

**Course Code**

GP01

**Course Title**

**Interpretation of Seismic Reflection Data for Beginner and Non-Geophysicist Interpreters**

**Instructor**

Dr. Cahit Çoruh



**Professional Career**

Dr. Çoruh is an Emeritus Professor of Geophysics at Virginia Tech. (Virginia Polytechnic Institute and State University) and keep himself busy with writing, giving seminars, serving on advisory boards, and doing consultancy. After fourteen years experience in geophysical exploration, Dr. Çoruh continued his career in academia while keeping his contact with oil and geophysical exploration industry via special projects and consultancy. After a few years with Istanbul University and Istanbul Technical University he joined Virginia Tech and continued his research and teaching in exploration seismology (acquisition, processing, and interpretation). His research interests included development and implementation of reflection and refraction seismic data acquisition and processing methods with special emphasis on static corrections, spectral whitening, interpretive seismic data processing, and data interpretation. His research also included application of exploration seismology to studies of the continental crust and tectonic framework of the southern Appalachians and Anatolia via special processing and interpretation of seismic data. During his tenure with Virginia Tech he authored and co-authored two books, eight book chapters, forty published papers, one-hundred-thirty published abstracts. "Basic Exploration Geophysics (published by John Wiley, 1988) he coauthored was used as a textbook at more than forty universities in the United States. Courses he taught include Elementary Geophysics, Exploration Seismology, Seismic Stratigraphy, Seismic Deconvolution, and Seismic Migration. Because of his research spectrum and productivity, Dr. Çoruh is honored as Fellow of Geological Society of America. He is also honored with dedication of a book entitled "Hydrogeosciences." Dr. Çoruh became an Emeritus Professor and consultant after serving ten years as the Chairman of the Department of Geosciences at Virginia Tech.

**Course Objective and Description**

The topics covered in this course are essential for those use seismic data to study subsurface geology and tectonic for hydrocarbon (oil and gas) exploration. The topics include overview of seismic data acquisition and processing methods, seismic wavelets, synthetic seismograms, seismic velocities, seismic resolution, seismic stratigraphy, seismic imaging and mapping of 2-D and 3-D structural, use of time-lapse seismic volume data, seismic lithology, and use of geophysical well-log data.

Understanding of the physical aspects related to seismic data acquisition and processing methods and their effects on seismic interpretation; correlating the results of seismic data processing with available geologic and well data; seismic images of a variety of subsurface models; interpreting seismic record sections and volumetric data; and understanding seismic signatures of principal of depositional sequence stratigraphy.

(Mathematica package will be used in class demonstrations to explain mathematical and physical concepts related to seismic trace.)

**Who Should Attend**

Geologists, geophysicists, and engineers who want to use seismic data for oil and gas exploration/production

**Prerequisite**

Basic level of physics, math, and geology

**Learning Level**

Introductory to prepare participants for advanced courses

**Duration**

5 days

**Course Material**

Course notes and referenced articles



## Course Outline

### Day One

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- Introduction to seismic interpretation
  - o Seismic wavelets, seismic trace, seismic section, seismic cube, and seismic slices
  - o Fundamentals of seismic wave propagation
  - o Geometry of seismic reflections and diffractions
  - o Aspects of rock physics
  - o Data Acquisition: spreads, receivers, energy sources and their effects on data quality
  - o Interpretation

### Day One

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- Key parameters and concepts in seismic data processing that affect interpretation
  - o Seismic amplitude manipulations
  - o Seismic velocities (velocity determinations, average, root-mean-square, and interval velocities and their use)
  - o Statics
  - o Filtering
  - o Deconvolution
  - o Migration
  - o Limits of seismic resolution (concepts of temporal and spatial resolution)

### Day Three

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- Key concepts in seismic data interpretation
  - o Seismic trace-geology ties
  - o Reflection identification
  - o Seismic ties to well data
  - o Well velocity surveys
  - o Vertical seismic profiling (VSP)
  - o Fundamental definitions of seismic stratigraphy and reflection configurations
  - o Lap-outs and relationships to depositional sequences and sequences boundaries
  - o Seismic expression of unconformities
  - o Seismic responses associated with subsurface features

### Day Four

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- Key concepts in quantitative seismic data interpretation
  - o Inversion of seismic data
  - o Use of seismic attributes
  - o Seismic lithology
  - o Stratigraphy from seismic velocities
  - o Use of amplitude versus offset (AVO) information
  - o Stratigraphic interpretation from combined compressional- and shear-wave seismic data
  - o Recognition of stratigraphic features from seismic data: A quantitative interpretation

*Day Five*

- Examples of data interpretation
  - o Seismic stratigraphy and facies analysis
  - o Recognition and mapping of stratigraphic features from seismic data
  - o A seismic stratigraphic case history: A Dim-Spot case; Seismic stratigraphy of carbonatedepositional sequences
  - o Seismic responses associated with data acquisition and processing procedures(structure or velocity and/or statics)
  - o Seismic interpretation today and tomorrow

Antalya, Turkey  
26-30 Apr  
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stanbul, Turkey  
18-22 Oct  
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