

Mars landing missions by Japan: Its strategy and sciences

*Yasuhito Sekine¹, Tomohiro Usui², Hitoshi Hasegawa⁴, Kanako Seki³, Keisuke Fukushi⁵, Kazuhisa Fujita², Kazuhiko Yamada², Kojiro Suzuki³, Yasunori Nagata², Takanao Saiki², Tetsuo Yoshimitsu², Osamu Mori², Atsushi Yamazaki²

1. Earth-Life Science Institute, Tokyo Institute of Technology, 2. ISAS, JAXA, 3. University of Tokyo, 4. Kochi University, 5. Kanazawa University

This paper discusses strategies for landing exploration on Mars. In particular, we will discuss the steps for acquiring the technology, the science goals at each stage, and the science we are aiming for in the eventual full-scale rover exploration of Mars. In particular, for the final phase of a 200-kg-size rover mission to Mars in the late 2030s and beyond, the sulfate dune area in the Martian north-pole region is a candidate for landing. The sulfate is thought to be evaporites of liquid brine that flowed out in the near past due to the breakup of an ice-bottom lake at the bottom of the polar cap. By conducting chemical, mineral, and organic analyses of the sulfate salt evaporites, we aim to determine the quality of water chemistry and habitability on present-day or recent past Mars. In addition, the sulfate dune area is known for the appearance of dark spots during the summer. Perchlorate brines are likely involved in formation of these dark spots in interdunes. The north-pole sulfate dune regions are ideal landing sites for studying the present-day water cycles and water environments.

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