



SMART-1 mission, techniques, travel and lessons for the future

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SMART-1 is the first of Small Missions for Advanced Research and Technology as part of ESA science programme “Cosmic Vision”. Its objective is to demonstrate Solar Electric Primary Propulsion (SEP) for future Cornerstones (such as Bepi-Colombo) and to test new technologies for spacecraft and instruments. The spacecraft has been launched on 27 Sept. 2003, as Ariane-5 auxiliary passenger. SMART-1 has left the inner radiation belt, and spiraled out towards lunar capture on 15 November 2004. It then spiraled down towards lunar science orbit (300-3000 km) until February 2005. The SMART-1 mission has orbited the Moon for a nominal period of six months, with 1 year extension, until impact on 3 September 2006. The spacecraft has carried out a complete program of technology and science measurements: an experiment (KaTE) aimed at demonstrating deep-space telemetry and telecommand communications in the X and Ka-bands, a radio-science experiment (RSIS), a deep space optical link (Laser-Link Experiment), using the ESA Optical Ground station in Tenerife, and the validation of a system of autonomous navigation (OBAN) based on image processing. For lunar science, the payload includes a miniaturized high-resolution camera (AMIE) for lunar surface imaging, a near-infrared point-spectrometer (SIR) for lunar mineralogy investigation, and a very compact X-ray spectrometer (D-CIXS) with a new type of detector and micro-collimator which will provide fluorescence spectroscopy and imagery of the Moon’s surface elemental composition. We shall describe the travel of SMART-1 from launch to impact and discuss lessons and perspectives for the future. We shall summarise in particular results from a SMART-1 Technology workshop held at ESTEC on 16-17 January 2007.