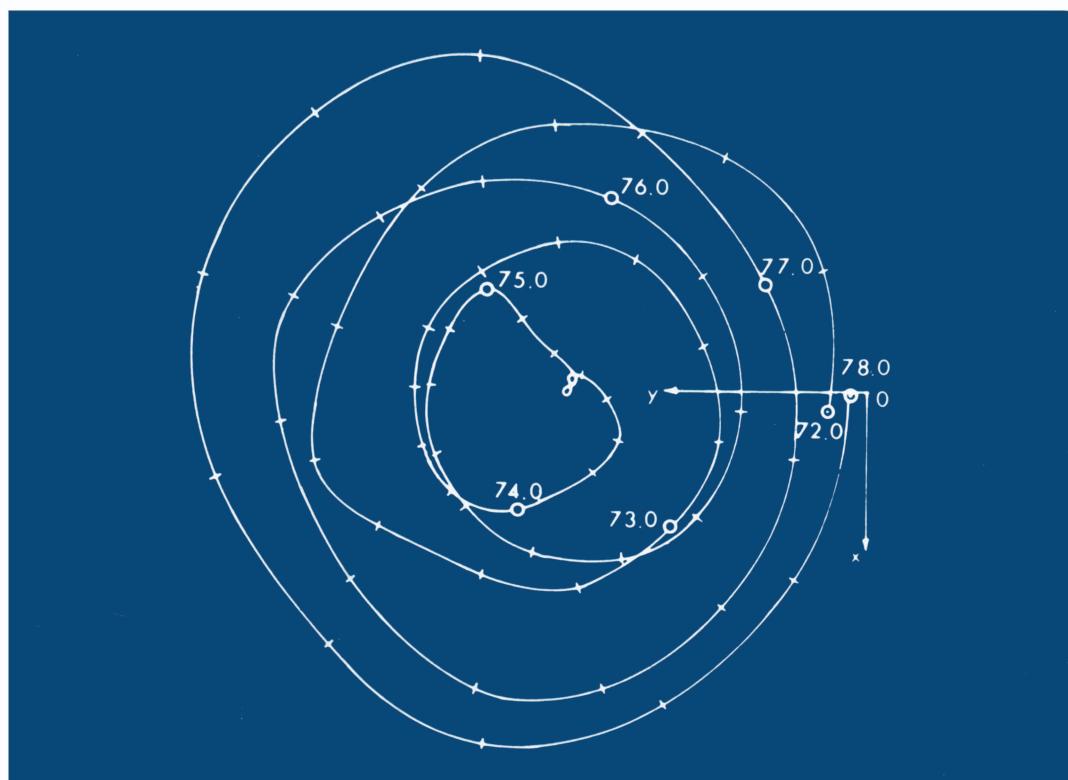


INTERNATIONAL ASTRONOMICAL UNION

SYMPOSIUM No. 82

TIME AND THE EARTH'S ROTATION

Edited by DENNIS D. McCARTHY AND JOHN D. H. PILKINGTON



INTERNATIONAL ASTRONOMICAL UNION

D. REIDEL PUBLISHING COMPANY / DORDRECHT : HOLLAND

BOSTON : U.S.A. / LONDON : ENGLAND



TIME AND THE EARTH'S ROTATION

IAU SYMPOSIUM NO. 82

The development of new techniques has caused a new concern for the rigorous definition of the reference systems in which observations of the Earth's rotation parameters are made. This was discussed extensively at the meeting. Also considered were the current and planned capabilities of various techniques to improve the accuracy of astronomical time and polar motion observations.

Papers were presented dealing with time, polar motion, astronomical and geodetic reference systems, conventional radio interferometry, very long baseline interferometry (VLBI), Doppler satellite methods, satellite laser ranging, lunar laser ranging, and geo-physical research concerning the Earth's rotation.

D. REIDEL PUBLISHING COMPANY
DORDRECHT : HOLLAND / BOSTON : U.S.A.
LONDON : ENGLAND

TIME AND THE EARTH'S ROTATION

INTERNATIONAL ASTRONOMICAL UNION
UNION ASTRONOMIQUE INTERNATIONALE

SYMPOSIUM No. 82

PROCEEDINGS OF THE 82ND SYMPOSIUM OF THE INTERNATIONAL
ASTRONOMICAL UNION HELD IN SAN FERNANDO, SPAIN, 8-12 MAY, 1978

TIME AND THE
EARTH'S ROTATION

EDITED BY

DENNIS D. McCARTHY

U.S. Naval Observatory, 34th and Massachusetts Avenue N.W., Washington, D.C., U.S.A.

and

JOHN D. H. PILKINGTON

Royal Greenwich Observatory, Herstmonceux Castle, Hailsham, East Sussex, England



D. REIDEL PUBLISHING COMPANY

DORDRECHT : HOLLAND / BOSTON : U.S.A. / LONDON : ENGLAND



Library of Congress Cataloging in Publication Data



Main entry under title:

Time and the Earth's rotation.

(Symposium – International Astronomical Union; no. 82)

Papers presented at a symposium held in San Fernando, Spain, May 8–12, 1978.

Includes index.

1. Time—Congresses. 2. Earth—Rotation—Congresses. I. McCarthy, Dennis D.
 - II. Pilkington, J. D. III. Series: International Astronomical Union. Symposium; no. 82.
- QB209.T523 525'.35 79-14967
ISBN 90-277-0892-4
ISBN 90-277-0893-2 pbk.
-

*Published on behalf of
the International Astronomical Union
by*

D. Reidel Publishing Company, P.O. Box 17, Dordrecht, Holland

*All Rights Reserved
Copyright © 1979 by the International Astronomical Union*

*Sold and distributed in the U.S.A., Canada, and Mexico
by D. Reidel Publishing Company, Inc.
Lincoln Building, 160 Old Derby Street, Hingham,
Mass. 02043, U.S.A.*

*No part of the material protected by this copyright notice may be reproduced or utilized
in any form or by any means, electronic or mechanical, including photocopying, recording
or by any informational storage and retrieval system, without written permission from
the publisher*

Printed in The Netherlands

TABLE OF CONTENTS

Preface	xi
Organizing Committees	xii
Acknowledgements	xiii
List of Participants	xv
 INTRODUCTION: R. O. VICENTE / The Future of the Researches About the Earth's Rotation	 1
I. TIME	
B. GUINOT / Basic Problems in the Kinematics of the Rotation of the Earth (Invited Paper)	7
S. PUSHKIN / A New State Time and Frequency Standard of the USSR	19
D. YU. BELOTSERKOVSKIY and M. B. KAUFMAN / A New Method of Universal Time Computation Used in the State Time and Frequency Service of the USSR	23
YA. S. YATSKIV, A. A. KORSUN', and N. T. MIRONOV / On the Determination of UT1 by the BIH and the U.S.S.R. Time Service	29
S. DEBARBAT / Etude d'Observations Effectuées à l'Astrolabe de Paris et Comparaison avec d'Autres Resultats Concernant les Termes Principaux de la Nutation	41
V. S. GUBANOV and L. I. YAGUDIN / A New System of the U.S.S.R. Standard Time for 1955-1974 and its Application in the Study of the Earth's Rotation	47
D. D. MCCARTHY and D. B. PERCIVAL / An Analysis of the Rotational Acceleration of the Earth (Abstract)	53
L. V. MORRISON / New Determination of the "Decade" Fluctuations in the Rotation of the Earth, 1860-1978 (Abstract)	55
A. I. EMETZ and A. A. KORSUN' / On the Long-Period Variations in the Rate of the Earth's Rotation (Abstract)	59
N. S. SIDORENKO / Main Results of Studying the Nature of the Irregularity of the Earth's Rotation	61

D. D. MCCARTHY / Some Advantages and Disadvantages of a Photographic Zenith Tube (abstract)	65
N. P. J. O'HORA and T. F. BAKER / Tidal Perturbations in Astronomical Observations	67
J. POPELAR / Polar Motion and Earth Rotation Monitoring in Canada	73
D. DJUROVIC / Polar Coordinates and UT1-UTC from PZT Observations	75
S. IIJIMA, S. FUJII, and Y. NIIMI / (α -2L) Terms as Obtained from PZT Observations	79
G. BILLAUD / Etude Succinte du Catalogue Fondamental FK4 à Partir des Observations Faites à l'Astrolabe	85

II. POLAR MOTION

E. P. FEDOROV / On the Coordinate Systems Used in the Study of Polar Motion (Invited Paper)	89
S. YUMI, K. YOKOYAMA, and H. ISHII / Derivation of Pole Coordinates in a Uniform System from the Past ILS Data	103
M. FEISSEL / On the Computation of Accurate Earth Rotation by the Classical Astronomical Method	109
A. POMA and E. PROVERBIO / On the Relative Motion of the Earth's Axis of Figure and the Pole of Rotation	115
V. P. SHCHEGLOV and G. M. KAGANOVSKY / Secular Variation of Tashkent Astronomical Latitude (Abstract)	123
B. KOLACZEK / Coordinates of the Pole for the Period 1968-1974 Computed in the System of 10 Stations with Small Variations of Mean Latitudes	125
F. CHOLLET / Amelioration des Calculs de Reduction des Observations à l' Astrolabe. Application à la Determination des Termes de 18.6 et 9.3 Ans de la Nutation	129
L. M. BARRETO / Time and Latitude Programs at the National Observatory of Brazil	135
L. BUFFONI, F. CARTA, F. CHLISTOVSKY, A. MANARA, and F. MAZZOLENI / Preliminary Analysis of Astrolabe Observations at Merate Observatory During the Period 1970-1977 (Abstract)	137

K. KANIUTH and W. WENDE / The Longitude Difference Merate-Milano Derived from Danjon Astrolabe Observations by Means of a One-Step Adjustment Using an Extended Model	139
J. MOCZKO / Velocity of the Motion of the Terrestrial Pole	145
III. REFERENCE SYSTEMS	
J. KOVALEVSKY / The Reference Systems (Invited Paper)	151
C. A. MURRAY / The Ephemeris Reference Frame for Astrometry	165
N. CAPITAIN / Nutation in Space and Diurnal Nutation in the Case of an Elastic Earth	169
E. W. GRAFAREN, I. I. MUELLER, H. B. PAPO, and B. RITCHER / Concept for Reference Frames in Geodesy and Geodynamics: The Reference Directions (Abstract)	175
IV. RADIO INTERFEROMETRY	
B. ELSMORE / An Introduction to Radio Interferometric Techniques	177
K. J. JOHNSTON / The Application of Radio Interferometric Techniques to the Determination of Earth Rotation (Invited Paper)	183
W. E. CARTER, D. S. ROBERTSON, and M. D. ABELL / An Improved Polar Motion and Earth Rotation Monitoring Service Using Radio Interferometry	191
J. L. FANSELOW, J. B. THOMAS, E. J. COHEN, P. F. MACDORAN, W. G. MELBOURNE, B. D. MULHALL, G. H. PURCELL, D. H. ROGSTAD, L. J. SKJERVE, and D. J. SPITZMESSER / Determination of UT1 and Polar Motion by the Deep Space Network Using Very Long Baseline Interferometry	199
K. J. JOHNSTON, J. H. SPENCER, C. H. MAYER, W. J. KLEPCZYNSKI, G. KAPLAN, D. D. MCCARTHY, and G. WESTERHOUT / The NAVOBSY/NRL Program for the Determination of Earth Rotation and Polar Motion	211

D. S. ROBERTSON, W. E. CARTER, B. E. COREY, W. D. COTTON, C. C. COUNSELMAN, I. I. SHAPIRO, J. J. WITTELS, H. F. HINTEREGGER, C. A. KNIGHT, A. E. E. ROGERS, A. R. WHITNEY, J. W. RYAN, T. A. CLARK, R. J. COATES, C. MA, and J. M. MORAN / Recent Results of Radio Interferometric Determinations of a Transcontinental Baseline, Polar Motion, and Earth Rotation	217
--	-----

H. G. WALTER / Precision Estimates of Universal Time from Radio-Interferometric Observations	225
--	-----

V. SATELLITE LASER RANGING

D. E. SMITH, R. KOLENKIEWICZ, P. J. DUNN, and M. TORRENCE / Determination of Polar Motion and Earth Rotation from Laser Tracking of Satellites (Invited Paper)	231
B. E. SCHUTZ, B. D. TAPLEY, and J. RIES / Polar Motion from Laser Range Measurements of GEOS-3	239
P. L. BENDER and E. C. SILVERBERG / Low Cost Lageos Ranging System (Abstract)	245

VI. LUNAR LASER RANGING

E. C. SILVERBERG / On the Effective Use of Lunar Ranging for the Determination of the Earth's Rotation (Invited Paper)	247
J. D. MULHOLLAND / Is Lunar Ranging a Viable Component in a Next-Generation Earth Rotation Service?	257
O. CALAME / Preliminary UTO Results from EROLD Data	261

VII. DOPPLER SATELLITE METHODS

C. OESTERWINTER / Polar Motion through 1977 from Doppler Satellite Observations (Invited Paper)	263
B. GUINOT / Irregularities of the Polar Motion	279
P. PAQUET and C. DEVIS / Reasons and Possibilities for an Extended Use of the Transit System	287
F. NOUEL and D. GAMBIS / Very First Results of the MEDOC Experiment	295

VIII. GEOPHYSICS	
S. K. RUNCORN / The Geophysical Interpretation of Changes in the Length of the Day and Polar Motion	301
C. R. WILSON / Estimation of the Parameters of the Earth's Polar Motion	307
S. TAKAGI / Rotational Velocity of an Earth Model with a Liquid Core (Abstract)	313
G. P. PIL'NIK / On Investigations of the Tidal Waves M_f and M_m (Abstract)	315
P. BROSCHE and J. SUNDERMANN / Oceanic Tidal Friction: Principles and New Results	317
V. P. SHCHEGLOV / The Stability of Continental Blocks in Seismically Active Regions (Abstract)	321
GENERAL DISCUSSION	323
RESOLUTIONS	329
INDEX	331