

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)  
Future Space Transportation Systems (4)

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OCAM-G – A GNSS TECHNOLOGY IN-ORBIT DEMONSTRATION EXPERIMENT FOR FUTURE  
EUROPEAN LAUNCHER APPLICATION

**Abstract**

OCAM-G is the GNSS version of the flight-proven On-board CAMera module, well known in the European launcher community. Main objective of the project is to provide a platform for the in-orbit demonstration of GNSS technology for launcher applications. OCAM-G has been developed, built and qualified under the lead of OHB System (formerly Kayser-Threde) with support from numerous partners in research and industry, such as DLR and Septentrio, within an ESA program on GNSS technology for launch vehicles. The initiative aims to supplement other studies performed in this area by a practical flight experience.

In total, two flight units have been built and qualified so far. As its predecessors, the OCAM-G experiment is a fully self-contained and autonomously operating system, composed of a main electronic box, two camera modules, two LNAs and two GNSS- and S-Band antennas mounted on opposite sides of the outer circumference launcher to provide attitude independent signal reception throughout all flight phases. Currently, OCAM-G is equipped with three GNSS receivers, two AsteRx-m GNSS receivers from Septentrio N.V., Belgium, and one Phoenix GPS receiver from DLR, Germany. Navigation, raw and status data from these receivers are collected at a configurable update rate by an onboard processor and either directly send to ground via S-Band transmitters or stored and dumped during the next pass over a ground station.

The successful maiden flight of the OCAM-G system took place on July 29, 2014 onboard the Ariane-5 flight VA 219 (ATV-5), marking the first flight of a GNSS receiver aboard an Ariane launch vehicle. For this flight, the OCAM-G module had been accommodated in the vehicle equipment bay and data have been recorded from a few minutes before lift-off to a few minutes after ATV-5 separation. With the exception of two very short outages, navigation and raw data at good quality are available for the entire operation time of OCAM-G.

Following a brief introduction to the “GNSS In-Orbit Demonstration program” this paper will provide a technical description of the OCAM-G system and its individual components. Furthermore the

accomplished hardware and software qualification program is shortly described. In the second part the paper will present and discuss in detail the results of the maiden flight on Ariane-5. It will illustrate the strengths and weak points of the use of GNSS technology in launcher applications and provide suggestions for future developments. Furthermore an outlook is provided on a potential second flight experiment.