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REPORTS ON ASTRONOMY

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TRANSACTIONS  
OF THE  
INTERNATIONAL ASTRONOMICAL UNION  
VOLUME XIXA

# REPORTS ON ASTRONOMY

*Edited by*

RICHARD M. WEST

*General Secretary of the Union*

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## P R E F A C E

Volume XIX A of IAU Transactions contains the reports by Presidents of Commissions, covering the period July 1981 - June 1984. The topics of IAU Commissions deal with all of contemporary astronomy and the present volume therefore constitutes an exhaustive and unique record of astronomical research during this interval. It is particularly useful for astronomers and other scientists who want to gain an overview of a certain field, not necessarily near their own research area.

Each Commission President was requested, by early 1984, to begin preparations for the compilation of his/her Commission report. All members of Commissions were asked to supply details about their individual research programmes. The ensuing, very substantial task of concatenating was undertaken in late 1984 by the Presidents, often supported by a team of authors, all recognized authorities in their fields. In order to preserve some measure of uniformity - which is in any case very difficult with so many authors - editorial guidelines were sent to Presidents, including the number of pages allotted to each Commission.

I am most thankful to all involved, Presidents and Members of Commissions, for having put so much work into the preparation of these reports and for having complied so well with the guidelines. It is due to their great efforts that it is possible to send this volume to the printer only a few weeks after the originally indicated deadline. It will now become available well before the XIXth General Assembly in Delhi, India, on 19-28 November 1985 and shall serve as a valuable basis for the Commission meetings there.

I believe that all readers will concur about the extraordinary importance of these reports. They contain a wealth of details, not only about past and ongoing projects, but, what is perhaps even more important, also about future trends in the various disciplines. The extensive bibliographical lists form a major part, although it is a pity that the definitive recommendations for journal abbreviations etc., to be incorporated in the new IAU Style Book, were not yet available. The lack of uniformity in this respect should not, however, distract from the other virtues of this volume.

It is a pleasure to acknowledge the friendly and expert collaboration of the IAU Publisher, D. Reidel Publishing Co., Dordrecht, during the various phases of the editorial work.

Richard M. West  
General Secretary

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#### 4. EPHEMERIDES (EPHEMERIDES)

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VICE-PRESIDENT: B L Morando

ORGANIZING COMMITTEE: V K Abalakin, S Aoki, R L Duncombe, J H Lieske, A Orte,  
P K Seidelmann, A M Sinzi, G A Wilkins, B D Yallop

##### I. Introduction

The period of this Report includes 1984 January 1, the date which was probably the most drastic caesura in the history of astronomical almanacs. It seemed, therefore, appropriate to concentrate here to the general aspects rather than to describe the works going on at the particular almanac offices. It is, however, hoped that the past years with their developments and changes will be followed by a period of consolidation and continuity. This would be also of great benefit for the users of the almanacs who still need some time for getting accustomed to so many innovations.

##### II. International and National Ephemerides

###### 1. GENERAL CHANGES

According to the Resolutions adopted at the IAU General Assemblies 1976, 1979, and 1982 many changes had to be introduced from 1984 January 1 onwards, namely:

- (a) the IAU (1976) System of Astronomical Constants (Trans. IAU XVIB, 58);
- (b) the 1980 IAU Theory of Nutation (Trans. IAU XVIIIIA, 8);
- (c) the new definitions of time and time scales (Trans. IAU XVIB, 58; XVIIIB, 69; XVIIIIB, 72);
- (d) the Cartographic Coordinates and Rotational Elements of the Planets and Satellites (33.091.004);
- (e) the new fundamental reference frame (Trans. IAU XVIB, 58).

Each ephemeris and data set as given in an almanac is affected by one or more of these changes. It should be remarked that slight modifications of the adopted values for the astronomical constants may be introduced either indirectly by the use of certain fundamental ephemerides or for other reasons which are mentioned in the explanation of the almanac.

###### 2. THE FUNDAMENTAL SYSTEM

A particular remark is necessary with regard to item (e); in the Resolution adopted in 1976, it was recommended that the new fundamental reference frame should be defined by the positions and proper motions of the FK5 catalogue. This catalogue which is currently in preparation at the Astronomisches Rechen-Institut Heidelberg, is not yet available at the time when the almanacs for 1984 and some subsequent years are prepared. Only the correction of the FK4 equinox and its fictitious motion was available (Trans. IAU XVIIIIA, 3) and could be applied whenever necessary. Nevertheless the FK5 can be regarded de jure as the fundamental reference system from 1984 January 1 onwards. Corrections for the transition from the



FK4 to the FK5 system will be given in both analytical and tabulated form as soon as the FK5 catalogue is available, for those years from 1984 onwards in which the ephemerides in the almanacs had still to be based on the FK4 system.

In particular, this will also be true for the volumes "Apparent Places of Fundamental Stars". They are still based on the FK4 (except of the equinox correction); but for each year from 1984 until the first volume based on the FK5, for each star the reduction from FK4 to FK5 will be given containing both the systematic and the individual corrections.

### 3. BASIS OF THE EPHEMERIDES

Intentionally one has not adopted a certain theory or method as the basis for the ephemerides of the bodies of the solar system. Of course, there is a common agreement that the results should "best fit" the observations. There are in principle two different ways to approach that goal:

(1) The new fundamental ephemerides are derived by numerical integration and represent a most accurate, consistent set that can be calculated based on currently available observational data. They were cooperatively prepared by the Jet Propulsion Laboratory, Pasadena, and the U. S. Naval Observatory, Washington. The data as given in most of the almanacs are derived from these fundamental ephemerides. Ref.: E M Standish, P K Seidelmann (31.047.021); E M Standish (31.091.048); P K Seidelmann, R L Duncombe (31.091.030); X X Newhall et al. (34.046.003).

(2) The other method, which is used by the Bureau des Longitudes, Paris, consists in the development of new theories for the motions of the Sun, Moon, and planets as well as for the Galilean Satellites. The data as given in the *Connaissance des Temps* is based on these theories. Ref.: J-F Arlot (31.099.138); P Bretagnon (32.042.038); J-L Simon (33.042.026); G Francou et al. (34.046.007); M Chapront-Touzé, J Chapront (34.094.002); J Chapront, D T Vu (*Astron. Astrophys.* 141, 131).

The question which of these both methods is better and preferable, appears to be idle because each has its merits: The first may furnish more accurate results for the present period of time; the second permits to improve our knowledge on the long-term development and changes of the orbits. In any case, because both methods are based on practically the same observational material, the comparison of the results would also facilitate to reveal any defects or neglected effects.

### 4. ACCURACY, PRESENTATION, AND EXPLANATION

Improvement of the measurements required also a corresponding increase of accuracy in computing the ephemerides as given in the almanacs. This demand could be met partly by more powerful calculating means available; but also new computing techniques had to be developed and additional small effects which could be neglected in the past, were included.

Moreover, in some almanacs the presentation of the ephemerides and of other data has been more or less drastically modified. The main reason was to accommodate the form to the modern possibilities which the users had at their disposition, in particular the assistance of small computers. In many cases the most practicable realization of that aim was to tabulate interpolation coefficients in suitable intervals of time (e. g. The *Astronomical Almanac*, *Connaissance des Temps*, and, particularly, the *Almanac for Computers*). On the other hand, for the needs of occasional users the classical method of tabulation of the required data in a fixed interval (eventually with differences) offers some advantage (e. g. *Astronomical Ephemeris of the USSR*, *Apparent Places of Fundamental Stars*).

The introduction of all these changes of different kind required corresponding modifications of the explanation or even its re-writing for the 1984 editions



of the almanacs. It seems, therefore, not necessary to enumerate in detail the changes which had been made in each almanac. Two examples only should be mentioned as exemplary:

(a) The Astronomical Almanac contains quite practice-orientated explanations given with each section of tabulation and accompanied by very useful examples.

(b) Both The Astronomical Almanac and the Japanese Ephemeris have added to the 1984 and 1985 edition respectively a Supplement which gives the basis of the new Ephemeris, i. e. a theoretical description of all fundamentals of the almanac including the necessary formulae and numerical values.

### III. Recent Developments

The Commission should not restrict its activity to the almanacs and their production. There are now two quite distinct groups which do no longer use the ephemerides which are given in the almanacs:

(1) Formerly these ephemerides had been used not only for preparing the observations and for facilitating to find the objects to be observed on the sky, but also for comparing the ephemeris values with the observations, with the goal to improve the theory or at least some basic elements or constants, by analyzing the O-C's. For that use, the ephemerides had to be at least of the same precision as the observations. This utilization of the almanacs is, however, widely superseded. Most of the institutions which do such fundamental work have now large computers available; they are used not only for the reduction of the observations, but also for calculating the data directly from the theory rather than to interpolate them in an almanac. For some ephemerides one could therefore reduce the precision such that it is sufficient for prediction purposes.

(2) The other quite different group consists of those who have a small computer at their disposal. They would be able and willing to calculate by themselves the data which they formerly took from the almanacs. They are therefore interested to find formulae and practical prescriptions for this, which are not offered in the classical astronomical literature. I do not think that this Commission should ignore that development (sometimes perhaps regarding it even as somewhat as a competition to the printed almanacs). The Commission should rather be interested that publications should be available which present the material in accordance with the adopted methods and constants. Good examples are T C van Flandern and F K Pulkkinen (26.021.032), Y Kubo, T Fukushima (Report Hydrogr. Res. Nos 15 and 16), and J Meeus (23.003.071).

### IV. Long-term Ephemerides

Almanacs usually appear 1 - 3 years in advance. But in some cases one is interested to have ephemerides which are extended for a longer interval of time into the future. Without claiming completeness, some of them may be enumerated:

(1) Planetary and Lunar Coordinates for the years 1984 - 2000, by H. M. Nautical Almanac Office, Herstmonceux, (34.046.009) is the continuation of the volume for the years 1980 - 1984. The publication contains coordinates of the Sun, Moon, and planets to low precision for J2000.0 and some other predictions.

(2) Compact Data for Navigation and Astronomy for 1986 - 1990, to be published by H. M. Stationery Office, London.

(3) Another interesting publication which also covers the time up to 2000, giving also a star catalogue, but no positions of the Moon is: Star and Planet Catalogue (Equinox 2000.0) by S Nakano and A Otawara (34.002.082).

(4) Advanced predictions of eclipses for the next few years are, as usually,

given in U.S. Nav. Obs. Circulars; they are currently prepared by A D Fiala and M R Lukac. Eclipse predictions for the years 1981 - 2000 are published also as Supplements to the Japanese Ephemeris 1980 to 1983.

(5) Longer intervals are covered by the Canon of Solar Eclipses -2003 to +2526 (Wien, 1983) and the Canon of Lunar Eclipses -2002 to +2526 (Wien, 1983), both by J Meeus and H Mucke, as well as the Canon of Lunar Eclipses from 1000 B.C. to A.D. 3000 by B-1 Liu (34.002.068).

#### V. Reduction to apparent place

Due to the changes mentioned above, there is an urgent need for precise instructions for the reduction of mean positions (old and new system) to apparent positions (new system) and vice versa; special problems arise in the case of stars where reductions include those from one equinox to another and also from one epoch to another (i. e. taking account of proper motions). Several publications appeared on this subject, e. g. by

P Bretagnon, J Chapront (30.043.004);  
G H Kaplan (31.043.001);  
E M Standish (32.043.003);  
S Aoki et al. (34.041.033);  
F Chollet (37.041.007);  
W Melbourne et al. (37.044.055);  
T Lederle, H Schwan (37.046.018).

Unfortunately there are some, even small differences between the various proposed methods. The most divergent point is the question whether the transition from the old to the new system (particularly concerning the numerical values for precession) has to become effective on 1984 January 1 or at another epoch. Those who are not so familiar with the problems may be highly disturbed by all the nuances. It seems to be not necessary that the Commission expresses its opinion in favour of one method by a formal recommendation; but it would be highly desirable that the experts agree to one unified procedure (even by some compromise) - and that this procedure be communicated by a common publication of these experts.

#### VI. Formulae relating time scales

Resolution 3 of Commissions 4, 19 and 31 on the expression of UT1 in terms of GMST as adopted in 1979 (Trans. IAU XVIIIB, 69) has been superseded by the Resolution 3 of Commissions 4, 19 and 31 on the expression for GMST at  $0^h$  UT1 as adopted in 1982 (Trans. IAU XVIIIB, 72). S Aoki has emphasized that in consequence of that modification one has also to change the figures as given in the Note to the Resolution (Trans. IAU XVIIIB, 70). Although the expressions with the corrected numerical values have been already published by S Aoki et al. (31.044.003), it appears appropriate to give here the new version of the Note according to the text proposed by S Aoki:

"Note: The followings are frequently used quantities which are also affected by the Resolution:

a) The interval of mean sidereal time in a mean solar day becomes

$$24^h + \frac{8\ 640\ 184^s.812\ 866 + 0^s.186\ 208T_u - 1^s.86 \cdot 10^{-5}T_u^2}{36525}$$

$$= 86\ 636^s.555\ 367\ 908\ 72 + 0^s.000\ 005\ 098\ 10T_u - 5^s.1 \cdot 10^{-10}T_u^2,$$

b) The ratio of a sidereal day of 86400 mean sidereal seconds to this interval becomes

$$\frac{\text{mean sidereal day}}{\text{mean solar day}} =$$

$$0.997\ 269\ 566\ 329\ 0840 - 5.868\ 40 \cdot 10^{-11}T_u + 5.86 \cdot 10^{-15}T_u^2,$$

c) The ratio of the mean solar day to the mean solar day becomes

$$1.002\ 737\ 909\ 350\ 7954 + 5.900\ 58 \cdot 10^{-11}T_u - 5.89 \cdot 10^{-15}T_u^2,$$

d) Disregarding the secular variations, the equivalent measures of the lengths of the day at J2000.0 are

$$1 \text{ mean sidereal day} = 23^h 56^m 04^s.090\ 530\ 8329$$

$$= 86\ 164^s.090\ 530\ 8329 \text{ of mean solar time,}$$

$$\text{and } 1 \text{ mean solar day} = 24^h 03^m 56^s.555\ 367\ 9087$$

$$= 86\ 636^s.555\ 367\ 9087 \text{ of mean sidereal time.}"$$

## VII. IAU/IAG/COSPAR Working Group on Cartographic Coordinates and

### Rotational Elements of the Planets and Satellites

The 1982 Report of the IAU Working Group presented at the XVIIIth General Assembly has been published by M E Davies et al. (33.091.004). Tables give the recommended values for the directions of the north poles of rotation and the prime meridians of the planets and satellites referred to both the B1950.0 and J2000.0 standard coordinate systems. References for mapping these bodies are described. An appendix discusses the principal changes to the tables since 1979.

The International Association of Geodesy (IAG) suggested the establishment of a joint IAU/IAG working group to define reference systems for the planets and sat-

ellites. Since this falls into the activity of this Working Group, the IAU Executive Committee and the IAG agreed with the Joint Working Group which has been enlarged by members nominated by the IAG. COSPAR would endorse the activities of the Joint Working Group. The new name will therefore be as indicated above in the title.

T LEDERLE

President of the Commission

COMMISSION 5. DOCUMENTATION AND ASTRONOMICAL DATA  
DOCUMENTATION ET DONNEES ASTRONOMIQUES

PRESIDENT: W.D.Heintz.

VICE-PRESIDENT: G.A.Wilkins.

ORGANIZING COMMITTEE: O.B.Dlushnevskaya, B.Hauck, C.Jaschek, P.Lantos, S.Mitton,  
L.Schmadel, F.Spite, C.E.Worley.

The report period 1982-84 was characterized by an again increased volume of material processed in data and abstracting centers, and by a growing clientele particularly of online services. The Working Groups of Commission 5 seek continued consultation with research object commissions so that the advanced documentation technology be efficiently employed toward specific demands of subject areas as to indexing, tagging, comprehensive, selective and inter-disciplinary retrievals. The guideline library for these purposes has been augmented by the First Dictionary of the Nomenclature of Celestial Objects by A.Fernandez, M.-C. Lortet, and F.Spite (Astr.Astrophys.Suppl. 52, no.4, 1983) and by the Guide to the Presentation of Astronomical Data by G.A.Wilkins (CODATA Bull.46, 1982); a new draft of the IAU Style Manual is before the IAU EC.

Following the 1981 Strasbourg conference on data retrieval (IAU Colloquium 64, published 1982: Reidel), some topics of cataloguing have been discussed at the IAU Symposium 111 on Calibration of Fundamental Stellar Quantities in Como (Italy), May 24-29, 1984 (chaired by A.H.Batten and L.Pasinetti). Astronomical catalogs were the specific subject of a colloquium arranged by the Astronomical Council of the USSR Academy of Sciences (USSR Data Center, O.Dlushnevskaya) and the Abastumani Observatory, September 10-16, 1984, near Tbilissi. The Commission is arranging for an open meeting on celestial object designations (chair: C.Jaschek) during the XIX CA. Among the topics proposed for discussion are particularly the nomenclature of specific objects in other galaxies, designation practices of objects observed from satellites, establishments of lists of acronyms, and procedures of error correction.

The Working Groups present the following Progress Reports:

Astronomical Data (B.Hauck, IAU Representative in CODATA):

The most visible activity of the WG was the arrangement of a course on data handling in astronomy and astrophysics, which was held in Trieste, July 9-13, 1984, and co-sponsored mainly by CNR (Italy), CODATA, and the Osservatorio Astronomico di Trieste. There were over 50 participants, and the chief topics were: Data management for data banks; astronomical catalogs; information transfer systems and standards; extraction methods for observational data; data handling in other sciences. The proceedings will be published in the Mem.Soc.Astr.Ital.

Two meetings in Strasbourg relating to astronomical data were titled "Statistical Methods in Astronomy" and "The Future of Non-stellar Astronomical Data". The proceedings of the Astronet conference (Rome 1982) have appeared in Mem.Soc.Astr.Ital. vol.53.

To characterize the expanding activities of the existing datacenters: About 450 astronomical catalogs are now available at the CDS Strasbourg. The Catalogue of Stellar Identifications (CSI) now contains about 550,000 objects, and has commenced inclusion of non-stellar objects, among them 50,000 galaxies. The USSR datacenter has at present 268 catalogs, including 13 prepared in the USSR, and four new ones

dispatched in 1983. The collaboration between several observatories permitted extensive activity in relation to data in the USSR, and many scientific papers are being published in that field. Nauchnye Informatsii no.5 was devoted to the activities of the datacenter as a special issue. The compendium "Informatics in astronomy and Geodesy" (in Russian, ed. E.Mustel) was published by Nauka (Moscow 1982).

Among a number of new catalogues and atlases, wide interest attaches to the new edition of the Bright Star Catalog (Hoffleit and Jaschek; Yale 1982) with data on 9096 stars brighter than  $V = 6.50$ , with a 1983 Supplement. The Yale parallax catalog (to be published) contains - according to the entries completed in 1984 - trigonometric parallaxes for 7435 stars. Bibliographies of photographic catalogs of star positions, and of atlases and charts are found in Bull.Astr.O.Beograd no. 29 (1982). The new edition of the General Catalogue of Variable Stars is being completed in the USSR. Two astronomical satellites (the Space Telescope and Hipparcos) are at the origin of very large catalog projects. A massive guide-star list of some  $10^7$  objects is needed for the first mission, and comprehensive information on some  $10^5$  program stars for the second. The International Ultraviolet Explorer obtained manyspectra, and a recently-published IUE Low-dispersion Spectra Reference Atlas contains 229 stars, the aim being to establish and to illustrate spectral reference sequences in the UV range.

Bibliography is an important complement of catalog data; in particular, the Bibliographical Index of the Strasbourg CDS (BSI) collects all citations of stars or of galaxies.

CODATA activities: The 8th International CODATA Conference was held in Jachranka (Poland), October 4-7, 1982. The Proceedings ("Data for Science and Technology", ed. Ph.Glaeser) were published by North-Holland Co. The 13th General Assembly took place just after this conference. The 9th International Conference, followed by the 14th GA, was held in Jerusalem, June 24-28, 1984. This assembly adopted a new policy concerning task groups, and some of the groups were discontinued, or modified in scope. The next conference will be prepared for July 14-17, 1986 at the Univ. of Ottawa (Canada), the subject being Computer Handling and Dissemination of Data. IAU members interested in this topic may contact the WG Chairman. CODATA Bulletins 45 through 55 were published during the report period. Apart from the "Guide to the Presentation of Astronomical Data" (G.A.Wilkins, no. 46, cited earlier), the following issues may be mentioned:

- No.48: CODATA Directory of Data Sources for Science and Technology, chap.7: Nuclear and elementary particle physics (June 1982).
- No.49: Directory chap.8: Molecular spectroscopy (July 1982).
- No.52: Directory chap.10: Geodesy (Jan 1984).
- No.54: 9th Conference Jerusalem 1984), Scientific Program and Abstracts (March 1984)

In addition, CODATA has sponsored the publication of "Database Management in Science and Technology", eds. J.R.Rumble and V.E.Hampel (North Holland Co.), which may be useful to astronomers. It is designed as an introduction for scientists and engineers to the use of computers to store, manipulate, and distribute collections of, numerical data.

#### Standardisation of Data Exchange (Special Task Force; P.Grosbol):

The Task Force on the Flexible Image Transport System (FITS) was created by Commission 5 during the XVIII GA in 1982, where Resolution C1 recommended the FITS tape format for the interchange of astronomical image data and other digital arrays between observatories. In cooperation of the North American AAS group and the European Software Coordination group, the two main functions of the Task Force are: (1) to channel comments and suggestions on the use of FITS for data interchange, and (2) to explore the possibilities for extending the FITS tape format to include

table and catalog data. The current results, including presentations at the Course in Trieste (1984), are as follows:

(1) Close contacts between the groups have been established; the problems, comments and suggestions raised are collected, and discussed at intervals. The main items that came up in the groups and in a Panel Discussion at Trieste were: (a) a need for a booklet on how to use FITS; (b) a list of commonly used non-standard FITS keywords and their meaning would also be helpful; (c) concern on the 'small' physical block size on FITS tapes has been expressed by a number of major institutions.

(2) After extensive discussion a proposal for Generalized FITS Extensions (with applications to tables and catalogs) was published in the Astronomical Image Processing Circular no.10, and presented at Trieste. The proposed FITS extension format has been implemented in prototype versions at NRAO and ESO. Table data exchange between these institutions proceeded without problems. The extension is being examined by datacenters for the purpose of catalog exchange. Sample programs for encoding and decoding have been prepared in addition to a test tape which contains the Nilson Uppsala General Catalogue of Galaxies.

#### Designations (C.Jaschek):

The "First Dictionary of Nomenclature ..." (Fernandez, Lortet, Spite 1983, cited above) contains about 1200 acronyms and 900 references, and is expected to become the standard reference for catalog abbreviations. Preparation of the first supplement is well under way, as is similar work on objects in M31 and in the Magellanic Clouds.

Circulars were addressed to the editors of astronomical periodicals to call their attention to the designation problem. All contacted magazines answered favorably and requested additional desk copies of the "Dictionary" which were provided. It is hoped that the actions promised to be taken will yield visible results in the future. Input from other commissions is desired. Designation practices were also the subject of a paper by J.Mead and a discussion by Jaschek at Trieste. The WG had an exchange of letters with regard to the designations of objects observed by EXOSAT.

#### Classification Systems and Information Retrieval (P.Lantos):

The IAU Vocabulary, on which a report was presented to the CODATA 1984 conference, is awaiting approval by the WG. The translation into French is planned. Contacts to journal editors are intended in order to explore a feasible way of disseminating the Vocabulary.

#### Abstracting Guidelines (L.Schmadel):

The Task Force is still constituting itself, but preliminary material has been circulated. A progress report will be completed in time for discussion at the XIX GA.

The Astronomy and Astrophysics Abstracts (AAA) are approaching a volume of 20,000 papers per year. Compilation has been transferred to a modified ITT 3030 system which is very satisfactory and has permitted further reduction of the publication time of the volumes. As a result, the 3rd Five-year Index (vol.35/36) has already appeared, and vol.38 is in progress. A tape service is in preparation. The code ASTHMA, under which the latest volumes of AAA should be available by mid-1984, will be a standard tape (9-track unlabeled, ASCII, 1600 bpi, block size 80, record length 4000) of high redundancy and simple structure, so that it can be operated on computer systems of low capacity. Marketing is still being negotiated.



VINITI (All-Union Institute for Scientific and Technical Information, Dept. Astronomy and Geodesy, Moscou; I.S.Shcherbina-Samoilova) :

The Department continued publication of Abstract Journals (Referativnyj Zhurnal) in three series: 51.Astronomy, 52.Geodesy, and 62.Space Research. The total number of abstracts amounted to 22,000 annually.

Itogi Nauky (state-of-the-art reviews) have the following new volumes: (Astronomy Series)

17. Radio Exploration of Moon and Terrestrial Planets, part II (1981).
18. Problems of Extragalactic Astronomy (1981).
19. Radiation Receivers for Ground-based Astronomy (1982).
20. Celestial Mechanics.
21. Stellar Flares. Supernovae. X Ray Sources. The Sun (1982).
22. Peculiar Stars, Strong Magnetic Fields, and Gamma Astronomy (1983).
23. Problems of Modern Astronomy (1983).
24. Astrophysics and Cosmic Physics (1983).
25. Solar Physics (1984).

(Space Research Series)

17. Physics and Evolution of Stars (1981).
18. Magnetism of Planets (1982).
19. Key Problems of Planet Exploration in the Solar System (1983).
20. Molecules in Astrophysics (1983).
21. Materials Science in Space (1984).

The descriptor vocabulary "Space research" has been prepared and is used for storage and machine readable output of Abstract Journal 62. The corresponding work for Astronomy is nearing completion.

Astronomy and space research reviews are contained in a newly established database for reviews.

NASA/GSFC Astronomical Data Center (Greenbelt MD, USA; W.Warren):

Request activity at the ADC, NASA Goddard Space Flight Center, continues to increase. During the report period, 1300 requests were completed by the ADC, with 900 machine readable catalogs disseminated. New or corrected/modified machine readable catalogs received numbered 141, while detailed descriptive comments were produced for 64 catalogs. In brief description, significant work completed at the ADC includes these items:

Machine readable versions of the entire Cordoba (613959 stars) and Cape Photographic (454877 stars) Durchmusterungen were completed. Zones  $-01^{\circ}$  to  $+19^{\circ}$  of the Bonner Durchmusterung (111323 stars) were also finished.

New versions of the Smithsonian Astrophys.Obs. Star Catalog (SAOC) and the SAO-HD-GC-DM Cross Index were completed following five years of part time work (Roman and Warren, ADC Bull. 1,212). A new machine version of the Henry Draper Catalogue has also been prepared (Roman and Warren, Bull. AAS 16, 502, 1984).

The NASA version of the retrieval system of the Bibliographical Star Index (Carpuat et al., Bull.Inf.CDS 26, p.83, 1984), available on-line to the scientific community, was considerably improved and updated with new BSI data (Hill, Mead, and Nagy, ADC Bull. 1,220, 1983; Hill, Brotzman, and Mead, Bull.AAS 16, 503,1984).

A Bibliographical Index of Objects Observed by IUE 1978-82, containing 523 papers, has been prepared (Mead, Kondo, and Boggess, Bull.AAS 16,502). A new version of the Catalog of Infrared Observations has been completed in both machine and printed forms, and published as NASA Reference Publ. 1118 (May 1984).

ICSTI (International Council for Scientific and Technical Information, the former ICSU Abstracting Board) reconstituted itself at the GA in Philadelphia in June 1984, the IAU being represented on its Executive Committee by W.Heintz. The organisation is resuming its wide-field and inter-disciplinary studies (Aggregate lists of serials; thesauri and translations; downloaded machine readable databases; copyrights) and intensifying the cooperation with CODATA.

Astronomy has a problem, in the opinion of this author, with some bibliographical databases (other than those prepared by astronomical services) which are less than helpful when used for searches. They may be incompletely compiled or downloaded (particularly on noncommercial literature), confusingly classified, or poorly cross-referenced. Diversity of publishing policies in the primary literature, especially with respect to vocabularies, and disagreements on classification schemes do not help to alleviate the problem. A fact accepted with resignation appears to be the "unmanageable" volume of primary publications. Hardware and techniques for the requisite secondary processing are in place, but the conventions toward optimal use of these facilities are incomplete.

CDS Strasbourg and the USSR Data Center in Moscou report in the Bulletins d'information of CDS. Attention is called to other publications in these Bulletins, notably the Holding Aggregates (no.25, p.87, 1983) with supplments on microfiches, and the paper by D.Egret (no.24, p.109) on the organisation, contents and use of the CDS database. Literature relevant to documentation is referenced in chapter 002 of the A.A.Abstracts.

W.D.HEINTZ  
President of the Commission.