HYDROLOGY IN SCOTLAND

TRANSACTIONS OF THE ROYAL SOCIETY OF EDINBURGH



EARTH SCIENCES

Volume 78 Part 4

PUBLISHED BY THE ROYAL SOCIETY OF EDINBURGH

22 GEORGE STREET · EDINBURGH · EH2 2PQ

1987

Editorial Board

B. J. BLUCK University of Glasgow (Executive Editor)

P. E. BROWN University of Aberdeen (Chairman)

E. N. K. CLARKSON University of Edinburgh (Executive Editor)

S. CRAMPIN British Geological Survey

C. D. WATERSTON

General Secretary

Royal Society of Edinburgh

B. HARTE University of Edinburgh (Executive Editor)

R. MCQUILLIN Britoil plc.

I. PARSONS University of Aberdeen

V. B. PROUDFOOT University of St Andrews

W. RITCHIE University of Aberdeen

B. G. J. UPTON University of Edinburgh

W. DUNCAN
Executive Secretary
Royal Society of Edinburgh

Consulting Editors

H. P. BANKS
Cornell University, Ithaca
R. G. C. BATHURST
University of Liverpool
J. M. COLEMAN
Louisiana State University, Baton Rouge
J. F. DEWEY

University of Oxford R. W. HUTCHINSON Colorado School of Mines

E. JÄGER Universität Bern

J. KONTA Charles University, Prague

K. J. MÜLLER Rhein. Friedrich-Wilhelms-Universität J. V. SMITH University of Chicago

D. F. STRONG Memorial University, St Johns

V. C. THAKUR Wadia Institute of Himalayan Geology

S. UYEDA University of Tokyo

O. VAN BREEMEN Geological Survey of Canada, Ottawa

D. E. WHITE U.S. Geological Survey, Menlo Park

R. WOODALL Western Mining Co., Adelaide

Publications Secretary, Royal Society of Edinburgh: E. A. Ingpen

COPYRIGHT: It is the policy of the Royal Society of Edinburgh not to charge any royalty for the production of a single copy of any one article made for private study or research. Requests for the copying or reprinting of any article for any other purpose should be sent to the Royal Society of Edinburgh.

© 1987 The Royal Society of Edinburgh and the authors of individual papers.

TRANSACTIONS

OF

THE ROYAL SOCIETY OF EDINBURGH: EARTH SCIENCES

TRANSACTIONS

OF

THE ROYAL SOCIETY OF EDINBURGH: EARTH SCIENCES

TRANSACTIONS

OF

THE ROYAL SOCIETY OF EDINBURGH: EARTH SCIENCES

Volume 78

PUBLISHED BY THE ROYAL SOCIETY OF EDINBURGH 22 GEORGE STREET, EDINBURGH EH2 2PQ

1987

CONTENTS

The structural evolution of the Dalradian of the Central Highlands of Scotland. By J. E. TREAGUS
Episodic Ordovician-Silurian plutonism in the Topsails igneous terrane, western Newfoundland. By J. B. WHALEN, K. L. CURRIE and O. VAN BREEMEN
Sedimentology of part of the Lower Oil-Shale Group (Dinantian) sequence at Granton, Edinburgh, including the Granton "shrimp-bed". By JOHN M. L. CATER
The age of the Springdale Group, western Newfoundland, and correlative rocks—evidence for a Llandovery overlap assemblage in the Canadian Appalachians. By F. W. CHANDLER, R. W. SULLIVAN and K. L. CURRIE
Niveo-aeolian sand deposits on An Teallach, Wester Ross, Scotland. By COLIN K. BALLANTYNE and GRAEME WHITTINGTON
Growth and function of the micro-frills present on the Devonian brachiopod <i>Athyris campomanesi</i> (Verneuil & Archiac). By FERNANDO ALVAREZ, COVADONGA BRIME and GORDON B. CURRY
Observations on Eristophyton Zalessky, Lyginorachis waltonii Calder, and Cladoxylon edromense sp. nov. from the Lower Carboniferous Cementstone Group of Scotland. By ALBERT G. LONG
Formation of late Caledonian subvolcanic breccia pipes at Cruachan Cruinn, Grampian Highlands, Scotland. By I. M. PLATTEN, and M. S. MONEY
The Ordovician graptoloid <i>Didymograptus murchisoni</i> in South Wales and its use in three-dimensional absolute strain analysis. By C. J. JENKINS
Geochemistry and original nature of Precambrian khondalites in the Eastern Ghats, Orissa, India. By B. DASH, K. N. SAHU and D. R. BOWES
Environment of deposition of conglomerates from the Silurian of north Galway, Ireland. By D. MICHAEL WILLIAMS and P. D. O'CONNOR
Carboniferous dikes of West Connacht, Ireland. By J. G. MITCHELL and P. MOHR
Evidence for late Ordovician amalgamation of volcanogenic terranes in the Iapetus suture zone, eastern Ireland. By FINBARR C. MURPHY
A terminal debris-flow lobe in the northern Pennines, United Kingdom. By P. A. CARLING
The shape of the Upper Carboniferous non-marine bivalve <i>Anthraconaia</i> in relation to the organic carbon content of the host sediment. By R. M. C. EAGAR
Restoration of the Caledonian Baltoscandian margin from balanced cross-sections: the problem of excess continental crust. By R. A. GAYER, A. H. N. RICE, D. ROBERTS, C. TOWNSEND and A. WELBON
Constraints on the significance of the Orlock Bridge Fault within the Scottish Southern Uplands—a discussion of "The Orlock Bridge Fault: a major Late Caledonian sinistral fault in the Southern Uplands terrane, British Isles." By J. D. FLOYD, P. STONE, R. P. BARNES and B. C. LINTERN
Reply to "Constraints on the significance of the Orlock Bridge Fault within the Scottish Southern Uplands", a discussion of "The Orlock Bridge Fault: a major Late Caledonian sinistral fault in the Southern Uplands terrane, British Isles". By T. B. ANDERSON and G. J. H. OLIVER
The Balquhidder catchments, Scotland: the first four years. By J. R. BLACKIE
The Loch Fleet project, SW Scotland. By GWYNETH HOWELLS and D. J. A. BROWN
The Loch Dee project: runoff and surface water quality in an area subject to acid precipitation and afforestation in SW Scotland. By W. T. WELSH and J. C. BURNS
Snowmelt modelling in the Cairngorms, NE Scotland. By R. I. FERGUSON and E. M. MORRIS
Factors affecting the future of the Scottish hydrometric network. By T. POODLE
The use of long-term rainfall records for augmenting historic flood series: a case study on the upper Dee, Aberdeenshire, Scotland. By L. J. McEWEN
Ecohydrology of Scottish peatlands. By H. A. P. INGRAM
The hydrology of a drained, afforested peat bog in southern Scotland, 1977–1986. By D. C. LEDGER and S. E. HARPER

Flood frequency estimation in Scotland using index floods and regional growth curves. By M. C. ACREMAN and A. WERRITTY
Experimental and computational aspects of overbank floodplain flow. By D. A. ERVINE and J. ELLIS
Processes of evaporation from vegetation of the uplands of Scotland. By R. L. HALL
The effect of catchment afforestation on public water supplies in Strathclyde Region, Scotland. By L. A. GREENE 335
Solute leaching in light-textured soils: prediction of solute leaching in light-textured soils using a chromatographic plate method. By A. J. A. VINTEN, S. YAZID, D. B. NAYSMITH and M. E. PARKES
A re-assessment of phosphorus inputs to Loch Leven (Kinross, Scotland): rationale and an overview of results on instantaneous loadings with special reference to runoff. By A. E. BAILEY-WATTS and A. KIRIKA
Sediment yields in lowland Scotland derived from reservoir surveys. By ROBERT W. DUCK and JOHN McMANUS
Forestry effects on suspended sediment and bedload yields in the Balquhidder catchments, Central Scotland. By R. I. FERGUSON and T. A. STOTT
Modelling the effect of acid deposition in upland Scotland. By P. G. WHITEHEAD and C. NEAL
Episodic acidification of streams at Loch Dee, SW Scotland. By S. J. LANGAN
Soils and surface water quality in northeastern Scotland. By MALCOLM S. CRESSER, KENNETH B. PUGH and ANTHONY C. EDWARDS
Index to Volume 78

HYDROLOGY IN SCOTLAND

Proceedings of a Symposium organised by

THE ROYAL SOCIETY OF EDINBURGH

in association with THE BRITISH HYDROLOGICAL SOCIETY

and

THE SCOTTISH HYDROLOGICAL GROUP OF THE INSTITUTION OF CIVIL ENGINEERS

and held in

The Wolfson Theatre
Royal Society of Edinburgh
22 George Street, Edinburgh

on

Wednesday and Thursday, 15 and 16 October 1986

CONTENTS

Preface. By V. B. PROUDFOOT	xi
Research catchments in Scotland	
The Balquhidder catchments, Scotland: the first four years. By J. R. BLACKIE	227
The Loch Fleet Project, SW Scotland. By GWYNETH HOWELLS and D. J. A. BROWN	241
The Loch Dee project: runoff and surface water quality in an area subject to acid precipitation and afforestation in SW Scotland. By W. T. WELSH and J. C. BURNS	249
Hydrometeorology	
Snowmelt modelling in the Cairngorms, NE Scotland. By R. I. FERGUSON and E. M. MORRIS	261
Factors affecting the future of the Scottish hydrometric network. By T. POODLE	269
The use of long-term rainfall records for augmenting historic flood series: a case study on the upper Dee, Aberdeenshire, Scotland. By L. J. McEWEN	275
Surface and subsurface hydrology	
Ecohydrology of Scottish peatlands. By H. A. P. INGRAM	287
The hydrology of a drained, afforested peat bog in southern Scotland, 1977–1986. By D. C. LEDGER and S. E. HARPER	297
Rainfall-runoff modelling	
Flood frequency estimation in Scotland using index floods and regional growth curves. By M. C. ACREMAN and A. WERRITTY	305
Engineering and applied hydrology	
Experimental and computational aspects of overbank floodplain flow. By D. A. ERVINE and J. ELLIS	315
Processes of evaporation from vegetation of the uplands of Scotland. By R. L. HALL	327
Land use and water quality	
The effect of catchment afforestation on public water supplies in Strathclyde Region, Scotland. By L. A. GREENE	335
Solute leaching in light-textured soils: prediction of solute leaching in light-textured soils using a chromatographic plate method. By A. J. A. VINTEN, S. YAZID, D. B. NAYSMITH and M. E. PARKES	341
A re-assessment of phosphorus inputs to Loch Leven (Kinross, Scotland): rationale and an overview of results on instantaneous loadings with special reference to runoff. By A. E. BAILEY-WATTS and A. KIRIKA	351
Sediment transport	
Sediment yields in lowland Scotland derived from reservoir surveys. By ROBERT W. DUCK and JOHN McMANUS	369
Forestry effects on suspended sediment and bedload yields in the Balquhidder catchments, Central Scotland. By R. I. FERGUSON and T. A. STOTT	379
Acidification of surface waters	
Modelling the effect of acid deposition in upland Scotland. By P. G. WHITEHEAD and C. NEAL	385
Episodic acidification of streams at Loch Dee, SW Scotland. By S. J. LANGAN	393
Soils and surface water quality in northeastern Scotland. By MALCOLM S. CRESSER, KENNETH B. PUGH and ANTHONY C. EDWARDS	399