POLAR MOTION AND EARTH ROTATION FROM LAGEOS LASER RANGING

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Laser ranging collected during the period from May 7 1976 through May 1981, has been used to determine polar motion and length of day (LOD) variations. Independent short-arc solutions of five days in length are used to obtain the polar motion and LOD results. The solutions obtained with these approaches are compared with BIH and Doppler solutions. With the Vondrak smoothing parameter of 10^{-7}, the weighted RMS of the raw minus smoothed results is 0".010 in x, 0".008 in y and 0.28 msec in LOD. Finally, the results obtained during the MERIT campaign, an international polar motion intercomparison experiment, using both "quick-look" and the final processed laser range data are discussed.

O. Calame (ed.), High-Precision Earth Rotation and Earth-Moon Dynamics, 123–124.

DISCUSSION

Kozai : I understand that the semi-major axis of LAGEOS has been decreasing for some unknown reason. Do you introduce this unknown force into your equations of motion, and do you have an estimate of the errors introduced in your values of UT1 and polar motion by this ?

Tapley : The LAGEOS decrease is included in the dynamic model. Looking at the unmodelled acceleration over extended arcs, we have noticed periodicities associated with the node and perigee of the LAGEOS orbit and the tides. We have fit these components along with a constant and a linear term over 1652 days of data, essentially removing this effect. The exact cause of this effect is not understood : Dr. Barlier of CERGA and Dr. Rubincam of GSFC have both investigated a number of possible causes (atmospheric drag, charge drag, etc...)

Reigber : Did you say that you used constant values for C_{21} and S_{21} for the terrestrial reference frame ?

Tapley : Yes, we held them fixed. We encounter a problem when we attempt to use the Goddard potentials, because they float these coefficients. This means that they effectively define a different terrestrial reference frame each time they obtain a geopotential solution.

Reigber : With a non-rigid Earth, is it not that time-dependent ?

Tapley : Not on the scale that we are talking about.

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