

Petroleum Geology of Northwest Europe:  
Proceedings of the 5th Conference

Volume 1

# Petroleum Geology of Northwest Europe: Proceedings of the 5th Conference

held at the Barbican Centre, London, 26–29 October 1997

## Volume 1

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## Foreword

The Fifth Conference on the Petroleum Geology of NW Europe was held in the Barbican Centre, London, on 26–29 October 1997.

The conference was sponsored jointly by The Geological Society, the Institute of Petroleum, Petroleum Exploration Society of Great Britain (PESGB) and Joint Association for Petroleum Exploration Courses (JAPEC) and endorsed by the Oil & Gas Directorate of the UK Department of Trade and Industry, the Society of Petroleum Engineers (SPE), the British Geological Survey (BGS), the United Kingdom Offshore Operators Association (UKOOA), the Petroleum Affairs Division of the Irish Department of Marine and Natural Resources, the American Association of Petroleum Geologists (AAPG) and the Danish Energy Agency – Ministry of Environment and Energy.

The Organizing Committee appreciate the support of these organizations and also wish to acknowledge generous financial support from the oil industry:

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We had the great pleasure of inviting Leslie Illing and Douglas Hobson (editors of the 1980 NW Europe Conference volume), Ken Glennie (co-editor of the 1986 Conference volume) and Derek Blundell (organizer of the University Displays for the past 3 conferences) as our distinguished guests. Also present as guests were Richard Hardman (President of The Geological Society), David Setchell (President of the Institute of Petroleum), Colin Gray (Chairman of PESGB), Michael Fisher (Chairman of JAPEC), John Mitchell (Director Oil & Gas – UK DTI) and Pierre Jungels (Chief Executive of Enterprise Oil plc).

This series of NW Europe conferences is a key event for the oil and gas industry and the technical programme and resulting conference proceedings are important events for both large and small oil companies, consultants, service companies and academics.

There were over 1300 delegates at the Fifth Conference – including 325 from 18 countries other than the UK – who appreciated and enjoyed the technical and social events. There were 120 technical papers and posters written by over 400 different authors representing many aspects of the oil and gas industry. The Core Workshop had 35 displays of about 530m (1750 feet) of core representing most sub-basins in the North Sea with additional displays from the Norwegian Atlantic Margin, Barent Sea, Greenland, Denmark and Norway and offshore UK. There were also 16 displays of geological and geophysical projects being undertaken in UK Universities.

The Gala Dinner was held in the Banqueting House in Whitehall with some 350 delegates and guests enjoying the meal and our after dinner speaker – The Right Honourable Tony Benn MP – who, during his time as UK Energy Minister, saw the first North Sea oil flow from the Argyll Field in June 1975.

In conclusion, I wish to thank and acknowledge the help and support of all the people who contributed scientific papers, posters and core displays to the conference. With particular thanks to those companies who released so much new information for the first time to such expectant audiences.

I also wish to thank the Conference Technical Committee – especially Andy Fleet and Steve Boldy and their session convenors for their hard and dedicated work in putting the sessions together and for their ongoing post-conference work in preparing this proceedings volume.

My final words must be special ‘Thank Yous’ to John Brooks, John Parker and George Meakin – whose wise words and advice both on and off the Organizing Committee were always a great help to me. Other members of the Organizing Committee gave valuable time and effort to ensure that preparations for the conference and exhibition were well organized and directed – busy people who gave their time willingly towards making the conference such a great success.

Vanessa Ward and Sharon Pigeon (together with ‘many others’) from CASIL administered and organized the conference on behalf of Petroleum Geology ‘86 Limited and they are acknowledged for all their effort and work before and during the conference and exhibition.

Thank you to all those who contributed, attended and helped with the conference – it was a great privilege and pleasure to be Chairman of such a successful and enjoyable event.

Enjoy the proceedings and we hope the papers will assist you in finding some new oil and gas – or at least to understand where you went wrong the last time!

*Jim Brooks*  
*Conference Chairman*

# General Introduction

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The 'Fifth Conference on the petroleum geology of northwest Europe' threw the spotlight on the Atlantic margin from Norway to Ireland. Discoveries West of Shetland over the five years or so since the last conference, and continually improving deep-water technology, provide the allure of this region. However, the economic engine of the petroleum industry in northwest Europe is still the North Sea, so the needs for exploration in this 'mature' province and for effective field development and reservoir management remained at the heart of the conference.

These proceedings reflect these complementary concerns of the industry. Volume 1 first provides the structural framework both overall and in detail for the Atlantic margin and the North Sea. It then reviews our knowledge of the Atlantic margin from north to south drawing on evidence from Greenland and eastern Canada. Volume 1 finally focuses on the present centre of activities along the margin West of Shetlands to the Faeroes. Volume 2 is primarily concerned with the North Sea and first provides examples of current exploration interest and of reservoir development and management before looking at some of the new tools in the technological armoury and their applications. The earlier sections within the volume cover Southern North Sea gas fields, subtle traps for petroleum in the Jurassic, the 'renaissance' of Chalk prospects, high temperature/high pressure plays and fields, and integrated field development and reservoir management. The later sections on 'technology' address reservoir studies, geophysics and basin modelling.

The sections of the volumes directly reflect the proceedings of the conference. With ever-increasing integration of disciplines within the geosciences and of the geosciences with other industry skills, particularly those of engineering, and with the need to transfer technology from asset to asset, the applicability of most papers is far wider than the sections into which we have had to pigeon-hole them. Common approaches, concepts and technological advances run through many of the papers. Of these the following stand out as being prime issues and developments of the last five years and, seemingly, of the moment:

- the development and application of 3D seismic, time-lapse ('4D') seismic and other innovative seismic tools;
- the ongoing refinement of sequence and other stratigraphic approaches, including the integration of detailed biostratigraphic data;
- the development of modelling at both the reservoir and basin scale which can respond to new data acquisition and be used to assess uncertainties at the reservoir scale and scenarios at the basin scale.

The first of these areas provided two of the highlights of the conference. Patrick Leach won the best paper award for his presentation on the first vertical cable seismic survey in the North Sea which was undertaken around the Strathspey Field. Bob White and his colleagues and collaborators won the best poster award for their presentation of the Faeroes Large Aperture Experiment (FLARE) which successfully allowed them to map sediments and basement under up to several kilometres of basalt east of the Faeroes.

Another highlight of the conference was the 'Core display and discussion forum' which certainly lived up to the latter part of its name. This owed its success to the energies of Colin Oakman and John Martin, who built on their equally successful efforts for the Fourth Conference, and to Howard Johnson.

The papers in these proceedings represent nearly all that were presented at the conference whether verbally or as posters. With the area considered in detail being greater than that at previous conferences, and with stratigraphic nomenclature being developed for new areas such as West of Shetland, it has been impossible to impose uniformity of geographical and structural or stratigraphic nomenclature across all papers. We have encouraged authors to follow the structural terminology of the Petroleum Exploration Society of Great Britain's map of the *Structural framework of the North Sea area* (1997 edition) except where this does not cover the area of interest or conflicts with nomenclature recognized by the relevant national licensing authority. Following the PESGB map has resulted in the anomaly of using the spelling Faeroe rather than Faroe, the local spelling; our apologies for this oversight. In the case of stratigraphic nomenclature we have asked authors to identify the basis of the terminology very clearly. In the case of timescales we have suggested they follow Harland *et al.* (1990: *A geologic time scale 1989*, Cambridge University Press) or explicitly state the source of the timescale used. As with previous proceedings, a list of common abbreviations is to be found near the back of each volume.

The last, and by far the most important, words of this general introduction are of thanks to all those who contributed to the success of the conference and to the production of these proceedings: first to our colleagues on the Technical Committee who brought the papers together both at the conference and now in these proceedings, acting as editors for their individual sections; second to the authors and their companies or universities whose work and support were at the core of the endeavour; and finally to Jo Cooke from the Geological Society Publishing House who, initially with Mary Ker, patiently and efficiently steered us through production of these proceedings.