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SPACE EXPLORATION SYMPOSIUM (A3)
Space Exploration Overview (1)

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ROBOTIC EXPLORATION IN TODAY'S EVOLVING GLOBAL SPACE SECTOR

Abstract

Robotic space exploration will continue to play a critical role in space activities, enhancing our understanding of the universe and paving the way for future human presence in the solar system. During the 2011 Space Generation Congress, held immediately prior to the 62nd International Astronautical Congress, a group of twenty students and young professionals from all over the world focused their efforts on defining the role of robotic exploration within international space programs. A particular emphasis was placed on discussing the merits of human versus robotic exploration and the synergies between them.

Robotic space exploration also enables international collaboration. It is suggested that emulating the partnership schemes employed by the International Space Station (ISS) and the European Space Agency (ESA) could foster cooperation across borders. International collaboration, supervised by an international entity such as the International Space Exploration Coordination Group (ISECG), provides an effective model to achieve synergy in case of collaboration among countries from different continents. Members would join on a voluntary basis and ISECG supervision would help strengthen national agencies. Cooperation among countries increases their mutual understanding of each other and helps to develop a platform for collaboration in other areas such as education, technology and science. Technology sharing allows countries with a less developed space sector to take advantage of the new technologies and expertise developed by their partners.

Two ideal types of missions are recommended to utilize the unique benefits of robotics for space exploration. The first type is a precursor mission to enable future human exploration of a target. Near Earth Objects are suggested as a destination for technological validation and robotic scientific investigation. The second type of mission is purely scientific, towards a destination like Europa that is otherwise inaccessible to humans with current technologies. These missions utilize the unique strengths of robotic missions to act autonomously, tele-robotically or in aide of humans to further overarching scientific goals. A focus on encouraging international collaboration is applied. The intrinsic human safety of remote robotic missions and the possibility to plan one-way trips enables greater risks to be taken and could result in a significant reduction of the overall cost. The architecture of spacecraft, with complex and scalable configuration, allows a good opportunity for wider cooperation with diverse levels of member contribution.