SPIRMADBOIS project

Use of NIRS for a sustainable management of forest resource in Madagascar

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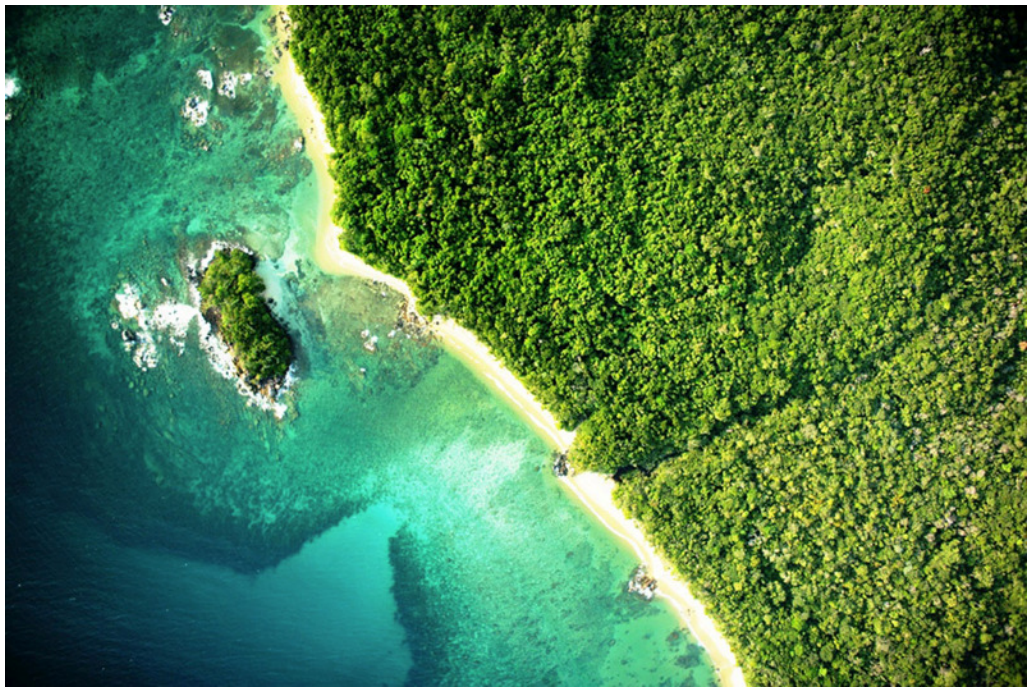
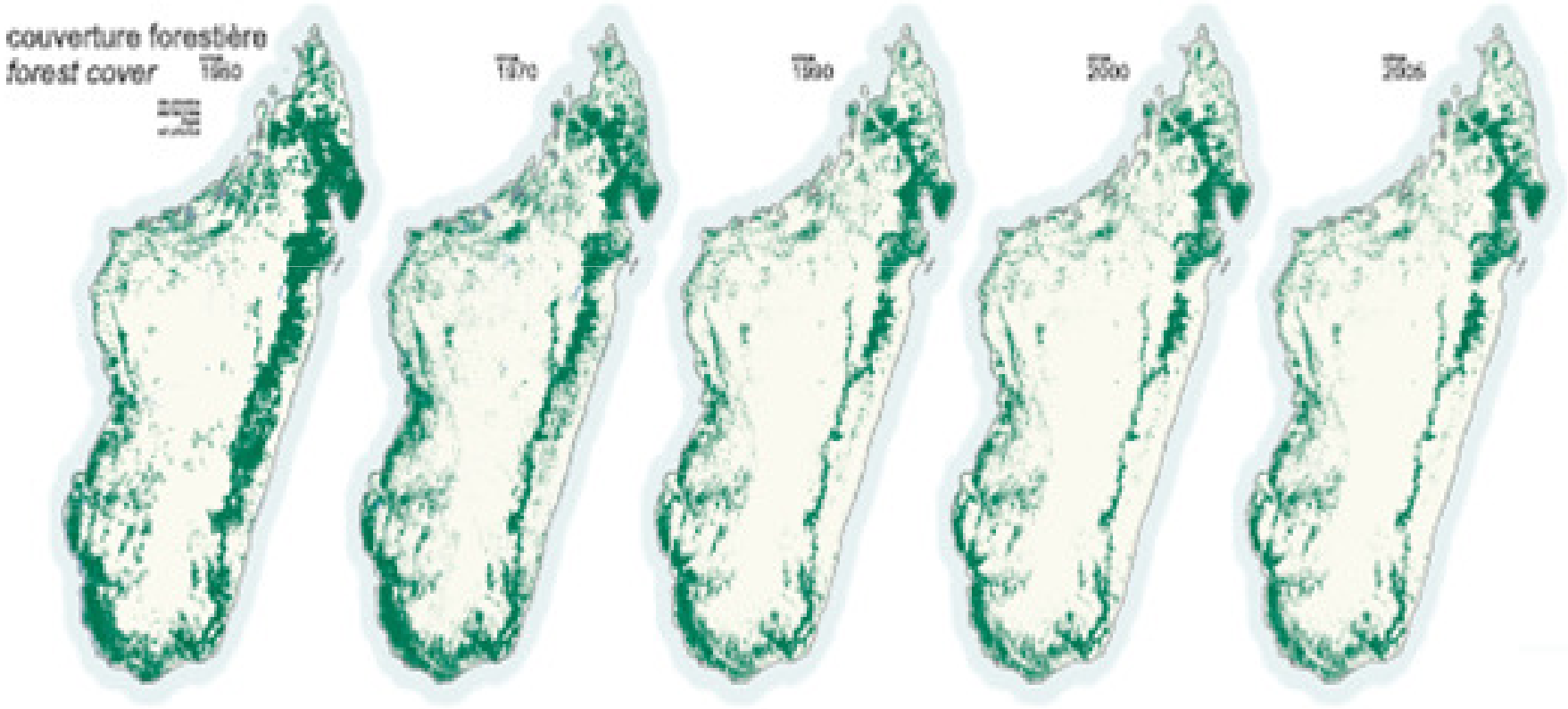


http://www.saintemarie-events-travels.com

Estimates of forest cover over years



Source : MEFT (2009)

Some mid and long-term research objectives

- The search for alternative species previously considered as secondary, to avoid total extinction of precious wood species such as rosewood (*Dalbergia* sp.)
- Knowledge of wood properties to choose species adapted for different uses, and ensure the sustainability (both biological and strength)

Objectives of SPIRMADBOIS project

- Establish a NIRS calibration model to estimate the Malagasy wood properties: Density (x-ray), lignin, cellulose, hemicellulose, extractives, natural durability, energetic properties
  - Native natural species
  - Eucalypts
- Establish a NIRS calibration model to determine the geographical origin of a species
  - Eucalypts
- Establish a xylarium

Wood sampling

Native species

- Radial variation :
  - 60 native species * >6 trees

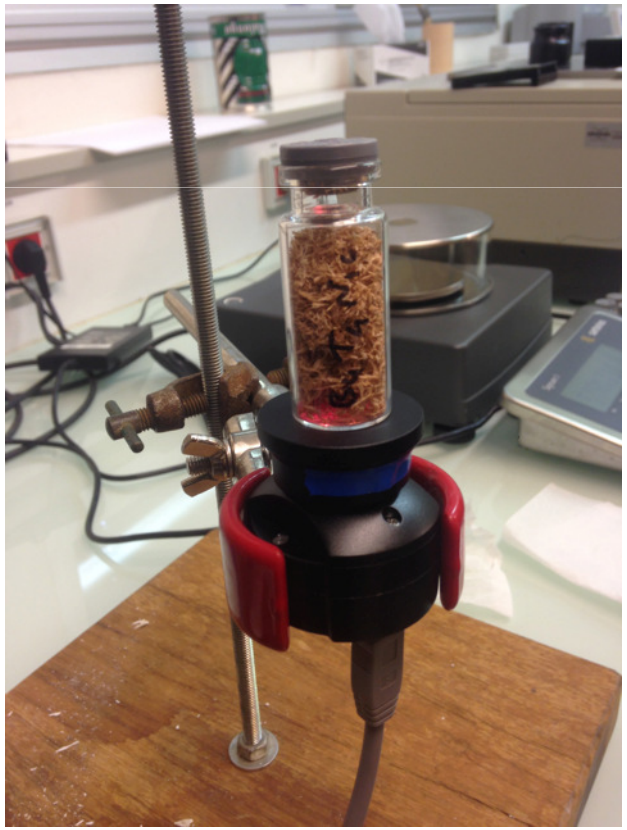
- Longitudinal variation:
  - 3 native species * 3 sites * 9 trees

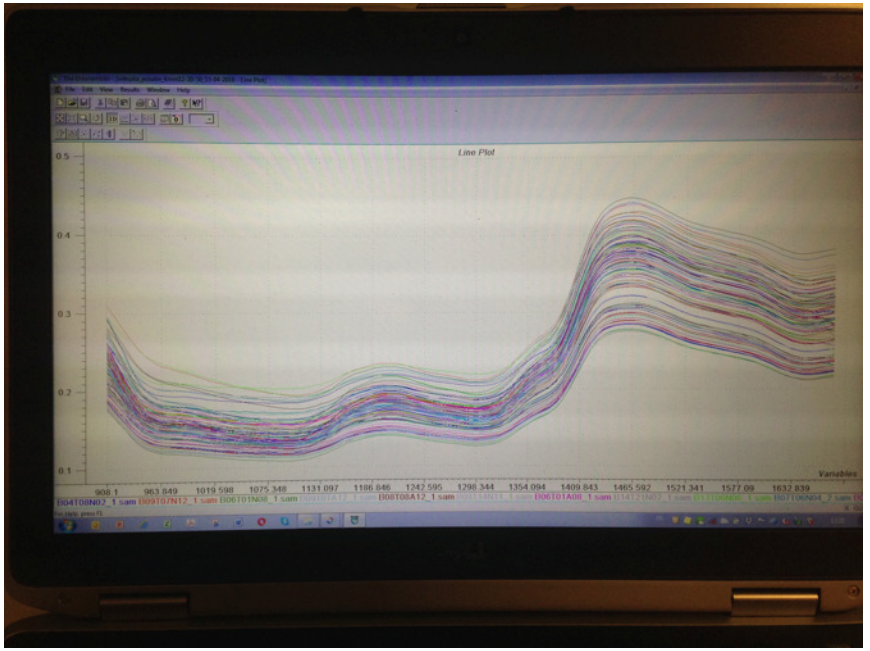
Eucalypts

- 1 specie from plantaion (Eucalyptus robusta) * 12 sites * 3 ages * 3 trees/age class

NIRS

- Acquisition Viavi MicroNIR



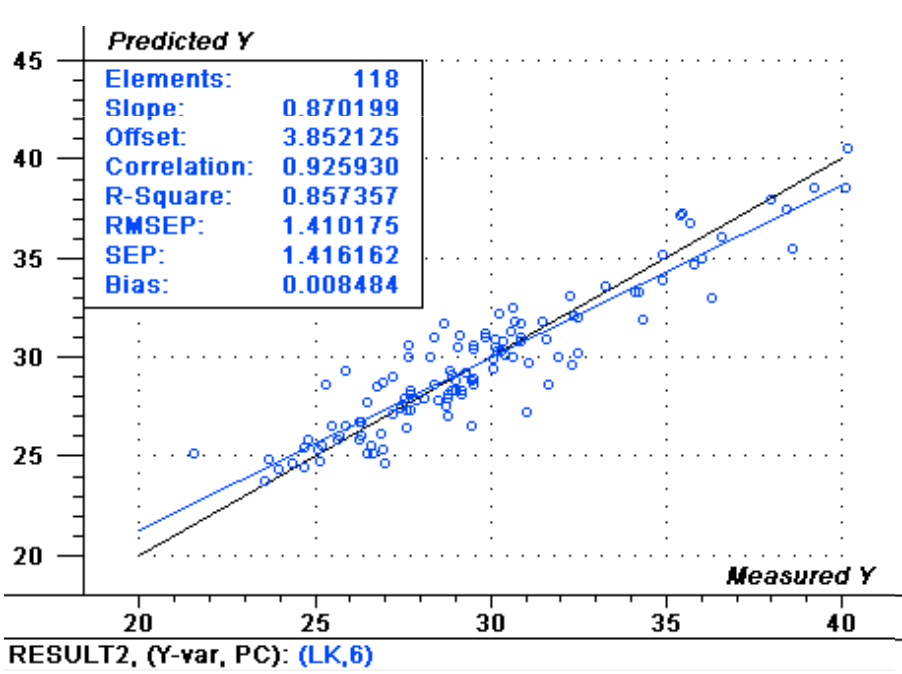


Xylarium

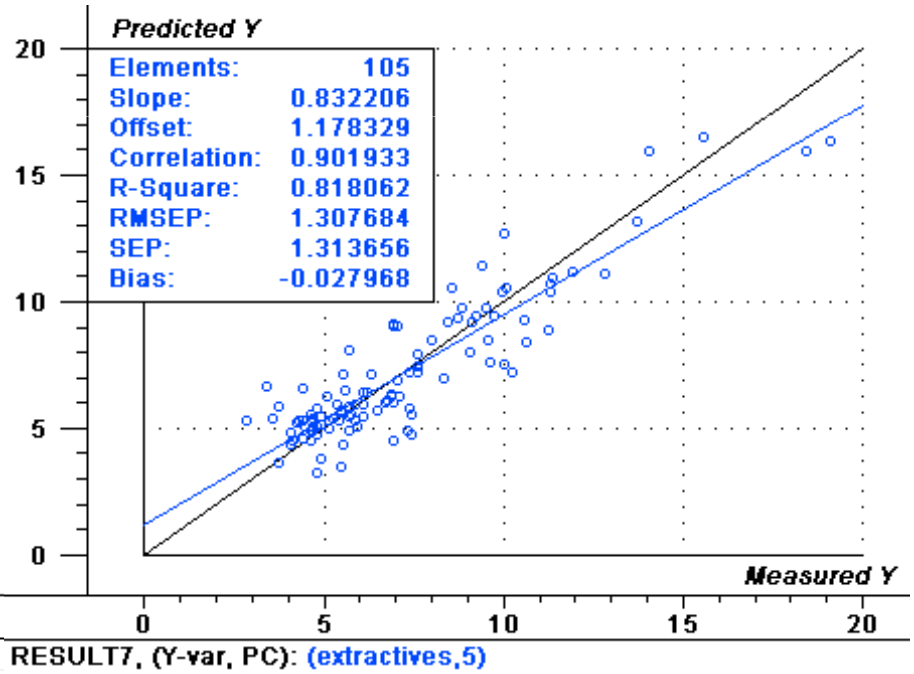
- 900 species (collaboration with FOFIFA)

Some preliminary results

- Chemical compounds/ *Eucalyptus robusta* (with MicroNIR / ESSA)



Klason lignin, RPD = 2.7



Extractives, RPD = 2.9

Eucalyptus wood phenotyping by Near Infrared Spectroscopy for chemical compounds, basic density and moisture content

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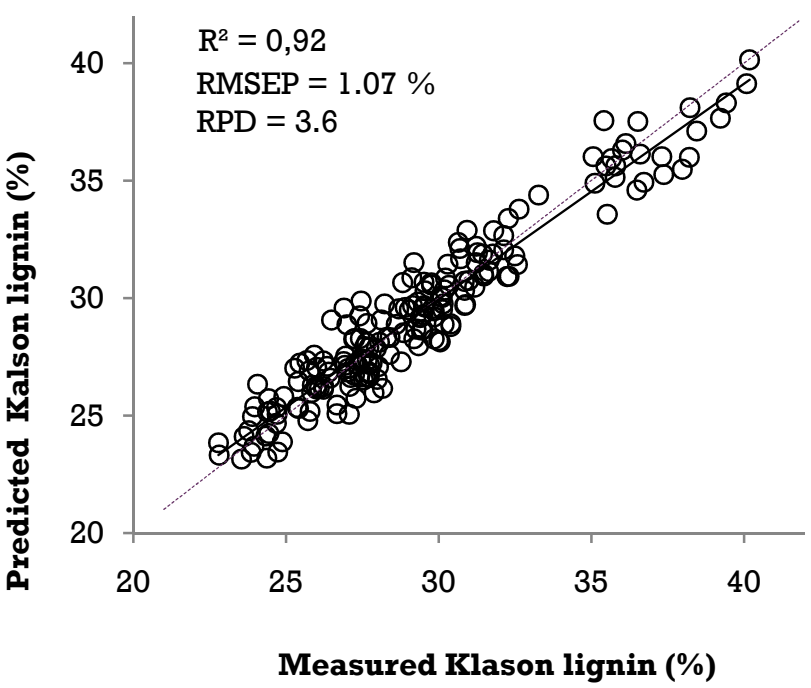
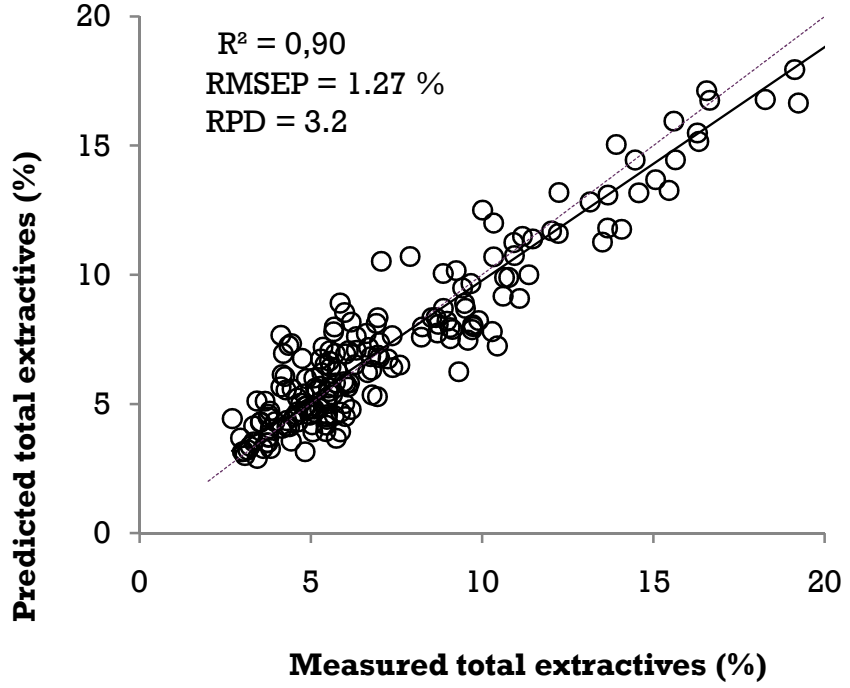
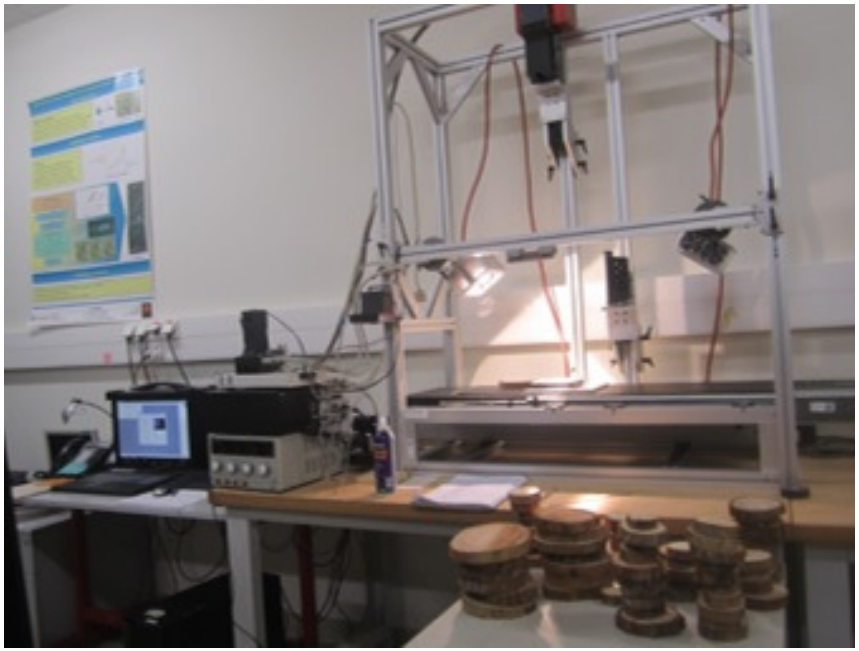
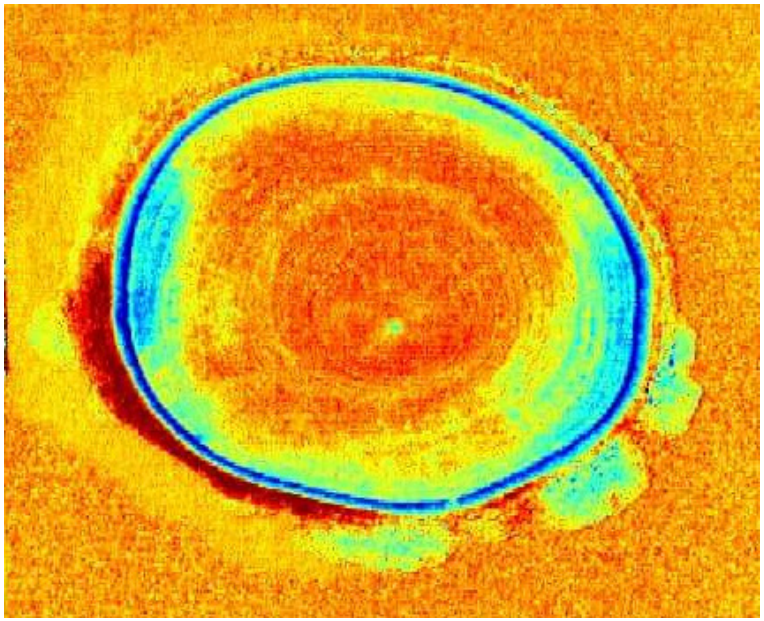
- Chemical compounds/ Multiple eucalypts species





- Hyperspectral analysis (IRSTEA Montpellier)
- Camera SWIR 1000-2500 nm





Future

- Project still ongoing

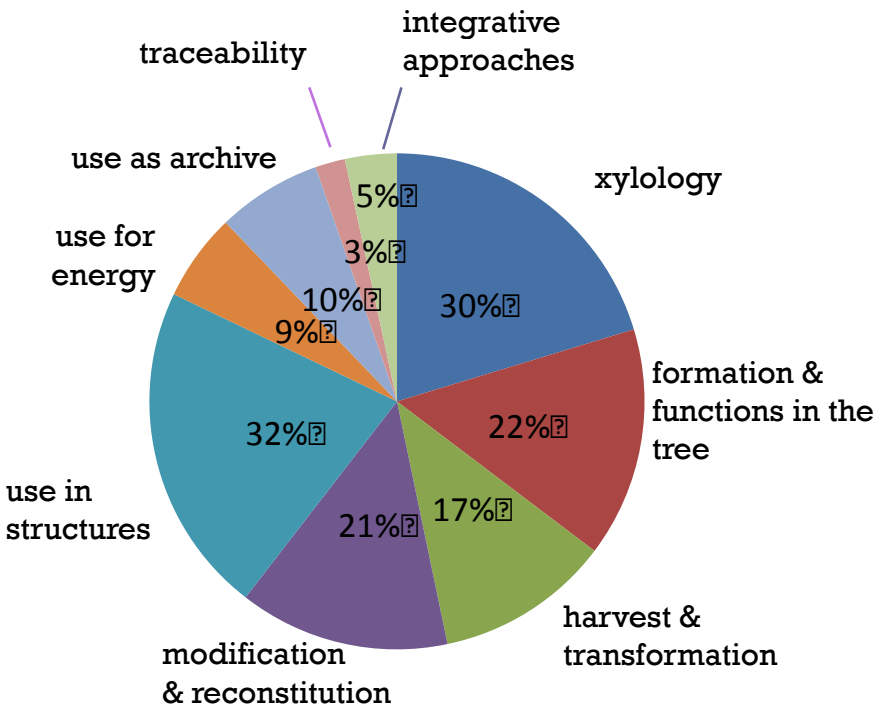
- New opportunity for a new research project about identification of precious wood (rosewood and ebony) funded by EU:
  - Wood anatomy (Faculty of Science)
  - DNA barcoding (University of Zurich)
  - NIR, FT-IR techniques?

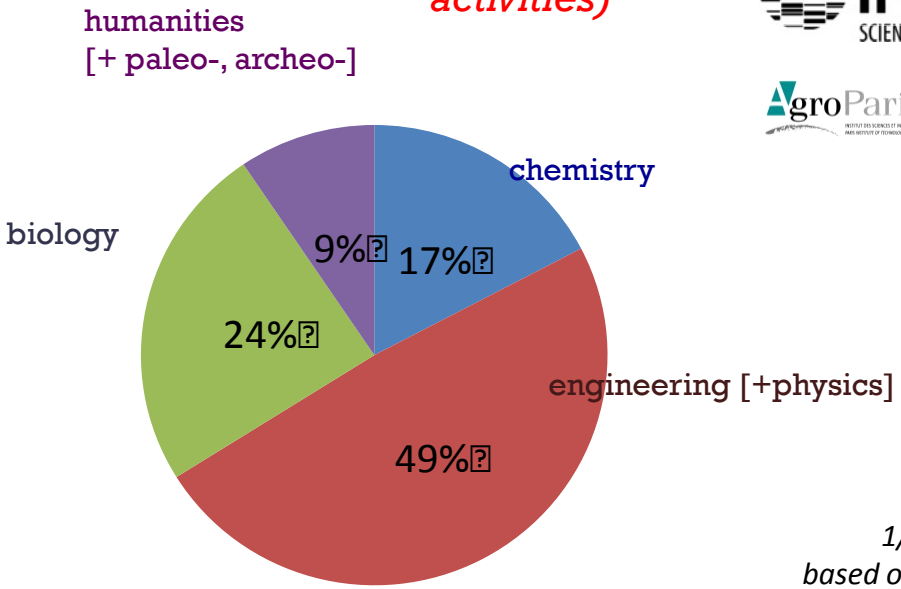
French research group on Wood science (GDR 3544)

http://www6.inra.fr/gdr-sciences-du-bois/

- Started 2012 - supported by CNRS, Ministry of Culture, INRA
- Coordination of wood research and education in France,
- Promotion of exchanges between French groups
- Relay for international networks (COST actions, IUFRO...)
- Annual meetings: Montpellier 2012, Paris 2013, Nancy 2014, Clermont-Fd 2015, *Bordeaux 2016... + thematic meetings*
- Training schools: Nantes 2014, Egletons 2015, Nantes 2016, *Mont-de-Marsan 2017*

→ ***Communication mostly in French*** *(little overlap with other networks & activities)*



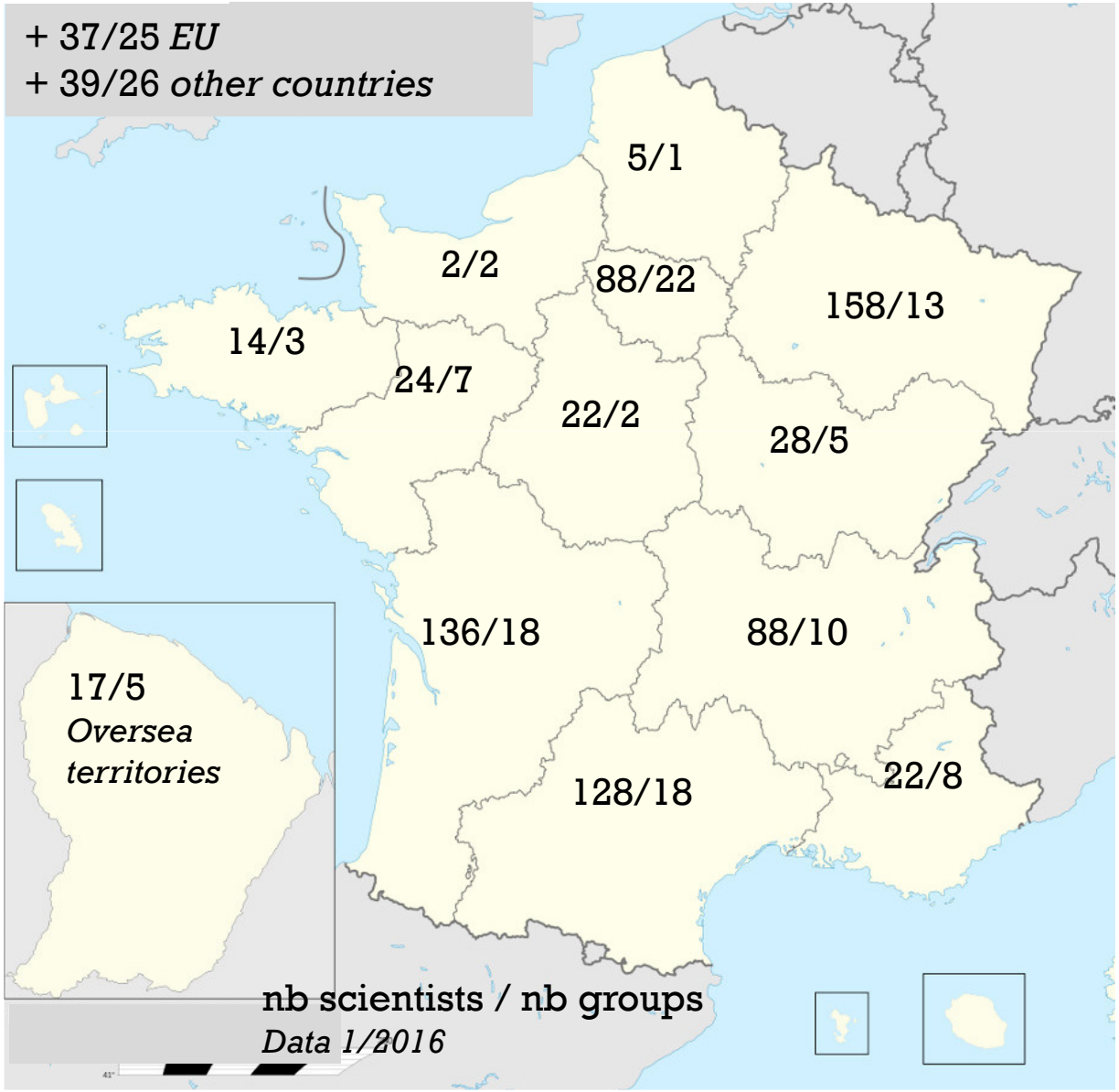


Research themes and disciplinary domains

1/2016
based on 715 diffusion list data

Participation to GDR3544

Members of the diffusion list, incl. students, technical staff, 'for info' …



In 2015:

- 730 scientists in 100 groups + 75 abroad
- 40% in 9 groups of 20+ (LERMaB, BioWooEB, FCBA, PIAF, I2M, LERFoB, Pascal, A GPF, LMGC)
- ½ groups of 1-2

Thank you

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