EGI Energy & Geoscience Institute
AT THE UNIVERSITY OF UTAH

Since 1972

TRAINING COURSES

Instructor:

Michal Nemčok, Ph.D.
Research Professor

Course Structure

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

Duration

1-Day up to 5-Dasy

Location

EGI's Salt Lake facilities or Member's location

EMAIL:
ContactEGI@egi.utah.edu

PHONE: (801) 585-3826

Thrustbelts

Structural Architecture, Thermal Regimes & Petroleum Systems

Available to EGI Corporate Associate Members

OVERVIEW

Thrustbelts are likely to be productive sources of hydrocarbons well into the future. Many new technical tools are enabling new discoveries, or the more efficient recovery of known reserves. The short course aims at providing a comprehensive account of thrust systems, including orogenic thrustbelts, transpressional ranges and accretionary prisms, and discuss both thin-skin thrust systems and thick-skin inversion structures. The short course, in its full length, includes major sections on the basic concepts, definitions and mechanics of thrust systems, the roles of syn-tectonic stratigraphy and fluid flow in determining structural style, the origins and nature of evolving thermal regimes in thrustbelts, and a thorough analysis of petroleum systems and hydrocarbon plays in thrustbelts. Case studies are presented with discussion of the potential applications of the technique, possible limitations and future developments. This short course is a resource for exploration geologists, exploration scientists, oil company managers and students.

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 either on interpretation of seismic profiles from various thrustbelt settings/features or on learning various aspects of balanced profile construction and restoration. 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.

Based on your time interval specification, the following library of topics is available to choose from:

Structural architecture

1. Introduction to the topic of thrustbelts
2. Mechanics of thrust wedges
3. Mechanics of thrust sheets
4. Thin-skin thrustbelt structures
5. Thick-skin thrustbelt structures
6. Determination of timing of thrusting and deformation rates
7. Role of mechanical stratigraphy on evolving architectural elements and structural style
8. Role of pre-contractional tectonics and anisotropy on evolving structural style
9. Role of syn-orogenic erosion and deposition on evolving structural style
10. Fluid flow in thrustbelts during and after deformation

Thermal regimes

1. Role of pre-orogenic heat flow on subsequent thermal regimes
2. Role of structural and stratigraphic architecture on thermal regimes
3. Role of syn-orogenic burial and/or uplift and erosion on thermal regimes
4. Role of deformation on thermal regimes
5. Role of fluid movement on thermal regimes

Petroleum systems

1. Hydrocarbons in thrustbelts: global view
2. Source rocks in thrustbelt settings
3. Maturation and migration in thrustbelts
4. Seals and traps in thrustbelts
5. Reservoir destruction or enhancement due to thrusting
6. Remaining petroleum potential of thrustbelts

Course Material

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

One copy per class will be provided.

Participant Supplies

Each participant will need to have two triangular rulers, soft black pencil, eraser, three pieces of transparent paper in A3 format and a small set of color pencils.

Equipment Requirements

Screen and projector for the instructor's laptop.

EGI Energy & Geoscience Institute
AT THE UNIVERSITY OF UTAH

Since 1972

Email
mnemcok@egi.utah.edu

Phone
421-2-5463-0037 (SK)

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.

EMAIL:
ContactEGI@egi.utah.edu

PHONE: (801) 585-3826