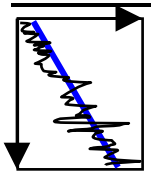


Depth Conversion Methods & Pitfalls

Instructor: **Alan Atkinson**

Outline

This is a course for practicing seismic interpreters tasked with creating depth maps for volumetrics and well planning. Time is split equally between teaching and exercises, which are designed to illuminate concepts and cement understanding through hands-on application. The course incidentally provides attendees with a geophysics refresher, mapping and interpretation tips and several efficiency enhancing spreadsheets to take away.

Overview

Depth conversion is approached as part of the geological-geophysical interpretation process, starting during seismic time interpretation and ending with maps for STOIIP/GIIP calculations and well planning. Tips and techniques in data QC, practical velocity modelling methods, and recognition of geological and geophysical pitfalls are emphasised. The techniques are equally appropriate for those with sophisticated tools who must understand the 'black box', and by those who have to make depth maps using only mapping software and a spreadsheet. Attendees will learn how to maximise use of their velocity data, see how greater control on the velocity model can be achieved by incorporating geological understanding, and recognise that vital structural information can be destroyed by inappropriate well tying. A wide range of experience will be catered for in the course which is biased towards worked examples. Attendees will leave with the skills necessary to independently undertake depth conversions.

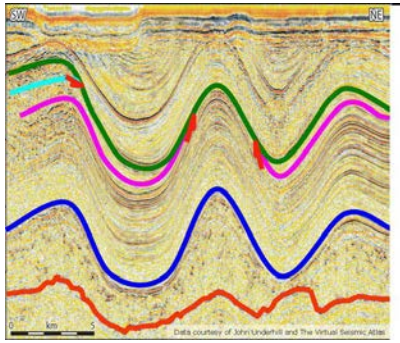
Course content and learning outcomes

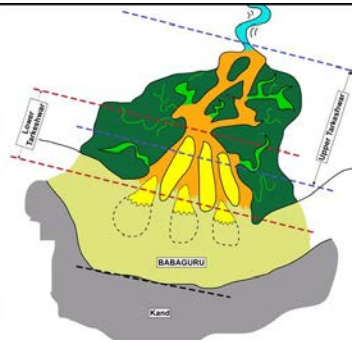
Introduction

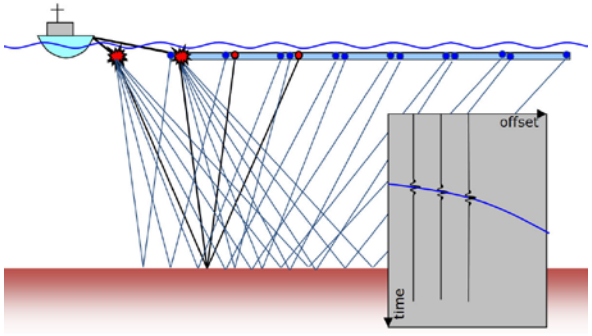
- Understand the relevance of depth conversion in the era of Pre Stack Depth Migration
- Know the defining characteristic of a good depth conversion

Geological factors influencing velocity

- Understand what intrinsic properties of rocks influence their velocity
- Understand how geological processes control macro velocity variations in the subsurface





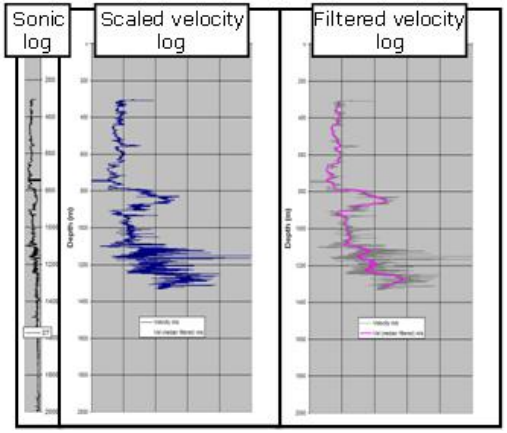


Sources of velocity data and their problems

- Be aware of the different sources of data providing a measure of velocity
- Understand the limitations of the data and know checks to help ensure data integrity
- Be familiar with velocity terminology

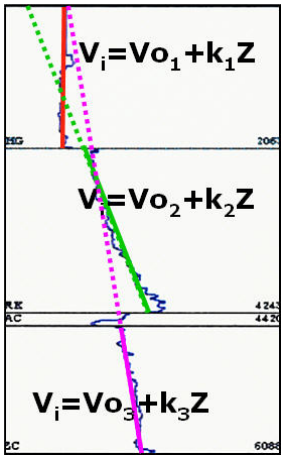
Synthetic seismograms and time-depth relationships

- Understand how interpretation systems use time-depth data and how this influences calculated velocities
- Learn how to optimally calibrate synthetic seismograms for use in depth conversion



Analysing velocity data

- Learn the importance of looking at all of the data, including logs and seismic velocities
- Learn data analysis techniques which help determine the best approach to velocity modelling and depth conversion
- Understand the importance of scale in displaying quantitative data



Velocity model building methods

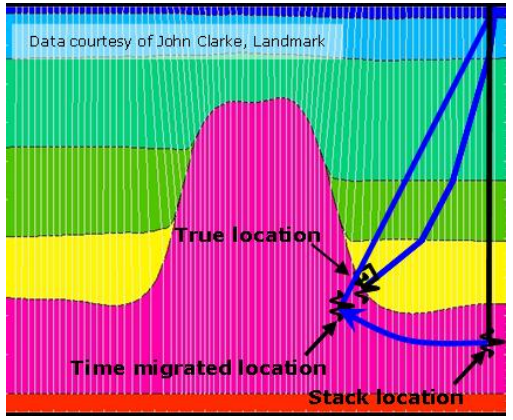
- Understand when simple functions (e.g. t-d polynomials) and average velocity are poor velocity models
- Appreciate benefits of layering even with simple velocity models
- Be comfortable implementing the common velocity modelling methods, including linear velocity functions ('Vok'), and understand their limitations
- Know techniques to condition seismic velocity products

The process of depth conversion

- Be aware of generic workflows for depth conversion
- Understand the influence of data availability and geological complexity on choice of workflow
- Be aware of potential pitfalls in implementing the processes

Tying to wells

- Know mapping techniques that make depth conversion easier by minimising misties
- Be aware of pitfalls in the use of check-shots and well picks
- Learn the importance of QC for assessing the effects of tying
- Understand when it is best to tie in depth, velocity or time domains
- Appreciate the implications and value of mapping Vo, and learn how to do it
- Know when it is best not to tie

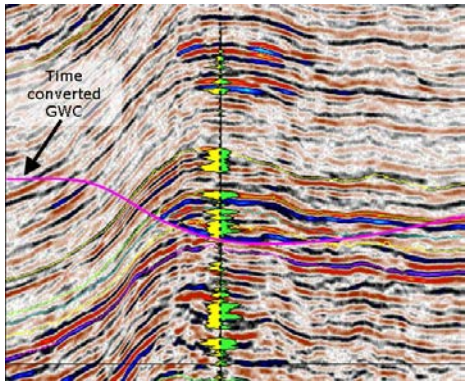


Dealing with geophysical pitfalls

- Be aware of the reasons why the seismic image is not a vertical scaled version of the real earth
- Understand the impact of channels and other shallow anomalies on seismic reflection times and how they limit the accuracy of seismic velocities
- Learn what solutions can be implemented in vertical depth conversion, and which require another approach

Depth domain seismic

- Understand the benefits and limitations of tomographic velocity models
- Understand how anisotropic PSDM results are matched to well depths
- Recognise the importance of being aware of/involved in seismic processing of your dataset
- Learn how to adapt good depth conversion practice to depth domain seismic horizon corrections

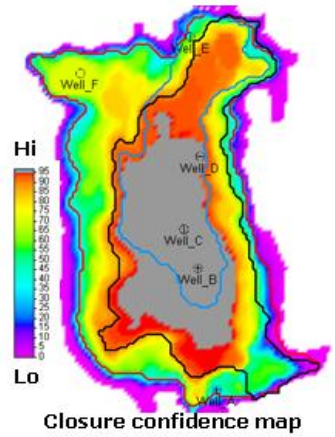


Quality control: tips and techniques

- Know techniques to QC the time model – time grids and correction surfaces
- Learn techniques to QC the velocity model through 'time conversion'
- Learn workflows to assess the impact of adding sophistication to velocity modelling
- Be aware of quick and effective technique for QC'ing others' work

Dealing with geological pitfalls

- Understand that, even when properly implemented, there are times when some velocity modelling methods will not work (in the presence of uplift, hydrocarbons, deep sea floor channels etc)
- Learn solutions or work-arounds for use when the recommended techniques need modification



Closure confidence map

Quantifying uncertainty

- Learn the fundamentals of combining uncertainty measurements
- Be aware of the techniques available to quantify mapping uncertainty

Duration

This is a five day classroom based course.

Training Method

Sophisticated Excel based exercises and easy-to-use mapping software exercises are interspersed with lecture material including case-studies, recommended workflows, and tips on dealing with problems. A final comprehensive depth conversion exercise consolidates understanding of the workflow.

Who should attend

Geologists, Geophysicists, and Technical Support staff engaged in producing depth maps from seismic interpretations, as well as technical management and other subsurface professionals involved in evaluating and using depth mapping results. Those with limited experience will benefit from the practical lectures and worked examples, while those with more experience will treat the classroom exercises as a workshop for exploring new techniques.

Prerequisites

A basic understanding of geology, structural interpretation and the seismic method is required. Experience in mapping and seismic interpretation will be a significant advantage.

For more information on the

Depth Conversion Methods & Pitfalls
training course, please contact:

Alan Atkinson
Via LinkedIn: https://uk.linkedin.com/in/alan-atkinson
Web: www.aageophysical.co.uk

Or if you are a member of Nautilus' Training Alliance, you can also contact:

Nautilus
Goldvale House
27-41 Church Street West
Woking
Surrey
GU21 6DH
United Kingdom

Tel: +44 (0)1635 248910
Web: www.nautilusworld.com