

## Professor Graham Westbrook

Emeritus Professor of Geophysics

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### Biography

BSc London Geology - 1970; PhD Marine Geophysics - Durham 1974. Senior Demonstrator, University of Durham 1973-1974. Lecturer in Geophysics, University of Keele 1974-1976. Lecturer in Geophysics, University of Durham 1977-1984. Professor of Geophysics, University of Birmingham 1984-. Head of the Department of Geological Sciences 1984-1988. Head of the School of Earth Sciences 1996-1999. Adjunct Senior Research Scientist (part-time) Lamont-Doherty Earth Observatory of Columbia University, USA. 1985-1999. During his research career, Graham Westbrook has held 28 research grants and contracts and he has participated in 22 marine geological and geophysical research cruises. He has taught a wide range of subjects at both BSc and MSc level in the fields of geophysics and tectonics.

### Postgraduate supervision

#### Researchers supervised since 2005

S. Alexandry – (PhD) Classification and interpretation of seabed geology from analysis of combined sonar and acoustic profiling data. - (European Commission, and self)

H. Sherif – (PhD) Sequence stratigraphy of evaporites and their development in the late Triassic Ghadames-Berkine basin of North Africa. - (Libyan Government)

R. R. Haacke – (PhD) Multicomponent seismic investigation of elastic anisotropy and gas hydrates in the continental margin of west Svalbard. - (University, and Society of Exploration Geophysicists Ian Jack Postgraduate Scholarship)

R. J. K. Exley – (PhD) Seismic anisotropy in gas-hydrate bearing sediments and continental slope stability. - (NERC, CASE with Veritas DGC)

**[B. Jibrin \(http://www.gees.bham.ac.uk/staff/pgbwj620.shtml\)](http://www.gees.bham.ac.uk/staff/pgbwj620.shtml)** – (PhD) Analysis of fault curvature from 3D seismic data near the toe of the Niger Delta. - (Univation Limited)

A. Gailler – (Post-doc) Seismic analysis of the 3D structure and properties of fluid-escape chimneys in the Nyegga region offshore Norway. - (European Commission)

R. J. K. Exley - (Post-doc) Seismic analysis of the 3D structure and properties of fluid-escape chimneys in the Nyegga region offshore Norway. - (European Commission)

**[K. E. Thatcher \(file:///C:/staff/thatcherke.shtml\)](file:///C:/staff/thatcherke.shtml)** – (Post doc) Modelling release of methane from gas hydrate in polar continental margins since the last glacial maximum. - (NERC)

### Research

#### Research interests

- Geophysical investigations of the structure and tectonics of convergent plate boundaries, especially accretionary complexes
- Interaction between deformation, fluid pressure and flow, in sediments
- Gas hydrates in submarine continental margins

#### Current and recent research

##### ***Techniques for the Quantification of Methane Hydrate in European Continental Margins***

This project developed and tested seismic techniques for detecting and quantifying the amount of methane hydrate in the sediments of continental margins. (European Commission), with C. Long, S. Peacock, R. Haacke (Birmingham University), T. Reston, M. Zillmer, E. Flueh (IFM-GEOMAR, Germany), J-P. Foucher, H. Nouzé, I. Contrucci, F. Klingelhoefer (IFREMER, France), A.I. Best, J.A. Priest (NERC Southampton Oceanography Centre) A. Camerlenghi, J. Carcione, G. Rossi, G. Madrussani, D. Gei (OGS Trieste, Italy), J. Mienert, M. Vanneste, S. Buenz (Tromsø University, Norway), S. Hetland (RF, Norway), R. Larsen, E. Habetinova (SINTEF, Norway), T.A. Minshull, S. Chand, C.R.I Clayton, S. Dean (Southampton University) web site: <http://hydrattech.bham.ac.uk> (<http://hydrattech.bham.ac.uk/>).

##### ***Seismic anisotropy and slope stability on the flank of the Storegga slide***

Seismic anisotropy was used to detect the presence of cracks in sediments on the flank of the Storegga slide off Norway, and their orientation and distribution was examined in relation to the stability of the submarine slope in which they occur. (NERC Ocean Margins LINK Programme), with R.J.K. Exley (research student) and S. Ronen (Veritas-DGC).

##### ***HERMES – Hotspot Ecosystem Research on the Margins of European Seas***

This project, which is a component of HERMES, used high-resolution seismic techniques to investigate the 3D structure and properties of chimneys through which fluids, including gas, migrate to the sea floor. (FP6 European Commission), principal collaborators: R.J.K. Exley (Birmingham University), T.A. Minshull (NOC, Southampton) H. Nouzé, J.P. Foucher, S. Ker (IFREMER, France), and A. Plaza-Faverola (Tromsø University, Norway), web site: <http://www.eu-hermes.net> (<http://www.eu-hermes.net/>)

##### ***Structure and tectonics of the accretionary wedge of the Gulf of Cadiz***

An examination of the seismic and other evidence for recent deformation in this accretionary wedge. A megathrust event at the base of this wedge may have been responsible for the Lisbon earthquake and tsunamis of 1755. (CNRS, France), in collaboration with M.A. Gutscher (IUEM, France).

## Dynamics of gas hydrates in polar marine environments 2007-10

An investigation of the evidence for the release of methane from gas hydrate in polar continental margins since the last glacial maximum, and an assessment of how much would be released by global warming in the future. (NERC), principal collaborators: K.E. Thatcher (Birmingham University), T.A. Minshull (NOC, Southampton), E. Nisbet (Royal Holloway, University of London), C. Berndt (IFM-Geomar, Germany), web site: <http://www.noc.soton.ac.uk/gg/IPY/index.html> (<http://www.noc.soton.ac.uk/gg/IPY/index.html>).

## Publications

### Key Publications since 2006

- Thatcher, K.E., Westbrook, G.K., Sarkar, S. and Minshull, T.A. 2013. Methane release from warming-induced hydrate dissociation in the West Svalbard continental margin: timing, rates and geological controls, *Journal of Geophysical Research*, doi: 10.1029/2012JB009605.
- Gutscher, M.-A., Westbrook, G.K., Marcaillou, B., Graindorge, D., Gailler, A., Pichot, T. and Maury, R. 2013. How wide is the seismogenic zone of the Lesser Antilles forearc? *Bull. Soc. Geol. Fr.*, 184, 47-59, doi:10.2113/gssgfbull.184.1-2.47.
- Pichot, T., Patriat, M., Westbrook, G.K., Nalpas, T., Gutscher, M.A., Roest, W.R., Deville, E., Moulin, M., Aslanian, D., Rabineau, M. 2012. The Cenozoic tectonostratigraphic evolution of the Barracuda Ridge and Tiburon Rise, at the western end of the North America-South America plate boundary zone, *Marine Geology*, 303-306, 154-171.
- Thomas, Y., Marsset, B., Westbrook, G.K., Grall, C., Géli, L., Henry, P., Cifçi, G., Rochat, A., Saritas, H. 2012. Contribution of high-resolution 3D seismic near-seafloor imaging to reservoir-scale studies: application to the active North Anatolian Fault, Sea of Marmara, *Near Surface Geophysics*, 10, 291-301.
- Gutscher, M.-A., Dominguez, S., Westbrook, G.K., Le Roy, P., Rosas, F., Duarte, J.C., Terrinha, P., Miranda, J.M., Graindorge, D., Gailler, A., Sallares, V., Bartolome, R. 2012. The Gibraltar subduction: A decade of new geophysical data, *Tectonophysics*, 574-575, 72-91.
- Sarkar, S., Berndt, C., Minshull, T.A., Westbrook, G.K., Klaeschen, D., Masson, D.G., Chabert, A., Thatcher, K.E. 2012. Seismic evidence for shallow gas-escape features associated with a retreating gas hydrate zone offshore west Svalbard, *Journal of Geophysical Research*, 117, B09102, doi:10.1029/2011JB009126.
- Chabert, A., Minshull, T.A., Westbrook, G.K., Berndt, C., Thatcher, K., Sarkar, S. 2011. Seismic characterisation of gas hydrate and free gas along the western continental margin of Svalbard, *Journal of Geophysical Research*, 116, B12102, doi:10.1029/2011JB008211.
- Patriat M., Pichot T., Westbrook G.K., Umler M., Deville E., Bénard F., Roest W.R., Loubrieu B. and the ANTIPLAC cruise party 2011. Evidence for Quaternary convergence across the North America - South America plate boundary zone, east of the Lesser Antilles, *Geology*, 39, 979-982.
- Sarkar, S., Berndt, C., Chabert, A., Masson, D.G., Minshull, T.A., Westbrook, G.K. 2011. Switching of a paleo-ice stream in northwest Svalbard. *Quaternary Science Reviews*, 28, 2564-2581.
- Sarkar, S., Chabert, A., Berndt, C., Minshull, T.A., Westbrook, G.K., Klaeschen, D., Masson, D.G. 2011. Seismic evidence for shallow fluid-escape features offshore western Svalbard, in *Proceedings of the 7th International Conference on Gas Hydrates*, Edinburgh, 17-23 July 2011. 10p.
- Thatcher, K. & Westbrook, G.K. 2011. Timing of methane release from hydrate dissociation on the west Svalbard margin, in *Proceedings of the 7th International Conference on Gas Hydrates*, Edinburgh, 17-23 July 2011. 12p.
- Exley, R.J.K., Westbrook, G.K., Haacke, R.R., Peacock, S. 2010. Detection of seismic anisotropy using ocean bottom seismometers: a case study from the northern headwall of the Storegga Slide, *Geophysical Journal International*, 183, 188-210, doi: 10.1111/j.1365-246X.2010.04730.x.
- Plaza-Faverola, A., Westbrook, G.K., Ker, S., Exley, R.J.K., Gailler, A., Minshull, T.A., and Broto, K. 2010. Evidence from 3D seismic tomography for a substantial accumulation of gas hydrate in a fluid-escape chimney in the Nyegga pockmark field, offshore Norway, *Journal of Geophysical Research*, 115, B08104, doi:10.1029/2009JB007078.
- Peacock, S., Westbrook, G.K., and Bais, G. 2010. S-wave velocities and anisotropy in sediment entering the Nankai subduction zone, offshore Japan, *Geophysical Journal International*, 180, 743-758 doi:10.1111/j.1365-246X.2009.04430.x
- Westbrook, G.K., Thatcher, K.E., Rohling, E.J., Piotrowski, A.M., Pälike, H., Osborne, A.H., Nisbet, E.G., Minshull, T.A., Lanoisellé, M., James, R.H., Hühnerbach, V., Green, D., Fisher, R.E., Crocker, A.J., Chabert, A., Bolton, C.T., Beszczynska-Möller, A., Berndt, C., Aquilina, A. 2009. Escape of methane gas from the seabed along the West Spitsbergen continental margin. *Geophysical Research Letters*, 36, L15608, doi:10.1029/2009GL039191.
- Gutscher, M.-A., Dominguez, S., Westbrook, G.K., Leroy, P. 2009. Deep structure, recent deformation and analog modeling of the Gulf of Cadiz accretionary wedge: implications for the 1755 Lisbon earthquake, *Tectonophysics*, 475, 85-97, doi:10.1016/j.tecto.2008.11.031.
- Haacke, R.R., Westbrook, G.K. and Peacock, S. 2009. Layer stripping of shear-wave splitting in marine PS-waves: an investigation into the practical limits of resolution. *Geophysical Journal International* 176, 782-804, doi:10.1111/j.1365-246X.2008.04060.x
- Foucher, J.P., Westbrook, G.K., Boetius, A., Ceramicola, S., Dupré, S., Mascle, J., Mienert, J., Pfannkuche, O., Pierre, C., Praeg, D. 2009. Structure and drivers of cold seep ecosystems, *Oceanography* 22(1), 92-109.
- Gutscher, M.-A., Dominguez, S., Westbrook, G.K., Gente, P., Babonneau, N., Mulder, T., Bartolome, R., Rosas, F. and the Delila and DelSis Scientific Teams. 2009. Tectonic shortening and gravitational spreading in the Gulf of Cadiz accretionary wedge: observations from multi-beam bathymetry and seismic profiling, *Marine and Petroleum Geology*, 26, 647-659, doi:10.1016/j.marpetgeo.2007.11.008.
- Gutscher, M.-A. and Westbrook, G.K. 2009. Great earthquakes in slow-subduction, low-taper margins, in S. Lallemand and F. Funiciello (eds.), *Subduction Zone Geodynamics*, p.119-133, *Frontiers in Earth Sciences*, Springer-Verlag Berlin Heidelberg, 119 doi:10.1007/978-3-540-87974-9.
- Westbrook, G.K., Chand, S., Rossi, G., Long, C., Bünz, S., Camerlenghi, A., Carcione, J.M., Dean, S., Foucher, J.P., Flueh, E., Gei, D., Haacke, R.R., Madrussani, J., Mienert, J., Minshull, T.A., Nouzé, H., Peacock, S., Reston, T., Vanneste, M., Zillmer, M. 2008. Estimation of gas-hydrate concentration from multi-component seismic data at sites on the continental margins of NW Svalbard and the Storegga region of Norway, *Marine and Petroleum Geology*, 25, 744-758, doi:10.1016/j.marpetgeo.2008.02.003.
- Westbrook, G.K., Exley, R., Minshull, T.A., Nouzé, H., Gailler, A., Jose, T., Ker, S., Plaza, A. 2008. High-resolution 3D seismic investigations of hydrate-bearing fluid-escape chimneys in the Nyegga region of the Vøring plateau, Norway. *Proceedings of the 6th International Conference on Gas Hydrates (ICGH 2008)*, Vancouver, British Columbia, CANADA, July 6-10, 2008, 12pp. [<https://circle.ubc.ca/handle/2429/1022>]
- Haacke, R.R., Westbrook, G.K. and Hyndman, R.D. 2008. Formation of the bottom-simulating reflector and its link to vertical fluid flow. *Proceedings of the 6th International Conference on Gas Hydrates (ICGH 2008)*, Vancouver, British Columbia, CANADA, July 6-10, 2008, 10pp. [<https://circle.ubc.ca/handle/2429/1022>]
- Exley, R., Westbrook, G.K., Peacock, S. and Haacke, R.R. 2008. Detecting fluid and gas migration pathways within the hydrate stability zone on the northern headwall of the Storegga slide. *Proceedings of the 6th International Conference on Gas Hydrates (ICGH 2008)*, Vancouver, British Columbia, CANADA, July 6-10, 2008, 7pp.

Haacke, R.R., Westbrook, G.K. and Smith, M.S. 2008. Controls on the formation and stability of gas hydrate-related bottom-simulating reflectors (BSRs): A case study from the west Svalbard continental slope, *Journal of Geophysical Research*, 113, B05104, doi:10.1029/2007JB005200.

Ivanov, M., Westbrook, G.K., Blinova, V., Kozlova, E., Mazzini, A., Nouzé, H. and Minshull, T.A. 2007. First sampling of gas hydrate from the Voring Plateau. *Eos, Transactions of the American Geophysical Union*, 88(19), 209-212.

Haacke, R.R., Westbrook, G.K. and Hyndman, R.D. 2007. Gas hydrate, fluid flow and free gas: formation of the bottom-simulating reflector, *Earth and Planetary Science Letters*, 261(3-4), 407-420, DOI:10.1016/j.epsl.2007.07.008

Haacke, R.R., and Westbrook, G.K. 2006. A fast and robust method for detecting and characterising azimuthal anisotropy with marine PS converted waves, and its application to the continental slope of west Svalbard. *Geophysical Journal International*, 167, 1402-1412, doi:10.1111/j.1365-246X.2006.03186.x

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