



INSTITUT 6012 L I-14 b
FÜR METEOROLOGIE U. KLIMATOLOGIE
DER TECHN. UNIVERSITÄT
3 HANNOVER, HERRNHÄUSER STR. 3
A United States Contribution
to the International Hydrological Decade

THE PROGRESS OF HYDROLOGY

Proceedings of
The First International Seminar for Hydrology Professors

A National Science Foundation Advanced Science Seminar
Held at the University of Illinois, Urbana, Illinois, U.S.A.
July 13-25, 1969

VOLUME II
SPECIALIZED HYDROLOGIC SUBJECTS

Department of Civil Engineering
University of Illinois at Urbana-Champaign
Urbana, Illinois, U.S.A.





INSTITUT 60/2 L II-74 6
FOR METEOROLOGIE U. KLIMATOLOGIE
DER TECHN. UNIVERSITÄT
HANNOVER, HERRENHEUSER STR. 2
DK: 557.4

A United States Contribution
to the International Hydrological Decade

THE PROGRESS OF HYDROLOGY

Proceedings of

The First International Seminar for Hydrology Professors

A National Science Foundation Advanced Science Seminar
Held at the University of Illinois, Urbana, Illinois, U.S.A.

July 13-25, 1969

VOLUME II

SPECIALIZED HYDROLOGIC SUBJECTS

Department of Civil Engineering
University of Illinois at Urbana-Champaign
Urbana, Illinois, U.S.A.



TABLE OF CONTENTS

VOLUME I. NEW DEVELOPMENTS IN HYDROLOGY

	Page
LIST OF PARTICIPANTS	4
SEMINAR PROGRAM	12
INTRODUCTION, <i>Ven Te Chow</i>	22
NEW DEVELOPMENTS IN HYDROLOGY	25
Scientific Hydrology in the World, <i>Dean F. Peterson</i>	26
Scientific Hydrology in the United States, <i>William C. Ackermann</i>	50
Remote Sensing in Space Technology in Hydrology, <i>Paul Bock</i>	61
Space Technology in Hydrologic Applications, <i>Charles J. Robinove</i>	88
Some of ESSA's Current Efforts in Satellite Data Applications for Hydrology, <i>Donald R. Baker and E. Paul McClain</i>	108
Nuclear Techniques in Hydrology, <i>Bryan R. Payne and</i> <i>Turgut Dincer</i>	126
Principles of the Application of Nuclear Techniques to Hydrologic Investigations, <i>L. L. Thatcher</i>	149
Recent Developments in Measuring Techniques for Flow in Open Channels, <i>George F. Smoot and Harry H. Barnes, Jr.</i>	194
The Computer and Hydrology, <i>Warren A. Hall</i>	226
The Role and Development of the Programming Language "Hydro" in Hydrology, <i>George Bugliarello</i>	233
Use of Analog Computer in Groundwater Hydrology, <i>William C. Walton</i>	265
Computers in the Research and Teaching of Hydrology, <i>Venkateswararao Vemuri</i>	290
Some Aspects of Education and Research in Stochastic Hydrology, <i>Vujica Yevjevich</i>	316
Hydrostatistics - Principles of Application, <i>Leo R. Beard</i>	334
Mathematical Modeling in Hydrology, <i>David R. Dawdy</i>	346
Mathematical Methodology in Hydrology, <i>Chester C. Kisiel</i>	362
Deterministic Linear Hydrologic Systems, <i>Peter S. Eagleson</i>	400
Deterministic Nonlinear Hydrologic Models, <i>J. Amorocho</i>	420

	Page
Optimum Gaging Station Location, <i>Nicholas C. Matalas</i>	473
Systems Approaches in Hydrology and Water Resources, <i>Ven Te Chow</i>	490
VOLUME II. SPECIALIZED HYDROLOGIC SUBJECTS	
SPECIALIZED HYDROLOGIC SUBJECTS	511
World Meteorological Organization and Its Programmes in Hydrometeorology and Hydrology, <i>Jaromir Nemeč</i>	512
Hydrometeorological Studies, <i>John F. Miller</i>	521
Digital Simulation in Hydrology and Its Role in Hydrologic Education, <i>Ray K. Linsley</i>	563
An Engineering-Oriented Model of Watershed Hydrology, <i>H. N. Holtan and N. C. Lopez</i>	572
Urban Hydrology, <i>W. J. Bauer</i>	605
A Summary of the Hopkins Storm Drainage Research Project: Its Objectives, Its Accomplishments, and Its Relation to Future Problems in Urban Hydrology, <i>John C. Schaake, Jr.</i>	638
Significance of Evaporation in Hydrologic Education, <i>W. J. Roberts</i>	666
Evapotranspiration: A Factor in the Plant-Soil-Water Economy, <i>Lloyd L. Harrold</i>	694
Snow and Ice Hydrology, <i>Walter U. Garstka</i>	717
Glaciers and Snowpacks: Some Common Problems in Non-Polar Glaciology, <i>Mark F. Meier</i>	729
Sedimentation Processes as Part of Hydrology, <i>Emmett M. Laursen</i>	737
Status of Research and Education in Forest Hydrology, <i>William E. Sopper</i>	744
Geomorphology, <i>Adrian E. Scheidegger</i>	777
Subsurface Water - Ground Water, <i>George B. Mawey</i>	787
Ground Water Hydrology - Recent Developments, <i>Roger J. M. De Wiest</i>	816
The Movement of Water in Unsaturated Soils, <i>A. Klute</i>	821
A Framework for Evaluating Carbonate Hydrology, <i>Harry E. LeGrand</i>	887
A Short History of Hydrology, <i>Asit K. Biswas</i>	914
VOLUME III. HYDROLOGIC EDUCATION AND DISCUSSIONS	
HYDROLOGIC EDUCATION	937
International Cooperation in Hydrologic Education, <i>Maurice L. Albertson</i>	938

	Page
Manpower Needs in Hydrology, <i>Arno T. Lenz</i>	954
Hydrologic Training for Water Resources Development, <i>Carl E. Kindsvater and Willard M. Snyder</i>	962
Comments on Some Recent Trends in Hydrology Research, <i>E. D. Eaton</i>	974
Relations of University Hydrologic Programs with Government Agencies, <i>Robert L. Smith</i>	994
International Hydrologic Education Through Fellowships and Assistantships, <i>William S. Butcher</i>	1011
Curriculum Development in Hydrology, <i>Daniel D. Evans and John W. Harshbarger</i>	1024
Teaching Aids and Hydrology, <i>Walter L. Moore</i>	1044
An Introduction to Terrestrial Hydrology - A Gap in Training, <i>L. A. Heindl</i>	1079
Hydrologic Education in Israel, <i>Jacob Bear</i>	1086
Education and Research in Hydrology in France, <i>Jean J. Fried</i>	1109
Hydrologic Education in Canada, <i>Don M. Gray</i>	1125
Hydrologic Education in the United Kingdom, <i>M. J. Hall</i>	1136
Hydrologic Education in Australia and New Zealand, <i>J. R. Burton</i>	1156
Hydrologic Education in India, <i>V. C. Kulandaiswamy</i>	1178
Hydrologic Education in the Federal Republic of Germany, <i>K. Lecher</i>	1191
Hydrology in Taiwan, <i>Yen-Chi Lu</i>	1195
Education in Hydrology in Japan, <i>Masatugu Murakami</i>	1209
Hydrology in Colombia, <i>Carlos Angulo</i>	1219
Centre of Applied Hydrology, Hydraulics Research Institute, Federal University of Rio Grande do Sul, <i>Jose Leite de Souza</i>	1225
Hydrologic Education in Spain, <i>R. Heras</i>	1236
Hydrological Education in Czechoslovakia and Eastern Europe, <i>Jaromir Nemeš</i>	1246
International Higher Summer Courses for Instructors and Specialists in Hydrology, <i>V. D. Bykov</i>	1256
DISCUSSIONS	1267
On New Developments in Hydrology	1268
On Specialized Hydrologic Subjects	1280
On Hydrologic Education	1288