JOINT DISCUSSIONS

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I. PRECESSION, PLANETARY EPHEMERIDES AND TIME SCALES

(Edited by J. Kovalevsky)

Organizing Committee

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INTRODUCTORY REMARKS

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May I open with a couple of remarks this joint discussion No. 1 on Precession, Planetary Ephemerides and Time scales. This discussion has a rather long story that I think it is good to remind.

As you all know, it is in 1964, that the IAU has adopted a new system of astronomical constants, that were introduced in most ephemerides like the apparent p̃laces in 1968 and fully introduced in all the Ephemerides in 1972. But already in 1964, it was clear that the work was left unfinished. What actually the IAU did in 1964 was to replace those constants that were too widely away from the values made known by the current observations. This was the case of the constant of aberration, the astronomical unit as expressed in kilometers, the masses of the Moon and the Earth, lunar parallax, geocentric constants of gravitation and the ellipticity of the Earth's figure. Some of these were afterwards adopted also by the IUGG.

Now, already in 1964, it was clear that the system of planetary masses will have to change some time but it was felt that the years to come should bring so much new information about the masses, essentially, but not only, through the tracking of deep space planetary probes.

Also, in 1964, as well actually as in 1950 when the case was taken up for the first time, it was well known that the constant of precession was in error by about 1″ per century. Minor but not negligible inaccuracies existed also in the constant of nutation and in the obliquity of the ecliptic. Finally it was also apparent that the ephemerides of various bodies, in particular the Sun and the Moon, were not referred to the same position of equinox. However, the difficulties, inherent in the application of such changes were considered too large and no change in these constants was proposed.

Since then, several new factors arose. The most important is certainly the inadequacy of the ephemeris time to cope with the high precision lunar laser and planetary radar observations as well as the precise tracking of space probes.

Atomic time is now used as a clock for ET... Should it be like that or should we adopt a new time-scale for the ephemerides in the solar system? Another important point is the construction of the FK5. The date when the fundamental catalogue is changed is an appropriate date for changes in other constants defining the system of reference.

The catalogue FK5 should be completed around 1980. The question arises then: should we also change the constant of precession?

The current planetary ephemerides are also very insufficient and should (and could actually) be greatly improved using better masses, but also better theories.

The deadline of 1980 was given by Commission 4 three years ago and three working groups were formed. These W.G. has started to debug the complex problem and the

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joint discussion is essentially aimed at a critical discussion of their preliminary conclusions.

This is why there is only one contributed paper, but three invited papers, that I invite you to discuss throughly in the light of the goal we wish to achieve in the nearest future: to establish a really comprehensive and coherent system of astronomical constants and units that is also consistent with the actual precision of theories and observations.

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