

## JUICE/GALA-J (1) : The Ganymede Laser Altimeter (GALA) for the JUICE mission

- Introduction, current status, and role of the Japan team

\*Keigo Enya<sup>1</sup>, Noriyuki Namiki<sup>2</sup>, Masanori Kobayashi<sup>3</sup>, Jun Kimura<sup>4</sup>, Hiroshi Araki<sup>2</sup>, Hiroto Noda<sup>2</sup>, Shoko Oshigami<sup>2</sup>, Shingo Kashima<sup>2</sup>, Ko Ishibashi<sup>3</sup>, Shingo Kobayashi<sup>5</sup>, Masanobu Ozaki<sup>1</sup>, Takahide Mizuno<sup>1</sup>, Shin Utsunomiya<sup>1</sup>, Yoshifumi Saito<sup>1</sup>, Kazuyuki Touhara<sup>1</sup>, Shunichi Kamata<sup>5</sup>, Koji Matsumoto<sup>2</sup>, Kiyoshi Kuramoto<sup>5</sup>, Sho Sasaki<sup>6</sup>, Satoru Iwamura<sup>7</sup>, Teruhito Iida<sup>8</sup>, Yoshiaki Matsumoto<sup>8</sup>, Masanori Fujii<sup>9</sup>, Naofumi Fujishiro<sup>10</sup>, Tomoyasu Yamamuro<sup>11</sup>, Kay Lingenauber<sup>12</sup>, Thomas Behnke<sup>12</sup>, Juergen Oberst<sup>12</sup>, Judit Jaenchen<sup>12</sup>, Horst-Georg Loetzke<sup>12</sup>, Harald Michaelis<sup>12</sup>, Hauke Hussmann<sup>12</sup>

1.JAXA/ISAS, 2.NAOJ, 3.CIT, 4.Earth-Life Science Institute, Tokyo Institute of Technology, 5.Hokkaido University, 6.Osaka University, 7.MRJ, 8.PLANET, 9.FAM Science, 10.Astro-Opt, 11.OptCraft, 12.DLR

We present an introduction, current status, and especially role of the Japan team for the Ganymede Laser Altimeter (GALA) for the Jupiter Icy Moon Explorer (JUICE) mission. JUICE is a mission of ESA to be launched in 2022, and GALA is one of the payloads of JUICE.

Major objectives of GALA are to provide topographic data of Ganymede, the largest satellite of Jupiter, and to measure its tidal amplitudes. The latter is crucially important to detect and to characterize an underground ocean on Ganymede. Furthermore, GALA support geological studies, e.g., identification of characterization of tectonic and cryo-volcanic regions, impact basins, and craters. GALA also provides information on surface roughness and the albedo.

For the laser altimetry, GALA emits and receives laser pulses at about 500 km altitude above Ganymede. Wavelength, energy, and nominal repetition frequency of the laser pulse are 1064 nm, 17 mJ, and 30 Hz, respectively. Reflected beam from the Ganymede surface is received by the receiver telescope with 25 cm diameter aperture, re-focused by the BEO including a narrow band-pass filter, and then detected by the APD detector.

Development of GALA is carried out in international collaboration from Germany, Japan, Switzerland, and Spain. GALA-Japan will develop the Backend Optics (BEO), the Focal Plane assembly (FPA) including an avalanche photo-diode (APD) detector, and the Analog Electronics module (AEM) in the receiver chain. It should be noted that responsibility of development of the receiver telescope has been moved from Japan to Germany. Based on the heritage of studies for the telescope, GALA-Japan will contribute to the receiver telescope development through the German team.

Keywords: JUICE, GALA, Jupiter, Icy moon, Ganymede, Laser altimeter