Protecting our Planet from Extraterrestrial Life: Safe Solar System Exploration

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1. Introduction

For several decades the prioritisation for robotic exploration missions has been roughly: 'flyby, orbit, land, rove, and return samples for further study.' This prioritisation has reflected both the state of the technology available to each mission, as well as the state of the knowledge-base that each mission needed to depend on for success. More recent missions that have targeted comets and asteroids for the return of samples have reflected that same tiered approach and knowledge-base, and reflect our current understanding of those bodies in both their science and in the measures thought necessary to conduct them safely. Meanwhile, with the application of new technology and concomitant funding, space agencies are now beginning a serious attempt to return samples from solar system bodies that may have significant water as both ice and subsurface liquid, and one of the compelling themes about such missions is the potential for them to detect extraterrestrial life – either extinct or extant – a factor not seriously considered for sample return missions since the Apollo missions of the 1960s and 70s.

2. Responsibly addressing the possibility of life, elsewhere

In this paper a review of the criteria that are addressed in planetary protection policies (e.g., NASA, ESA, COSPAR [1]) to determine whether such a mission has an "unrestricted" or "restricted" Earth return will be given, and the logical implications for such missions (or suite of missions) gaining a "restricted" categorization will be discussed. In particular, the anticipated role of certain regulatory authorities and their relationship with the space agencies conducted such missions will be examined.

3. Reference

[1] Kminek, G., and Rummel, J.D.: COSPAR's Planetary Protection Policy, COSPAR's Information Bulletin, *Space Research Today*, Vol. 193, pp. 7-17, 2015.

Short Summary

A review of the criteria addressed in planetary protection policies to determine whether a mission has an "unrestricted" or "restricted" Earth return and the logical implications for missions given a "restricted" categorization. The anticipated role of certain regulatory authorities and their relationship with space agencies will be examined.