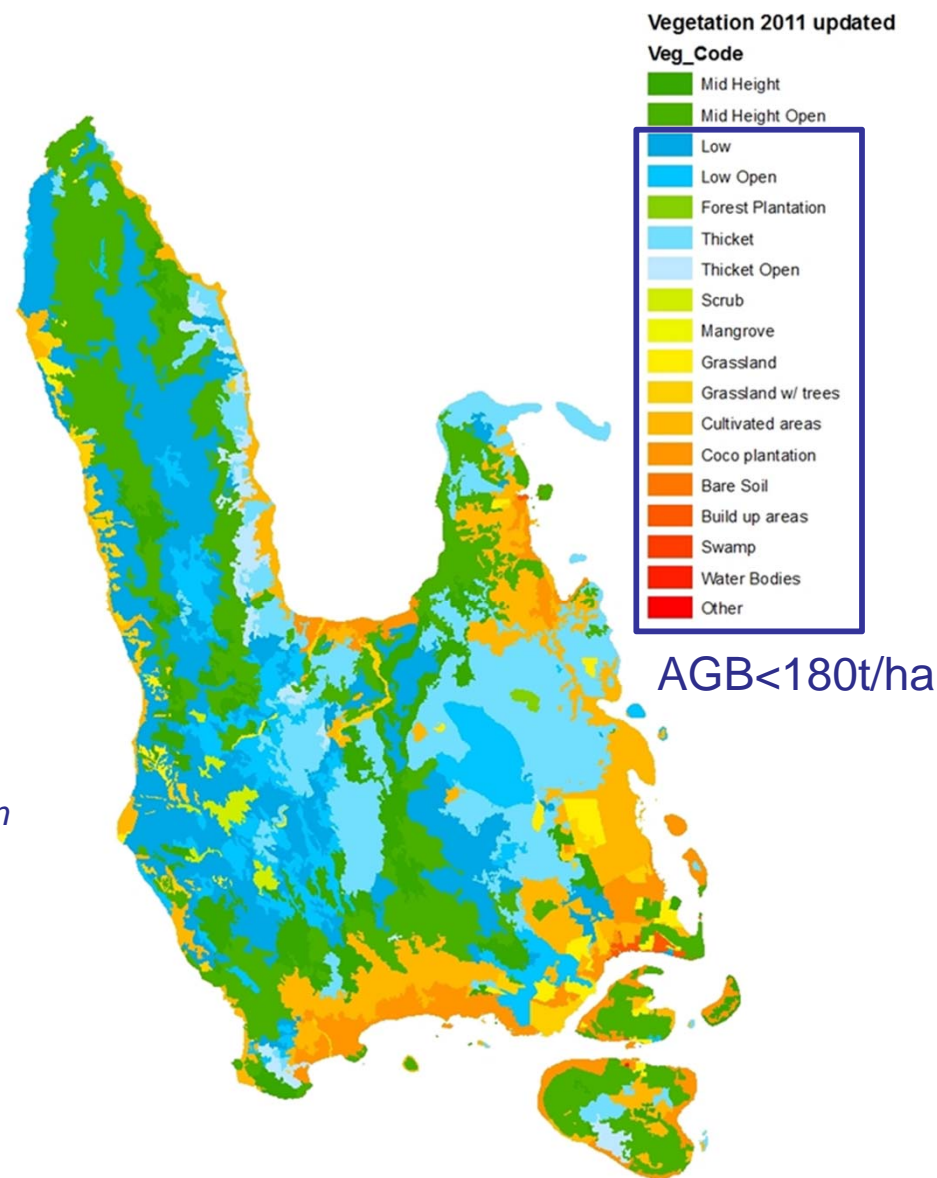
## Next steps: Piloting NFI and direct biomass assessment

Piloting of the National Forest and GHG Inventory (NFI) 2013/2014

Direct assessment of aboveground biomass in low-carbon stands building backscatter- biomass regressions based on 1ha plots  
(S. Mermoz *et al.* forthcomming)



Methods development  
supported by the European  
Commission's



## Conclusions

Without ALOS Palsar it would be hardly possible to detect deforestation for the periods 2000 onwards (scarce optical data, clouds).

Rough topography will remain a challenge for SAR processing. Hybrid solutions combining optical and SAR processing will be necessary.

Thematic consistency between optical (1990-2000-2007) and SAR processing (2007 – 2010) will be difficult to achieve.

Distinction of tree crops (coconut) and forest not yet solved. Further work required (OBIA: texture analysis).

Expectation: SAR based direct biomass assessments will reduce future monitoring cost.