Special Issue

Laser Altimetry and 3D Mapping in Planetary Exploration: Methods and Applications

Message from the Guest Editors

In the past decades, from the Mars Orbiter Laser Altimeter (MOLA) and Mercury Laser Altimeter (MLA) to the Lunar Orbiter Laser Altimeter (LOLA) and the BepiColombo Laser Altimeter (BELA), laser altimeters have played vital roles in planetary mapping and exploration, providing accurate, abundant, and accessible 3D measurements. Unlike image-based photogrammetry, laser altimetry can overcome the lack of illumination in planetary observation, and provide relatively accurate vertical measurements in comparison to radarmetry with cost-effective instruments and platforms, which is desirable for mapping permanently shadowed regions (PSRs). Beyond planetary exploration, laser altimeters and LiDAR are also employed in the exploration and mapping of asteroids. For example, the NEAR Laser Rangefinder (NLR) and OSIRIS-REx Laser Altimeter (OLA) were introduced to map the shape of the asteroids. For the missions of Hayabusa 1 and 2, LiDAR systems were also equipped for navigation in the touch-down phase and employed in the 3D shape mapping of the asteroids.

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Deadline for manuscript submissions

closed (31 January 2023)

Remote Sensing

an Open Access Journal by MDPI

Impact Factor 4.1
CiteScore 8.6

mdpi.com/si/100031

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