Synthesis of SMART-1 lunar results: Science and Exploration

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The SMART-1 spacecraft 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. We shall give a synthesis on SMART-1 lunar highlights relevant for science
and exploration. SMART-1 lunar science investigations include studies of the chemical
composition of the Moon, of geophysical processes (volcanism, tectonics, cratering,
erosion, deposition of ices and volatiles) for comparative planetology, and high
resolution studies in preparation for future steps of lunar exploration. The mission
addresses several topics such as the accretional processes that led to the formation
of rocky planets, and the origin and evolution of the Earth-Moon system. SMART-1
AMIE camera has been used to make studies relevant to the study of cataclysm bombardment,
and to preview future sites for sampling return. Lunar North polar maps and
South pole repeated high resolution images have been obtained, giving a monitoring
of illumination to map potential sites relevant for future exploration . The SMART-
1 observations have been coordinated with upcoming missions. SMART-1 has been
useful in the preparation of Selene Kaguya, the Indian lunar mission Chandrayaan-1,
Chinese Chang'E 1 , the US Lunar Reconnaissance Orbiter, LCROSS, and subsequent
lunar landers. SMART-1 is contributing to prepare the next steps for exploration: survey
of resources, search for ice, monitoring polar illumination, and mapping of sites
for potential landings, international robotic villages and for future human activities
and lunar bases.