

Proposal of a preliminary Planetary Protection protocol for the development of future Mars missions at the University of Vigo.

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Introduction

We present the implementation of a Planetary Protection (PP) protocol for a hypothetical mission launched in 2030 designed by the University of Vigo.

We performed the microbiological study of two cleanrooms at the University Campus.

The PP protocol was completed with the support of researchers from CAB/INTA with real experience in Mars missions such as ESA's ExoMars and NASA's Mars2020.

Methods

The method followed for the collection and processing of samples was the NASA 6022: Handbook for the microbiological examination of space hardware.

1. Wet swabbing of a 5 x 5 cm area from two cleanrooms and the environment.
2. The samples were heat treated to select spore-forming bacteria and
3. Seeded on TSA agar.

The objective was the quantification of space travel resistant microorganisms (CFU) in the cleanrooms to verify their use for aerospace engineering.



Fig. 1 Image of the swabbing method.

Results/Conclusions

Planetary Protection is essential in astrobiology. Microbiological control is a key requirement for the development of space missions to study and understand the emergence and evolution of life. The most used work surfaces are the main source for contamination risk. 3 points of contamination were identified.

UVigo cleanrooms are prepared to host aerospace activities within the ISO 7 cleanroom requirements (300 spores/m²)

Table 1. Results of the microbiological assay performed in the cleanrooms

Place	Σ spore CFU	Σ sp. UFC/ n° samples	Surface (m ²)	UFC/ m ²
Uvigo Spacelab	3	0,333	0,0225	14,815
Enx. Industrial	1	0,111	0,0225	4,938
Joint rooms	4	0,222	0,045	4,938

Planetary Protection protocols ensure a decrease in variability (1-2), decrease in the number of colonies(2-3), and a low presence of resistant organisms (3).

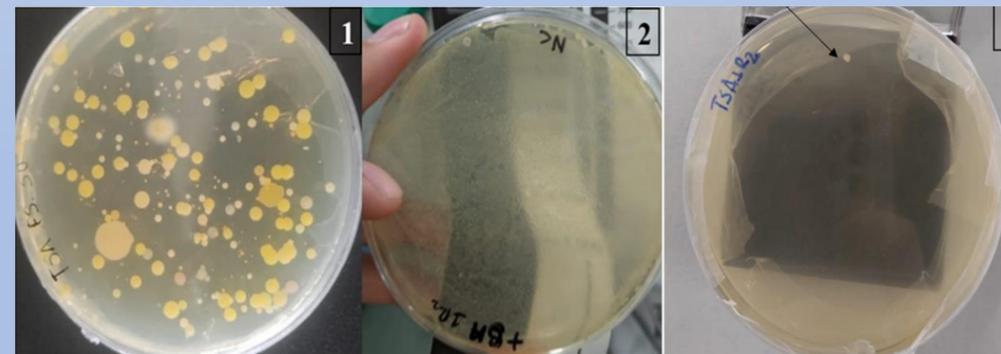


Fig. 2 Comparison of three petri plates from a cleanroom.

The rest of the protocol was made with bibliographic resources and advice from INTA/CAB researchers.

References

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UVigo Spacelab:

<https://uvigospacelab.space/CINTECX> Centro de Investigación en Tecnologías, Energía y Procesos Industriales de la Universidad de Vigo
<http://cintecx.uvigo.es/>

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