Development of a Multitemporal Urban Spectral Library for a Typical Mediterranean City

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Equipment

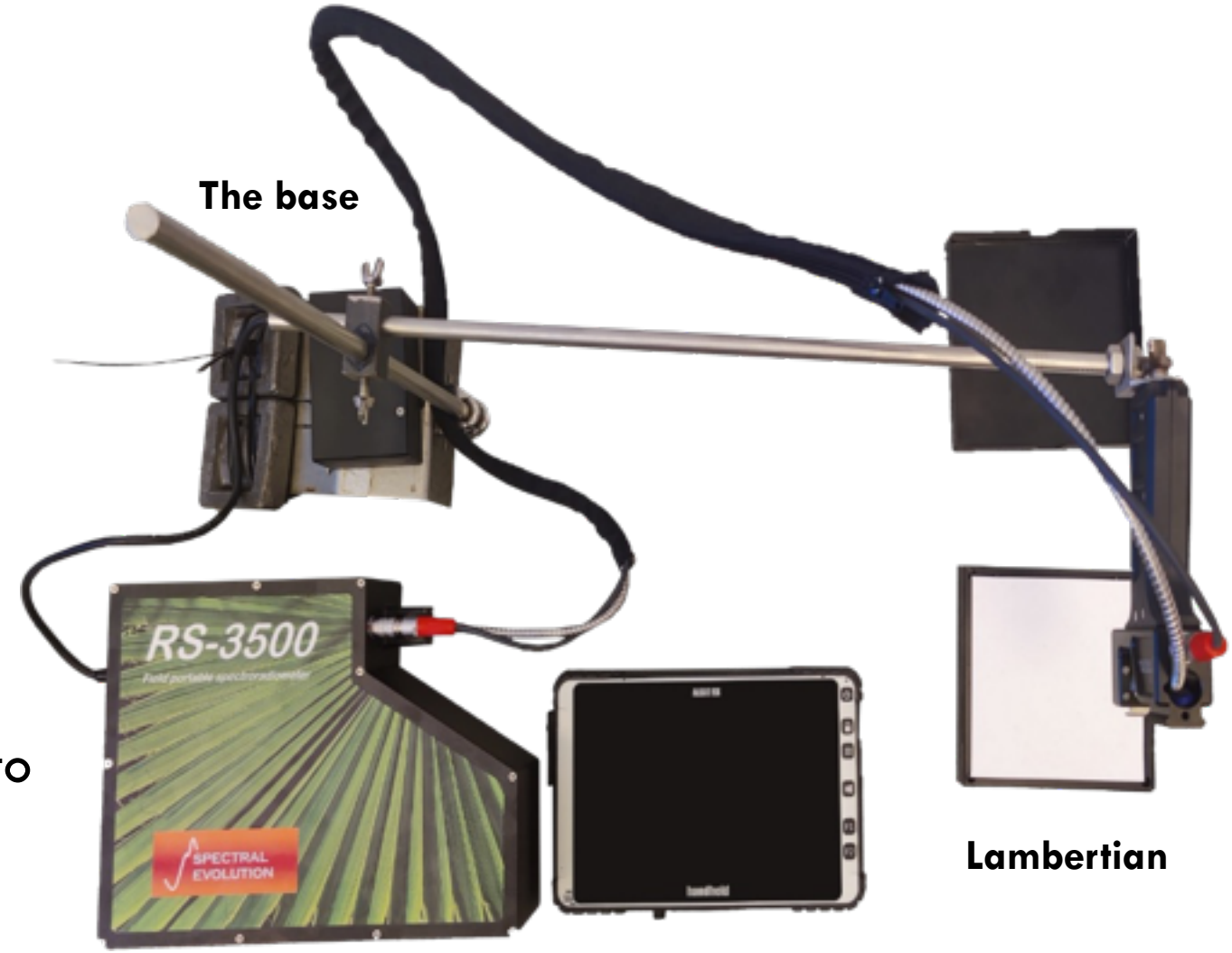
RS- 3500 Spectral evolution

- Spectral Range: 350-2500nm
- Field of view: 22°
- Spectral Resolution
  - 2.8 nm @ 700nm
  - 8 nm @ 1500nm
  - 6 nm @ 2100nm

Rugged Handheld Table

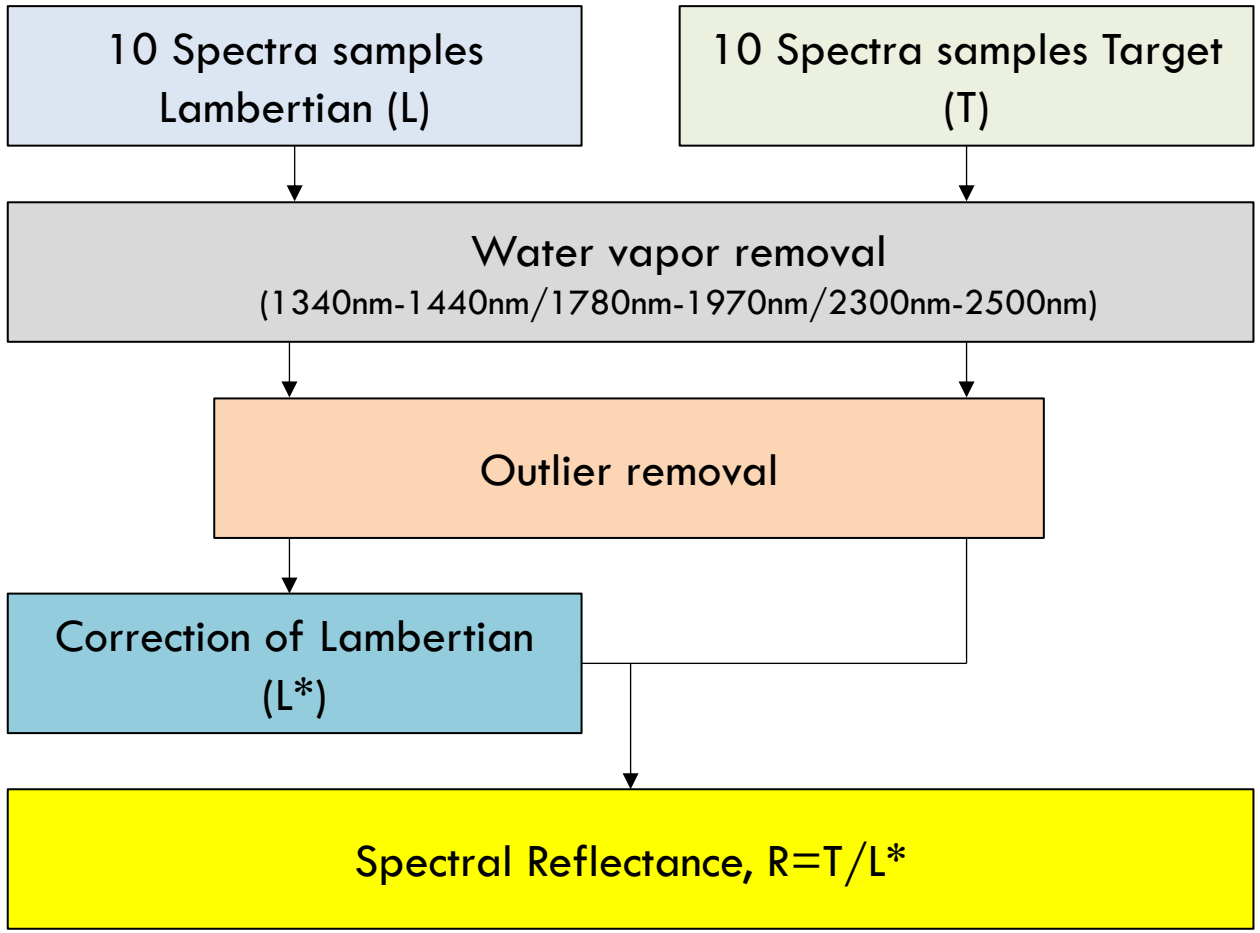
- Real-time, wireless instrument control
- Built-in GPS, camera, and microphone to collect & organize essential field data

DARWin software for data acquisition



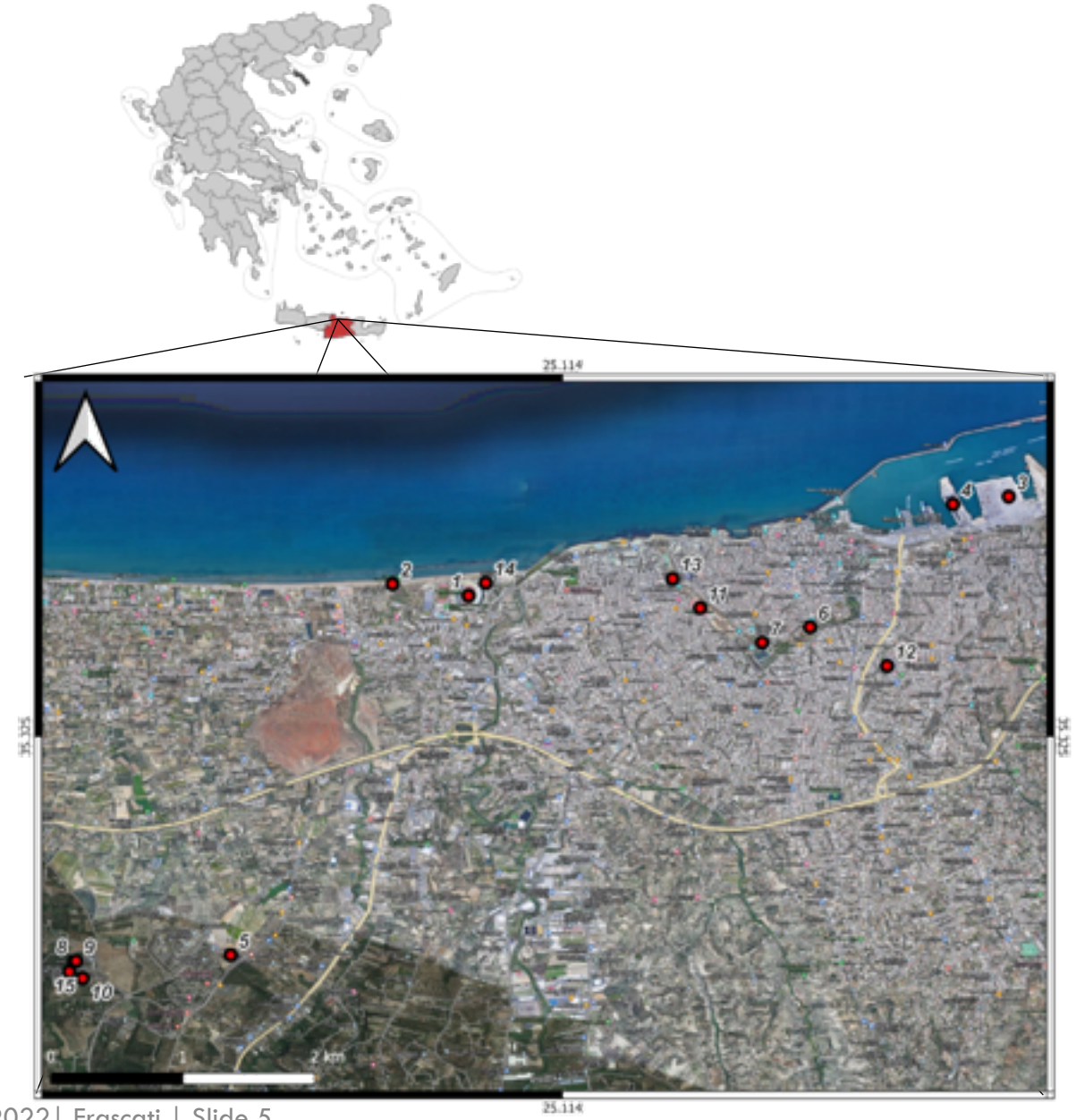
Measurements

A total of ten measurements are made from a height of 20cm for the reference target. The same method is used for the material target.



Project area

- Heraklion is the largest city of the island of Crete, Greece. A typical dense Mediterranean City.
- Presents unique characteristics in terms of building and population density, a high variety of building types, ages and materials and a very heterogeneous morphology.
- The historic city center has extended commercial and touristic areas mixed with typical residential neighborhoods. It has very few open and green spaces, located mainly in the southeast as a remaining of the 16th century Venetian walls.



Materials for coupling with satellite

ID	Type	Materials
1	Vegetation	Low Grass
2	Bare Soil	Sand
3	Paved	Asphalt
4	Paved	Asphalt
5	Bare Soil	Soil
6	Paved	Red
7	Paved	Stone
8	Paved	Asphalt
9	Paved	Asphalt
10	Paved	Stone
11	Vegetation	Low grass
12	Paved	Asphalt
13	Paved	Concrete
14	Paved	Concrete
15	Vegetation	Low Grass

Urban Spectral Library

1. This study aims to build the first spectral library created with the Spectral Evolution RS-3500 handheld spectroradiometer for the urban materials available for construction material in city of Heraklion, Crete, a typical Mediterranean city.
2. Collection of spectral signatures aiming at the designation of library architecture designed to facilitate coupling with satellite observations by assuring simultaneous data collection with the satellite overpasses contributing to the creation of urban materials maps.
3. The long-term strategy is to perform a year-round field campaign to study the temporal spectral changes in the same materials and using UAS-based hyperspectral observations (HySpex) to map Heraklion urban material.

Material selection

Targets have been selected based on a set of criteria:

- Data to able to be coupled with hyperspectral remote sensing such as PRISMA and EnMAP mission along with the forthcoming ESA CHIME. The target must be homogeneous in a large spatial area, at least 90x90m to avoid adjacency effects, as much as possible.
- The target must not be affected by temporal changes such as grass which turns into non-photosynthetic vegetation or deciduous trees.

Most of the targets are compact in large surface spatial area and consists of paved, bare soil, concrete, asphalt etc. Selected targets are presented in the map with red dots.

Urban materials

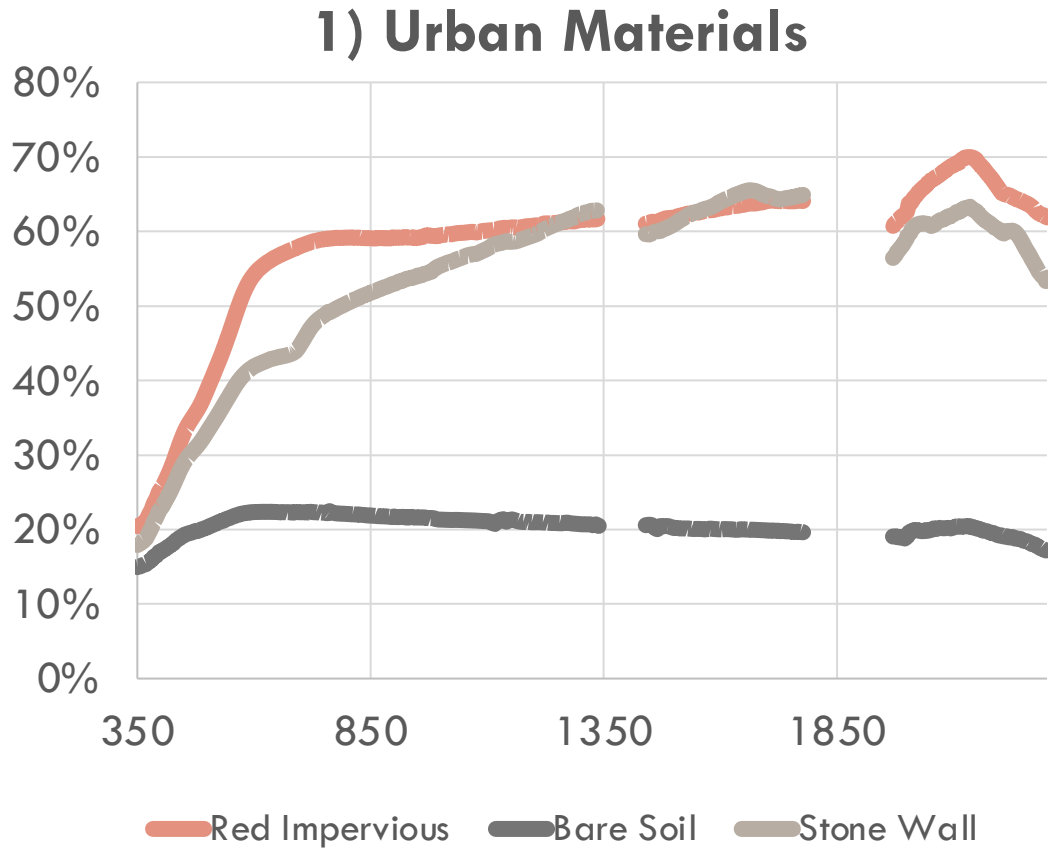
- Homogenous area larger than 5x5 m^2
- No temporal variation (stable material targets for *b* and c).
- Soil is a challenge to face in the campaigns

Urban materials

a) Bare soil

b) Red Impervious

c) Stone Wall



PRISMA comparison materials

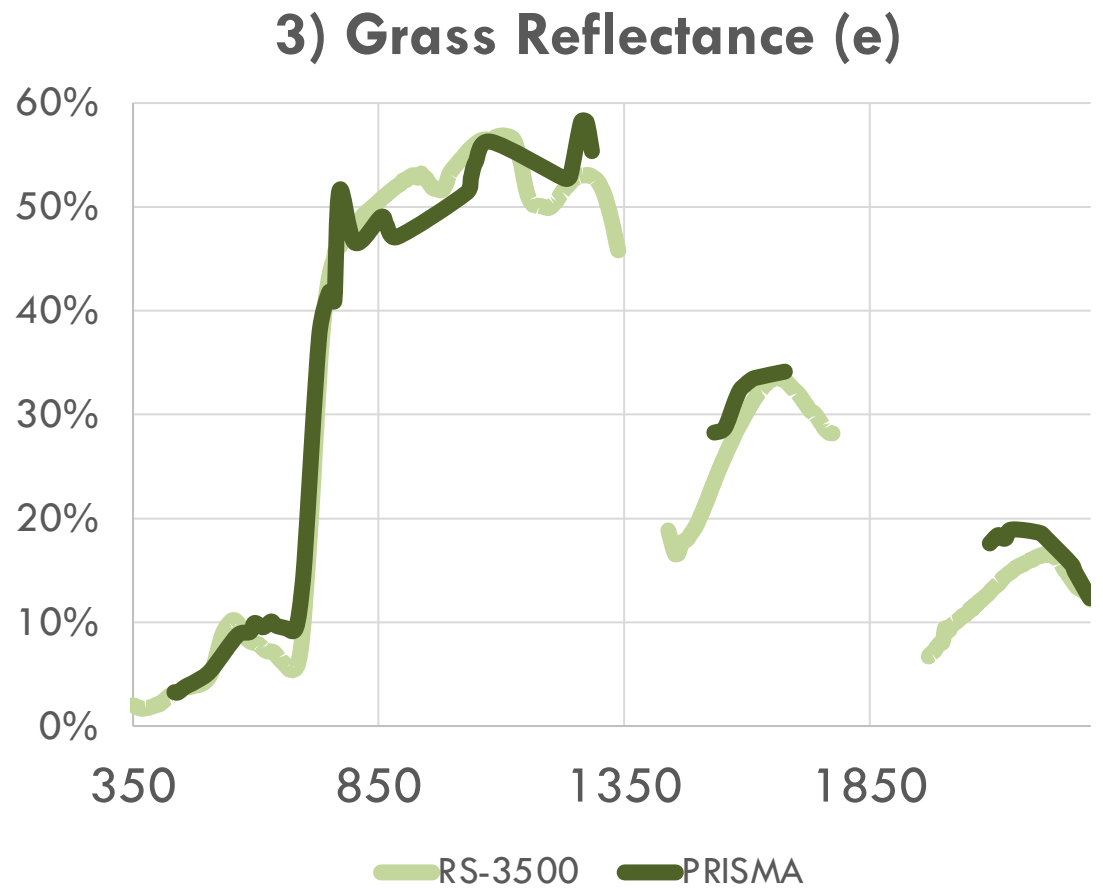
- Area larger than 30x30 m^2 in order to be compared with the hyperspectral images from PRISMA
- Asphalt in the area of the port

Paved

PRISMA comparison materials

- Area larger than 30x30 m^2 in order to be compared with the hyperspectral images from PRISMA
- Grass in soccer field

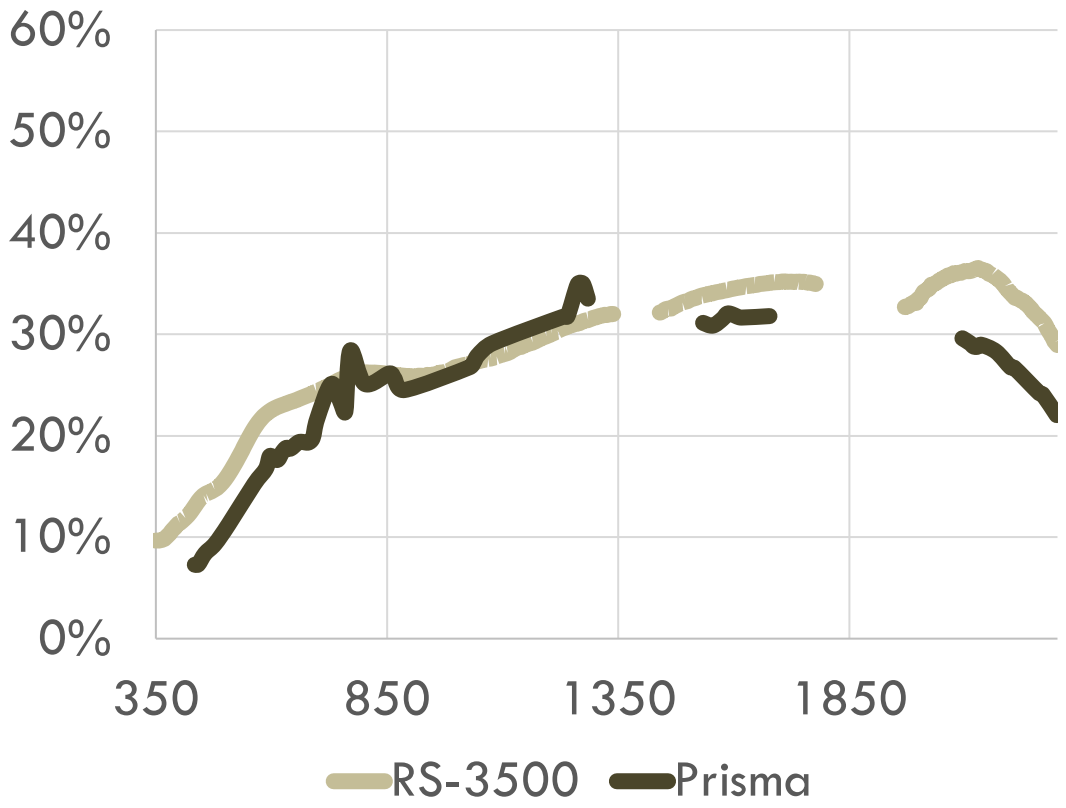
Grass



PRISMA comparison materials

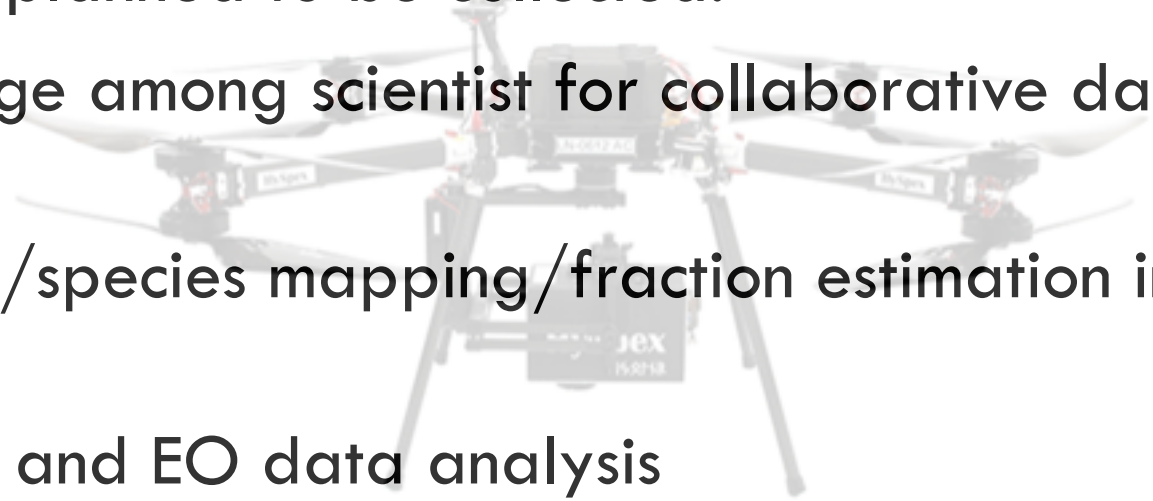
- Area larger than 30x30 m^2 in order to be compared with the hyperspectral images from PRISMA
- Sand from NW beach of the city

Bare Soil



Outlook

- Coordinated data collection during hyperspectral satellite overpasses, when systematic data will be planned to be collected.
- Spectral library data exchange among scientist for collaborative data analysis
- Use of real data for material/species mapping/fraction estimation in urban and suburban areas
- Multitemporal data collection and EO data analysis
- Use of UAV based Hyperspectral sensor for high resolution urban material mapping



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