Effects of precession uncertainties on planetary ephemerides.

H.G. Walter
(Astronomisches Rechen-Institut Monchhofstr. 12-14
D-69120 Heidelberg, Germany

Recent estimates of the luni-solar precession suggest a correction of -0.31 ± 0.02 arcsec/cy to the adopted 1976 IAU value. If angular measurements of bodies of the solar system are used for the determination of the semimajor axis(a), its relative variation $\Delta a/a$ as a function of the precession uncertainty is estimated at 0.2 * 10^{-8} multiplied by the time difference of observations measured in years. Assuming a time difference corresponding to one half of an orbital period, Δa is of the order of 6 km for objects of 5 AU barycentric distance. On the other hand, the theoretical precision of planetary radar ranging is as small as 0.1 km which, in practice, increases to 1-3 km for planets and some 10 km for asteroids depending on the quality of the surface models. A corrected value of precession would render equivalent the determination of semimajor axes of orbits from ranging and angular measurements.