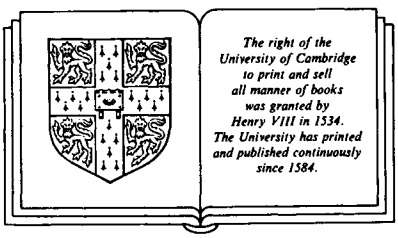
Data in astronomy

Data in astronomy

CARLOS JASCHEK
Centre de Données Stellaires, Observatoire de Strasbourg, France



CAMBRIDGE UNIVERSITY PRESS
Cambridge
New York New Rochelle Melbourne Sydney

CAMBRIDGE UNIVERSITY PRESS
Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore,
São Paulo, Delhi, Dubai, Tokyo, Mexico City

Cambridge University Press
The Edinburgh Building, Cambridge CB2 8RU, UK

Published in the United States of America by Cambridge University Press, New York

www.cambridge.org
Information on this title: www.cambridge.org/9780521177283

First published 1989
First paperback edition 2011

A catalogue record for this publication is available from the British Library

Library of Congress Cataloguing in Publication data
Jaschek, Carlos.
Data in astronomy/Carlos Jaschek.
p. cm.
Includes bibliographies and index.
ISBN 0 521 34094 2
1. Astronomy—Data processing. 2. Astronomy—Observations.
3. Astronomy—Documentation. I. Title.
QB51.3.E43J37 1989
5201.28′5—dc9 88-9504 CIP

ISBN 978-0-521-34094-6 Hardback
ISBN 978-0-521-17728-3 Paperback

Contents

Preface

Natural sciences are based upon observations and experiments and the outcome of both is data. To be usable, data must be preserved on some support medium, such as paper. These two sentences summarize the objective of this book: a survey of how data are obtained, compiled and published.

Readers will find in Chapter 1 a discussion of observations. Chapter 2 deals with the places where these observations are carried out, the observatories. Chapter 3 deals with data in general. In Chapter 4 the ways observations are archived are discussed. Chapter 5 discusses the presentation of astronomical data for further use. Chapter 6 deals with the problem of how astronomical objects are designated. Then, in Chapter 7, I present the catalogues, in different fields of astronomy, that provide the most readily usable data. The growth of the quantity of data with time is the subject of Chapter 8. Chapter 9 deals with data banks and data bases; data centres and networks are the subject of Chapter 10. Chapter 11 deals with scientific information in general and the ways this information is published. In Chapter 12 the growth of scientific information in general and some of the uses made of publications for evaluation are discussed. Finally, the thirteenth and last chapter describes international organizations dealing with data.

Throughout the book the word 'astronomy' is used in a restricted sense, which excludes solar system objects. The choice of this restriction is explained in Chapter 1; it depends essentially on the fact that all observations beyond the solar system are exclusively based upon the study of the radiation received. They are thus of a passive kind, beyond the reach of experimentation either today or in the near future. For instance, one can send a spacecraft to Mars and make observations *in situ*. It is to be hoped that in the next decades such landings (or close-up visits) can be made on

nearly all bodies of the solar system, and this creates, essentially, two astronomies with different methodologies.

Because of the rapid growth in the number of astronomers and of observing facilities, we have to cope with rapidly increasing amounts of new data and numbers of publications. It is essential for our survival as scientists to find ways to order this information, if only to avoid being buried under tons of paper. The organizations for dealing with data and information exist already but new techniques have forced us to adopt new solutions; however, not all astronomers may be aware of these new solutions. Therefore, it seems timely to provide an introduction to this fascinating subject. Because of its rapid evolution, I have preferred to write a broad outline rather than an encyclopaedia.

My involvement with data started a long time ago, at La Plata, when one of my students, H. Conde, proposed the idea of publishing as a catalogue a file that we were compiling for private use. This was in the early 1960s and, since then, I have been associated with the handling of data. This link became even stronger when I was appointed Director of the Strasbourg Stellar Data Centre (CDS) in 1975. This centre, which will be mentioned many times in the book, has been in many ways a privileged 'watch-tower' over what has happened in the field during the following years.

So, it is clear that this work is the outcome of many exchanges with my colleagues over the years, especially the staff of the CDS and the members of its Scientific Council.

Acknowledgements

I want to thank Mr C. Schohn for the illustrations and Mrs Boisselier for typing the manuscript.

I would also like to thank the following for permission to reproduce the figures listed:

– Columbia University Press for Figure 11.1;

– The *Publications of the Astronomical Society of the Pacific* for Figure 12.2.

I would like to express my special gratitude to my wife, M. Jaschek, and to Messrs J. Delhaye, F. Ochsenbein and E. Davoust, who have read the draft of this book, or parts of it, and made many comments. I hope that I have used their comments in the right way. I am very grateful to Dr Jacqueline Mitton who corrected not only the English but also a number of errors and mistakes and helped to improve the presentation. Finally I want also to thank all those who have contributed with the many 'private communications' dispersed through the text.

Abbreviations for bibliographic references

In the bibliographic references at the end of each chapter I have used a number of abbreviations for the titles of journals, which are as follows:

AA = Astronomy and Astrophysics
AA Suppl. = Astronomy and Astrophysics Supplement
AJ = Astronomical Journal
AN = Astronomische Nachrichten
Ap. J. = Astrophysical Journal
Ap. J. Suppl. = Astrophysical Journal Supplement
ASpS = Astrophysics and Space Science
BICDS = Bulletin d'Information du Centre de Données Stellaires
Mem RAS = Memoirs of the Royal Astronomical Society
MN = Monthly Notices of the Royal Astronomical Society
PASP = Publications of the Astronomical Society of the Pacific
QJRAS = Quarterly Journal of the Royal Astronomical Society

'CDS catalogue x' designates a catalogue not otherwise published. It can be obtained from all centres listed in Chapter 10.