

DYNAMICAL REFERENCE FRAME AND SOME ASTRONOMICAL
CONSTANTS FROM PLANETARY OBSERVATIONS 1769-1988 YY

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Modern planetary theory may be considered as a carrier of 4-dimensional dynamical reference frame which is to be confronted with stellar (or quasar) based fundamental frame. Of most interest is the problem of existence of secular trends between the above systems. We investigated the problem by discussing a vast set of planetary observations of different types. The set includes ranging observations of the inner planets (up to 1988 y), USNO meridian observations, transits, etc. The main results are the following:

1. We have confirmed our earlier findings on the corrections dT to the adapted system of the differences between the dynamical ("ephemeris") time and Universal Time :

$$dT = -12.9 \pm 1.3 \text{ sec/cy} \quad (\text{from transits})$$

$$dT = -14.5 \pm 2.1 \text{ sec/cy} \quad (\text{from USNO meridian obs.})$$

2. The time derivative \dot{g} of the gravitational constant g (or a secular trend between the atomic and dynamical time) was estimated:

$$\dot{g} = 0.32 \pm 0.45 / 10^{-11}$$

3. By investigating of secular variations of the solar and planetary longitudes a correction to Newcomb's value of the constant of precession has been obtained (which is independent of errors in the proper motions of stellar catalogues) :

$$dp = 0.46 \pm 0.13 \text{ "/cy}$$

4. For distance scaling factor AU of the dynamical frame the new estimate is

$$AU = 149597870.62 \pm 0.18 \text{ km}$$