

2014

ADVANCED OFFSHORE STRUCTURAL GEOLOGY



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# Advanced Offshore Structural Geology

Geo. James N. Kellogg, Ph.D.

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**Geo. James N. Kellogg, Ph.D.**

University of South Carolina

### OBJETIVO

Students will learn advanced structural interpretation skills through hands-on mapping of offshore geologic structures. Exercises will include application of the "kink method" of volume-balanced interpretations to extensional and compressional marine structures and the evolution of salt structures. In optional final project, students interpret 3-D volumes and time slices in an offshore exploration environment.

1. Learn the basic principals of balanced geologic interpretations of marine structures.
2. Recognize and interpret compressional (fault-bend folds and fault propagation folds) and extensional structures (roll over anticlines).
3. Interpret evolution of marine salt structures.
4. Learn how to interpret 3D volumes and time slices.

### CONTENIDO

#### 1. Day 1

- Introduction
- Evaluation of balanced cross sections
- Kink-bend method
- Fault-bend folds
- Tectonic evolution of oceanic plates: divergent, convergent, and transcurrent boundaries
- Evaluation of balanced cross sections
- Fault propagation folds
- Imbricate duplex structures

#### 2. Day 2

- Construction of balanced cross section
- Tectonic evolution of the Magdalena Fan, northern Colombia, compressional folds and mud diapirs
- Evaluation of balanced cross sections

- Construction of retrodeformed section

### 3. Day 3

- Geodynamics of convergent marine plate boundaries – Caribbean and Nazca plates
- Seismic interpretation with kink method
- Extensional Structures. Double fault-bend origin of rollover anticlines, growth faulting. Exercise: Brazos Ridge Field, Gulf of Mexico
- Interpretation of gravity data

### 4. Day 4

- Salt Tectonics. Mechanics and structure, salt thickness, rim synclines, subsalt exploration. Exercise: Southern North Sea
- Interpretation of magnetic data

### 5. Day 5

- Seismic interpretation with kink method – growth faults
- 3D data interpretation: use of 3D volumes and time slices.
- Exercise: Tiger Shoal Gulf of Mexico (paper or paperless version of exercise depends on availability of computers and visualization software – such as Kingdom Suite)
- Volume balancing.
- Apply kink method to individual data
- Wrap up

## LECTURER

**Dr. James N. Kellogg**, is a Professor in the Department of Earth and Ocean Sciences, Director of the Andean Geophysical Laboratory, at the University of South Carolina, ([AndeanGeophysical.com](http://AndeanGeophysical.com)) and is Editor-In-Chief of the Journal of South American Earth Sciences. Jim pursued geophysical and structural studies of the northern Andes, funded by the Venezuelan Ministry of Energy and Mines, for his M.A. (1978) and Ph.D. (1981) in geology and geophysics at Princeton University. In 1987 he joined the faculty of the University of South Carolina as professor of applied geophysics. His principal research interests include geodetic, gravity and tectonic studies of active margins and the Andean orogenic belt where he has worked for the last 30 years.

He was Principal Investigator for the GEGEO (Guinea Equatorial GEOscience) Program, the Central and South America (CASA) GPS Geodesy Project, and the Colombia, Peru, and Bolivia Geophysical Projects. Dr. Kellogg's research has been published in over 60 peer-reviewed articles.