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INTERNATIONAL ASTRONOMICAL UNION
VOLUME XXIB

**PROCEEDINGS
OF THE TWENTY-FIRST
GENERAL ASSEMBLY**

BUENOS AIRES 1991

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UNION ASTRONOMIQUE INTERNATIONALE

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OF THE

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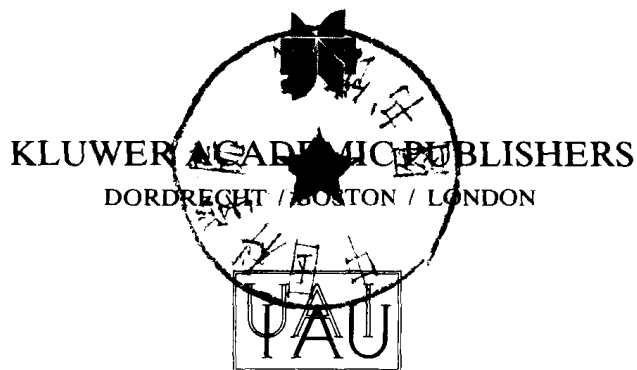
PROCEEDINGS OF THE TWENTY-FIRST
GENERAL ASSEMBLY

BUENOS AIRES 1991

Edited by

JACQUELINE BERGERON

General Secretary of the Union



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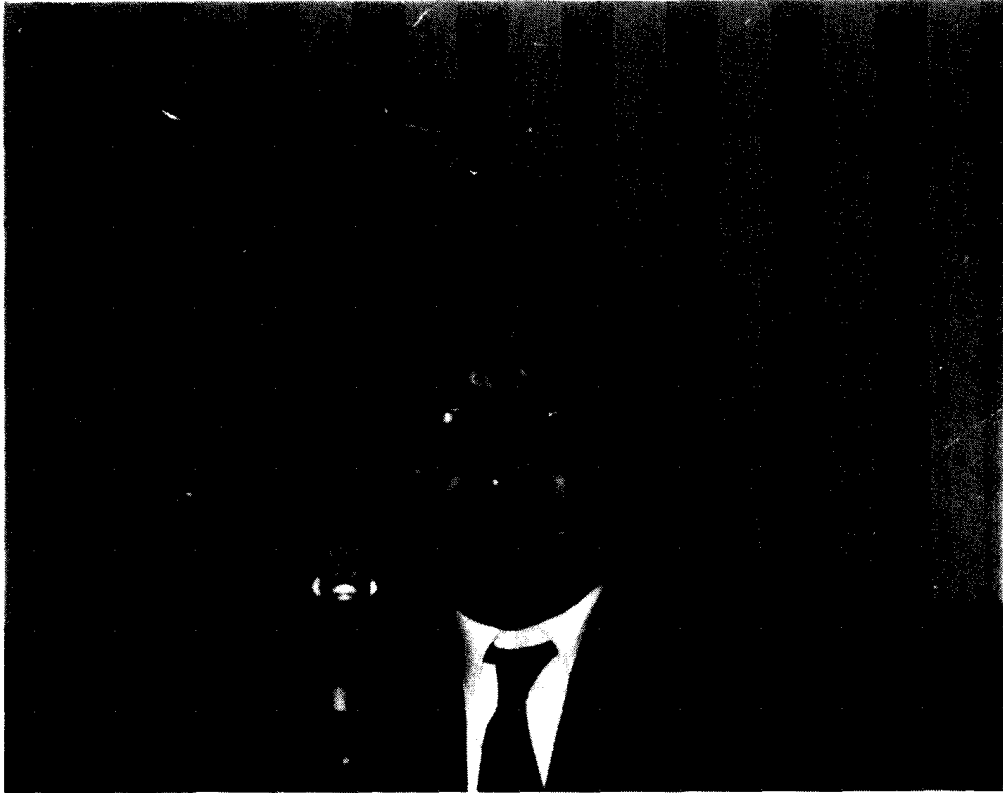
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PRÉSIDENT DE L'UNION ASTRONOMIQUE INTERNATIONALE

YOSHIHIDE KOZAI

PRESIDENT OF THE INTERNATIONAL ASTRONOMICAL UNION

1988–1991



ACRONYMS/ABBREVIATIONS/ABREVIATIONS/SIGLES

AIG/IAG	Association internationale de géodésie International Association of Geodesy
ASE/ESA	Agence spatiale européenne European Space Agency
BCT/TCB	Barycentric Coordinate Time Temps-coordonnée barycentrique
BDT/TDB	Barycentric Dynamical Time Temps dynamique barycentrique
BIPM/IBW	Bureau international des poids & mesures International Bureau of Weights & Measures
CASLEO	Complejo Astronomico El Leoncito (Argentina)
CCDS	Consultative Committee for the Definition of the Second Comité consultatif pour la définition de la seconde
CCIR	Consultative Committee on International Radiocommunications Comité consultatif international des radiocommunications
CIE	Compagnie Internationale de l'Eclairage
CNIE	Comision Nacional de Investigaciones Espaciales (Argentina)
CNRS	Centre National de la Recherche Scientifique (France)
CODATA	Committee on Data for Science & Technology (ICSU)
CONICET	National Council of Scientific & Technical Research (Argentina)
COSPAR	Committee on Space Research (ICSU) Comité pour la recherche spatiale (ICSU)
COSTED	Committee on Science & Technology in Developing Countries (ICSU)
CRAF	Comet Rendezvous Asteroid Flyby (NASA/ESA)
CTS	Committee on the Teaching of Science (ICSU)
EPS	European Physical Society
ESA/ASE	European Space Agency Agence spatiale européenne
FAGS	Federation of Astronomical & Geophysical Services
GCT/TCG	Geocentric Coordinate Time Temps-coordonnée géocentrique
IAF	International Astronautical Federation
IAFE	Instituto de Astronomia y Fisica del Espacio (Argentina)
IAGA	International Association of Geomagnetism & Aeronomy
IAMAP	International Association of Meteorology & Atmospheric Physics
IAR	Instituto Argentino de Radioastronomia (Argentina)
IAT/TAI	International Atomic Time Temps atomique international
IAU/UAI	International Astronomical Union Union astronomique internationale
ICSU	International Council of Scientific Unions Conseil international des unions scientifiques
IERS	International Earth Rotation Service Service international de la rotation de la terre
IGBP	International Geosphere-Biosphere Programme
IMU	International Mathematical Union
INSU	Institut National des Sciences de l'Univers (CNRS)
IS/SI	International Standards (units) Système International (units)
ISYA	International School for Young Astronomers
ISY	International Space Year
IUCAF	Interunion Commission on Frequency Allocations for Radio Astronomy & Space Sciences
IUGG/UGGI	International Union of Geodesy & Geophysics Union internationale de géodésie & géophysique
IUPAC/UICPA	International Union of Pure & Applied Chemistry Union internationale de chimie pure & appliquée

IUPAP/UIPPA	International Union of Pure & Applied Physics <i>Union internationale de physique pure & appliquée</i>
ITU/UIT	International Telecommunication Union <i>Union internationale des télécommunications</i>
IUWDS	International Ursigram & World Day Service (IAU/UAI)
LLR	Lunar Laser Ranging
MERIT	Monitor Earth Rotation & Intercompare Techniques
NASA	National Aeronautics & Space Administration (USA)
OAC	Observatorio Astronomico de Cordoba (Argentina)
QAFA	Observatorio Astronomico Felix Aguilar (Argentina)
CALP	Observatorio Astronomico de La Plata (Argentina)
OMM/WMO	Organisation météorologique mondiale World Meteorological Organization
QBSA	Quarterly Bulletin on Solar Activity (IAU/UAI)
RAS	Radio Astronomy Service <i>Service de radioastronomie</i>
RDSS	Radio Determination Satellite Service <i>Service de Détermination Radio par Satellite</i>
SCAR	Scientific Committee on Antarctic Research <i>Comité Scientifique pour la Recherche en Antarctique</i>
SCOPE	Scientific Committee on Problems of the Environment (ICSU)
SCOSTEP	Scientific Committee on Solar-Terrestrial Physics
SI/IS	Système International (units) International Standards (units)
SNC	Special Nominating Committee (IAU/UAI)
TAI/IAT	Temps atomique international International Atomic Time
TDB/BDT	Barycentric Dynamical Time <i>Temps dynamique barycentrique</i>
TCB/BCT	Barycentric Coordinate time <i>Temps-coordonnée barycentrique</i>
TCG/GCT	Geocentric Coordinate Time <i>Temps-coordonnée géocentrique</i>
TDT	Terrestrial Dynamical Time <i>Temps dynamique terrestre</i>
TT	<i>Temps terrestre</i>
UAI/IAU	Union astronomique internationale International Astronomical Union
UEGI/IUGG	Union internationale de géodésie & géophysique International Union of Geodesy & Geophysics
UICPA/IUPAC	Union internationale de chimie pure & appliquée International Union of Pure & Applied Chemistry
UIPPA/IUPAP	Union internationale de physique pure & appliquée International Union of Pure & Applied Physics
UIT/ITU	Union internationale des télécommunications International Telecommunication Union
UNESCO	United Nations Educational, Scientific & Cultural Organization
URSI	Union radio-scientifique internationale
USNO	United States Naval Observatory
VLBI	Very Long Baseline Interferometry
VLP	Visiting Lecturer's Programme (IAU/UAI)
WARC	World Administrative Radio Conference (ITU/UIT) <i>Conférence administrative mondiale des radiocommunications</i>
WGPSN	Working Group on Planetary System Nomenclature (IAU/UAI)
WMO/OMM	World Meteorological Organization <i>Organisation météorologique mondiale</i>

FOREWORD

The XX1st General Assembly of the International Astronomical Union was held in Buenos Aires from July 23 to August 1, 1991. The activities of General Assemblies are designed to provide opportunities for scientific exchanges within scientific commission meetings or during informal exchanges and for establishing new personal links between astronomers from different countries and continents, and to review and conduct the administration of the Union.

At the Inaugural ceremony on July 23, the Union was honored by the presence of the President of the Republic of Argentina, Dr. Carlos S. Menem, the representatives of the Argentine government, of the city of Buenos Aires and of the National and Local Organizing committees.

The excellent scientific programme in Buenos Aires was organized by the Presidents of the forty IAU Commissions and coordinated by the IAU General Secretary (1988-1991), Prof. Derek McNally. The local arrangements were taken care of by Dr. Fernando R. Colomb, and his collaborators of the National Organizing Committee and by the Local Organizing Committee under the supervision of its chairman, Dr. Roberto H. Mendez.

The present volume, IAU Transactions XXIB, summarizes the work of the XX1st General Assembly. The discourses given during the Inaugural and Closing Ceremonies are reproduced in chapters I & III respectively. The proceedings of the two sessions of the General Assembly will be found in chapter II, which includes the Resolutions, the report of the Finance Committee and the Accounts and other aspects of the administration of the Union. Together with the report of the Executive Committee for this last triennium (chapter IV), they provide the permanent record for the Union in the period 1988-1991. This volume also contains the Commission reports from Buenos Aires compiled by the Presidents of Commissions (chapter V). The Statutes, By-Laws and a few working rules of the Union are published in chapter VI. Finally, chapter VII contains the list of countries adhering to the Union and the alphabetical, geographical and commission membership lists of over 7350 individual IAU members. The IAU still appears to be unique among the scientific Unions in maintaining this category of individual membership which contributes in a crucial way to the spirit and the aims of the Union. These lists will also be published separately.

The production of this volume would not have been possible without the special co-operation of the Presidents of Commissions who provided camera-ready manuscripts, the members of the Resolution Committee, to Prof. Jean-Claude Pecker who supervised the French translation of the Resolutions and to Dr. Eduardo Simonneau who supervised the reproduction of the different speeches in Spanish. I am also indebted to Prof. Jorge Sahade for his help in obtaining the official discourses. I am most grateful to Monique Léger-Orine who, with the assistance of Julie Crook worked on the edition of this document.

J. Bergeron
General Secretary, IAU
January 24, 1992

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CHAPTER I

INAUGURAL CEREMONY 1991 JULY 23

The Inaugural Ceremony was held in the San Martin Cultural Centre, Buenos Aires, in the presence of the President of the Republic of Argentina, Dr. Carlos S. Menem, the National Secretary for Science and Technology, Dr. Raúl F. Matera, the Secretary for Education and Culture of the City of Buenos Aires, Lic. Osvaldo E. Devries, the President of the Argentinian Astronomical Association, Dr. Esteban Bajaja and the Chairman of the National Organising Committee, Dr. Fernando R. Columb.

The Chair was taken by Dr. Roberto H. Mendez, Chairman of the Local Organising Committee from the Institute of Astronomy and Physics of Space (IAFE), Buenos Aires.

A stylish musical interlude of works by Mozart, Piazzola, Bellosso and Ocampo was provided by the La Plata University Brass Quintet.

Address by Dr. Roberto H. Mendez, Chairman, Local Organizing Committee

"On behalf of the Local Organizing Committee it is a pleasure to welcome you all to Buenos Aires. Given the local economic situation, and the consequent restrictions in our budget, we have made a great effort to ensure the efficiency of scientific activities during this General Assembly. Your presence here is stimulating and will surely become a landmark for the younger generation of Argentine Astronomers. We thank you for coming and we wish all participants an invigorating astronomical experience. Thank you again, and good luck."

Address by Dr. Fernando R. Colomb, Chairman, National Organizing Committee

"It is a great honour for me to welcome you to our country on behalf of the Argentine Astronomical Community.

If meetings of this kind, which bring together men and women who search fervently to provide answers to the enigmas of the Universe, are always important, this one conference held in the year 1991 offers us the privilege to meet on the threshold of the commemoration of the fifth centennial of the discovery of America, the crucial step forward in the integration of humanity, in whose celebration the year 1992 has been declared the International Space Year.

I believe that this particular circumstance, filled with special significance, constitutes a special motivation for the achievement of a more fruitful exchange of information, expectations and queries in our quest of the place man has been reserved in the cosmos.

We are glad that the conference Argentina is hosting today is being attended by so many outstanding scientists from all over the world. Argentina has had an active tradition in astronomical research since 1871, when President Sarmiento inaugurated the Observatory in Cordoba, which allowed Benjamin Gould to level up the knowledge of

the southern hemisphere skies, information which was added to the data already existing for the northern hemisphere. At present there are six institutions devoted to astronomical research, over two hundred internationally renowned specialists working in various related branches, and the recently set up astronomical reserve of El Leoncito, in the province of San Juan, a space of over sixty thousand hectares, protected from interferences by a provincial law, offering the possibility of a pole for the development of observations in different wavelengths.

We are convinced that astronomical investigation and the answers it provides can contribute solutions for the welfare of humanity, at a time of explosive scientific and technological advance.

On behalf of the astronomers of Argentina, who feel very proud for having been chosen as the first Latin American country to organize the General Assembly of the International Astronomical Union, let me welcome you once more and hope that your stay in the city of Buenos Aires will be a truly memorable event for each one of you."

Address by Dr. Esteban Bajaja, President Argentina Astronomical Association

"Distinguished Guest, Ladies and Gentlemen,

It is a great honour and a great pleasure for me to be here now welcoming you to our country. A great honour and also a responsibility, because of the number and level of the scientists present here; because, I am speaking on behalf of the members of the Argentine Astronomical Association, a majority of them decided several years ago, when nobody imagined the critical times to come, to propose Argentina as host country for this General Assembly; and finally, because 120 years of professional astronomy in this country demand from us a corresponding competence in the organization of this meeting.

It is also a great pleasure because I am able this time to welcome to my country many of you whom I met in other parts of the world. I regret, however, that I miss the chance to welcome many other astronomers who are not coming just because this is a General Assembly, which, in their opinion, means too many people, too many subjects, too much time. In spite of this attitude, which will have to be considered when planning future General Assemblies, and other facts like the war in the Persian Gulf and the outbreak of cholera in some countries of South America, we are glad to see that the attendance exceeds our expectations.

To organize a General Assembly of the IAU is by itself a difficult job and implies a large responsibility, but when the host country has the economical situation that our country had, particularly during the last few years, such job is much more difficult to be carried out. The members of the LOC might write a book describing the all sort of problems they met in their long and painful way to reach this moment. Because of these difficulties we expect from you some indulgence when judging some details in the organization that might have gone or may go wrong.

The important thing is that you are here now and we shall try to make your stay as comfortable and fruitful as possible. For the latter you know what you expect from this General Assembly. Let me tell you what we expect from it, why we consider that it was worth the effort. As result of the 120 years of tradition in astronomy, during most of which Argentina had the leadership in South America, we have at present six observatories, two schools on astronomy and 180 members in our Association, more than two thirds of which are young astronomers and students, covering most of the fields in Astronomy. We have also a very good place for astronomical observations in El Leoncito, Prov. of San Juan, where, among others, we have a 2.15m optical telescope operating since 1986. There is even a project for a scientific satellite. On the basis of this picture we may conclude that we are in a rather good situation.

Being, however, in the southern end of South America and not being able to travel easily, means for us essentially to be isolated from the rest of the world. Scientific publications and different forms of communications make this isolation not absolute but they are not enough for the interaction needed for the scientific research. This isolation, together with a poor economical situation along many years, with low salaries and insufficient funds for equipment and maintenance, produced a slow but constant decrease in the intensity and, necessarily, in the level of the activity in astronomy. We are aware of this but it becomes painfully clear when we compare our activity with the activities in other countries.

In which way do we expect that this General Assembly will help us to correct this situation? The first result will be, certainly, that we shall be able to know each other, which will make, we hope, easier the communications and smaller the isolation. Our main problem, however has been the low financial support for our activity. The situation has improved recently but we need an increased and stable support and this will be only possible when the economical situation of the country improves. We hope that this will happen soon but then we still have to convince the government, and even ourselves, that our activity has to be fully supported.

The fact that the General Assembly is taking place in this country might help us to show to our people that there are many astronomers like we in the world, trying to discover the mysteries of the Universe. That there are large national efforts supporting this activity in many countries, in some of which the economical situation is even worse than in ours. That this science is for the mankind, the most important, not only for the knowledge of the Universe but also as a way to know itself. That this science contains all the other sciences.

Furthermore, in this General Assembly you are going to tell us about your magnificent observational and computational facilities, and the astronomical results obtained with them. We shall be very

much impressed, I am sure, but I hope that we can overcome the depressing feeling that can invade us when comparing them with our facilities. Instead of that I hope that they will awake our enthusiasm, specially of the young people whose impulse has not been yet weakened by years of frustration and depression. I expect that they will see this display as a challenge to their own capacities to work with the modern technology and that they will try, and will get the help, to use those facilities.

I expect they will not want to be just witnesses of your progress, that they will want to participate, like the many Argentine astronomers around the world, some of them present here, who have chosen to live abroad to work and to live better, proving at the same time that our schools were good enough to enter in the world of science at international level. We expect, especially from them, that they will not forget their colleagues in this country working under inferior conditions.

In conclusion, I consider that this, more than a meeting to honour the 120 years of past Argentine astronomy, is a meeting for the young people, for those who are supposed to build the astronomy in this country for the next 50 years. With this in mind, I wish you and ourselves much success during this General Assembly and a happy stay."

Address by Lic. Osvaldo E. Devries, Secretario de Education y Cultura, Municipalidad de la Ciudad de Buenos Aires (Municipality)

"Ladies and Gentlemen, Members of the XXist General Assembly of the International Astronomical Union:

In representation of the Mayor of Buenos Aires, Mr. Carlos Grosso, it is a pleasure to welcome you to this city.

It is a honour for us to receive these important representatives of the scientific field of Astronomy and Astrophysics of such different countries.

As a man of sciences and as Secretary of Education and Culture of the Town Hall of Buenos Aires (Municipality) I want to say we hope this city-site can be a good seat for the development and interchanges of knowledge in this congress and I am sure this meeting shall be a centre of up-to-date and advances in the sciences.

This gratitude is wider as we know that all serious and conscious development of the nature knowledges is always offering chances for the men in the difficult art of government. These knowledges -we know- are the channels and instruments of applying all the scientific performances in order to get a final destiny to benefit the peace, the growth and happiness of all the towns of the world.

To all of you I just have to say: I wish you the best success for this Congress and in the name of the citizens of Buenos Aires: Welcome! this city is yours."