

IV EAGE Education Tour (EET)
February 25th 2010, 9.00 a.m.

Main Conference room, eni, via Emilia, 1- S.Donato M.se, Italy

MODERN SEISMIC IMAGING

A review of the techniques, their principles, merits and limitations

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➤ ABSTRACT

As the search for new resources means that we are forced to maximise the production of discovered reservoirs and explore new ones in domains that are increasingly complex, seismic imaging is becoming more and more important as a tool. Seismic imaging is the ultimate stage of a time-consuming and complex data processing sequence that aims to produce accurate images of the Earth's subsurface suitable for interpretation by geoscientists. This course will give the audience an overview of today's most popular seismic imaging techniques used in the oil and gas industry. Two main classes of techniques are addressed: time-imaging and depth-imaging. Both approaches require an estimate of how fast the seismic waves travel at any given point in the Earth, but with different degrees of accuracy. If time-imaging embeds velocity analysis almost naturally, though at a cost in image quality, depth-imaging requires the explicit construction of a velocity model. Recent advances in seismic acquisition, imaging technology and high performance computing, allow us to correctly take into account a much greater complexity of subsurface model and consequently, start to image structures that were previously invisible. The course will present in simple terms (no equations!) the principle of different techniques in each class of methods, while pointing out their respective merits and limitations. The relationship between acquisition and imaging on the one hand and interpretation and imaging on the other will also be discussed.

The course addresses the following topics:

- ✓ What is a "reflection seismic image" exactly?
- ✓ Concepts behind Kirchhoff migrations
- ✓ Pre-Stack Time Migrations (PreSTM)
- ✓ Ray-based depth migrations
- ✓ Wavefield extrapolation-based migrations
- ✓ Full wave form inversion (FWI)
- ✓ Relations between seismic imaging and seismic acquisition
- ✓ Depth imaging and seismic interpretation

➤ WHO SHOULD ATTEND

The course is aimed at geoscientists involved in exploration and production projects where seismics play a role and who wish to:

- ✓ learn more about seismic imaging concepts and the terminology used by seismic processors
- ✓ improve their critical view on the benefits and limitations of the seismic data sets they are using in their projects
- ✓ have a well-argued selection of the imaging method to apply to the seismic data shot for their projects.
- ✓ have a better appreciation of what they can expect from reprocessing vintage data sets with modern tools

The course will also benefit students who want to have a first acquaintance to reflection seismics in general and seismic imaging in particular.

➤ BIOGRAPHY

Etienne Robein graduated from Ecole Nationale Supérieure d'Aéronautique et Espace and Ecole Nationale Supérieure Pétrole et Moteurs / FP in Paris in 1973. He started his career with Shell in The Hague, before joining Elf, now Total, where he has worked on operational, research and managerial assignments in France, Italy, the UK and Azerbaijan. His professional experience covers seismic acquisition, processing and interpretation. In recent years, he was Director of the Total Geosciences Research Centre in London. His last position with Total was R&D programme manager in Geology and Geophysics, before retiring in 2010. Etienne is the author or co-author of several presentations in International Conferences, including the SEG, EAGE, WPC, AAPG, and Petroleum Geology Conference and contributed to the EAGE's "Distinguished Lecture Programme" and "Education days". In 2003, he published a text book on "Velocities, Time imaging and Depth-imaging in Reflection Seismics," which became a best-seller EAGE Edition. Etienne was President of EAGE in 2000, when he presided over the ceremonies of the 50th anniversary of this association. He is a former Chairman of EAGE's Research Committee, a member of the EAGE Award Committee and Europe's representative at the SEG Council.