SPACE EXPLORATION SYMPOSIUM (A3)
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Author: Prof. Bernard Foing
European Space Agency (ESA/ESTEC), The Netherlands

SMART-1 NEW RESULTS AND LESSONS FOR FUTURE LUNAR EXPLORATION

Abstract

We present highlights and new SMART-1 results published or obtained in 2009-2010 that are relevant for lunar science and future exploration, in relation with subsequent missions and future landers. SMART-1 is the first of ESA's Small Missions for Advanced Research and Technology [1,2,3]. Its prime objective has been achieved to demonstrate Solar Electric missions (such as Bepi-Colombo) and to test new technologies for spacecraft and instruments. The SMART-1 spacecraft was launched in 2003, as Ariane-5 auxiliary passenger, and reached on 15 March 2005 a lunar orbit 400-3000 km for a nominal science period of six months, with 1 year extension until impact on 3 September 2006. New SMART-1 lunar science and exploration results since 2009 include: -Multiangular photometry of Mare regions and study of specific regions at different phase angles allowed to detect variations in regolith roughness. -Lunar North and South polar maps and repeated high resolution images have been obtained, giving a monitoring of illumination to study potential sites relevant for future exploration. This permitted to identify SMART-1 peaks of quasi-eternal light and to derive their topography. The SMART-1 archive observations have been used to support Kaguya, Chandrayaan-1, Chang'E 1 , the US Lunar Reconnaissance Orbiter, the LCROSS impact, and to prepare subsequent landers and future human activities and lunar bases.

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