

Lunar sciences by SELENE (Kaguya) / Terrain Camera data

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The Terrain Camera (TC), a high-resolution stereo camera onboard SELENE (Kaguya), successfully achieved lunar global mapping in the SELENE twenty-one months mission life, as we had planned (Haruyama et al., 2008, EPS, 60(4), 243-256). After the geometric corrections and radiometric calibrations, the TC data products are now in public. 1) TC morning map, 2) TC evening map, 3) TC ortho map, and 4) TC Digital Terrain Model (DTM) map. The relative height resolution of TC DTM is better than 10 m and the absolute location accuracy has been improved by referring to Lunar Altimeter (LALT) data.

By using TC data, scientifically significant results have been derived. 1) Haruyama et al. (2008, Science, 322, 938-939) revealed the lack of water ice on the permanent shadowed area of Shackleton crater where some amount of water ice had been expected to be accumulated. 2) Haruyama et al. (2009, Science, 323, 905-908) showed the longer-lived volcanism on the lunar far side mare deposits than previously known. 3) Newly obtained high-resolution images of the 22-kilometer-diameter lunar crater Giordano Bruno by TC revealed the formation age of Giordano Bruno to be 1 to 10 Ma, which is constructive evidence against the crater's medieval age formation hypothesis. This result was on the paper of Morota et al., (2009, MAPS, 44(8), 1115-1120). 4) Haruyama et al. (2009, GRL, 35, L23201, doi_10.1029/2008GL035868) reported the discovery of a possible skylight of a lunar lava tube on the Marius Hills region which is probably a strong candidate of a future lunar base. 5) The paper by Morota et al., (2009, GRL, 36, L21202, doi_10.1029/2009GL040472) concluded that a magma production in the farside mantle was 3-10 times less than that of the nearside.

We introduce the discoveries and progresses for lunar science achieved (and expected) by using TC data and discuss what kind of future lunar explorations should be planned.

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