SUBSURFACE GEOLOGY OF MARE SERENITATIS AND SURROUND REGIONS OF THE MOON AS REVEALED BY THE LUNAR RADAR SOUNDER ON-BOARD KAGUYA (SELENE)

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Introduction: Subsurface geology of the Serenitatis and its surrounding regions of the Moon was investigated by the Lunar Radar Sounder (LRS) onboard the KAGUYA (SELENE) spacecraft. LRS is capable of surveying to depths of several kilometers with a range resolution of < 100 m and a footprint of several tens of kilometers. Mare Serenitatis, a circular Nectarian basin with a diameter of ca. 600 km, is a typical mascon basin with thick mare deposits and the topographic features thought to be the results of mascon tectonics [e.g., 1].

Results: Despite of simple data processing applied to data from each shot, LRS revealed subsurface stratifications. Numerous horizontal and subhorizontal interfaces were found under the mare. Most of their reflections were faint, but there were prominent ones as well.

We compared our results with those by Peeples et al. [2] who reported subsurface layering in the southern part of the region using the ALSE (Apollo Radar Sounder Experiment) data. LRS detected prominent reflectors at a depth of a few hundred meters below the mare surface in the area. Some of those were identified at the same or similar depths along neighboring tracks. From the ALSE data along the parallel at 20° N, two interfaces were depicted by previous researchers [2], but they have been not verified by LRS. Prominent reflectors evidenced by LRS in the southern Serenitatis were significantly shallower than them.

Mare ridges were largely tectonic in origin [2,3]—there were folded or faulted strata found under the ridges in our data. Faults themselves were not imaged but ambiguously inferred by the discontinuity of reflectors.

Subhorizontal reflectors were found under highlands around Serenitatis. Signals from those reflectors were weak, but their apparent dip angles and/or inclinations were similar to each other under different tracks. Such coherence indicates the confidence of their existence. Strata under the northern highlands from Montes Caucasus to Lacus Somniorum showed basin-ward gentle tilting.

References: [1] Solomon S. C. and Head, J. W. 1979. *Journal of Geophysical Research* 84:1667–1682. [2] Peeples W., Sill W., May T., Ward S., Phillips R., Jourdan R., Abbott E. and Killpack T. 1978. *Journal of Geophysical Research* 83:3459–3468. [3] Maxwell T. A., El-Baz F. and Ward S. H. 1975. *Geological Society of America Bulletin* 86: 1273–1278.