

OSIRIS-REx II to Mars - Mars Sample Return from Phobos and Deimos - A Mars Mission Proposal for the NASA - Lunar and Planetary Institute Workshop Meeting - Concepts and Approaches for Mars Exploration,
T. L. Elifritz¹. ¹The Tsiolkovsky Group, Marshall Space Flight Center, Marshall, WI, USA.

Introduction: I argue that the quickest and least expensive or risky manner by which samples may be returned from Mars is to double the monetary resources available to the OSIRIS-REx program, such that the economies of design and fabrication will produce an additional sample return spacecraft and mission for visiting Phobos and Deimos. It is hoped that my voice is only one of many, such that this program may proceed.

Program Goal: The goal of the OSIRIS-REx Mark II program is to as quickly as possible develop the high precision remote control of generic asteroid approach, rendezvous, observation, sampling and sample return, while satisfying outstanding goals of planetary science.

Program Benefits: Benefits of a double spacecraft approach were demonstrated by the Mars Exploration Rover program. Mars surface sample return has been demonstrated to be too difficult and costly to achieve, and Phobos sample return is clearly its prerequisite. The Phobos Grunt mission has unfortunately failed. The ability to solve in the near term (2018-2022) these two outstanding problems in planetary science, carbonaceous asteroid and Mars Phobos sample return, will allow for the vastly more expansive and productive program of Earth based ground characterization and analysis of pristine extraterrestrial materials to proceed.

Launch Capabilities and Benefits: By the estimated launch date of these spacecraft (2016-2018), more powerful, less expensive and more reliable heavy lift launch vehicles will be available, such that advances in asteroid sampling techniques will benefit from current mission feedback applied to second generation designs.

National Benefits: OSIRIS-REx is already a high priority New Frontiers program. The inclusion of the Phobos and Deimos sample return to its mission using an additional second spacecraft and its operations, will elevate it to the national Mars Exploration flagship program desired by all of the sponsoring and executing mission stakeholders, at costs, complexities, schedule, risk and value comparable to its program requirements and the resources available, while still satisfying the original goal of a near term Mars sample return project.

Reference: [1] NASA OSIRIS-REx Fact Sheet, [OSIRIS_REx_Factsheet.pdf](#)