Ganymede Laser Altimeter (GALA) onboard JUICE: report on experiments during the lunar flyby in 2024 and plans for experiments during the Earth flyby in 2026

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In this presentation, we report on the Ganymede Laser Altimeter (GALA) onboard JUICE, with particular emphasis on the report of the experiments during the lunar flyby in 2024 and plans for the experiments during the Earth flyby in 2026.

The Ganymede Laser Altimeter (GALA) is one of the science instruments onboard the European Space Agency (ESA)-led Jupiter Ice Satellite (JUICE) spacecraft. GALA is the first laser altimeter applied to icy bodies. The main objectives of GALA are (1) to understand ice tectonics based on topographic information, (2) to understand the internal structure through measurements of tidal response, including the existence and characterisation of the subsurface ocean, and (3) to understand the small-scale roughness and reflectance of the surface. The science of the subsurface ocean is important from an astrobiological point of view, The development of GALA was conducted as an international collaboration by Germany (led), Japan, Switzerland and Spain. The Japanese team is responsible for the development of the three modules of the receiver: the back-end optics module (BEO), the focal plane instrument module (FPA) and the analogue electronics module (AEM).

After the launch of JUICE, an initial checkout of GALA in May 2023 showed that all the items checked were adequate. A lunar ranging experiment of GALA was planned for August 2024, using JUICE's lunar flyby. However, due to an unexpected reboot of GALA, the lunar ranging experiment could not be performed. As an alternative opportunity, GALA observed the Earth in September of the same year to conduct a functional test of the receiver system of GALA, and succeeded in receiving solar light reflected by the Earth properly. As for the reboot that occurred during the lunar flyby, the GALA team conducted investigations and experiments to determine the cause. A GALA’ s ranging experiment campaign is also planned for 2026, using the JUICE Earth flyby.

Although unexpected reboots have occurred, no failures of GALA itself have been identified since launch to date. In this presentation, we show a brief overview of GALA, and then report a report on the results of the on-orbit tests and related investigations, as well as the planned ranging test campaign using the Earth flyby.

Keywords: JUICE, GALA, Jupiter, Ganymede, laser altimeter, onboard tests

