PRELIMINARY UTO RESULTS FROM EROLD DATA

Odile Calame
BIH/CERGA
Ave. Copernic
06130 Grasse, France

INTRODUCTION

The status of the EROLD campaign has already been described in another
paper (Mulholland, 1979). Since the beginning of 1977 all of the com-
puter software has been ready to work. With the expectation that at
least one other station would be able to operate before the end of 1977,
it appeared not very interesting to use the single-station data for the
study of UTO during the last year since the other parameters of the
Earth's rotation can be determined only with multiple stations. However,
as this situation of a single operating station continues, it seemed to
be preferable to attempt some determinations of UTO, even if that rep-
resents only a part of the goals envisioned from this campaign. We give
here a brief resume of our preliminary results.

DETERMINATION OF UTO

The determinations of UTO have been made for the available data from the
McDonald station, using four lunar reflectors. Except for some improve-
ments, the mathematical model used to compute the residuals and partial
derivatives has already been described elsewhere (Calame, 1976); recently
the effects of tides for an elastic Earth model have been introduced.

Several determinations have been made for UTO differing by the selection
of the data and the time intervals for which each value of UTO was de-
termined. For example, averaging has been performed over 5 days, 2 days,
and 1 day with the constraints that the extreme hour angles in each in-
terval differ by at least 3 hours and that the number of data be greater
than 5 to 10. A first fitting pass consisted of an adjustment for 46 pa-
rameters describing the motions of the reflectors with respect to the
center of mass of the Earth. In addition, some unknowns for the geocen-
tric position of the station were included: coordinates, drift in long-
itude, annual term in longitude, and a long-period term (18.6 years).
In a second step, new post-fit residuals were computed and another ad-
justment was made to take into consideration the geocentric unknowns

for the station (mentioned above) and corrections to UTO taken from the
5-day smoothed values published by the BIH and used in the residual com-
putations.

Figure 1 shows a sample of the results obtained for UTO from 2-day de-
terminations for the year 1977. For the moment, it appears to be diffi-
cult to detect any short-period effects with confidence. The rms resid-
ual in the time interval 1970 - 1978 is about 36 centimeters.
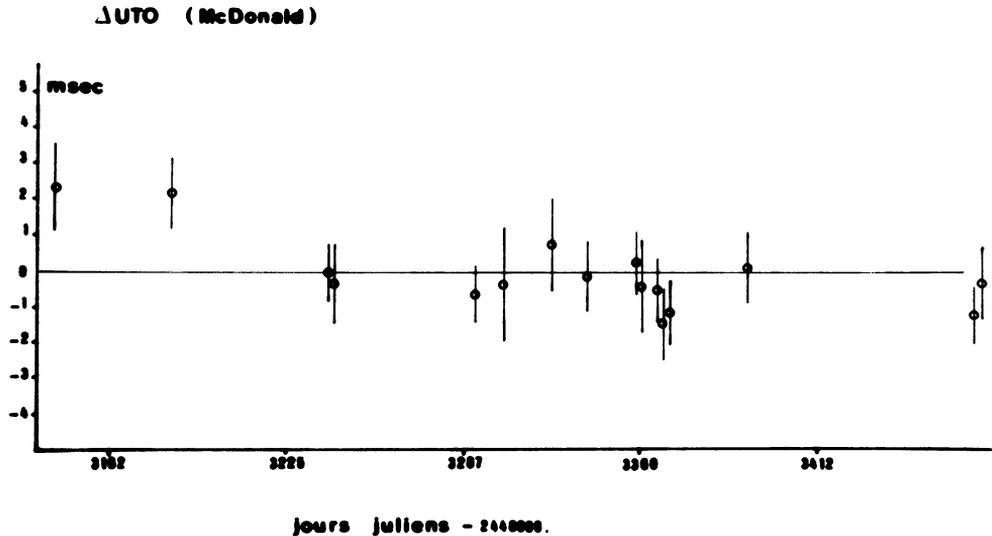
Figure 1. Corrections to BIH UTO determined from EROLD data.

CONCLUSION

It is necessary to emphasize that these results concern only UTO deter-
minations. It would be unrealistic to compare them with UT1 determina-
tions obtained in other ways. Indeed, some local effects may perturb the
results for a single station so that the global Earth rotation may dif-
fer from them. Only when other stations become operational will it be
possible to study this question along with polar wander. As soon as data
from other stations will be available we will be able to get new results
very quickly, for example, in one or two weeks.

REFERENCES

Calame, O.: 1976, Manuscripta Geodaetica, vol. 1, no. 3.
Mulholland, J. D.: 1979, this volume.