中 国 地 球 物 理 学 会

勘探地球物理委员会文件

会勘字〔2015〕2 号

关于举办 2015 年 SEG 高级课程培训的通知

由中国石油学会石油物探专业委员会和中国地球物理学会勘探地球物理委员会共同主办的 2015 年 SEG 高级课程培训将于 2015 年 9 月在河北涿州举办。课程题目为“The Interpreter's Guide to Depth Imaging”,讲师为 Western Geophysical 公司的 Scott MacKay 先生。现将培训有关事宜通知如下：

一、课程简介

课程主要探讨叠前深度成像理论及应用。讲师将讲述用于提高稳定性的质量控制方案 ,并标定和约束各向异性深度偏移方法以及可给出合理地质结论的方位属性的反演能力和陷阱等内容。

本课程学习对象为勘探和开发领域从事深度成像的解释人员。参加人员应熟悉地震方法并具有数年从事解释工作的经验。通过学习，学员将了解在各种地质条件下如何有效设计、实施深度成像项目并对其进行质量控制，并且能够：

- 归类各种不同的时-深转换方法
- 区别时间偏移和深度偏移
- 区分常用偏移算法

- 评价偏移参数试验结果
- 评价适应地质条件的速度更新方式（层析）
- 确定用于层析的目标速度分辨率及对应的成像网格
- 通过井-地震闭合资料验证和校正数据库
- 设计并检验用于迭代速度更新的 QC 方案
- 评估用于确定各向异性参数的方法
- 实施井-震标定
- 属性评价

课程主要内容：

1. 垂直时间-深度方法回顾
2. 时间和深度偏移比较
3. 偏移算法：理论和实践
4. 偏移：参数选择
5. 层析速度分析
6. 深度成像网格
7. 井/震数据库验证
8. 迭代深度成像：质量控制
9. 各向异性
10. 井标定
11. 属性

二、讲师简历

Scott MacKay 先生为业内公认的解释、深度变换和深度成像专家。

1979 年，从美国科罗拉多矿业学院毕业并取得地球物理硕士学位后，就职 Tenneco Oil 公司，开始其职业生涯。10 年后，进入 Western Geophysical 就职，后任研发部任经理，统筹协调公司全球范围内的深度成像、时延地震油藏描述和多分量成像等业务。1991 年，取得了休斯敦大学地质与地球物理博士学位。目前，MacKay 先生仍在参与 Western Geophysical 公司的国内及国际项目，并为新技术应用及风险控制提供咨询。其专业研究领域为非传统油气资源开发环境下，应用深度成像技术对储层品质进行量化分析。他获得了 5 项美国专利，在勘探和开发领域新技术应用及创新等方面发表了大量论文。

课程概述及讲师简历（英文版）见附件 1。

三、培训时间、地点及授课方式

培训班将于 2015 年 9 月 15-17 日在河北省涿州市东方地球物理公司石油物探培训中心举办，9 月 14 日全天签到。培训中心前台电话 0312-3820770，交通指南见附件 2。

培训课程由讲师用英文讲授，由专业翻译进行现场翻译。培训后考试合格的学员，将由 SEG 颁发培训证书，请学员注册报名时留下可靠有效的通讯地址，以便邮寄。

四、注册报名及费用

培训费（含教材）：2600 元/人，学生：1000 元/人；东方地球物理公司学员培训费由公司统一支付。参加培训的人员请于 2015 年 9 月 5 日前通过 E-mail 反馈报名回执（附件 3）。

受场地及教材限制，培训班人数限定为 100 人，满额后将不再接收报名。

培训班住宿统一安排，费用自理（标准间260元/天）。

培训通知及相关附件可登陆中国石油学会石油物探专业委员会网站(www.spg.org.cn)下载，培训班如有变化，将另行通知。

五、联系信息

单　位：东方地球物理公司石油物探专业委员会秘书处

联系人：白玉宝　　电　话：0312-3825271

王贵平　　0312-3825113

E-mail: seg_spg@cnpc.com.cn

地　址：河北省涿州市范阳路 188 号　　邮　编：072751

附件:　1、课程概述及讲师简历（英文）

2、交通指南

3、报名回执

中国地球物理学会勘探地球物理委员会

中国石油学会石油物探专业委员会

2015 年 6 月 28 日

附件 1:

The Interpreter's Guide to Depth Imaging

by Dr. Scott MacKay

Intended Audience: Intermediate level

Prerequisites (Knowledge/Experience/Education Required): Interpreters incorporating depth imaging into their exploration and exploitation evaluations. Training is conducted with a combination of, demonstrations, and test sets. Participants should be familiar with the seismic method and have several years of interpretation experience.

Summary: An intuitive approach to the theory and practical applications of prestack depth imaging. The instructor demonstrates the quality controls used to promote stable solutions and methods for well calibration, constraining anisotropic depth migration, and the power and pitfalls of inversion for azimuthal properties that yield geologically-reasonable results.

Learner Outcomes: Participants will gain an understanding of how to effectively design, guide, and quality control depth-imaging projects in a variety of geologic settings and be able to:

- Categorize the various time-to-depth conversion methodologies
- Differentiate between time and depth migration
- Distinguish between commonly used migration algorithms
- Evaluate migration-parameter tests
- Appraise the form of velocity updating (tomography) appropriate for the geology
- Define the target velocity resolution for tomography and the related imaging grids
- Validate and correct the database using well and seismic ties
- Plan and review QCs for iterative velocity updates
- Assess the methods used for determining anisotropic parameters
- Perform well and seismic calibration
- Evaluate attributes such as inversion and directional lithology estimates

1: Review of Vertical Time-to-Depth Methods

- Velocity field characterization
- Single- and multi-layer methods
- Error analysis and pitfalls

Test Sets:

Time-to-depth conversion and mapping problems

2: Time and Depth Migration: Comparisons

- General discussion of time and depth migration theory

Test Sets:

Industry examples and class discussions of participant experiences

3: Migration Algorithms: Theory and Practice

- Kirchhoff, Gaussian Beam, 1-way Wave Equation and 2-way (Reverse Time)
- Offset and angler domains for Common Image Point Gathers
- Anisotropy and Multi-component

Test Sets:

Ray-tracing problem sets and case history reviews

4: Migration: Parameter Selection

- Kirchhoff travel times and Wave Equation imaging conditions
- Amplitudes, aliasing, and aperture
- Regularization and illumination

Test Sets:

Ray trace, amplitude, aliasing, and aperture calculations with spreadsheet calculations

5: Tomographic Velocity Analysis

- Layer- and grid-based ray methods
- Full waveform inversion
- Tomographic limitations and stability

Test Sets:

Simple tomographic examples demonstrating uniqueness and stability

6: Depth Imaging Grids

- Depth/Velocity: Visualization and velocity representation
- Travel times/Propagation: Summation curves and/or wavefield extrapolation
- CIP picking/Tomography: Data input to tomography and solution grid

Test Sets:

Evaluate various scenarios using established criteria

7: Well/Seismic Database Validation

- Determine data polarity and phase (synthetic ties and VSPs)

- Basic depth-conversion QCs to encounter data discrepancies

Test Sets:

QCs presented with various problems

8: Iterative Depth Imaging: Quality Control

- QCs for creating the initial velocity model
- Iterative tomographic updates and target-velocity resolution
- Setting up an intuitive review of the iterative process

Test Sets:

QCs presented with associated data sets

9: Anisotropy

- Parameterization (Vz, delta, epsilon, VTI/TTI)
- Velocity and parameter updates including directional anisotropy (HTI)

Test Sets:

Review and discuss benefits and pitfalls of attributes from isotropic and anisotropic PSDM

10: Well Calibration

- Working in the time domain and updating the time/velocity model
- Conversion of time data to calibrated depth
- Uncertainty measures (Stochastic prognoses)

Test Sets:

Various calibration exercises in spreadsheet and map form

11: Attributes

- Poststack: amplitudes, curvature, coherence,
- Prestack: AVO, elastic inversion, brittleness
- AVO with Azimuth and other Horizontal Transverse Isotropy (HTI) measurements

Test Sets:

Review benefits and pitfalls of attributes from PSTM and PSDM

Dr. Scott MacKay

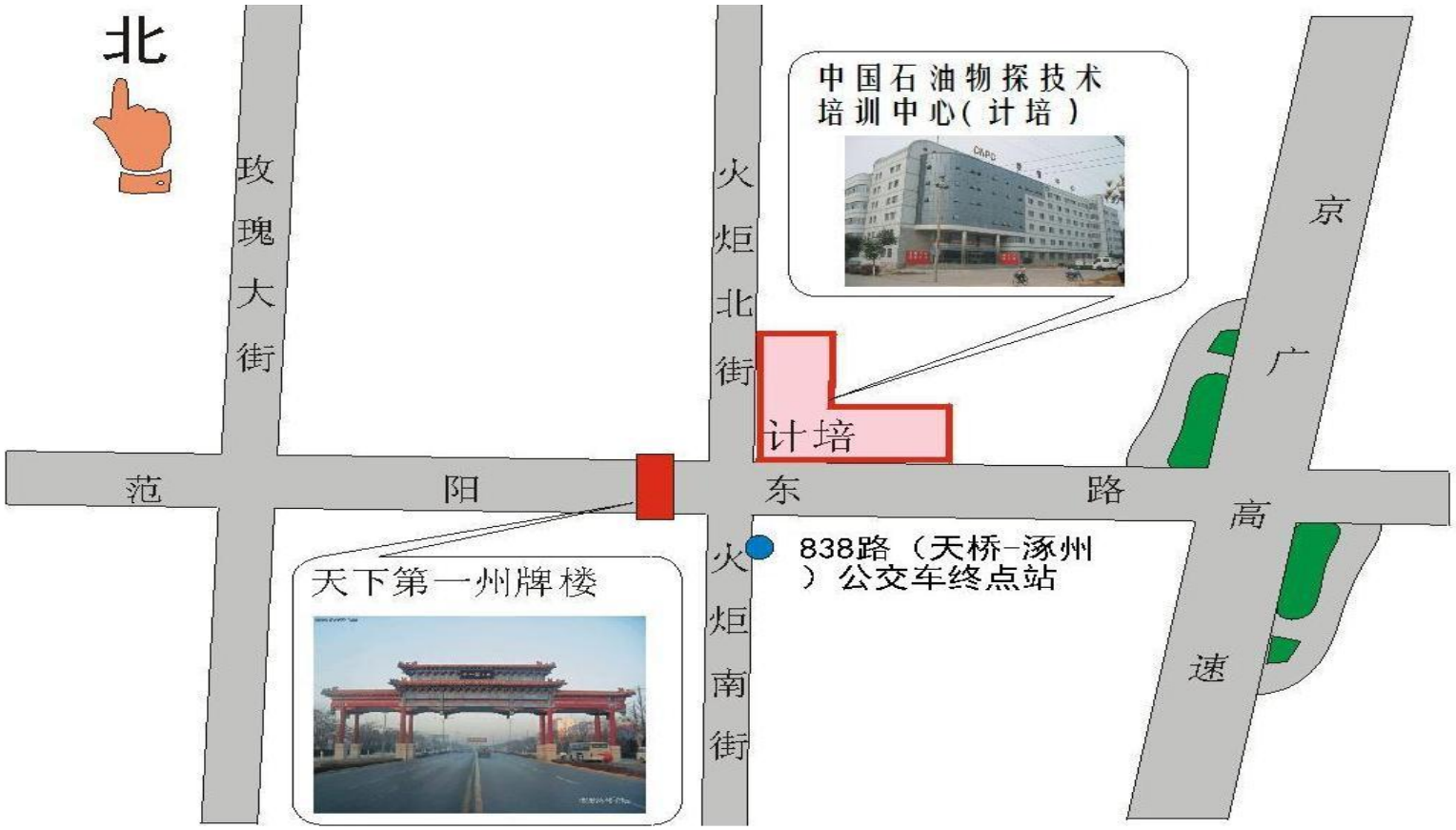
Dr. Scott MacKay is an independent consultant with 35 years of experience. He is an acknowledged expert in interpretation, depth conversion, and depth imaging. His career as an explorationist began with Tenneco Oil after graduating from Colorado School of Mines with an M.Sc. in Geophysics (‘79). After 10 years, Scott joined Western Geophysical R&D where he became Manager of R&D and a Schlumberger advisor. His roles included World-wide Coordinator for Depth Imaging, Time-lapse Reservoir Characterization, and Multi-component Imaging. Scott earned a Ph.D. in Geology and Geophysics from the University of Houston (‘91). He has five U.S. patents and numerous publications on applying innovative and practical solutions to exploration and exploitation challenges. Scott currently works domestic and international projects and advises on the application of new technologies and their impact on risk reduction. His main specialty is the application of depth imaging to unconventional plays to quantify reservoir quality.

附件 2

中石油物探技术培训中心(计培)交通指南

中石油物探技术培训中心坐落于京石高速路涿州出口西侧 500 米，紧邻涿州“天下第一州”大牌楼。培训中心总台电话：0312-3820770、3820771。

外地学员到北京后，可从天桥始发站、广安门内站或六里桥站乘 838 路公交（天桥-涿州），到东方地球物理公司培训中心（计培））站下车；或从北京西站乘高铁至涿州东站下车后，乘 23 路公交至行政中心下车或乘坐出租车至培训中心（参考车费 15 元）。自驾车可参考下图到达。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