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UNMANNED AIRBORNE VEHICLE-BASED 4D REMOTE SENSING FOR MAPPING RAIN FOREST BIODIVERSITY AND ITS CHANGE IN BRAZIL

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INTRODUCTION

- Atlantic Forest in Brazil has one of the highest levels of species richness and endemism on the planet and also the biome that suffered most forest loss.
- Hyperspectral remote sensing and LiDAR technology are promising candidates for biodiversity mapping of forests.
- A crucial step of these data is the appropriate data processing (radiometric and geometric correction, sensor calibration and integration, georeferencing, point cloud generation, etc). Many challenges are faced with novel light-weight UAV systems: the establishment of new types of sensors, non-stability of the imaging system and the non-stability and non-optimality of the measurement set-up as well as the object to be measured.

Objectives of UAV_4D_Bio:

To develop biodiversity change mapping technologies using

- 1) UAV as the sensor platform,
- 2) Complete object model (hyperspectral+3D geometry+BRF response as features), and
- 3) Time series of complete object models to be used for biodiversity mapping and for developing indicators of environmental change.

Method will be used in Finland in Evo test forests and in regeneration areas in the interior of São Paulo State, Atlantic Forest.

Study Area

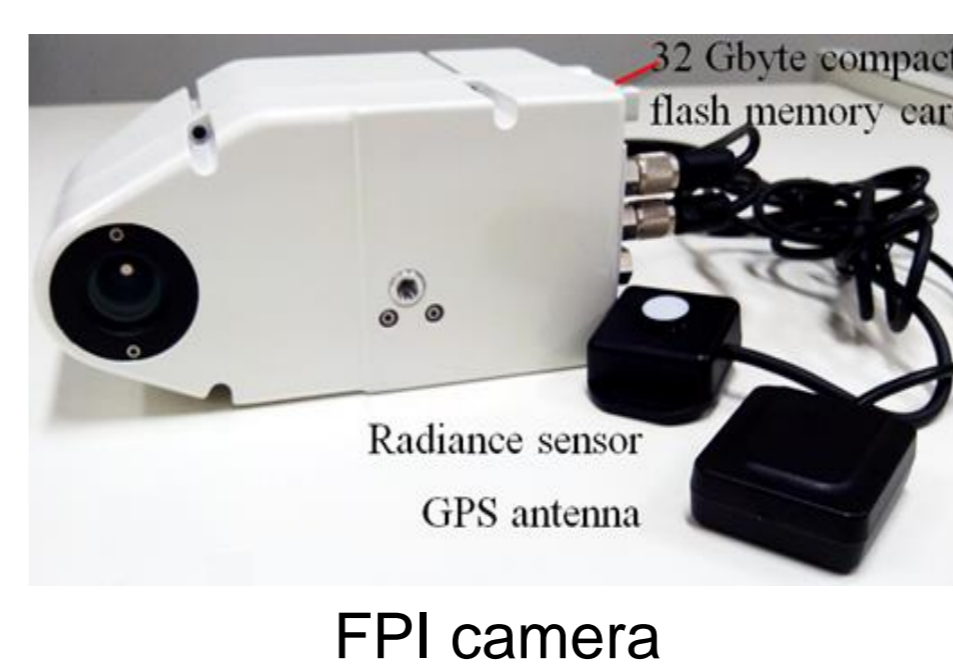
-Federal Protected Reserve: Estação Ecológica Mico Leão Preto. Located in Teodoro Sampaio, São Paulo-Brazil.

Field observations

- 49 test plots
- Field observations by Geography Department of Unesp
 - Tree species and DBH
 - Acquisition of leaves samples

Campaigns

- 28.Oct.2014 SensorMap UAV with Nex RGB camera
- 13.Feb.2015 SensorMap UAV with Nex RGB, FPI camera + Span-S1 INS
- 19.May.2015 SensorMap UAV with FPI camera + Span-IGM-S1
- 18.Jul.2015 Unesp UAV Octoapter FPI camera + Span-IGM-S1 + laser IbeoLux (over parking area + historical cemetery)
- 11.Aug.2015 - Unesp UAV Octoapter FPI camera + Span-IGM-S1 + laser IbeoLux + Nex RGB camera
- 07.Jul.2016 - Unesp UAV Octoapter FPI camera + Span-IGM-S1 + Nex RGB camera
- 09.Aug.2016 - Unesp UAV Octoapter FPI camera + Span-IGM-S1 + Nex RGB camera
- 16.Aug.2016 - Unesp UAV Octoapter FPI camera + Span-IGM-S1 + Nex RGB camera
- 16.Aug.2016 - Unesp UAV Octoapter FPI camera + Span-IGM-S1 + Nex RGB camera



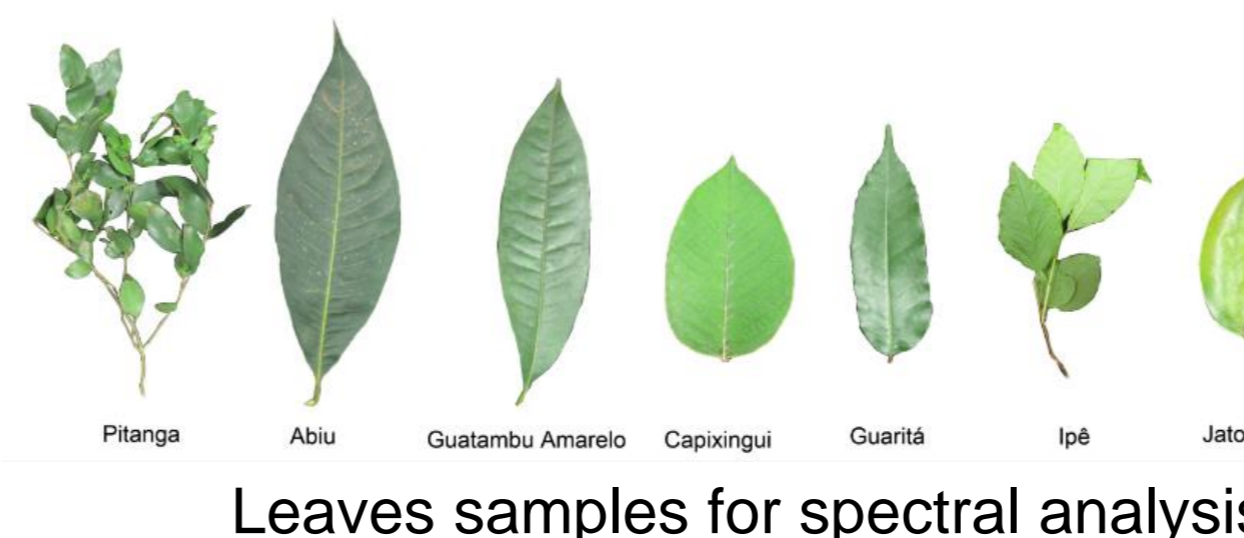
FPI camera



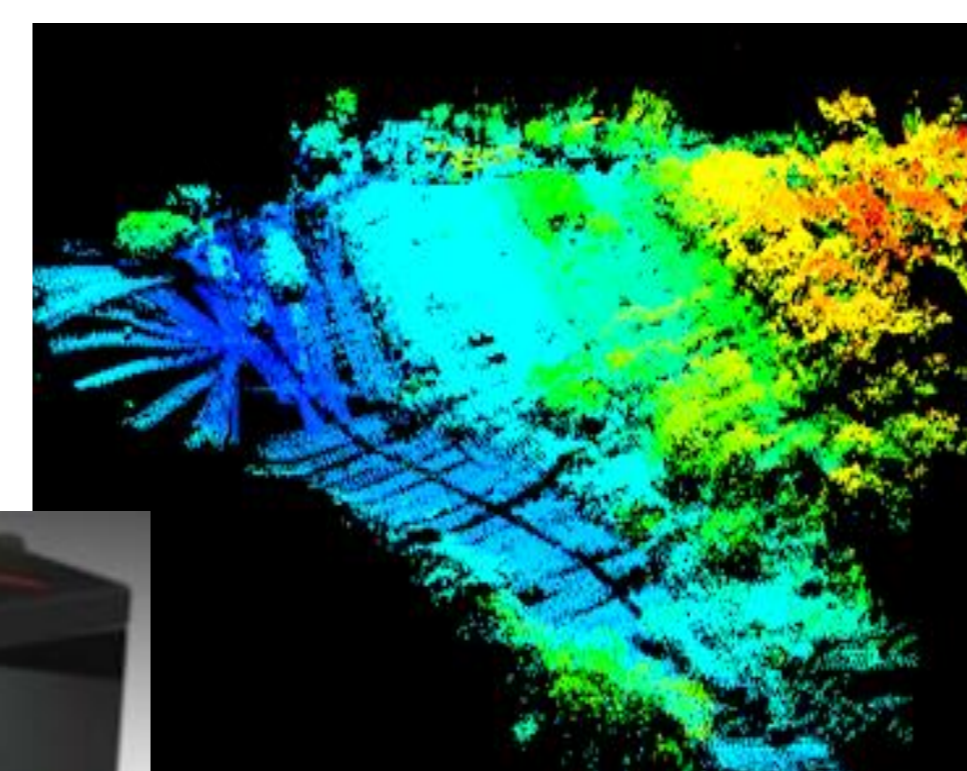
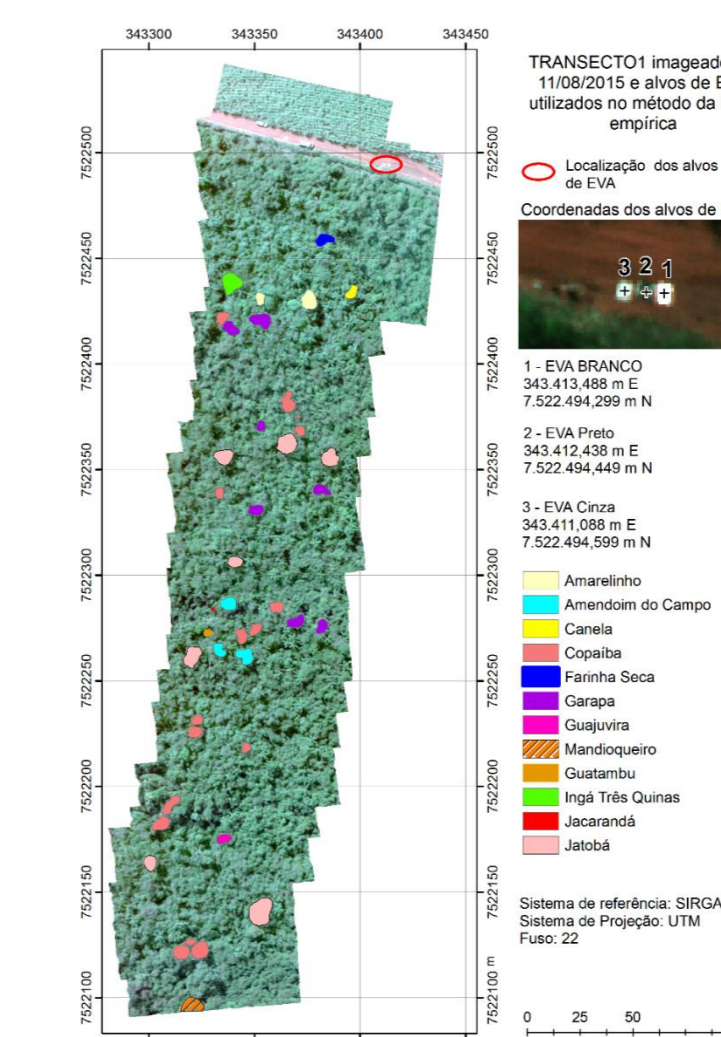
3D terrestrial calibration



Field work measurements.

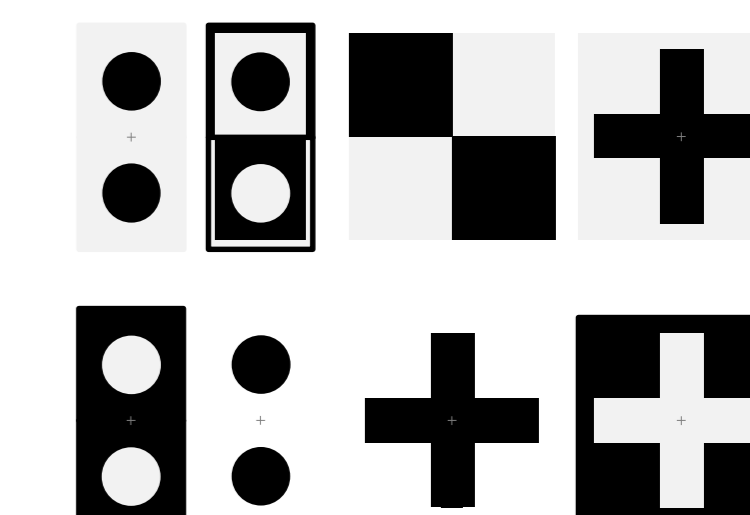


Leaves samples for spectral analysis.

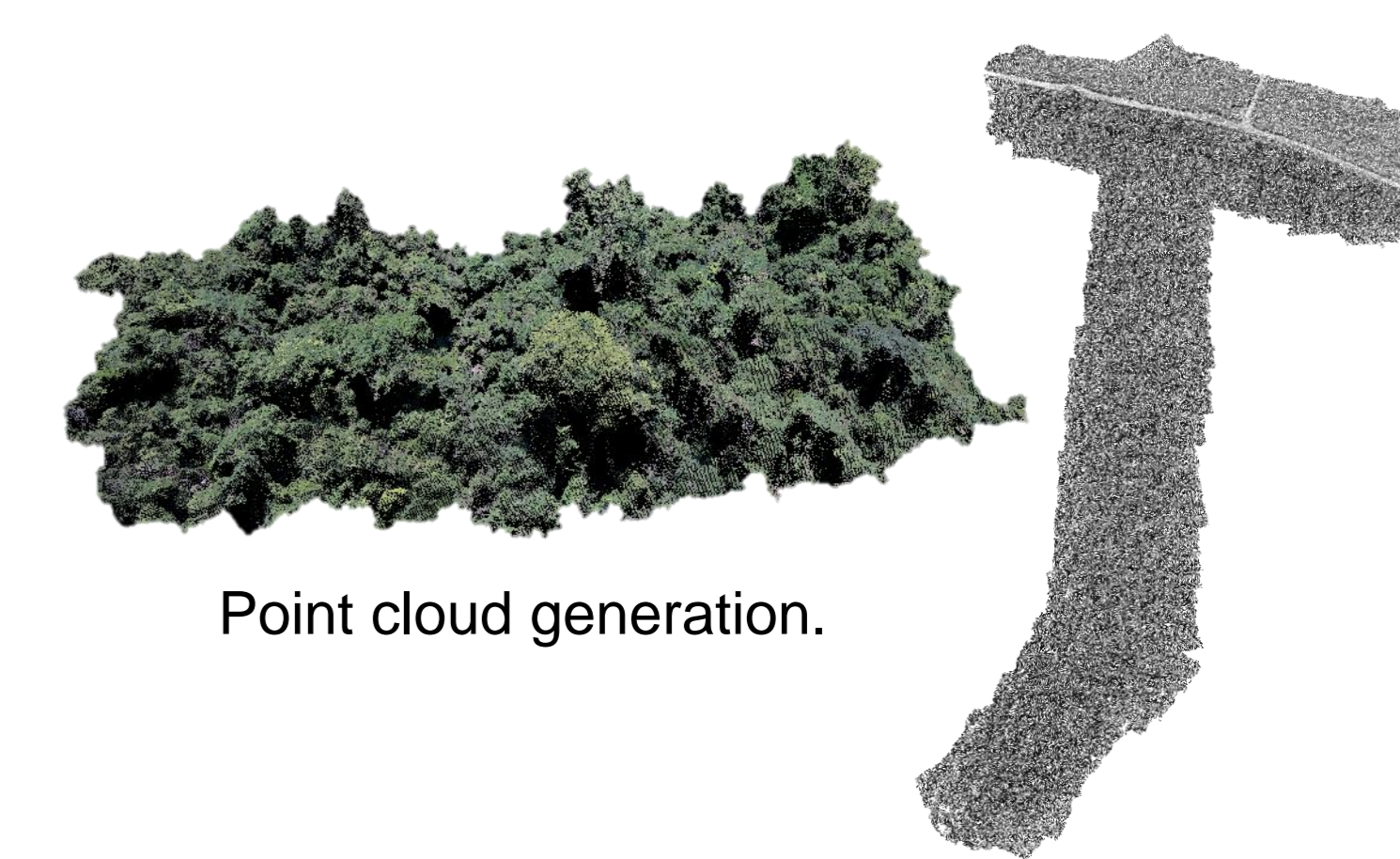


IbeoLux laser Point Cloud

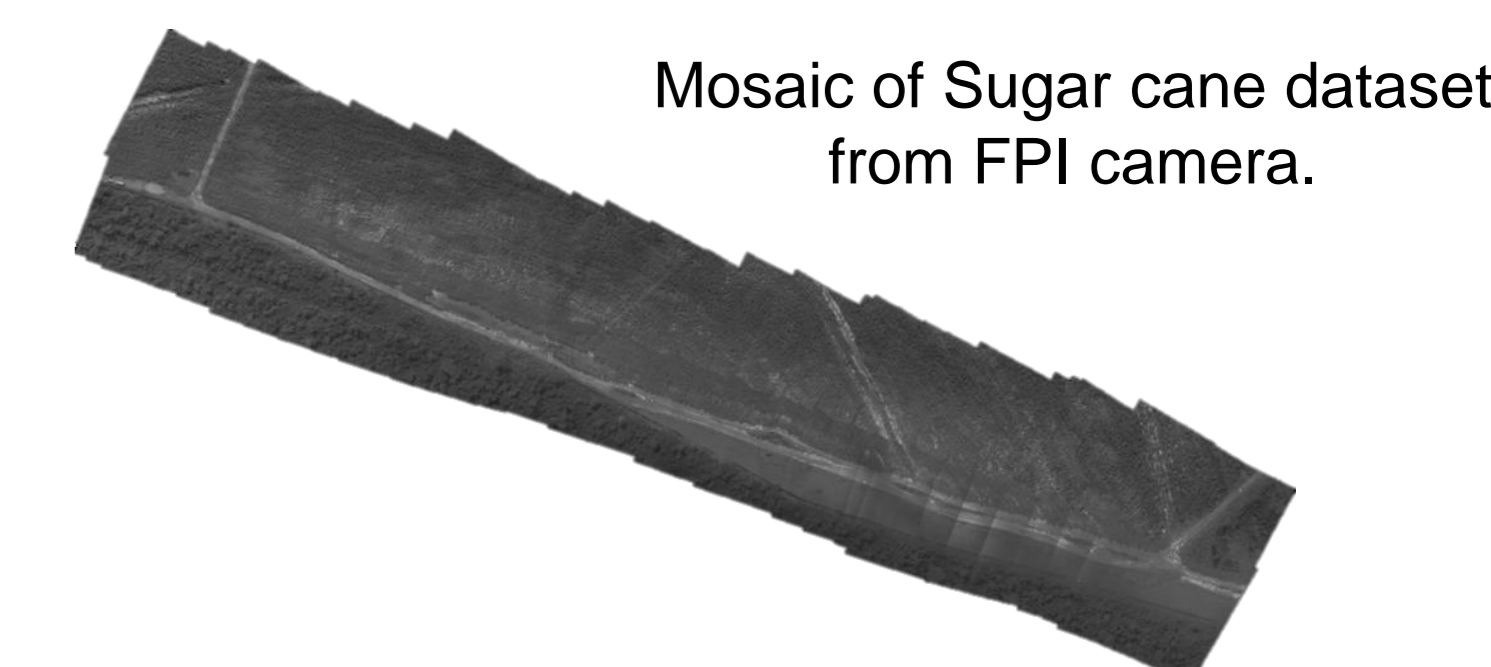
Ibeo Lux laser scanner



Measuring Control Targets in Hyperspectral Frame Images.



Point cloud generation.



Mosaic of Sugar cane dataset from FPI camera.



UAV Unesp

