

Scientific Objective and Infrastructure of Space Exploration (1)  
Scientific Objective and Infrastructure of Space Exploration (2)

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SCIENTIFIC OPPORTUNITIES ENABLED BY HUMAN EXPLORATION BEYOND LEO

**Abstract**

With the Global Exploration Roadmap (GER) describing an international approach for human and robotic space exploration to achieve broad social, intellectual and economic benefits, the participating agencies of the International Space Exploration Coordination Group (ISECG) acknowledge the important part for science in this endeavour. They have therefore engaged in a broad interaction with the global scientific community through a Science Advisory Group as well as through open exchanges at various events and conferences, including dedicated workshops with the support of COSPAR's Panel for Exploration, NASA's Solar System Exploration Research Virtual Institute (SSERVI), the European Science Foundation and ISECG participating agencies. The result is a Science White Paper which provides policy makers and other stakeholders with an overview of science opportunities that are created by the presence of humans and their infrastructure in the early steps of the exploration of the solar system. It reflects the broader view of the scientists on the exploration destinations, while focusing the description on the opportunities to the near-term reference mission scenarios of the GER, i.e. 1) extended duration crew missions in the lunar vicinity, 2) human missions to the lunar surface, and 3) human exploration of a near-earth asteroid. The Science White Paper captures opportunities for scientific discovery associated with exploration missions in two themes: "Understanding Our Place in the Universe" and "Living and Working in Space". The first of these combines all science investigations related to the physical nature of the universe around us and to how life evolved with the planetary environment. The latter theme then integrates science disciplines addressing the challenges of extending human reach into space. These themes provide the basis for the description of opportunities within the next step beyond low Earth orbit in the vicinity of the Moon, and, eventually, on the Mars surface. It further outlines the value of human explorers for science. A summary of the white paper of scientific opportunities has been published in November 2016 and can be downloaded from the ISECG website. The full Science White Paper will be published in spring 2017 and will inform the next edition of the Global Exploration Roadmap, expected in late 2017, as well as serving as a reference for individual space agency planning. The authors will present the rationale and contents of the Science White Paper together with an outlook into continued interaction with the scientific communities.