Energy & Geoscience Institute
AT THE UNIVERSITY OF UTAH

Since 1972

Training Courses

Basin Analysis: From Crustal Dynamics to Exploration

Instructors:

Michal Nemčok, PhD

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This 5-day course covers all the broad basin categories, addressing in each case controlling dynamics, structural architecture, stages of evolution, thermal regime, denudation and depositional settings – all culminating in petroleum systems. The course involves lectures, exercises and discussion. It incorporates current research and exploration trends, and provides opportunity for discussion tailored to specific geological problems and company interests.

Course Syllabus

Day 1

a) Global tectonics, lithospheric processes and basin classification
b) Intra-cratonic basins

Day 2

Rift basins and passive continental margins

Day 3

Strike-slip-related basins and transform margins

Day 4

Thrustbelts, active margins and foreland basins

Day 5

a) Recap and discussion
b) General exploration trends
c) Specific basins of interest

Course Material

The course draws strongly from the instructors' own exploration manuals published by Cambridge University Press: *Thrustbelts, Rifts and Passive Margins, and Strike-slip Terrains and Transform Margins* (in preparation). It is supplemented by other volumes edited by the instructors, for example the Geological Society volume *Transform margins: development, controls and petroleum systems, and by outside sources*. More detailed description of individual discussion points of first four days, course requirements and course material can be found at http://michalnemcok.sk/textbooks/.

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April 28, 2020 9:15 AM

Instructors

***Professor Michal Nemcok** has 30+ years' basic and applied research experience in structural geology, ranging for large-scale basin analysis to fracture research. He has more than 90+ publications, including five authored books and five co-edited volumes.*

***Professor Tony Doré** has 40 years' experience in the petroleum industry, with multiple academic connections. His 70+ publications, including seven co-edited books, have covered diverse subjects from broad-scale paleotectonic reconstruction to petroleum systems.*

References:

Nemčok, M., Schamel, S and Gayer, R. A., 2005. Thrustbelts: structural architecture, thermal regimes and petroleum systems. Cambridge University Press, Cambridge, 541pp.

Nemčok, M., 2016. Rifts and passive margins: structural architecture, thermal regimes and petroleum systems. Cambridge University Press, Cambridge, 607 pp.

Nemčok, M., Doré, A. G., Doran, H. and Henk, A., 2021. Strike-slip terrains and transform margins: structural architecture, thermal regimes and petroleum systems. Cambridge University Press, Cambridge, (in prep.).

Nemčok, M., Rybár, S., Sinha, S. T., Hermeston, S. A. and Ledvényiová, L., (Eds), 2015. Transform margins: development, controls and petroleum systems. Geological Society of London Special Publication No 431, http://doi.org/10.1144/SP431.)

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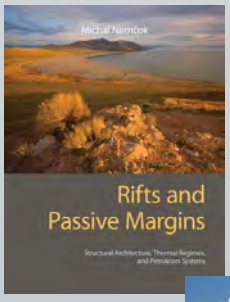
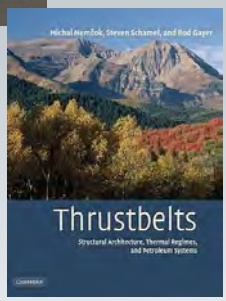
Research Interests

- Continental break-up processes and controlling factors
- Thrustbelt development and controlling factors
- Fracture development prediction





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Michal Nemčok, PhD

Research Professor

Michal holds a Ph.D. in Structural Geology from the Comenius University, Bratislava. He has 35 years of applied and basic research experience at the Slovak Geological Survey, University of South Carolina, University of Wales, Cardiff, Imperial College London, University of Salzburg, University of Wurzburg, and University of Utah. He joined EGI in 1998 and is a Research Professor and Structural Group leader. Michal has published 80+ articles, coauthored 5 monographs, and coedited five books.

Continental Break-up Processes & Controlling Factors

Continental break-up research focuses on both extensional and transform settings, with a focus on driving mechanisms and controlling factors to achieve predictive models with respect to structural architecture, thermal regimes, and petroleum systems. The main research contribution includes understanding anomalous thermal and uplift histories of transform margins, break-up mechanisms in extensional settings, and micro-continent-releasing mechanisms. A summary of his last eight years of break-up research is recorded in a monograph titled *"Rifts and Passive Margins; Structural Architecture, Thermal Regimes and Petroleum Systems"* published by Cambridge University Press, and authored by Nemčok, M. Together with co-authors, a new monograph called *Strike-slip Terrains and Transform Margins—Structural Architecture, Thermal Regimes & Petroleum Systems* is being written in contract with Cambridge University Press.

Thrustbelt Development & Controlling Factors

Michal's current research focuses on the thrustbelt-foreland interactions, with a concentration on driving mechanisms and controlling factors behind thick-skin tectonics, foreland plate flexure mechanisms, and flexural faulting in control of structural architecture and play concept elements. The main research contribution includes the factors and mechanisms leading to the lack of foreland flexing and transitions from initial inversion to full accretion. Accompanying research focuses on modeling of the fluid flow mechanisms occurring in the thrustbelt front and its foreland. A summary of thrustbelt research is written in a monograph called *"Thrustbelts; Structural Architecture, Thermal Regimes and Petroleum Systems",* published by Cambridge University Press, and authored by Nemčok, M., Schamel, S. and Gayer, R.. Current research findings are summarized in several articles included in the Geological Society of London Special Publication 377, which is edited by Nemčok, M., Mora, A., and Cosgrove, J.

Fracture Development Prediction

Fracture prediction research includes both detailed well core, rock outcrop and numerical simulation studies focused on predicting timing, location and kinematics of developing fractures. Most of the fracture studies come from thrustbelts, although some core-based studies come from various geothermal reservoirs. The main research contribution includes tools capable of predicting fracture locations, kinematics and propagation timing in two and three-dimensions for hydrocarbon reservoirs in thrustbelts, which were tested by well-based fracture data. Accompanying research includes understanding the role of mechanical stratigraphy on developing structural architecture. This research is published in a number of journals run by structural and geothermal communities.

EGI Energy & Geoscience Institute

... the science to find energy

Since 1972

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Research Interests

- Petroleum geology
- Regional geology, particularly of passive margins
- Hyperextended margins
- Basement reactivation
- Cratonic basins
- Petroleum systems of exhumed basins

Business Interests

- Prospect and play generation
- Commercial negotiation in the exploration domain
- Economics
- Future energy supply

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Recently retired from Equinor (formerly Statoil), Tony Doré obtained his PhD from University College London and joined the petroleum industry in 1977. He has held senior technical and leadership positions with Equinor (Statoil) for 20 years, including VP Exploration Americas (2002–2008) and VP North America (2008–2011), and is currently based in London.

He has worked petroleum provinces all over the world, with emphasis on NW Europe, the Arctic and the Americas. His achievements include major oil and gas discoveries in Norway, Brazil, Gulf of Mexico and Canada.

Tony has published on stratigraphy, NE Atlantic–Arctic evolution, basement reactivation, basin modelling, passive margin structure, transform margins, hyperextension, exhumed petroleum systems, and exploration risk analysis. He has edited books on basin modelling, resource quantification and passive margins.

He was Editor-in-Chief of the Journal of Petroleum Geoscience between 2006 and 2009, and chairman of the Geological Society Petroleum Group 2001-2003; chaired the 2003 Petroleum Geology of NW Europe conference and edited the subsequent proceedings (2005).

Tony serves on the advisory boards of several universities and currently holds an Honorary Professorship at Durham University.

His awards include the Petroleum Group Medal (2006), Order of the British Empire (OBE) in 2010 for services to geology, the AAPG Special Award, (2011), the William Smith Medal of the Geological Society (2015), Doctor of Science honoris causa Durham University (2016) and Lifetime Achievement Award from the Petroleum Group of the Geological Society, 2017.

Recent Publications

Doré, A.G., Lundin, E.R., Gibbons, A., Sømme, T. O & Tørudbakken, B.O. 2015. Transform margins of the Arctic: a synthesis and re-evaluation. In: Nemčok, M., Rybár, S., Sinha,S., Hermeston, S.A. & Ledvényiová, L. (eds.) *Transform Margins: Development, Controls, and Petroleum Systems*. Geological Society Special Publication. 431, 32 pp.

Lundin, E.R. & **Doré, A.G. 2017**. The Gulf of Mexico and Canada Basin: Genetic siblings on either side of North America. *GSA Today*, 27, 1, 4-11. Geological Society of America.

Lundin, E.R. & **Doré, A.G.** 2018. Non-Wilsonian break-up, pre-disposed by transforms: examples from the North Atlantic and Arctic. In: Wilson, R. W., Houseman, G. A., McCaffrey, K. J. W., Doré, A.G. & Buiter, S. J. H. (eds) Fifty Years of the Wilson Cycle Concept in Plate Tectonics. Geological Society, London, Special Publications, 470. Online First, 18 pp.

Sømme, T.O., **Doré, A.G.**, Lundin, E.R. & Tørudbakken, B.O. 2018. Triassic-Paleogene paleogeography of the Arctic: implications for sediment routing and basin fill. American Association of Petroleum Geologists Bulletin 102 (12), 2481-2517.