

SUBMILLIMETER SLR: AJISAI AS THE ZERO-SIGNATURE GEODETIC SATELLITE

D. Kucharski¹, G. Kirchner², T. Otsubo³, F. Koidl⁴

1) Space Science Division, Korea Astronomy and Space Science Institute
776, Daedeok-Daero, Yuseong-Gu, Daejeon, 305-348, South Korea
e-mail: daniel@kasi.re.kr

2) Space Research Institute of the Austrian Academy of Sciences
Lustbuehelstrasse 46, A-8042 Graz, Austria
e-mail: georg.kirchner@oeaw.ac.at

3) Geoscience Laboratory, Hitotsubashi University
2-1 Naka, Kunitachi 186-8601, Japan
e-mail: t.otsubo@r.hit-u.ac.jp

4) Space Research Institute of the Austrian Academy of Sciences
Lustbuehelstrasse 46, A-8042 Graz, Austria
e-mail: franz.koidl@oeaw.ac.at

Introduction: The normal points are the principal SLR data product and express the one-way distance between the reference point of the SLR station and the mean reflection point of the satellite. This mean reflection point is calculated as an arithmetic mean of the post-fit range residuals; the satellite's signature effect and the change of the SLR return rate during a pass cause variation of the position of the mean reflection point at the level from several millimeters to centimeters.

Analysis: In order to improve the accuracy of the range determination between the ground SLR system and the center-of-mass (CoM) of Ajisai we utilize the capability of Graz 2 kHz SLR system to measure ranges to the single corner cube reflectors (CCRs) of the satellites.

In the passes of Ajisai the range measurements to the single CCR panels are identified and the position of the panels is determined with an average RMS of 2.7 mm (comparable with the ground target calibration RMS). Using the position of the single CCR panels allows to eliminate problem of the satellite signature and express the distance to the satellite's CoM with RMS of 0.41 mm. The mean distance between the selected CCR panels and the Ajisai's CoM is 1027.46 mm.

This work proposes a post-processing method of the kHz SLR data which allows elimination of the satellite signature problem from the range measurements to Ajisai. The presented method demonstrates a potential to determine the effective distance to the satellite's CoM with submillimeter accuracy with the kHz SLR data.