

CHAPTER V

REPORTS OF MEETINGS OF COMMISSIONS

COMMISSION No. 4
EPHEMERIDES (EPHEMERIDES)

Report of Meeting 1988 August 4

PRESIDENT : B. Morando

SECRETARY : B.D. Yallop

It was the President's sad duty to report the deaths of two former past Presidents of the Commission, W. Fricke who had also been a Vice-President of the IAU and a President of Commission 8, and D. H. Sadler who had been Superintendent of H.M. Nautical Almanac Office from 1936 to 1969 and was once General Secretary of the IAU.

1 . Organisation and Membership

The President's proposals for the Officers of the Commission for the next years were adopted as follows :

President : P. K. Seidelmann
Vice-President : B. D. Yallop

Organising Committee : V.K. Abalakin, J. Chapront, R. L. Duncombe, H. Kinoshita, Y. Kubo, J.H. Lieske, B. Morando, H. Schwan, Fu Tong.

New members of the Commission : A. K. Bhatnagar, M. Chapront-Touzé, J. Coma-Samartin, M. E. Davies, XX Newhall, A. Shiryaiv, R.Wielen.

Consultants : J. Meeus, H. J. Felber, K.H. Steinert, T. Fukushima.

Retiring member : G.E. Taylor.

2 . Commission 4 Circular

The President announced that he has published the first issue of IAU Commission 4 Circular and hoped to publish another issue but he did not get any response from the members of the commission. P.K. Seidelmann said that it was a useful way of communicating to those members of the Commission who were unable to attend the IAU General Assembly, and it should be issued at least once a year.

3 . Resolutions of the Working Group on Reference Frames

The resolution of the Working Group on Reference Frames, which is a joint project of Commissions 4, 7, 8, 19, 20, 24, 31, 33 and 40 were discussed.

Commission 19 and 31 had already changed the first resolution to leave the formation of a study group open and names had been omitted. The changed resolution was agreed. R. L. Duncombe said that now there was no need to discuss

resolutions 7, 8 and 9 of the Report of the Working Group as they had been taken care of. The remainder of the resolutions were accepted with a few abstentions. E.M. Standish expressed a misgiving about resolution 5 because he felt that the observing requirements could not be achieved for another ten years. E. M. Gaposchkin pointed out that the observers needed encouragements which was an important aim of the resolution.

Report of Meeting 1988 August 6

PRESIDENT : B. Morando

SECRETARY : B.D. Yallop

1. New Astronomical Centre in Penang

M. Ilyas spoke about the new astronomical centre which is under construction at the equatorial location of Penang in Malaysia. The centre is part of the Malaysian Science University. Initial facilities will include a telescope and photoelectric equipment. Any assistance from other observatories would be welcome. They intend to publish an ephemeris eventually.

2. Latest observed values for precession and nutation

J. O. Dickey read a paper by the Lunar Laser Ranger Working Group giving the latest values for the constants of precession and nutation obtained from 5629 points in 19 years. The value of the constant of precession obtained by Fricke is now down from 1."10 to 0."86 per century.

3. Reports from Nautical Almanac Offices

P. K. Seidelmann discussed the work of the U.S. Naval Observatory. All the publications had continued except for the Ephemeris for land surveyors which terminated at the 1988 issue. The Floppy Almanac has now been produced for each year up to 1999. The Almanac for Computers is also available on a floppy disc for current years. Sight reduction procedures have been developed and a concise table for sight reduction will be published in the Nautical Almanac from 1989 onwards. Research has been carried out on planetary satellites and the Chinese observations of the satellites of Jupiter have been used. A "Moonwatch" was organised for the evening of 28 April 1987 to test different formulae for predicting the first visibility of new moon across North America.

B.D. Yallop reported on the activities of H. M. Nautical Almanac Office. The staff complement had been reduced to 6. There was a redivision of responsibilities between USNO and NAO for various sections of the Astronomical Almanac and the publication date has been brought forward. Compact Data for Navigation and Astronomy for the years 1986-1990 was published by HMSO in 1985. A new section on Sight Reduction Procedures has been added to Nautical Almanac 1989 which includes a method for direct computation using a programmable calculator. Four papers concerned with mean and apparent place reductions have been written in collaboration with the USNO.

B. Morando discussed the work of the Bureau des Longitudes. J.-E. Arlot had been studying the satellites of planets. It was found that a mixture of functions and polynomials required fewer coefficients for fast moving satellites. This information was now available on floppy discs. There was also a floppy disc which contained the Moon ephemeris (ELP) from -1500 to 2000 and new ephemerides of the satellites of Uranus called GUST 86. Apart from *Connaissance des Temps*, *Ephémérides Astronomiques* (or *Annuaire du Bureau des Longitudes*) and *Ephémérides Nautiques*, Bureau des Longitudes publishes supplements with ephemerides and

configurations for the main satellites of Jupiter and Saturn and Notes Scientifiques et Techniques devoted to various topics (comets, minor planets, etc.)

Y. Kubo described some of the work of the Japanese Hydrographic Department. A supplement to the Nautical Almanac for 1989 has been produced containing Chebyshev coefficients of the Sun, Moon, planets and 45 stars. A preliminary study on the numerical solution to precession and nutation of a rigid Earth has been made.

The report of the International Lunar Occultation Centre listed the numbers of timings in the period 1981 to 1987, which reached a peak in 1983 and showed an increase again in 1987. Corrections to the orbital longitude and latitude of the Moon deduced from the lunar occultations observations received by the ILOC, based on the IAU (1976) system of astronomical coordinates have been published for 1971 to 1986.

V. K. Abalakin reviewed the work of the Almanac Office in Leningrad. About 2300 copies of the Astronomical Yearbook are sold each year. The volume for 1990 has been submitted for publication, whilst copy for 1991 is in an advanced stage. An English version of the contents and explanation is being prepared. Software has been supplied to observatories in the USSR. Numerical integration has been carried out for the Phobos mission. Orbital libration of the Moon has been studied theoretically.

H. Schwan talked briefly about the work at Heidelberg. The apparent places in the APFS 1988 include both the systematic and individual corrections FK5-FK4 which are now available. The preface has been translated into five languages, and V. K. Abalakin was responsible for the Russian version. Work has been done on the Chinese calendar and it is now possible to convert precisely to Julian Date.

The meeting then discussed items of general interest. It was suggested that a collection of original volumes of all almanacs should be made. M. Standish drew attention to the four outer satellites of Jupiter which are drifting off from the ephemeris predictions by a few tenths of an arc second. J. Lieske mentioned that JPL had a dial in ephemeris.

Report of Meeting 1988 August 10

1. A dictionary of Almanacs

Tong Fu requested that a document be issued which explains what is published in each almanac. P. K. Seidelmann asked that Almanac Offices send him information so that he could start the work.

2. Resolution of the Working Group of Reference Frames

B. Morando reported that Commissions 19 and 31 had recommended a change of wording. P. K. Seidelmann suggested that the Chairman of the Working Group should be J. Hughes.

3. Changeover to J2000

P. K. Seidelmann reported that Commission 20 were the last to change to J2000. They were undecided whether to convert the individual observations or the orbital elements to J2000.

4. IAU Working Group on Astronomical Software and Computer Communications

The President read the proposals for a working group on astronomical software and computers to the Commission. G.A. Wilkins said that it was premature since Commission 5 had already set up a working group on computer software, and there was no need to set up another Commission when Commission 5 could handle the problems.

5. Future Developments in Ephemerides

P. K. Seidelman discussed the way he thought ephemeris offices would change in the future. He could see a continuing need for published volumes of almanacs and tables. There will also be a growing demand for data in alternative forms. For example, almanacs on floppy discs, such as the Almanac for Computers, and interactive almanacs, which can be interrogated by telephone. There would be a greater demand for software packages such as apparent place routines. It was important to standardise software distribution, to continuously improve the data and find more compact ways of representation. It was also important to monitor user needs, which were changing. There was a continuing increase in the non-scientific use of the data especially by religious groups.

P. Kammeyer gave a detailed talk about a 250 year compressed lunar and planetary ephemeris based on DE200. The floating point Chebyshev coefficients have been expressed in integer form which compresses the data to 900K-bytes. One of the first uses of this package will be to insert it into the multi-year floppy.

L.E. Dogget said that the Floppy Almanac will now be called the Interactive Computer Ephemeris which is being developed at USNO by himself, T.S. Carroll, P. Kammeyer, W. Tangren and W. Harris. The purpose is to make the data published in the Astronomical Almanac, the Nautical Almanac and the Air Almanac available on a micro-computer. The users will be Astronomers, Navigators, Surveyors, Amateur Astronomers and others. The data will be stored in the form of Chebyshev series and will contain heliocentric, geocentric and physical data except for eclipses, occultations and minor planet data. There will be two versions, a multi-year floppy suitable for IBM Pc's and an interactive MacAlmanac suitable for MacIntosh computers.

H. Schwan explained the status of the FK5. Data was available on a magnetic tape which included the extension of 2000 faint stars down to magnitude 9.5 and 980 bright stars from the FK4 Supplement.

V. K. Abalakin said that the demand for the Astronomical Yearbook was about the same as ever. The Moon's hourly had been replaced by Chebyshev coefficients. The apparent places of 777 stars selected for time and latitude services and geodesy had been produced.

B. Morando mentioned some recent development at the Bureau des Longitudes. Millisecond pulsars require a precise theory of the motion of the Earth especially over a short time scale. J. L. Barnier had produced a new theory in his theses which produced good results for the radio telescope at Nançay. Improvements to the theory of the motion of satellites were being made and a new theory of Hyperion should appear soon.

In France they have a system called Minitel where the user had a keyboard and a monitor screen. Information such as train time tables, and personal bank balance is available. The Paris Observatory and the Bureau des Longitudes have been asked to prepare a package of astronomical information to be included in this services. The latitude and longitude for topocentric information is deduced from the post codes.