Energy & Geoscience Institute
AT THE UNIVERSITY OF UTAH

TRAINING COURSES

Instructor:

Michal Nemčok, Ph.D.
Research Professor

Rifts & Passive Margins

Structural Architecture, Thermal Regimes & Petroleum Systems

Available to EGI Corporate Associate Members

Course Structure

1-day up to 5-day classroom presentation plus exercises, Questions & Answers throughout

Duration

1-Day up to 5-Days

Location

EGI's Salt Lake facilities or Member's location

OVERVIEW

There is good reason to believe that rifts and passive margins will be productive sources of hydrocarbons well into the future. Finding new resources will include searching for deeper targets, by-passed resources and probing types of crusts other than continental crust. It will also include application of numerous predictive hydrocarbon screening tools developed from the systematic knowledge of hydrocarbon-producing mechanisms and their controlling factors.

The short course aims to provide a comprehensive understanding of rifts and passive margins as a whole. The aim is to synthesize existing information devoted to specific aspects of these most important hydrocarbon habitats. The short course, in its full length, assembles this information in one volume, in a manner that permits the knowledge to be used to assess the risks of exploring and operating in these settings and development of systematic and predictive hydrocarbon screening tools.

This synthesis is completed from results of personal, long-term research on rifts and passive margins, numeric validations of various concepts, and extensive tables documenting various factors influencing structural styles, thermal regimes, and petroleum systems, as well as rates of various geologic processes. This short course is a resource for exploration geologists, exploration scientists, oil company managers and students.

Short course can be tailored to 1-day, 2-day, 3-day, 4-day or 5-day short course, based on your time interval specification, from the following library of topics to choose from:

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Structural architecture

1. Basic description of structural architecture
2. Mechanics of rifting and transition to drift phases
3. Determination of unstretched continental, thinned continental, proto-oceanic and oceanic crustal boundaries
4. Determination of timing of rift and continental break-up events
5. Role of lithospheric composition and compositional variations in evolving structural styles
6. Role of pre-existing anisotropy in structural architecture in evolving structural styles
7. Role of syn-extensional deposition and erosion in evolving structural styles
8. Fluid flow systems

Thermal regimes

1. Role of pre-rift heat flow in thermal regimes
2. Role of structural and stratigraphic architecture in thermal regimes
3. Role of syn-rift deposition and erosion in thermal regimes
4. Role of deformation in thermal regimes
5. Role of fluid flow in thermal regimes

Petroleum systems

1. Introduction to hydrocarbons in rift and passive margin settings
2. Models of source rock distribution, maturation and expulsion
3. Models of reservoir quality distribution
4. Sealing characteristics
5. Models of hydrocarbon migration
6. Trapping styles
7. Hydrocarbon preservation

When requesting instructor to cover specific topics in a short course tailored for a specific number of days, please be advised that two to three topics can be usually covered per day. Daily class activity includes six net hours of class, excluding coffee breaks and lunch break. Presentations are done in informal way, i.e., questions are asked at any time during their presentation. Apart from the PowerPoint slide presentations on chosen topics, a set of four to five exercises is included each day. They focus on interpretation of seismic profiles from various rift/passive margin settings/features. The optimal number of attending people, because of the exercise logistics, is 15. A larger number is not a problem, apart from people having to wait for instructor to finish the round of discussions with people making exercises to come back to them.

Course material

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

One copy per class will be provided.

Participant Supplies

Each person will need to have soft black pencil, eraser and a small set of color pencils.

Equipment Requirements

Screen and projector for one laptop connection.

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Research Interests

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

Michal Nemčok, PhD

Research Professor

Michal holds a Ph.D. in Structural Geology from the Comenius University, Bratislava. He has 30 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., along with various research articles

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.

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