Results from Lunar Laser Ranging (summary only)

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Results from lunar laser ranging (summary only)

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Over 1500 lunar laser range measurements have been made during the past six years at McDonald Observatory. These data have been fitted with a 41 cm r.m.s. residual. The geocentric coordinates of McDonald Observatory are now known to better than 1 m, the three-dimensional coordinates of the Moon and the selenocentric coordinates of the retroreflectors are accurate to about 25 m, and the mass ratio Sun/(Earth + Moon) is determined to 2 parts in 10^7. A search for the Nordtvedt term in the Moon's orbit, a term predicted by some relativity theories, gives a null value, a result consistent with general relativity. The measurement of the physical librations determines very accurately the moment of inertia parameters $\beta = (C-A)/B$ and $\gamma = (B-A)/C$, and significantly determines the third degree gravitational harmonics C_{30}, C_{32}, S_{32} and S_{33}. The postfit residuals are not random but yield corrections to the rotation of the Earth, values of U.T.0 for individual days having typical accuracies of 0.5 ms (20 cm). The anticipated regular operation of two or more stations will allow the separation of U.T.1 and polar motion.