

Planetary Laser Altimetry; Past and Present

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Abstract

After Apollo, laser altimetry in NASA began with Mars Observer (MOLA-1), launched in 1992 but lost on approach to Mars, and re-flown on Mars global Surveyor (MOLA-2) in 1996. In Jan 1994 the Clementine mission to the Moon carried the second laser altimeter into space that provided the first global shape of the Moon. In 1996 the NEAR spacecraft carrying the NEAR Laser Ranger (NLR) was launched to the asteroid 433 Eros, and in 2004 a laser altimeter was launched on the MESSENGER spacecraft to Mercury and is currently in cruise to the planet. Early next year the LRO spacecraft carrying LOLA will be launched to the Moon. Japan launched the SELENE spacecraft in 2007 carrying the LALT laser altimeter followed by Chang'E by China. Soon India will launch Chandrayaan carrying a laser altimeter. In nearly all the missions to date laser altimeters have been used for mapping of planetary bodies with remarkable success and played major roles in preparing for subsequent lander missions. All of these missions and their laser instruments have helped make advances in the use of lasers for planetary science and helped convince skeptical space agencies that these kinds of instruments could be used with confidence and reliability on long planetary missions in some harsh environments. Laser altimetry is now accepted, albeit not with the same level of confidence as microwave instruments, and laser tracking of planetary spacecraft will be next challenge.