



# **Development of an automatic method by remote sensing of chronological stages of deforestation-afforestation. The case of southern Chile**

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## **► To cite this version:**

Nicolas Maestriperi, Gilles Selleron, Martin Paegelow. Development of an automatic method by remote sensing of chronological stages of deforestation-afforestation. The case of southern Chile. ForestSat 2014, Nov 2014, Riva del Garda, Italy. <hal-01364448>

**HAL Id: hal-01364448**

**<https://univ-tlse2.hal.science/hal-01364448v1>**

Submitted on 12 Sep 2016

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# Development of an Automatic Method by Remote Sensing of Chronological Stages of Deforestation - Afforestation

## The Case of Southern Chile



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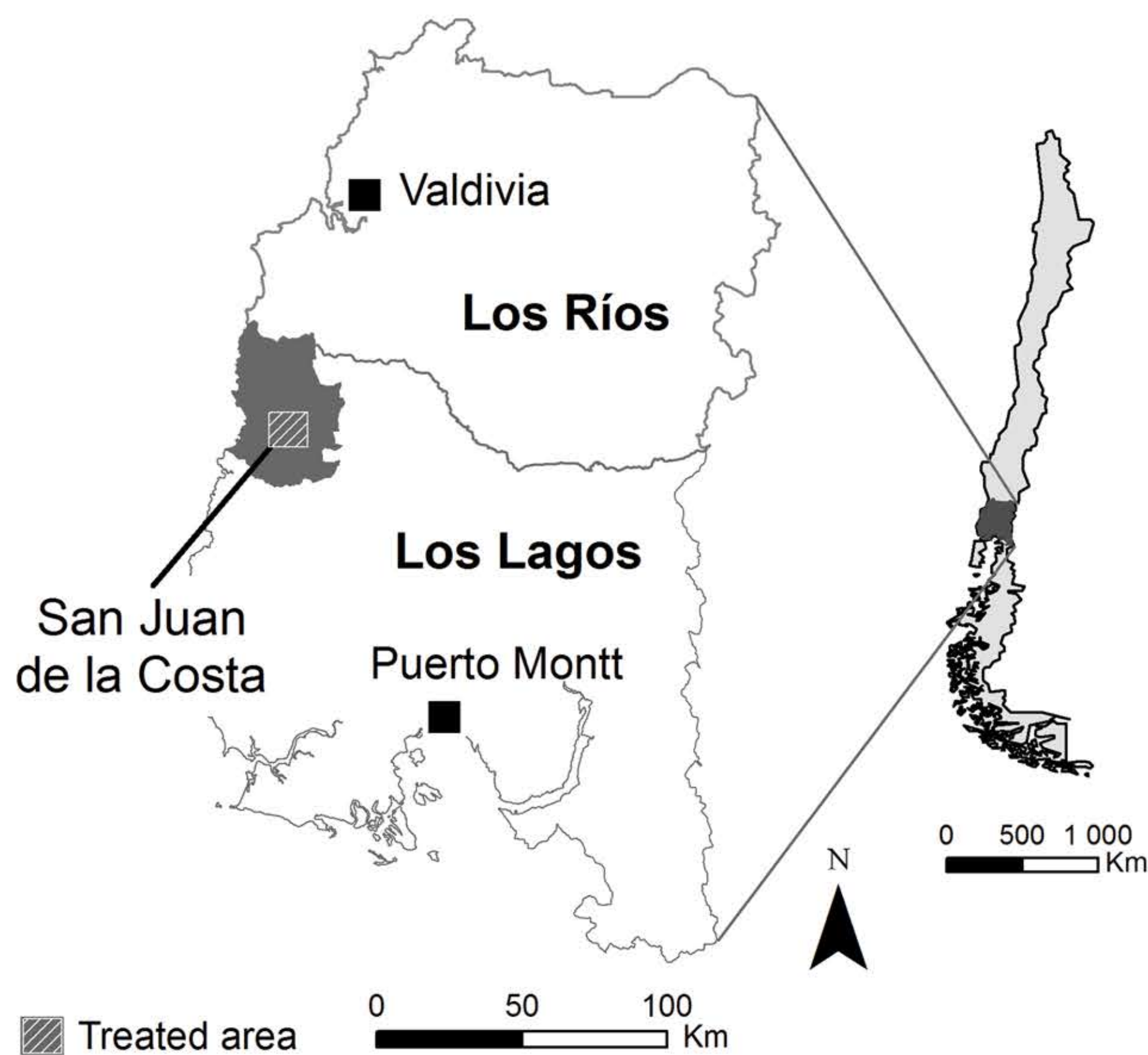


### 1 SCIENTIFIC PROBLEMATIC

**Huge spread of timber plantation** (pine and eucalyptus)  
Social and environmental impacts in a hotspot of biodiversity

**Short-rotation, high yield clear-cut and genetic manipulation**  
Observed phenomena also in Uruguay and Brazil

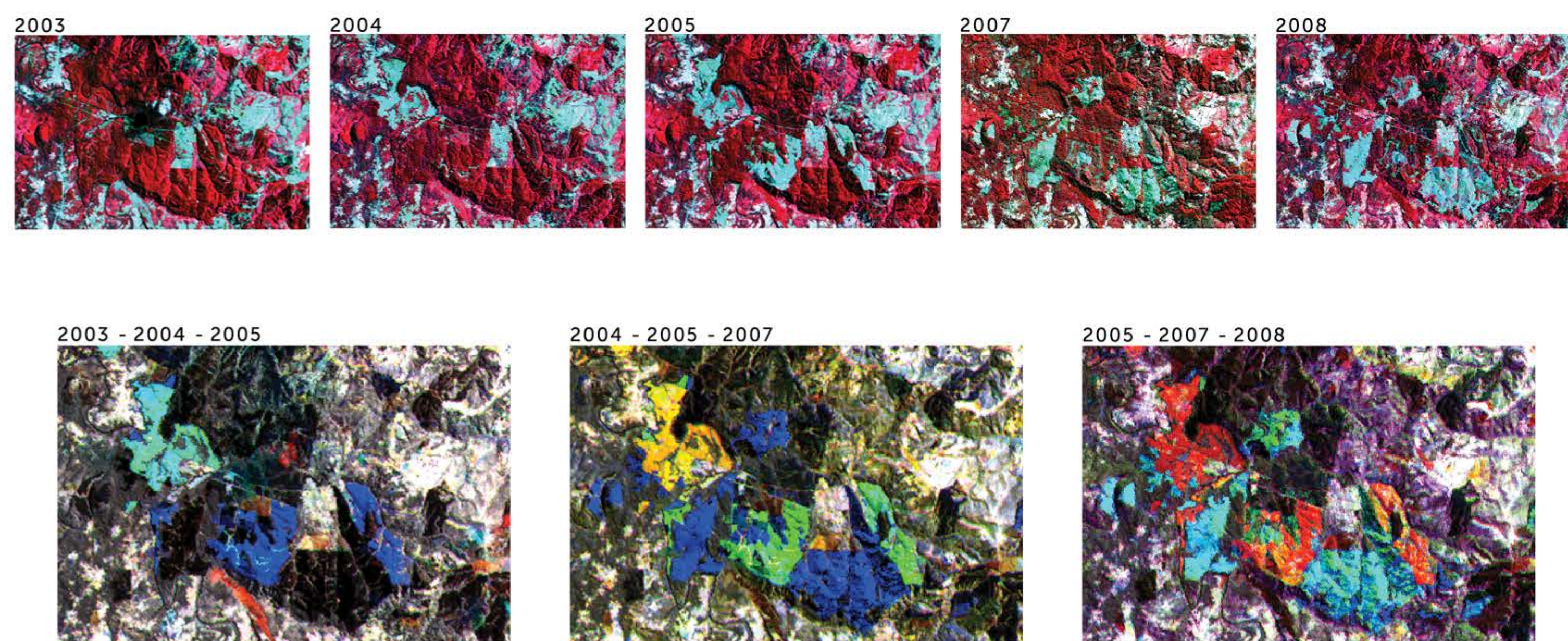
**Build a pluriannual model** to detect, monitor and characterize the high cutting frequency of timber plantations using multirate imagery



Typical landscape of timber plantation in the pre-coastal range - San Juan de la Costa

### 2 METHOD

From a classical vision of satellital imagery (IRC)...  
...To multi-temporal imagery (Mid-Infrared wavelenght)

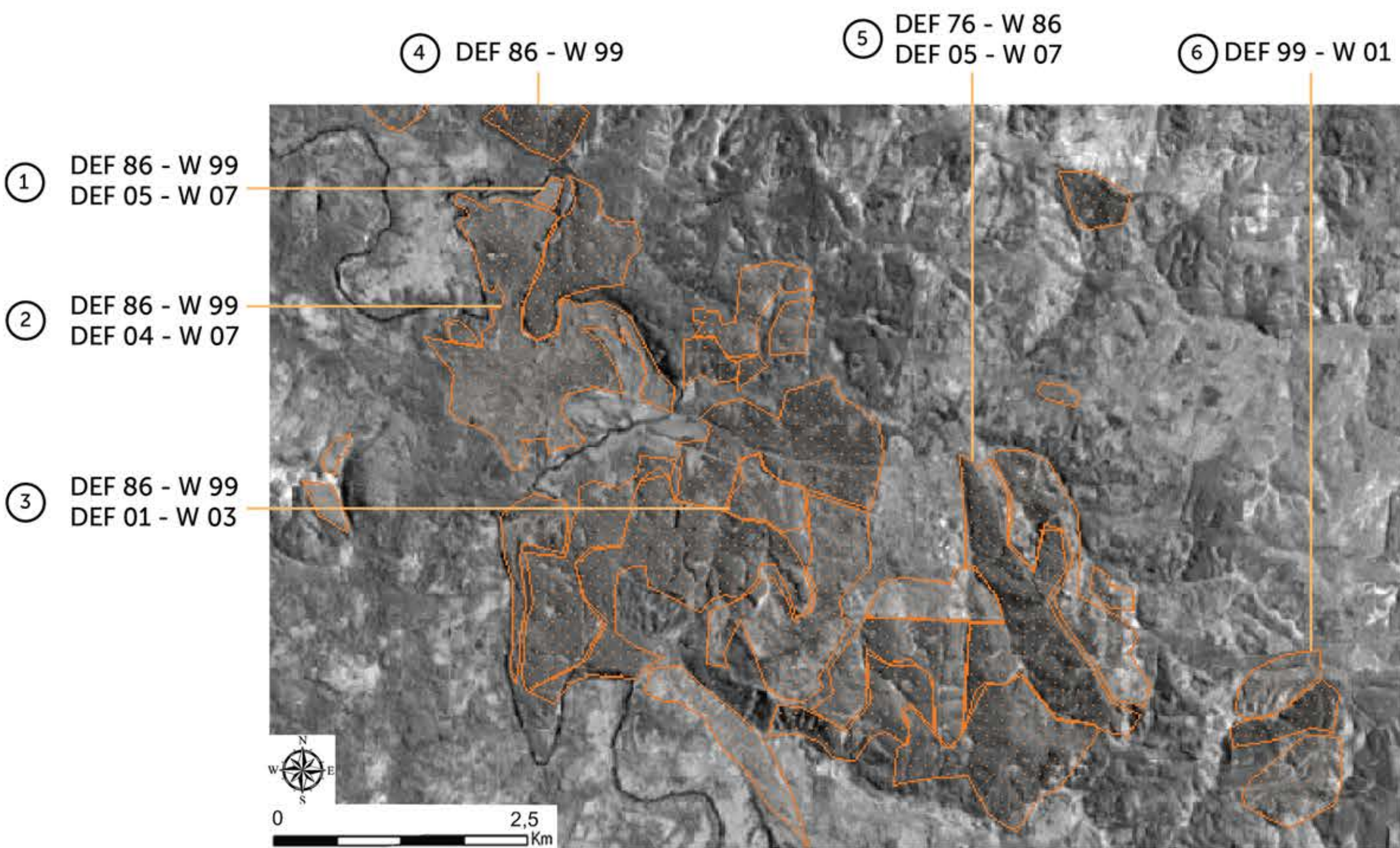


**A trichromatic composition** is built from spectral information taken from MIR along a temporal gradient of 32 years (1976 to 2008).

**Dynamical interpretation** grid which reflects stages of forest management in relation with pine/eucalyptus crop cycles.

COLOR ON SCREEN	DATE 1 (R)	DATE 2 (G)	DATE 3 (B)	INTERPRETATION
Red				Deforested D1 - Wooded D2 and D3
Green				Deforested D2 - Wooded D1 and D3
Blue				Wooded D1 and D2 - Deforested D3
Yellow				Deforested D1 and D2 - Wooded D3
Magenta				Deforested between D2 and D3
Cyan				Wooded D1 - Deforested D2 and D3
Black				Wooded stable
Grey / White				Deforested stable

### 3 RESULTS and DISCUSSION



Detection of forest rotation (DEF: deforested / W: wooded). Summary of the results

Forest rotation	1	2	3	4	5	6
Area (ha)	151.6	219.6	27.7	158.9	82.7	87.7

Area of forest rotation in hectare

**Integration** of forest rotation and a fallow period of 18 months allows the distinction between exotic species.

EUCALYPTUS - 8 years on average ① ②

PINE - 22 years on average ⑤

ABNORMAL SHORT-ROTATION - sanitary damages, fire ③

UNKNOWN SPECIES ④ ⑥

**Validation** with field surveys (GPS) and the Cadastre of Vegetation

#### OUTLOOK

Manual radiometric thresholding  
Automatic classification

Systematize the treatments - extraction of time series  
Couplage with official data (Cadastre of Vegetation Resources) and medium spatial resolution imagery MODIS