

SESSION 1.2

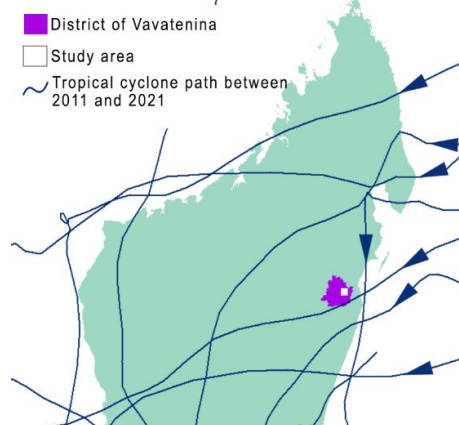
Follow the shift! How research can be part of transformation in agricultural practice ?

Follow the link to learn more about this study :
<https://nubes.teledetection.fr/index.php/s/y7NcLLJcmKE8ZL>

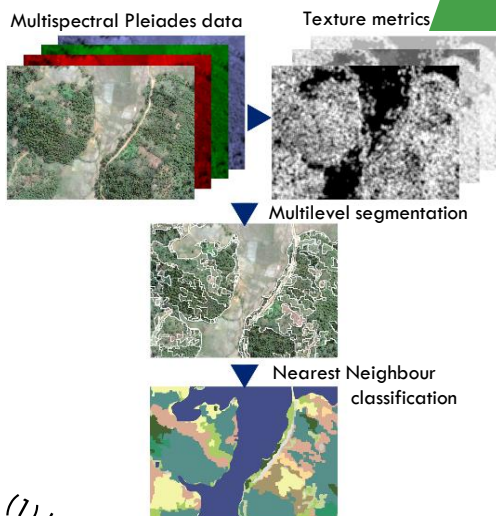
A method to study complex agroforestry landscapes : illustration in Madagascar

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Study site:
North-East coast of Madagascar



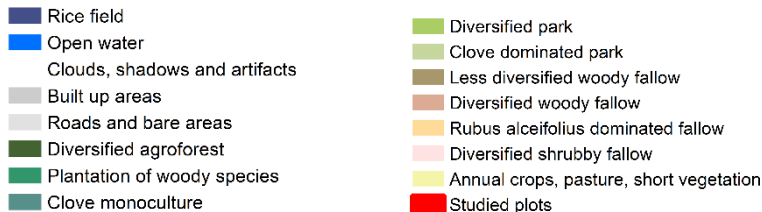
M1. Satellite data processing



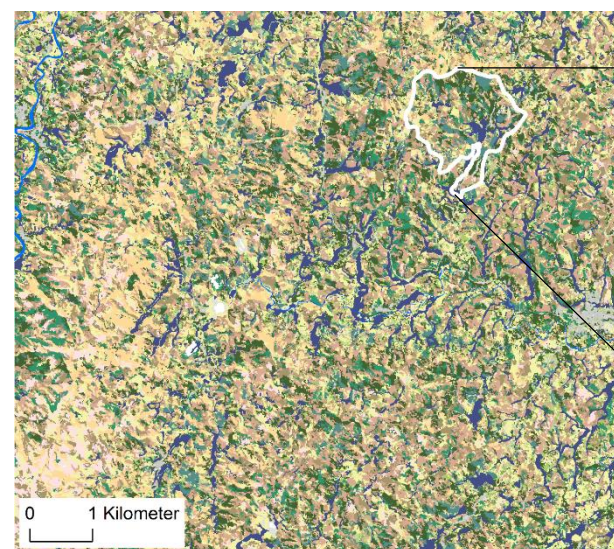
METHODS

RESULTS

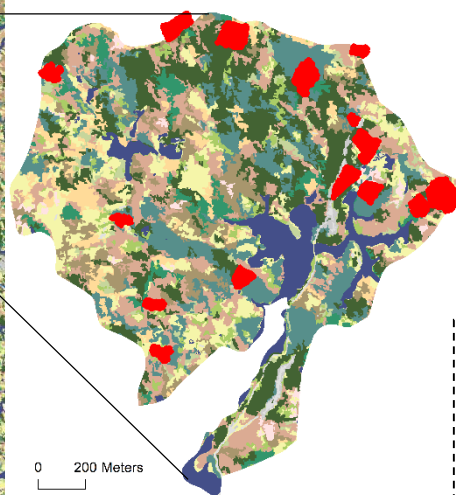
R1a. Composition and spatial organization of land uses and agroforestry



Land use map of the study site



Zoom of the land use map on a study village: Vohibary



CONTEXT



Some Betsimisaraka small-scale farmers of Vavatenina area have abandoned the traditional shifting rice cultivation in favor of various types of agroforestry, leading complex agricultural landscape patterns.

OBJECTIVES

- Describe the composition and spatial organization of land uses at landscape scale, and agroforestry plant species at plot scale.
- Analyse the effects of topography (slope, altitude, exposure) on the land uses and agroforestry systems.

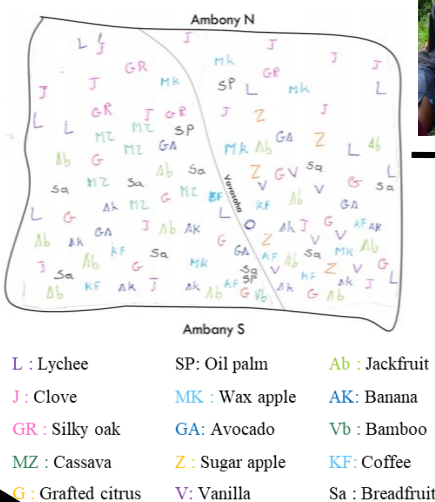
(1) Landscape



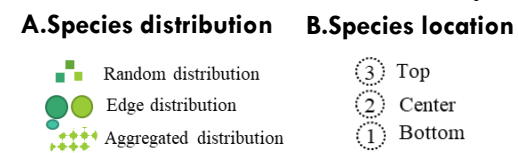
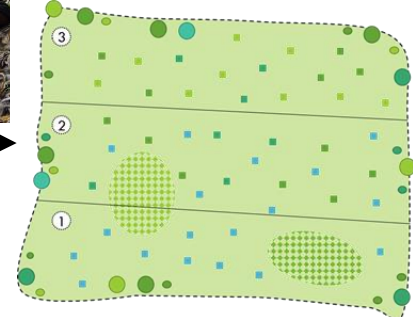
(2) Plot



M2a. Participatory map of agroforestry plot



M2b. Coding of participatory maps



(2) Plot



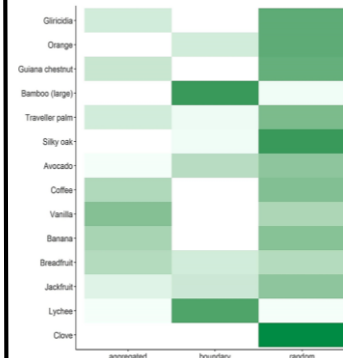
Mariel et al. 2021

R2. Composition and spatial organization of plant species in agroforests

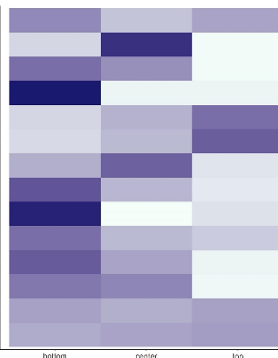
Species composition :
On average, the farmers listed **15 species** (± 4 ; range 8-22).

Fisher's exact test indicated **significant dependence** between species and the distribution (p -value<0.0005), and the location according to the slope (p -value<0.05).

A. Distribution



B. Location



Relative occurrence of the 14 most frequent species (%)

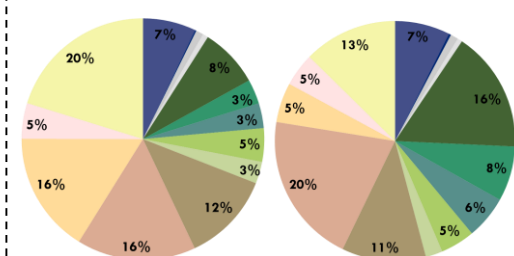
CONCLUSION

- The slope at the plot scale and its consequences for the environmental characteristics (soil, moisture, exposure to sunlight and to cyclones) **structure the practices of farmers** for the spatial organization of plant species.
- The topography (altitude, slope, exposure) at the landscape level shapes the distribution of cropping systems and land uses.
 - Woody crops, and especially clove and other agroforestry systems, are privileged on the opposite side of cyclone influence exposure.
 - Rice fields only set up on shallow slopes, replaced by fallows on steeper slopes.
 - Only fallows remain at higher altitudes.

R1b. Effect of exposure

Trees exposed on North/North-east/East slopes are highly vulnerable to cyclones

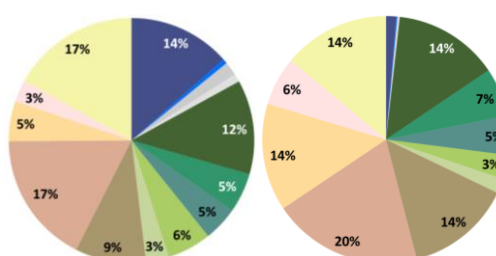
N/N-E/E 38% Other 62%



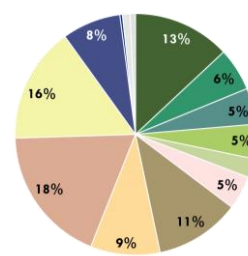
R1c. Effect of slope

Steep slopes $>15^\circ$ need woody and shrubby vegetation to stop erosion

$[0^\circ - 15^\circ]$: 46% $[15^\circ - 60^\circ]$: 54%



Distribution of the different land use classes



R1d. Effect of altitude

80-350 m : 90% 350m-700 m : 10%

