EGI Energy & Geoscience Institute
AT THE UNIVERSITY OF UTAH

Since 1972

TRAINING COURSES

Strike-slip Settings & Transform Margins

Structural Architecture, Thermal Regimes & Petroleum Systems

Available to EGI Corporate Associate Members

Instructor:

Michal Nemčok, Ph.D.
Research Professor

Course Structure
1-, 2-, or 3-day classroom presentation plus exercises, Questions & Answers throughout

Duration
1-Day, 2-Day, or 3-Day

Location
EGI's Salt Lake facilities or Member's location

OVERVIEW

The short course strategy, in its full form, is to develop a new and better appreciation of the factors controlling structural architecture, basin development, and fluid flow in transform margin settings (Structural architecture). Synthesis of this knowledge is then used to tackle what is perhaps the most enigmatic aspect of these environments–the factors controlling thermal regimes and temperature peculiarities of transform margin settings (Thermal regimes). The final phase (Petroleum systems) is the interpretation of petroleum systems based on the results of the two previous phases. Special attention is given to the deep water portion of transform margin– the large frontier region, starting to become touched by exploration in 2007-2012. 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 and 3-day short course, based on your time interval specification, from the following library of topics to choose from:

Structural Architecture

1. Basic description of structural architecture in strike-slip and transform margins settings
2. Mechanics of strike-slip faulting and transition to drift phases
3. Role of pre-extensional tectonics and anisotropy on evolving sheared margin structural styles and the effects of pre-break-up tectonics/ anisotropy on passive margin structural style
4. Role of syn-extensional deposition and erosion on evolving structural styles of sheared margins and effects of tectonics on deposition and erosional patterns
5. Fluid flow models along continental transfer fault systems, transforms and oceanic fracture zones

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Thermal Regimes

1. Role of pre-rift heat flow in thermal regimes
2. Role of deformation in thermal regimes
3. Role of fluid flow in thermal regimes

Petroleum Systems

1. Models of source rock distribution
2. Reservoir rock deposition in strike-slip and transform margin settings
3. Models of hydrocarbon migration

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 the 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 strike-slip/transform 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

Course material consists of a set of articles provided in electronic format, including:

Nemčok, M., Rybár, S., Sinha, S. T., Hermeston, S. A. and Ledvényiová, L., 2016. Transform margins: development, controls and petroleum systems – An introduction. In: 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/SP431.15.

Nemčok, M., Sinha, S. T., Doré, A.G., Lundin, E. R., Mascle, J. and Rybár, S., 2016. Mechanisms of microcontinent release associated with wrenching-involved continental breakup; a review. In: 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/SP431.14.

Nemčok, M., Rybár, S., Ekkertová, P., Kotulová, J., Hermeston, S. A., Jones, D., 2015. Transform margin model of hydrocarbon migration: Guyana-Suriname case study. In: 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/SP431.6.

Nemčok, M., Henk, A. and Molčan, M., 2015. Role of pre-break-up heat flow on thermal history of transform margin. In: 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/SP431.4.

Nemčok, M., Henk, A., Allen, R., Sikora, P. J. and Stuart, C., 2012. Continental break-up along strike-slip fault zones; observations from Equatorial Atlantic. In: Mohriak, W. U., Danforth, A., Post, P. J., Brown, D. E., Tari, G. M., Nemčok, M. and Sinha, S. T. (Eds), Conjugate Divergent Margins. Geological Society of London Special Publication, 369. doi: 10.1144/SP369.8.

Participant Supplies

Each person will need to have a #2 black pencil, eraser, and set of color pencils.

Equipment Requirements

Screen and projector for the instructor's laptop.

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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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