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MiSMoS (MicroScale Morphology System) Applied in the Study of Beach Microtopography

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Abstract

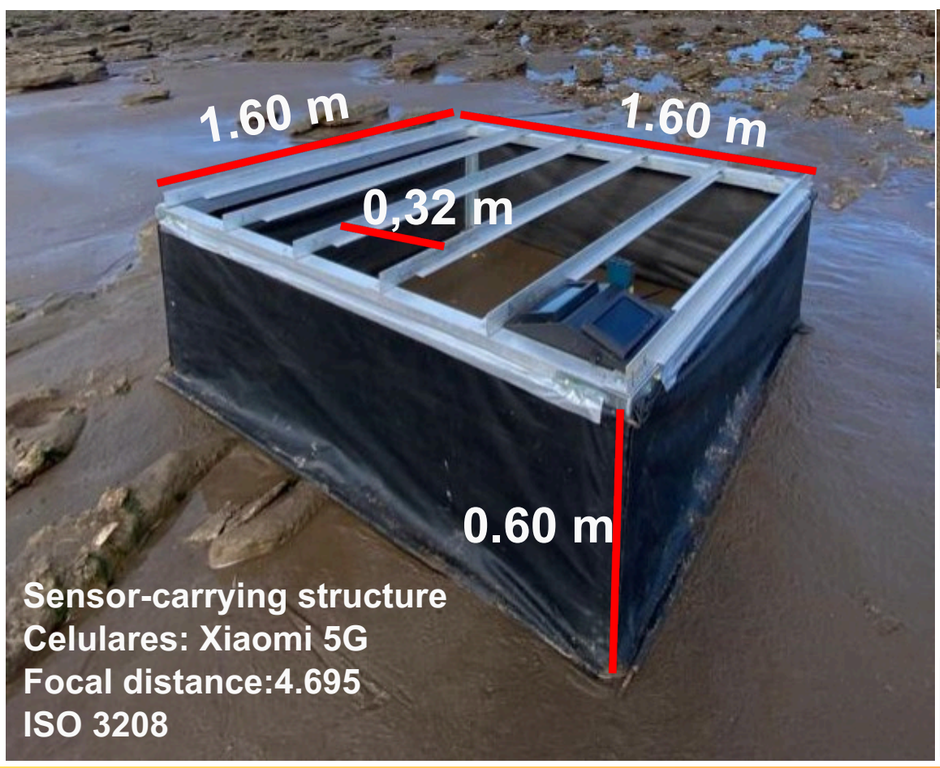
Microscale morphology in coastal environments is complex to study due to both the large spatial and temporal variability. No direct instrumentation is available to map the micromorphology in detail. Micromorphology features in any environment represent the result of the small-scale processes that are continuously shaping the larger scale landscape. The aim of this presentation is to describe the application of the newly developed MiSMoS (MicroScale Morphology System) methodology for mapping surface and small-scale morphologic features such as ripples, rills, and small courses, as well as to demonstrate its advantages and limitations. High-resolution 3D models were generated from the photos using Structure-from-Motion, Multi-View-Stereo (SfM-MVS) technique. The MiSMoS provides detailed resolution, enabling precise identification of micromorphology features such as cavities, pebble clasts, and rock fragments while avoiding the distortion of the resulting DEM.

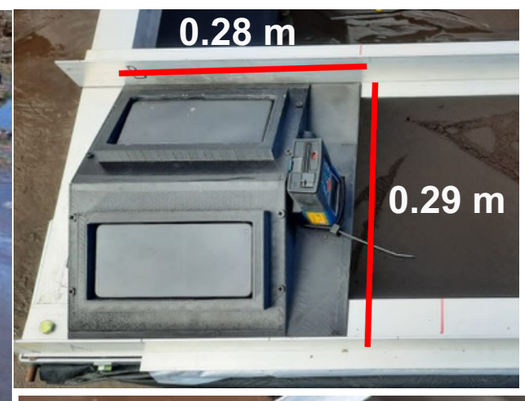
What is MiSMoS?

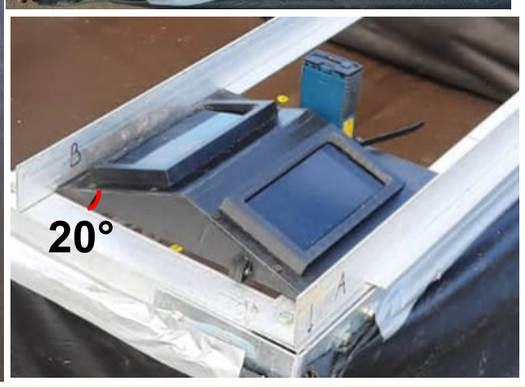
The MiSMoS (Perillo et al. 2022) was developed for micromorphology mapping. It consists of a table of 1.6 x 1.6 m square aluminum structure with six L-shaped rails on top to mobilize a sensor-carrying structure supported on four legs (0.60 m high).

The rails serve two purposes: **1)** to move the sensor-carrying structure along the top of the rails and **2)** to support panels to prevent light penetration.

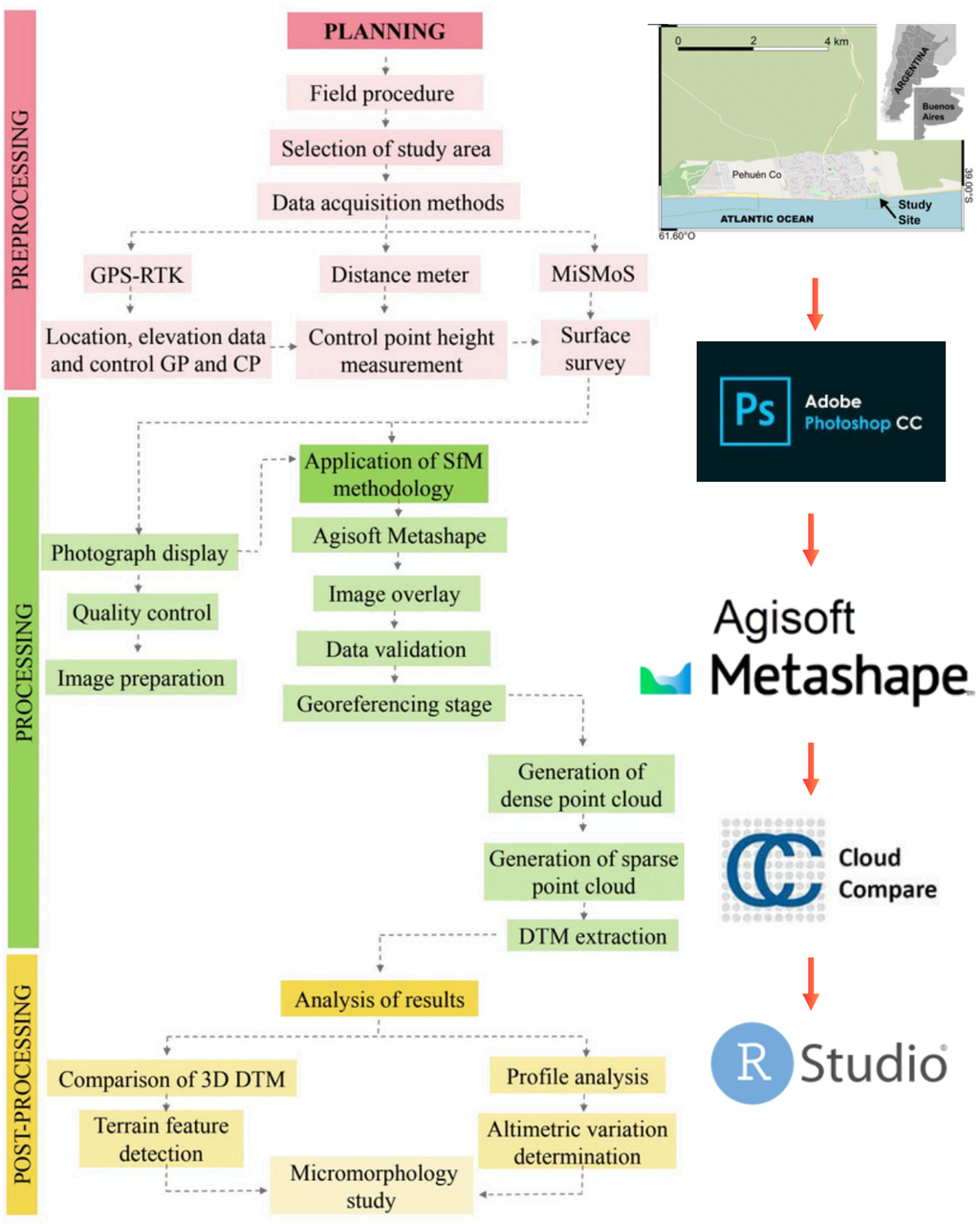
The sensor-carrying structure (i.e., two cameras and a Laser Distance Meter (LDM) was built with a fixed angle of 20° (cameras).





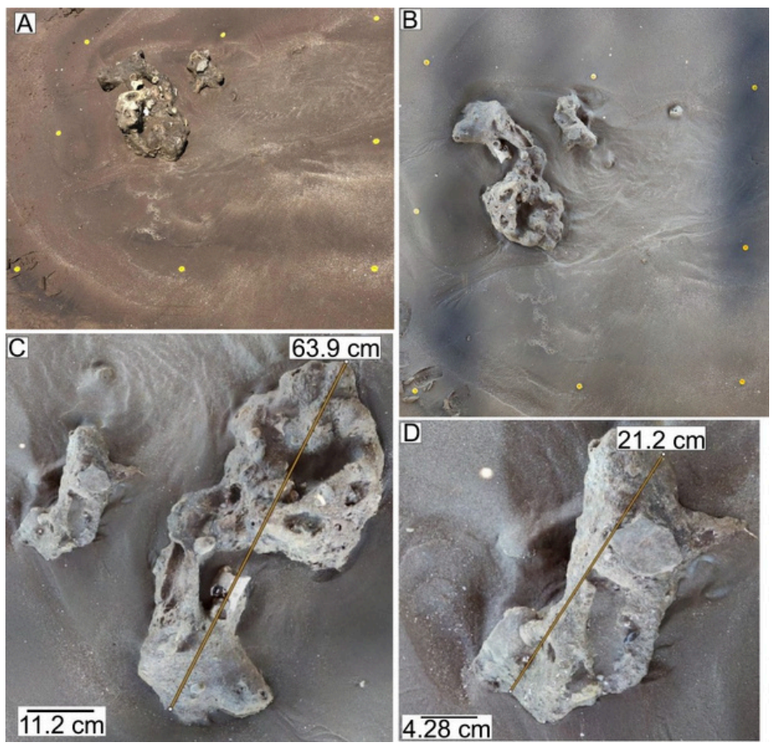


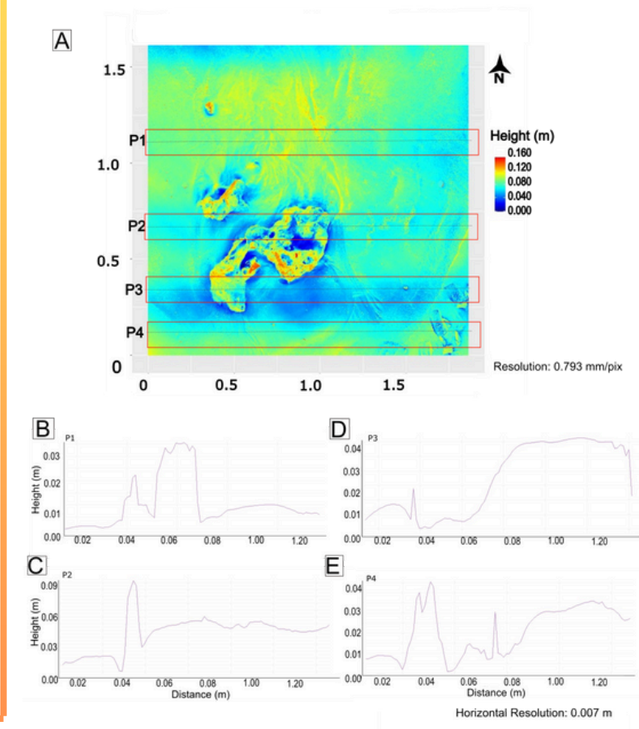
How to work with MiSMoS?



Micromorphology study

Results from Test sector. a) A photograph of a complex surface with differential erosion in the swash zone. **b)** Preliminary orthomosaic extracted using the SfM -MVS technique. Measurements of **c)** and d) were taken on the dense cloud. Yellow circles represent the CGP and CP markers.





a) Digital Elevation Model Digital Elevation Model from Test Sector. The position of the microprofiles P1, P2, P3 and P4 are indicated . Microprofiles of the test sector: b**)** sloping towards the beach, **c)**, **d)**, and **e)** sections determined over rocky outcrops.

Advantages of MiSMoS

1) it can map geomorphology at high resolution.
2) it is easy to build and deploy.
3) it is inexpensive.
4) in one operation, a high-resolution map of an area of 2.25 m2 can be obtained in about 15-20 min, where as other systems usually only provide cross-section profiles.

Reference

Perillo, G.M.E., Nuciari , L., Alquinga Salazar, Y.C., Genchi, S.A., Perillo, V.L.,and Piccolo, M.C., 2022. MiSMoS: a microscale morphology system. II Particles in America Conference (Abstract)

Acknowledgements

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