LUNAR SCIENCE FROM LUNAR LASER RANGING

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Seventeen years of lunar laser ranging data have been
analyzed to determine lunar second-degree moment
differences, third-degree gravitational harmonics, Love
number, rotational dissipation, and retroreflector
coordinates. The range accuracy improves through the
time span until 3-5 cm accuracies have been achieved
since 1985. The retroreflectors were located at the
Apollo 11, 14, and 15 sites and the Lunakhod 2 site.
The results from the solution are:

	Value Units	Error 10^{-6}
(C-A)/B	631.93	0.76
(B-A)/C	227.95	0.06
C30	-8.3	0.7
C31	35.2	12.
S31	2.9	3.4
C32	4.812	0.035
S32	1.682	0.019
C33	1.66	0.22
S33	-0.30	0.07

A more accurate value of C31 is available from previous
analyses of lunar orbiting satellite Doppler tracking data.
Two additional lunar solution parameters are the potential
Love number, $k = 0.027 \pm 0.006$, and the rotational
dissipation, $kT = 0.0048 \pm 0.0002$ days. The coordinates
of the retroreflectors were determined with accuracies of
a few meters. These results are to be published in the
proceedings of the international symposium titled Figure
and Dynamics of the Earth, Moon, and Planets.