

Netherlands Journal of Geosciences



Geologie en Mijnbouw



Netherlands Institute of Applied Geoscience TNO
- National Geological Survey



Royal Geological and Mining Society of the Netherlands

Geologie en Mijnbouw / Netherlands Journal of Geosciences

Geologie en Mijnbouw / Netherlands Journal of Geosciences (ISSN 0016-7746) is an international journal published by the 'Netherlands Journal of Geosciences' Foundation on behalf of the Royal Geological and Mining Society of the Netherlands (KNGMG) and the Netherlands Institute of Applied Geoscience TNO – National Geological Survey (NITG – TNO). It is the successor of the international journals of both the KNGMG (Geologie en Mijnbouw) and NITG – TNO (Mededelingen Nederlands Instituut voor Toegepaste Geowetenschappen TNO).

Address

Editorial Office Geologie en Mijnbouw / Netherlands Journal of Geosciences
P.O. Box 80015
3508 TA Utrecht
the Netherlands
tel. +31 (0)30-256 4600; fax +31 (0)30-256 4605
e-mail: njg@nitg.tno.nl

Editorial Board

J. Smit (Editor-in-Chief), Faculty of Earth Sciences, Vrije Universiteit, De Boelelaan 1085, 1081 HV Amsterdam, the Netherlands
Th.E. Wong, Netherlands Institute of Applied Geoscience TNO – National Geological Survey (NITG – TNO), P.O. Box 80015, 3508 TA Utrecht, the Netherlands
C. Kasse, Faculty of Earth Sciences, Vrije Universiteit, De Boelelaan 1085, 1081 HV Amsterdam, the Netherlands
D.A. Nieuwland (Technical Editor), 4e Binnenvestgracht 13, 2311 NT Leiden, The Netherlands

Advisory editors

H. Brinkhuis, Lab. of Palaeobotany and Palynology, Utrecht Univ., Budapestlaan 4, 3584 CD Utrecht, the Netherlands (palynology)
G. de Lange, Dept of Geochemistry, Institute of Earth Sciences, Utrecht University, Budapestlaan 4, 3584 CD Utrecht, the Netherlands (geochemistry)
M.M. Fischer, NITG – TNO, P.O. Box 80015, 3508 TA Utrecht, the Netherlands (Quaternary geology)
A.R. Fortuin, Fac. of Earth Sciences, Vrije Universiteit, De Boelelaan 1085, 1081 HV Amsterdam, the Netherlands (stratigraphy, sedimentology)
P. Gerling, Dept. of Hydrocarbon Research, BGR, Hannover, Germany (organic geochemistry, regional geology of Germany)
Ph. Gibbard, Quaternary Stratigraphy Group, Godwin Institute of Quaternary Research, Department of Geography, University of Cambridge, Downing Place, Cambridge CB2 3EN, United Kingdom (Quaternary geology, regional geology UK)
H.R.G.K. Hack, ITC, Kanaalweg 3, 2628 EB Delft, the Netherlands (engineering geology)
G.F.W. Herengreen, NITG – TNO, P.O. Box 80015, 3508 TA Utrecht, the Netherlands (palynology)
T. Hobma, ITC International Institute for Aerospace Survey & Earth Sciences, Division of Applied Geomorphological Survey, P.O. Box 6, 7500 AA Enschede, the Netherlands (hydrogeology, geo-information systems, modelling)
R. Isarin, Projectgroep Archeologie Betuweroute en HSL, P.O. Box 2484 (AVS 670), 3500 GL Utrecht, the Netherlands (sedimentology, Quaternary geology)
J.W.M. Jagt, Natuurhistorisch Museum Maastricht, De Bosquetplein 6-7, 6211 KJ Maastricht, the Netherlands (paleontology, regional geology SE Netherlands)
J. Kwadijk, Wat. Lab., Techn. Univ. Delft, P.O. Box 177, 2600 MH Delft, the Netherlands (hydrology)
C.G. Langereis, Laboratory of Paleomagnetism, Utrecht University, Budapestlaan 17, 3584 HD Utrecht, the Netherlands (paleomagnetism)
J.E. Meulenkamp, Institute of Earth Sciences, Utrecht University, Budapestlaan 4, 3584 CD Utrecht, the Netherlands (paleontology, stratigraphy, paleoecology)
H. Middelkoop, Department of Physical Geography, Utrecht University, P.O. Box 80.015, 3508 TC Utrecht, the Netherlands (physical geography)
R.T. van Balen, NITG – TNO, P.O. Box 80015, 3508 TA Utrecht, the Netherlands (structural geology, modelling)
N. Vandenberghe, Institute of Earth Sciences, Leuven University, Redingenstraat 16bis, B-3000 Leuven, Belgium (Quaternary geology)
C. J. van der Zwan, c/o SIEP-RTS, P.O. Box 60, 2280 AB Rijswijk, the Netherlands (petroleum geology)
M.E. van Donselaar, Department of Technical Earth Sciences, Delft University of Technology, Mijnbouwstraat 120, 2628 RX Delft, the Netherlands (sedimentology)
B. van Geel, Hugo de Vries Laboratory, Department of Palynology/ Paleoecology, Amsterdam University, Kruislaan 318, 1098 SM Amsterdam, the Netherlands (palynology, paleoecology, Quaternary geology)
Tj. van Weering, NIOZ, P.O. Box 59, 1790 AB Den Burg (Texel), the Netherlands (marine geology, North Sea)
T. Veldkamp, Laboratory of Soil Science and Geology, Agricultural University, P.O. Box 37, 6700 AA Wageningen, the Netherlands (physical geography)
G.J. Weltje, Department of Technical Earth Sciences, Delft University of Technology, Delft, the Netherlands (sedimentology, mathematical geology)
F. Wesseling, Naturalis – National Museum of Natural History, Darwinweg 2, 2333 CR Leiden, the Netherlands (paleontology)

Special issue:



**Groningen
Catalyst for the North West European oil
and gas industry**

**Congress Groningen 40 years
31 May – 1 June 1999**

**Edited by
H. Dronkert & E. Dijkhuis**

In 1999 the Groningen gas field will turn forty

On a human time scale forty years gone probably means another forty years to go. This is a good or celebration and for taking stock; to think about how the first forty years were used, what could have been done better, where we are now and the best way to spend the next forty years. The discovery of the giant Groningen gas field was the most significant event to take place in the European petroleum industry in the second half of the 20th century. The Groningen gas field stimulated the building of an extensive European natural gas distribution network. Through this network, gas from the North Sea, onshore NW Europe, Eastern Europe, North Africa and gas imported as LNG now flows. The finding of gas in Groningen was the catalyst for the discovery of the major North Sea oil and gas province.

Contents

| | |
|--|---|
| Preface, W.J.E. van de Graaff | 3 |
| Groningen 40 years, a special issue, H. Dronkert | 5 |
| Dinner speech & conference wrap up, J.A. Oele | 7 |

Abstracts first day presentations

| | |
|--|----|
| Ms. A. Jorritsma-Lebbink: Minister of Economic Affairs (opening address) Gas: Source of prosperity | 11 |
| H.J.M. Roels: Managing Director, NAM Groningen field, past, present and future | 12 |
| G.H.B. Verberg: General Managing Director, NV Nederlandse Gasunie Groningen, Gasunie and the gas market | 15 |
| P. Mellbye: Executive Vice President, Statoil Non-Groningen gas supplies for Western Europe | 16 |
| Ms A.C. Quinn: Managing Director, BP Amoco Gas Marketing Ltd. Past, present and future of the gas market in the North Sea region | 17 |
| Ch. Burgos: Director-General DGXVII (Energy), European Commission Groningen in the European context | 18 |
| N. van Hulst: Director-General Energy, Ministry of Economic Affairs Gas: government and market | 19 |
| R.F.M. Lubbers: Chairman of the Mining Council, former Prime Minister of the Netherlands Groningen – its impact on European society | 20 |

| | |
|------------------|----|
| Acknowledgements | 22 |
|------------------|----|

Conference Papers

| | |
|---|-----|
| L.D. Alblas: The petroleum industry in the Netherlands - its setting and possible future | 23 |
| K.W. Glennie: Exploration activities in the Netherlands and North-West Europe since Groningen | 33 |
| C. Hern, U. Nordlund, K. van der Zwan & K. Ladipo: Forward prediction of aeolian systems using fuzzy logic, constrained by data from recent and ancient analogues | 53 |
| N. Hoffmann, H. Jödicke & P. Gerling: The distribution of Pre-Westphalian source rocks in the North German Basin-Evidence from magnetotelluric and geochemical data | 71 |
| Th.E. Wong, N. Parker & P. Horst: Tertiary sedimentary development of the Broad Fourteens area, the Netherlands | 85 |
| F.J. Hollman: Integrated gas field development: The Anjum story | 95 |
| J. van Berkel: U. Kaymak, G. Kulawski, T. Weisenborn & M. White: Gas field planning tool | 103 |
| E. van der Schans, J.W.N van Lijssel & P. van Steenderen: Value Analysis: Capturing Total Cost of Ownership reduction opportunities in E&P projects | 107 |
| B.G. Taverne: The concession Groningen: A lawyer's view | 113 |
| H.J. Gussinklo, H.W. Haak, R.C.H. Quadvlieg, P.M.F.M. Schutjens & L. Vogelaar: Subsidence, tremors and society | 121 |
| A.F. Correljé & P.R. Odell: Four decades of Groningen production and pricing policies | 137 |