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THE ROLE OF THE LARES MISSION IN THE VEGA LAUNCHER QUALIFICATION FLIGHT

**Abstract**

The LARES mission started on 13th February, 2012, exactly on the planned time at 10:00 UT, from the Centre Spatiale Guianaise in Kourou with the successful launch of the new European small launcher, VEGA, at its maiden flight. Although it was a qualification flight, the first “Volo VEGA”, called VV01 mission, was completed with accomplishment of most of the launcher objectives and of the satellite ones, in compliance with the LARES-VEGA Interface Control Document (ICD) and LARES-VEGA Joint Development Plan. In fact, the LARES satellite, a 36cm-diameter tungsten sphere of slightly less than 400kg with 92 Corner Cube Reflector (CCR) installed on its external surface, was injected into the target orbit with an accuracy little higher than the predicted margins and the payload telemetry successfully acquired and transmitted to ground stations, containing all the environmental data acquired during the different phases of the flight. In particular, thanks to the Fast Acquisition Unit of the LARES System for shock sensors acquisition, and to the video cameras (installed on both the AVUM external surfaces and on the payload supporting structure), it has been possible to achieve the monitoring of rocket stages and payload separations flight dynamics, visual attitude behaviour, the outgassing phenomena, the possible space debris generation and, finally, the passivation of the AVUM propellant at mission end. After the launch vehicle de-orbiting manoeuvre, the secondary payloads, namely ALMASat-1 and the seven Cubesats, were released from the VEGA AVUM upper stage according to a pre-defined sequence in their final orbit. In the frame of the data exploitation activities of the Flight Qualification Review, the data provided by ASI on the orbital position of LARES, as acquired by the USSSN first and ILRS laser stations later, have been used to cross-check the telemetry data of the Inertial Reference System (IRS) of the VEGA launcher, and, on the other side, to validate the predicted as-built numerical data. Finally the ILRS measurements allowed the compliance verification with the orbital accuracy requirements defined in the LARES-VEGA ICD.