1st EnMAP user workshop
10th to 11th of October 2023

Using EnMAP data to characterize land surface covers the of ice-free areas within the South Shetland Areas, Antarctica

Thomas Schmid[1], Claudia Giménez Poblador[1], Sabine Chabrillat [2,3], Robert Milewski[2], Stéphane Guillaso[2], Jerónimo López-Martínez[4]

[1]CIEMAT, Avda. Complutense 40, 28040 Madrid, Spain, thomas.schmid@ciemat.es; claudia14gp@gmail.com
[2]GFZ German Research Center for Geosciences, Section 1.4 Remote Sensing, Telegrafenberg, 14473 Potsdam, Germany, chabri@gfz-potsdam.de; milewski@gfz-potsdam.de; stephane.guillaso@gfz-potsdam.de,
[3]Leibniz University Hannover, Institute of soil science, 30419 Hannover, Germany
[4]Facultad de Ciencias, Universidad Autónoma de Madrid, 28049 Madrid, Spain, jeronimo.lopez@uam.es

Introduction

- Antarctica: Ice-free areas.
- South Shetland Islands within the northern Antarctic Peninsula region and with a cold maritime climate.
- At present, this region is one of the most rapidly warming places in the world over the past sixty years.
- Rock outcrops, sediments and water bodies are the dominant surface covers.
- These ice-free areas contain fragile ecosystems with a potential biodiversity that is influenced by an active hydrologic cycle during the austral summer.
- More often Synthetic Aperture Radar data is used in these regions, however, when available hyperspectral data is ideal for providing information on the surface composition.

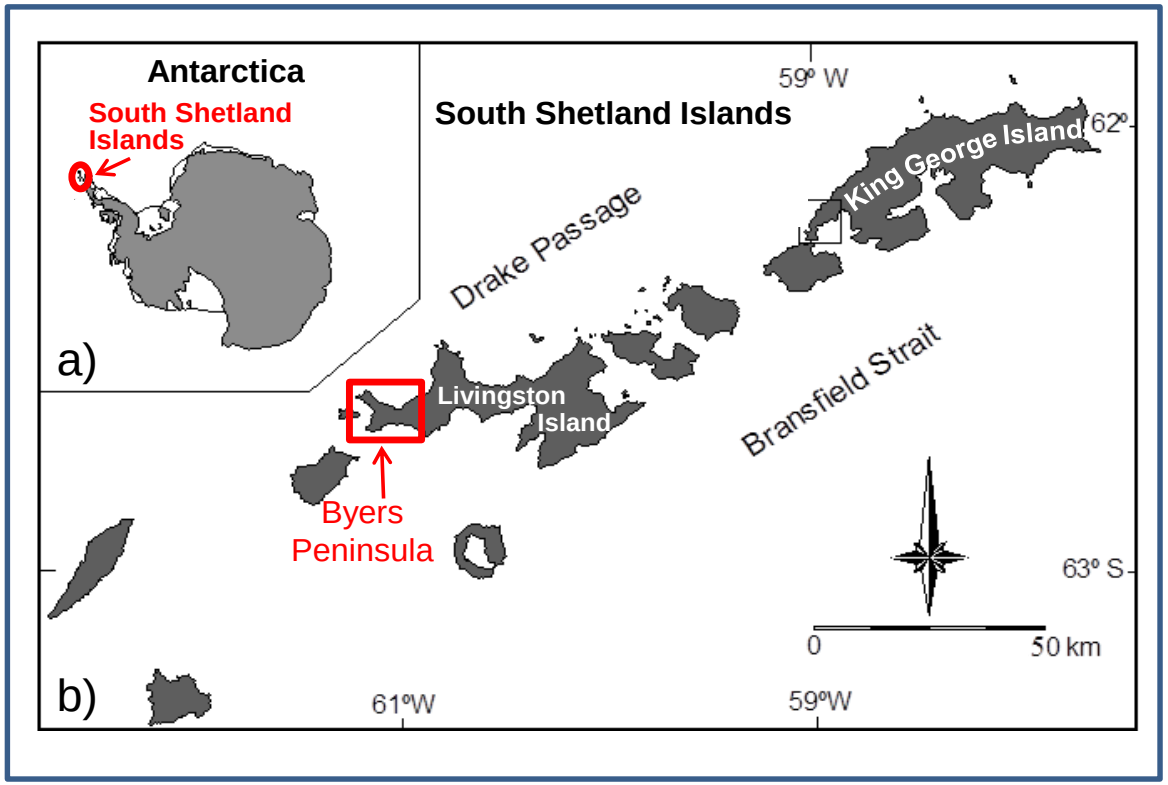
Objective

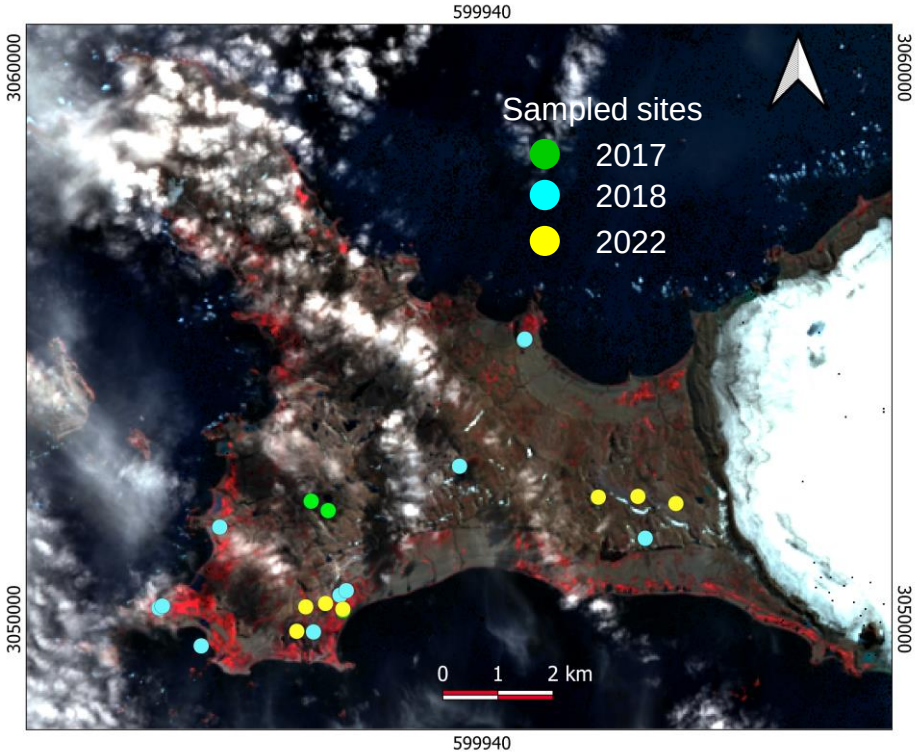
The main objective of this work was to use EnMAP data to determine the distribution of different abiotic and biotic indicators of terrestrial land surface covers within selected study areas of Byers Peninsula on Livingston Island.

The specific objectives included:

- **Obtaining field and laboratory reference spectra for the different abiotic and biotic indicators.**
- **Determining the spectral signature using the hyperspectral EnMAP data.**

Study area



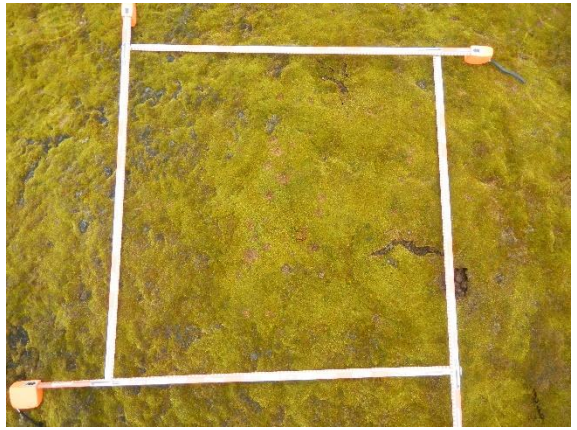
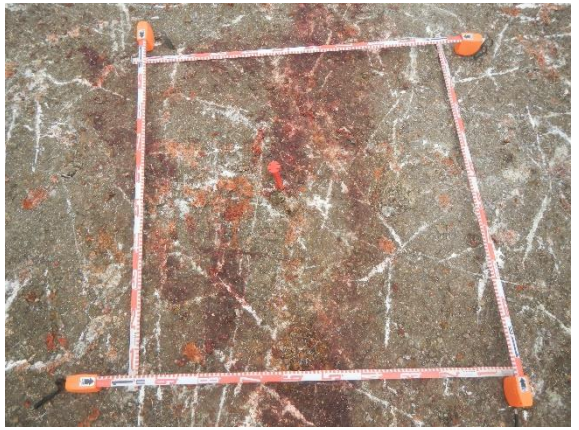


EnMAP_L2A from the 15 March 2023
Aquisition 9:59 a.m. local time
Solar altitude angle: 24.66º
(False color composition RGB 76, 47, 30)

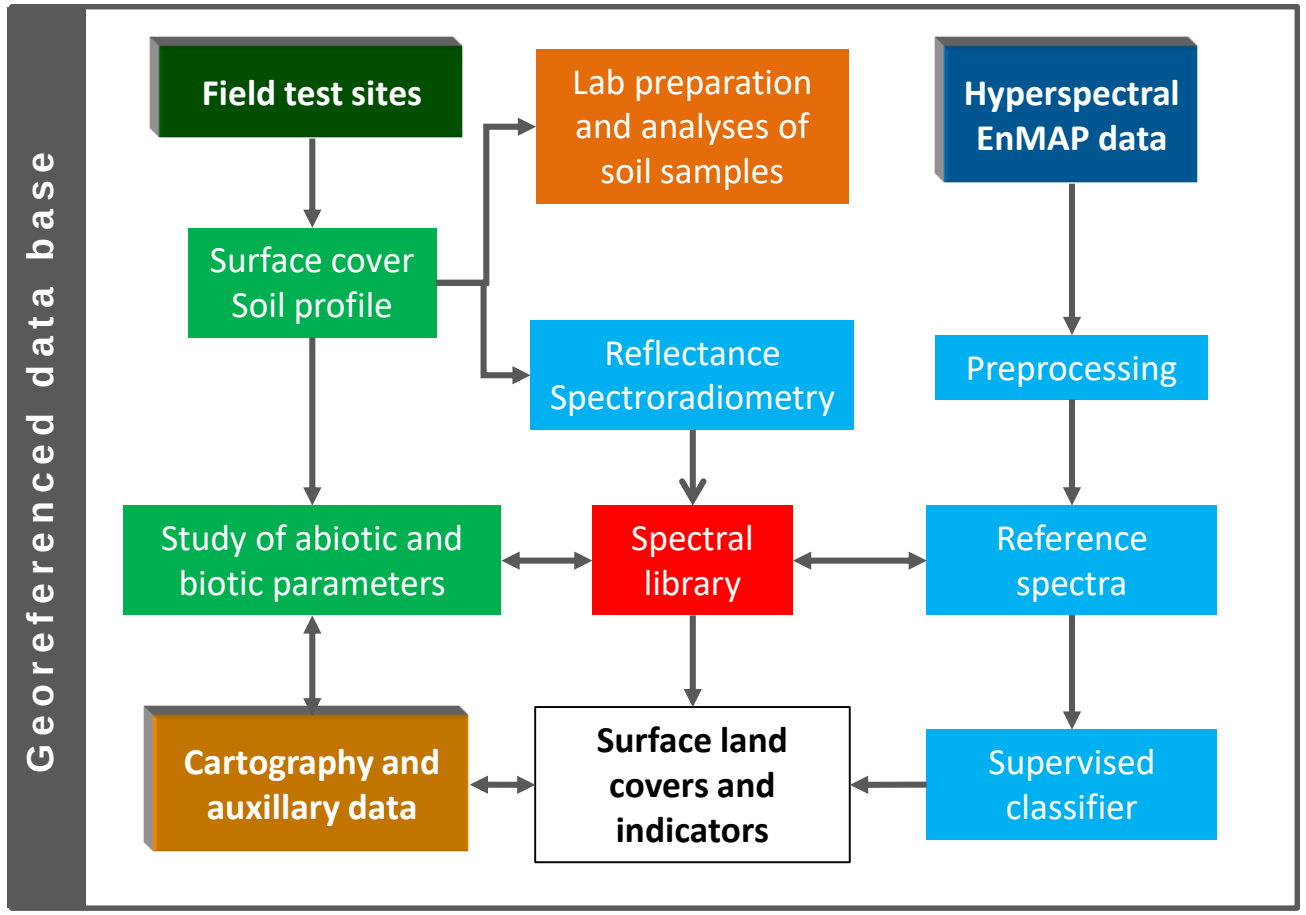
Abiotic and biotic indicators

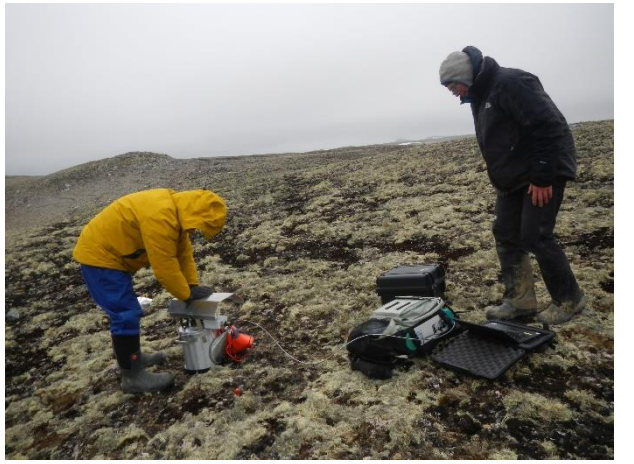


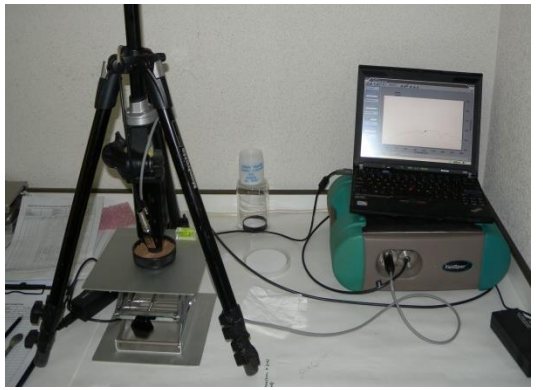


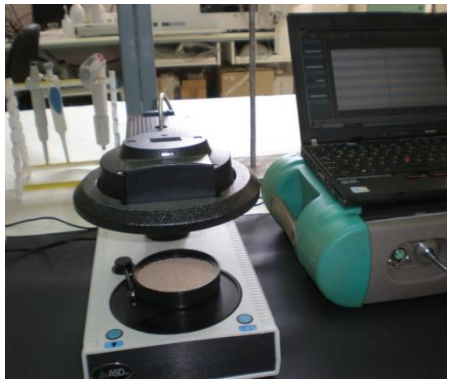



Method

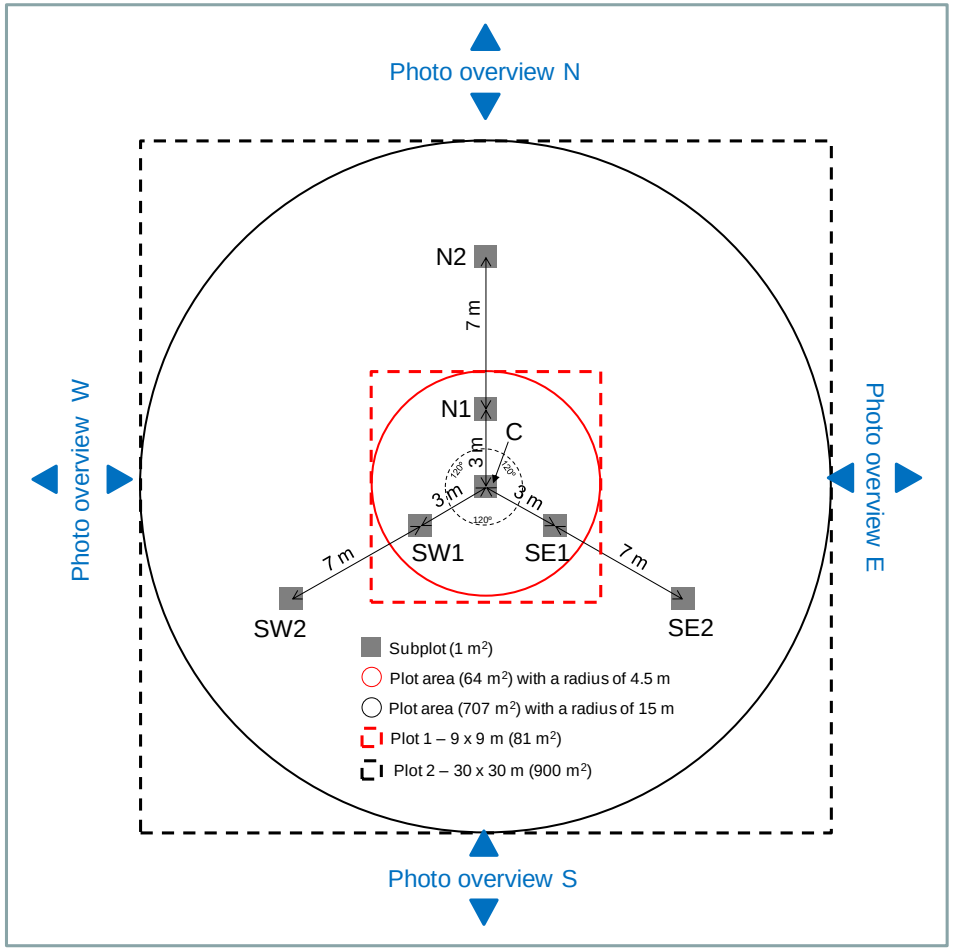

Georeferenced data base
Field test sites
Lab preparation and analyses of soil samples
Hyperspectral EnMAP data
Surface cover Soil profile
Reflectance Spectroradiometry
Preprocessing
Study of abiotic and biotic parameters
Spectral library
Reference spectra
Cartography and auxillary data
Surface land covers and indicators
Supervised classifier



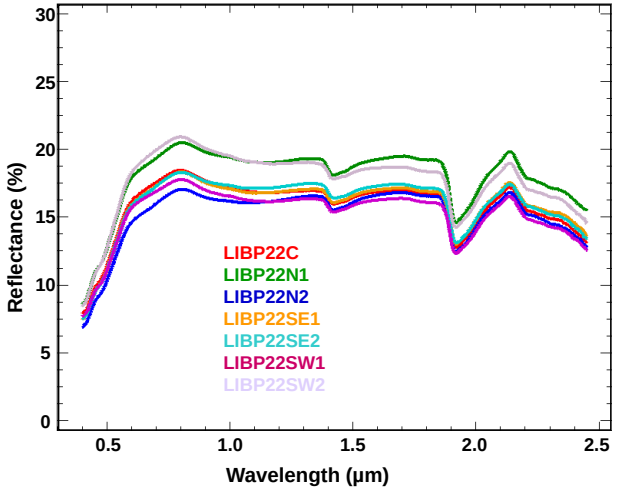




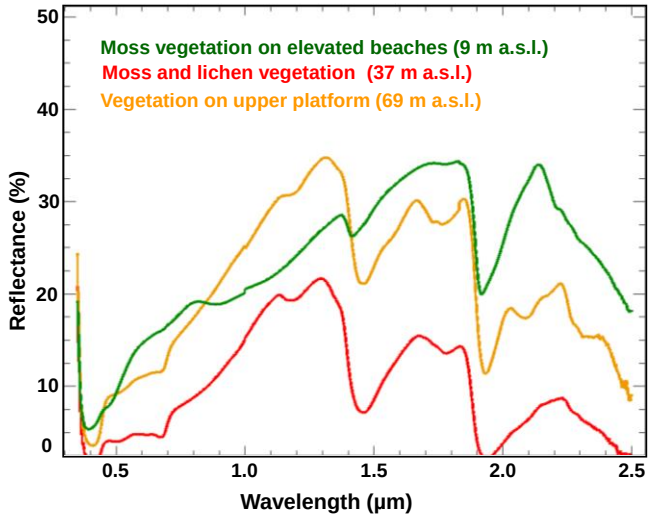
Northern Antarctic Spectral (NAPSPEC) library

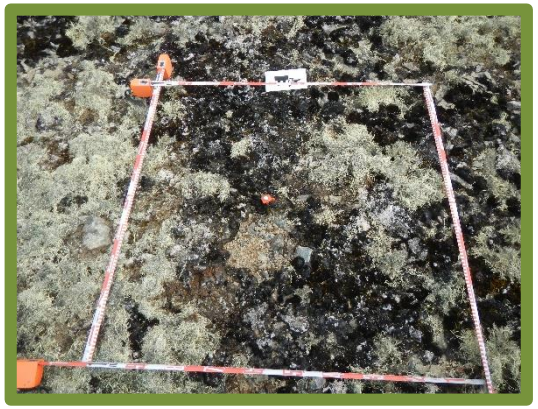


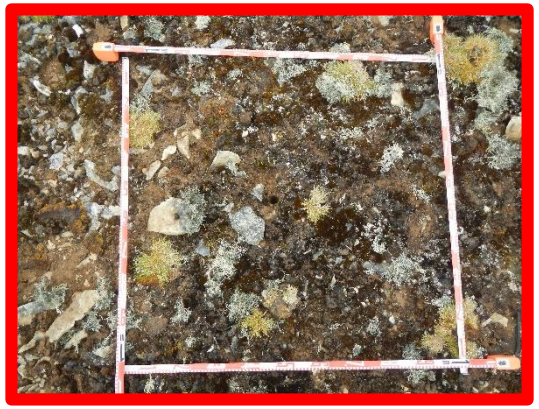
Bare soil spectra (SoilPROII)



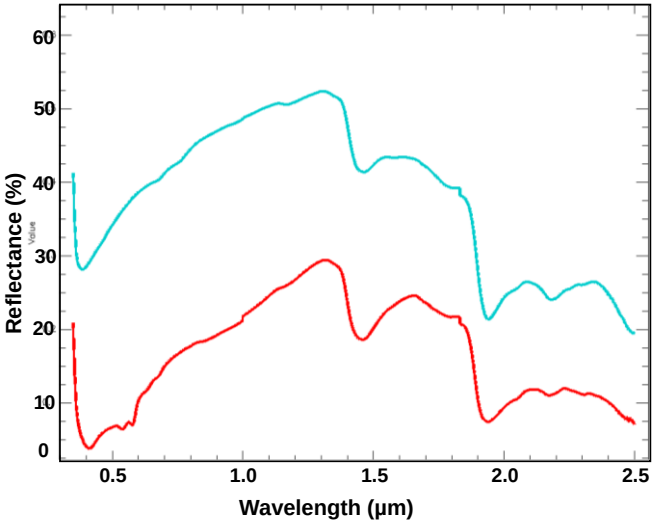
Reference surface covers

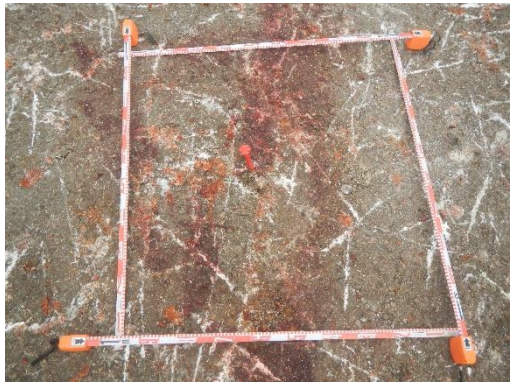






Vegetation cover at different elevation

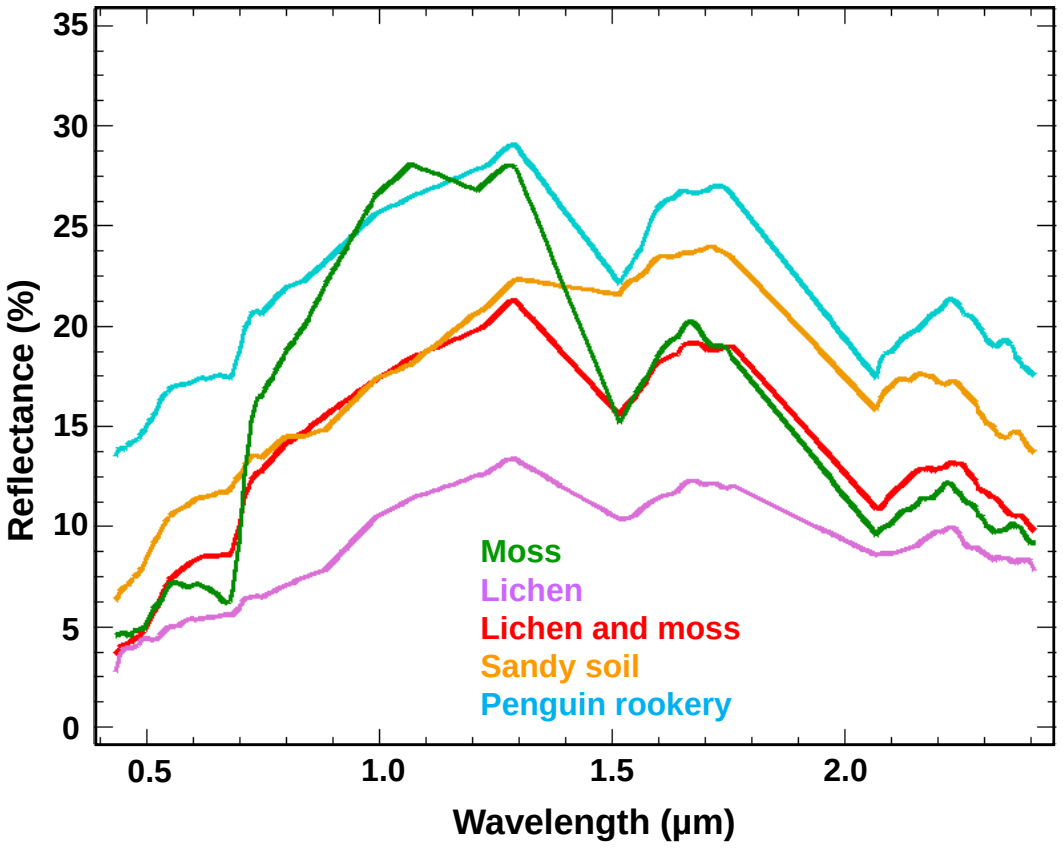




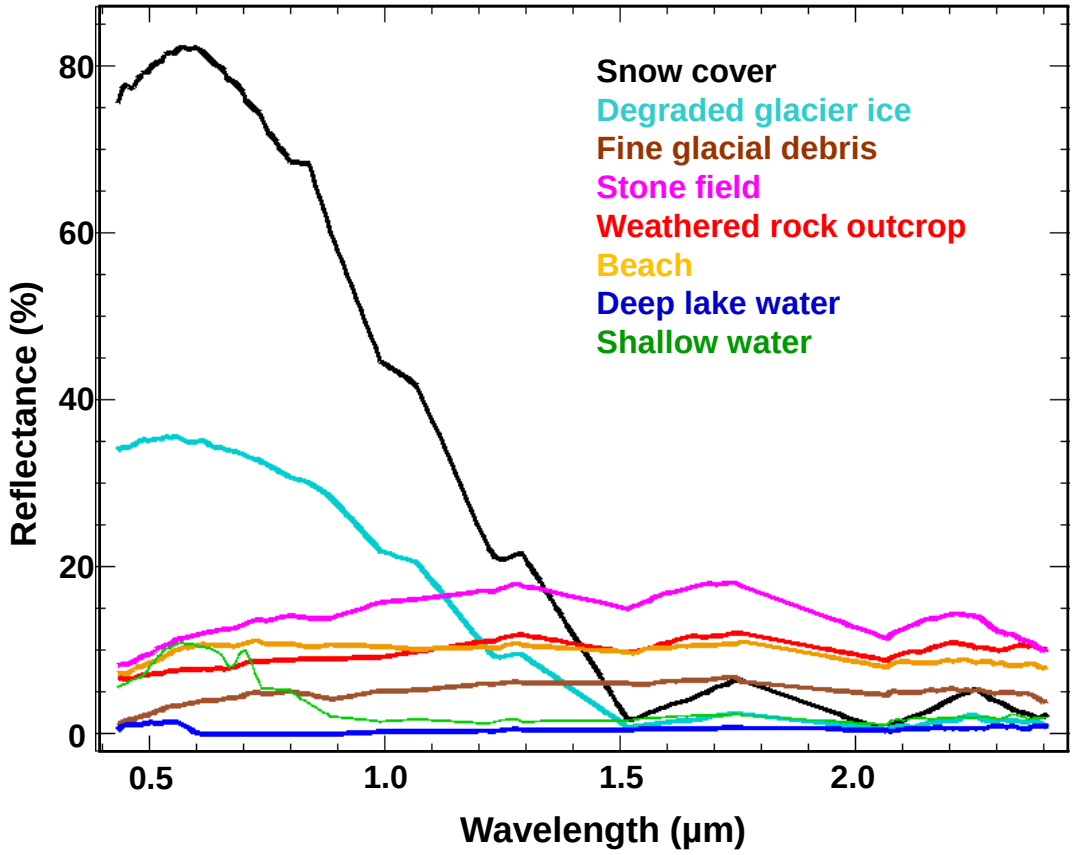
Penguin rookery

EnMAP surface cover spectra

Spectra from reference sites



Spectra from further observation points



Conclusions

- Climatic conditions pose a challenge to obtain spectral measurements within the VIS-NIR-SWIR range.
- The site specific information and the compilation of a spectral library of the Northern Antarctic Peninsula region (NAPSPEC) is considered important when working with the EnMAP data.
- Spectral comparison between the field and hyperspectral satellite-borne sensor data was an initial tool to label the corresponding indicators that are influenced by bare soil covers, flora and fauna within selected areas of Byers Peninsula
- Preliminary results show that spectral features of different surface covers within the ice-free areas were well identified using the EnMAP data.
- In this case, the solar altitude angle is an important issue and needs to be addressed.

Acknowledgements

- Spanish logistic personnel from the Juan Carlos I station and from the crew of the Oceanographic Research Ship "Hespérides".
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Ciemat
Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas

GFZ
Helmholtz-Zentrum Potsdam

Leibniz Universität Hannover

UAM Universidad Autónoma de Madrid