Nautical Almanac Unit, Regional Meteorological Centre,
Indian Meteorological Department, Calcutta, India

Calculations of geocentric longitudes and latitudes of planets, at the ending moments of *tithis*, *nakshatras* and *yogas* have been made on computer commencing from the issue for 1972 of the *Indian Ephemeris and Nautical Almanac.*

Autres rapports

J. Arias de Greiff a adressé un compte-rendu de publication de l'Annuario del Observatorio Astronomico de Bogota.

J. KOVALEVSKY
Président de la Commission

ANNEXE 1: RAPPORT DU GROUPE DE TRAVAIL SUR LES CONSTANTES DE LA PRÉCESSION

There has been an exchange of opinions between the members of the Working Group by correspondence, and, in addition, some results have become available concerning the strength of the evidence for new values. The prevailing opinion is that:

(1) the problems should be discussed in the Joint Discussion No. 1;

(2) no final decisions should be made at the IAU General Assembly in Sidney;

(3) decicions on precession should be made simultaneously with decisions on planetary masses.

On this basis, I suggest that the Working Group continues its activities beyond the XV General Assembly.

W. FRICKE
Chairman of the Working Group

ANNEXE 2: RAPPORT DU GROUPE DE TRAVAIL SUR LES UNITÉS ET LES ÉCHELLES DE TEMPS

The Group consists of Chebotarev, Clemence, Cook, Guinot, Kovalevsky, Morrison (Secretary), Shapiro, Van Flandern and Wilkins (Chairman). In addition, D. H. Sadler and Duncombe have made many helpful comments and suggestions on the matters under consideration. The Group was asked to consider: the effects of changes in the system of precessional constants on the definition and determination of astronomical time-scales and distances; the most appropriate form for the definition of the astronomical unit of distance; the relationship between ephemeris time and atomic time; and the possible need for new definitions of the unit and epoch of ephemeris time. The Group has worked largely by correspondence, although naturally there have been oral discussions whenever any members of the Group have met.

There is still a wide divergence of opinion amongst the members of the Group on the fundamental question of whether the concepts of the astronomical unit and ephemeris time should be retained or replaced by the use of SI units of length and time (i.e. the metre and the atomic second). The Chairman considers that neither of the extreme viewpoints is likely to be generally acceptable and that we should adopt a system which allows either astronomical or SI units to be used. The relationships between the two sets of units must be clearly and unambiguously specified, even though the numerical values of some of the conversion factors will be subject to determination by observation. It is suggested that this can be achieved in the following manner, but it must be emphasised that the Group has not yet decided whether this represents the optimum system.

There are two main arguments that determine the general structure of the system. Firstly, that the practical objections to the use of ephemeris time as now defined are so great that it would be preferable to adopt a gravitational time scale that, for general astronomical purposes, is identical

to the international atomic time scale over the common period from 1955 onwards. Secondly, that the use of the astronomical unit of length defined in terms of a fixed value of Gauss' gravitational constant is so widespread and of such general utility that it should be retained. A new formulation of the relevant part of the IAU system of astronomical units that is consistent with the adoption of these arguments is as follows:

1. The astronomical unit of mass (aum) =mass of the Sun.
2. The astronomical unit of time (day) =86400 SI seconds.
   In what follows the terms day and second will be used without qualification.
3. Gaussian gravitational constant, $k=0{\cdot}017\ 202\ 098\ 950$.
   k^2 has the dimensions of the (newtonian) constant of gravitation G, i.e. $L^3M^{-1}T^{-2}$.
4. The astronomical unit of length (aul) is that length for which k takes the value specified in (3) when the units of measurement are the astronomical units of length, mass and time. (It is almost the mean distance of the Earth from the Sun.)
5. Measure of 1 aul in metres $A=149{\cdot}600\times10^9$
6. Speed of light in metres per second $c=299{\cdot}792\ 500\times10^6$
7. Light-time for unit distance (1 aul) $\tau_A=499^s{\cdot}012$
   $=\ 0^d{\cdot}005\ 775\ 6$
8. Speed of light in aul per day $c=173{\cdot}142$
9. Constant of gravitation in SI units $G=6{\cdot}670\times10^{-11}$
10. Measure of 1 aum in kilograms $S=1{\cdot}990\times10^{30}$

Many details of the presentation of a revised system require further examination. The symbols 'aul' and 'aum' are only intended for temporary use; it is hoped that better proposals will be forthcoming, but it must be admitted that it will be difficult to find new symbols that will be apposite and yet will not clash with other symbols of the SI system. The values given are merely those of the 1964 system; it seems likely that a new value of the speed of light will be adopted soon for international use and so consideration will have to be given to the question of whether the values of this and other constants should also be changed. It is arguable too that τ_A, rather than A, should be treated as exact. The constant 9 and 10 were not given in the 1964 system, but it is desirable to add them in order to complete the statement of the relationships between astronomical and SI units.

In order to define the corresponding gravitational time-scale it is certainly necessary to specify the value on the time-scale at some unambiguously defined instant (e.g. an instant at which atomic time and universal time take known values). It will also be desirable to recommend procedures for determining gravitational time from observations of motions in the solar system, so that, for example, the variations in universal time before 1955 can be determined. This is, however, of no urgent practical concern since the atomic time scale will provide an adequate reference scale for current use in astronomy.

G. A. WILKINS

Chairman of the Working Group

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