

# Topographic exploration of lunar polar regions by SELENE-LALT

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It is very difficult to observe lunar polar regions. These images are obtained firstly by the Clementine mission(1994) long after the Apollo era. But the permanent shaded areas in the polar regions are invisible on the images taken by Clementine cameras especially near the south pole.

Recently ground based radar observations were carried out to obtain precise topographic data with 150m spatial resolution and 50m height resolution (Margot et al.,1999). Again relatively large areas are invisible in the south polar region due to large topographic amplitude and only less than 6.7 degrees down looking angle from the Earth.

Campbell et al.(2003) reported that thick deposits of ice less than several meters below the ground were not observed within the crater floor visible to the Arecibo system. Unfortunately large areas of lunar polar regions are remained to be observed especially in the crater floors very near south pole.

Permanent shaded regions should be confirmed with detailed and complete topographic map of the lunar polar regions from the data of laser altimeter (LALT) and topographic camera (LISM(TC)) for the research base. This map is also indispensable for planning future lunar polar observatory such as In-situ Lunar Orientation Measurement (ILOM) project.

Laser altimeter (LALT) on board SELENE main satellite which tracks near circular 100km altitude polar orbit will acquire complete topographic data set firstly in the lunar polar regions. Due to the orbit convergence near two poles, final footprint number density will be more than 1/300m and about 1/100m in average after 1 year mission period with 1Hz measurement. The data set will be invaluable for lunar science and planing future lunar missions. Unfortunately footprint positions will have 1-2 km error from the orbit and attitude error of the main orbiter though measurement error of LALT itself is less than 5m. Thus main problem is how to suppress the affection of these positioning error to the quality of final topographic map together with appropriate interpolation method and how to combine absolute elevation data over the pole obtained by radar observation of Margot et al.(1999). Based on these investigations contribution of LALT for making lunar polar topographic map will be presented.