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ArgoMoon: the Italian cubesat for Artemis1 mission

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In order to increase the scientific and technological return of the Artemis I mission, NASA has directed the SLS Program to accommodate Secondary Payloads on board of the Space Launch System (SLS), to be deployed with the Orion capsule; among them, ArgoMoon cubesat has been selected as European contribution. It is a 6U platform designed by Argotec on behalf of the Italian Space Agency (ASI) and will be released from the launch vehicle Interim Cryogenic Propulsion Stage (ICPS). The main objectives of the satellite are: i) taking photographs to document the ICPS after the deployment of the Orion capsule and the deployment of the other secondary payloads mounted on-board; ii) taking photographs of the Earth and the Moon; iii) validate guidance and autonomous targeting technology and iv) verifying a new technology for power distribution, satellite data acquisition and processing suitable for nanosatellite volume. In fact, the cubesat will be the first national spacecraft working in near Deep Space and operated through a Ground Segment mainly based in Italy.

ArgoMoon design is based on the HAWK platform, designed by Argotec following an "all in-house" concept. Some of the main features of this platform are the focus on rad-hard subsystem components, a high level of autonomy capability supported by artificial intelligence, and the scalability towards larger bus sizes.

Early after deployment, ArgoMoon will be able to operate autonomously and perform SLS tracking and proximity flight navigation, making use of a complex image recognition algorithm based on artificial intelligence. These operations are carried out by two optical payloads and the obtained photography will be used to support the NASA and payload communities in providing information regarding the status of their deployment and the condition of the second stage as it completes the final phase of its mission. After that, ArgoMoon will be operative for another six months for technological validation and Moon observation purposes.

During the communication windows throughout the entire satellite lifetime, ArgoMoon will be operated and monitored entirely by the Argotec Mission Control Centre, connected to the Deep Space Network (DSN). The Flight Control Team (FCT) will follow the flight operations with in-house developed software able to plan and validate in orbit activities, verifying the on-board.

After a successfully integration and test campaign, the cubesat has been shipped to USA for the filling activities on the propulsion tanks and the final delivery to NASA for the integration in the SLS, expected in July 2021.

The results of this mission will strongly contribute to future of Space Exploration based on small satellite platforms in Deep Space.