SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
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# ARIANE 5 LAUNCHER FOR SPACE EXPLORATION MISSIONS

**Abstract**

Ariane 5 is the European launcher currently putting into orbit more than half of the commercial telecommunications satellites in the world. Besides this important commercial record, Ariane 5 also responds to the European governments needs in terms of launch of scientific and military payloads. Among the institutional payloads, exploration missions have already been performed four times in the past years with the launch of: the XMM telescope in 1999 which has provided very valuable scientific results, the SMART-1 spacecraft in 2003 which was the first European lunar mission, the comet-chasing Rosetta spacecraft in 2004 which is on its way to the first comet rendezvous in 2014, and last the Automated Transfer Vehicle (ATV) in 2008, one of the two major European elements of the International Space Station. The fifth exploration mission is expected to take place in April 2009 with the launch of the Herschel and Planck satellites towards the 2nd Lagrangian point (L2).

Looking into the future, Ariane 5 in its current or future versions will continue launching space exploration missions like the ATV but could also go beyond its current missions by not only contributing to the international effort of Moon and Mars exploration through robotic missions but also offering an additional man-rated capability for crew transportation to LEO which might be of high interest for international cooperation in creating a robust and interoperable international fleet.

Having this goal in mind, EADS ASTRIUM has conducted several studies about various possible scenarios using Ariane 5 for new space exploration missions. With the support of CNES fundings a study started early 2008 addressing 3 main topics: the modifications required to adapt A5 launcher to man-rated missions, the launcher potential capabilities for a robotic lunar mission, and for the Mars Sample Return mission. For each type of mission various launcher configurations and mission scenarios have been traded, and the most critical technologies have been identified.

Other studies of interest were performed with internal ASTRIUM funding or in the frame of the ESA Advanced Return Vehicle (ARV) programme which is built upon the ATV architecture and experience.

This paper will present the main results and outcomes of these studies, starting with the possibilities of using the launcher for human missions, and continuing with the capabilities of Ariane 5 for Moon, Mars and other solar system exploration missions.