

# **Phase and Polarity Issues in Modern Seismic Interpretation\***

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Search and Discovery Article #40397 (2009)

Posted March 26, 2009

\*Adapted from oral presentation at AAPG International Conference and Exhibition, Cape Town, South Africa, October 26-29, 2008

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## **Abstract**

Zero phase is the objective of almost all seismic data processing today and its interpretive benefits are well known, however it is difficult to achieve. No more than 50% of seismic data achieves zero phase sufficiently closely for its benefits and accuracy to be properly enjoyed. Furthermore, 90 degree phase is a remarkably common accident and, if not identified, can cause havoc to detailed interpretation.

All interpreters should know how to visually assess the phase and polarity of their data. I regularly meet those who discover late in the interpretation that the data has a different phase or opposite polarity to what was first thought. In this paper recommendations for phase and polarity assessment will be made, and several phase circles will be presented. For zero phase data time and amplitude are co-located, and many interpretive procedures on modern workstations are based on this fact. For other phases complications arise, because time and amplitude are in different locations. Suggestions will be offered for handling the all-too-common 90 degree phase data.

**PHASE AND POLARITY**

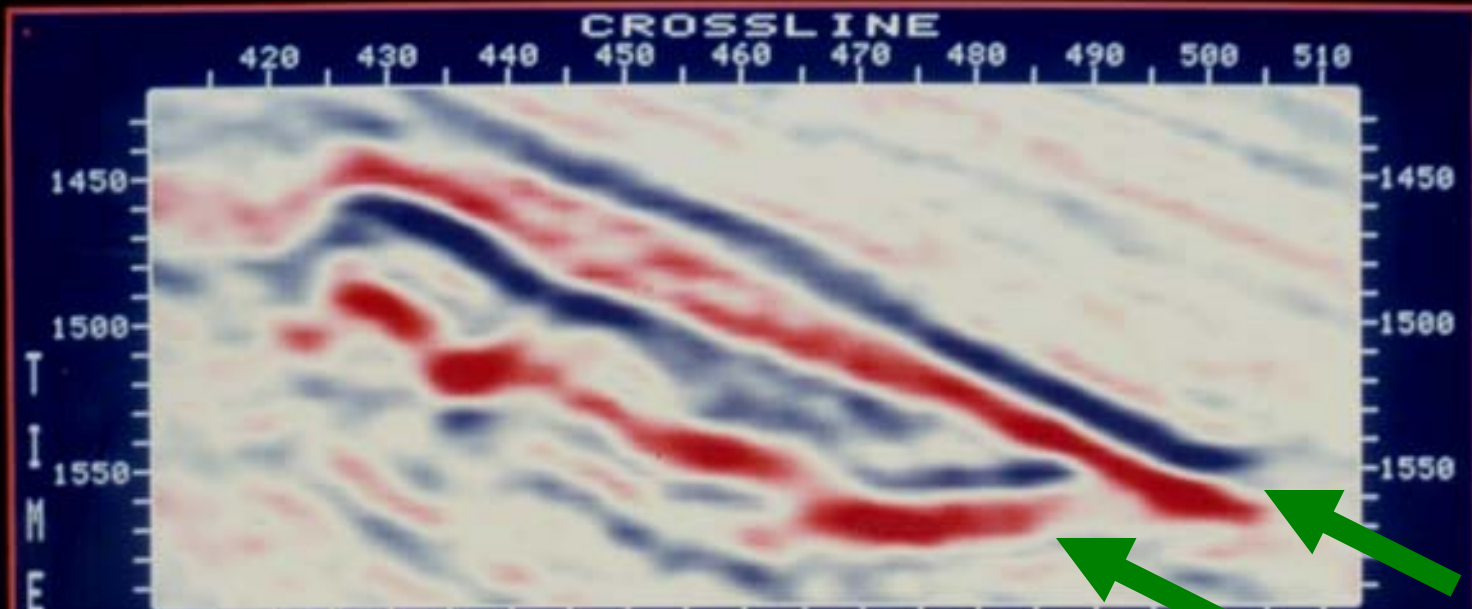
**ISSUES**

**IN**

**MODERN**

**SEISMIC INTERPRETATION**

**AAPG CONVENTION CAPE TOWN, SOUTH AFRICA  
26-29 October 2008 by Alistair Brown**

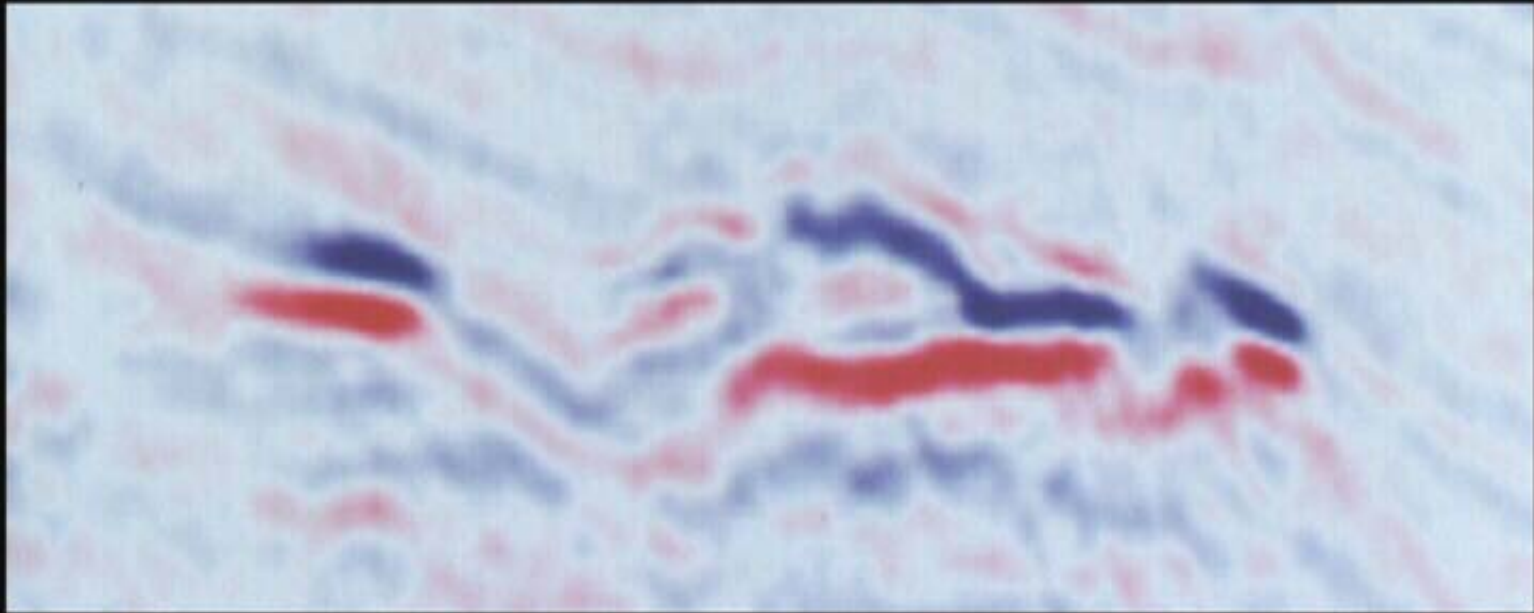


# NATURAL PAIRING

2008 © Alistair Brown

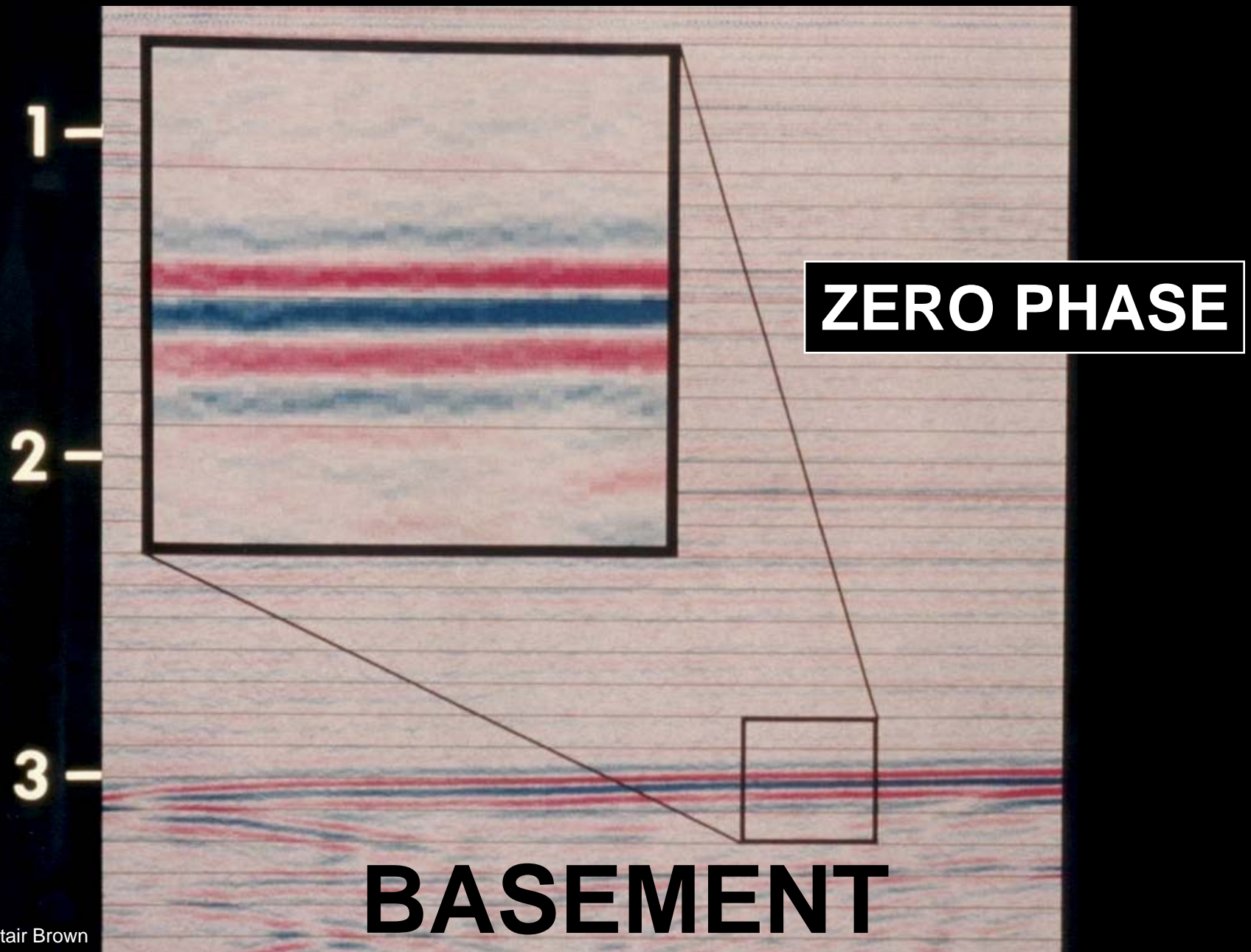


# **GULF OF MEXICO GAS SAND**



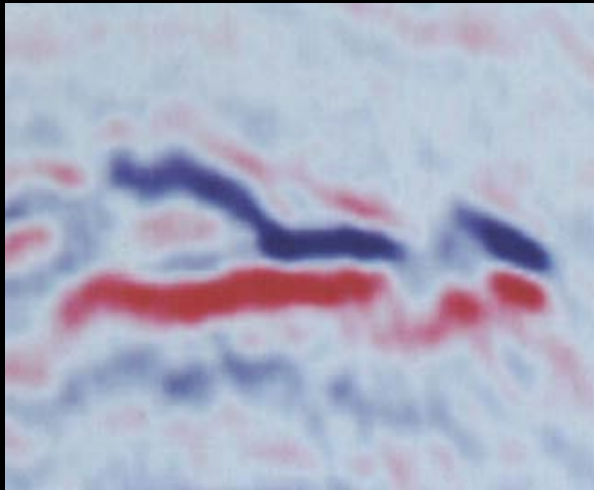
**ZERO PHASE**

# OFFSHORE EASTERN CANADA





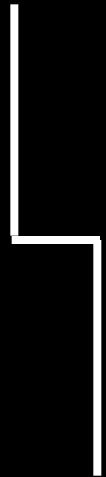
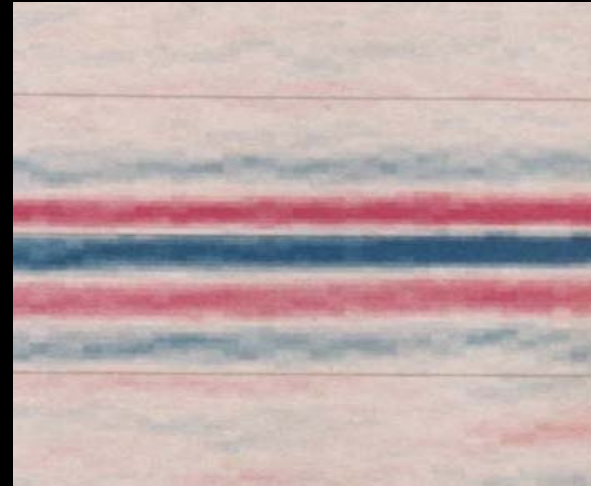
# TOP AND BASE GAS SAND



INCREASE IN IMPEDANCE  
IS  
**RED**

**EUROPEAN  
POLARITY**

# TOP OF BASEMENT



INCREASE IN IMPEDANCE  
IS  
**BLUE**

**AMERICAN  
POLARITY**

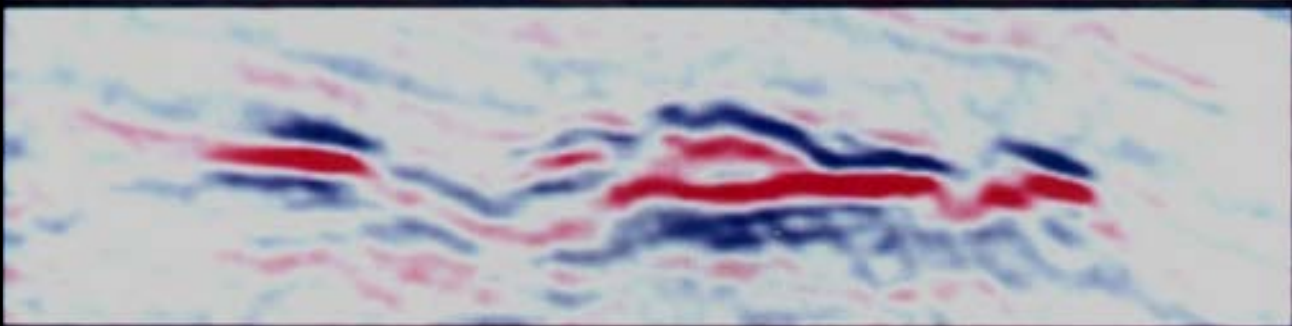
**90°**



**P**

**H**

**60°**



**A**

**S**

**30°**



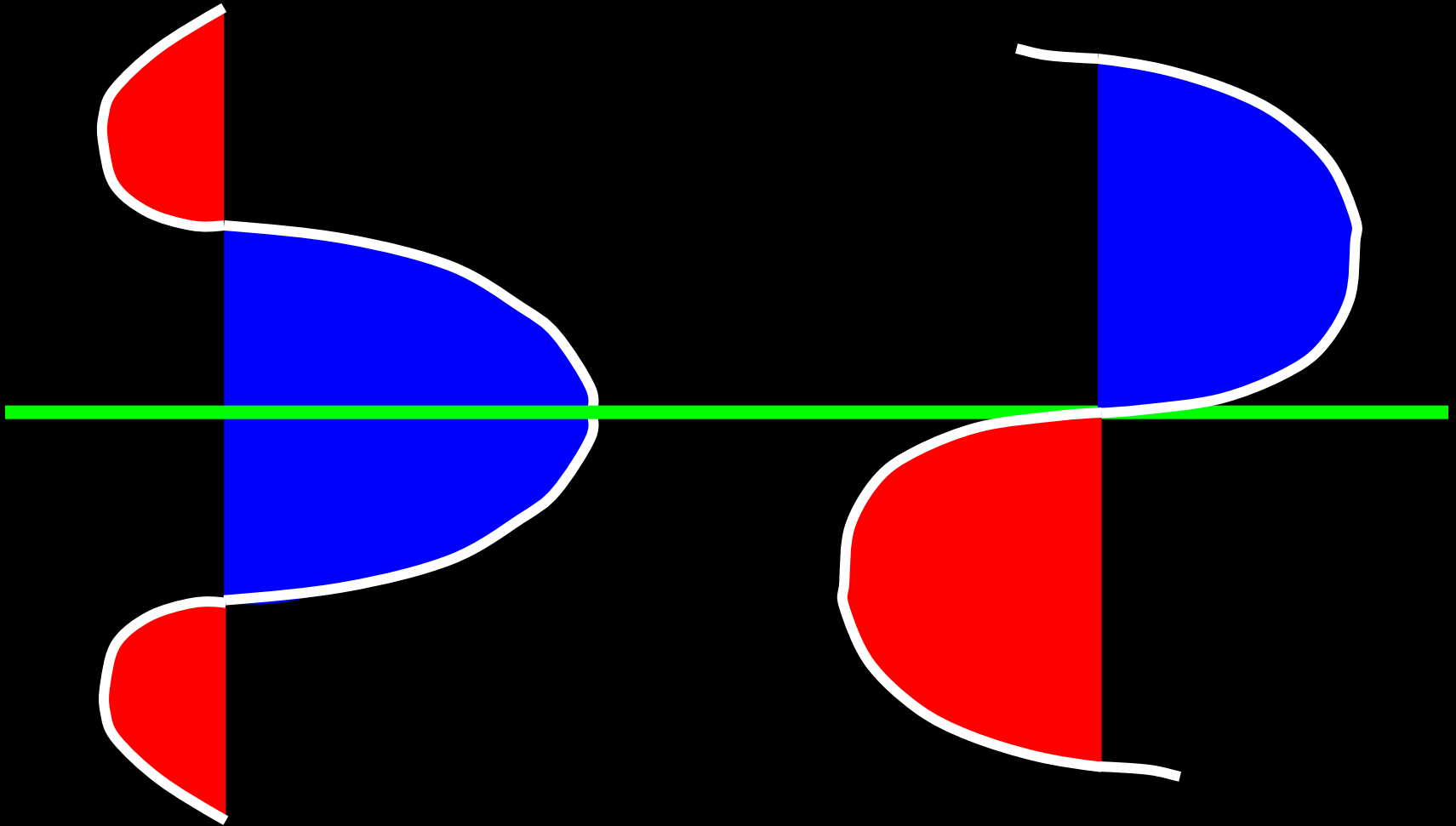
**E**

**0°**



**ZERO PHASE**

**90° PHASE**

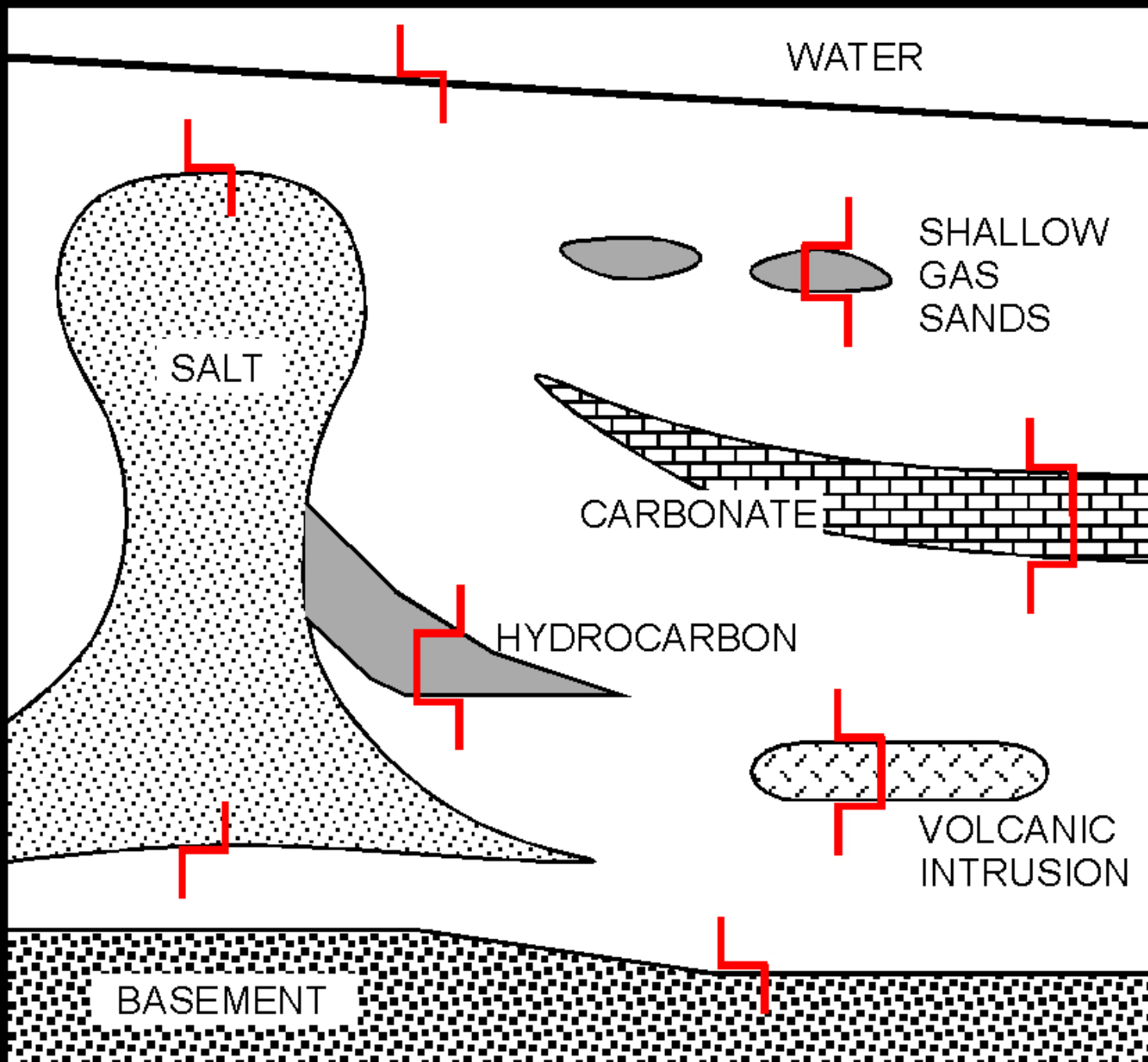


**AND THERE ARE TWO POLARITIES OF EACH**



PHASE AND POLARITY

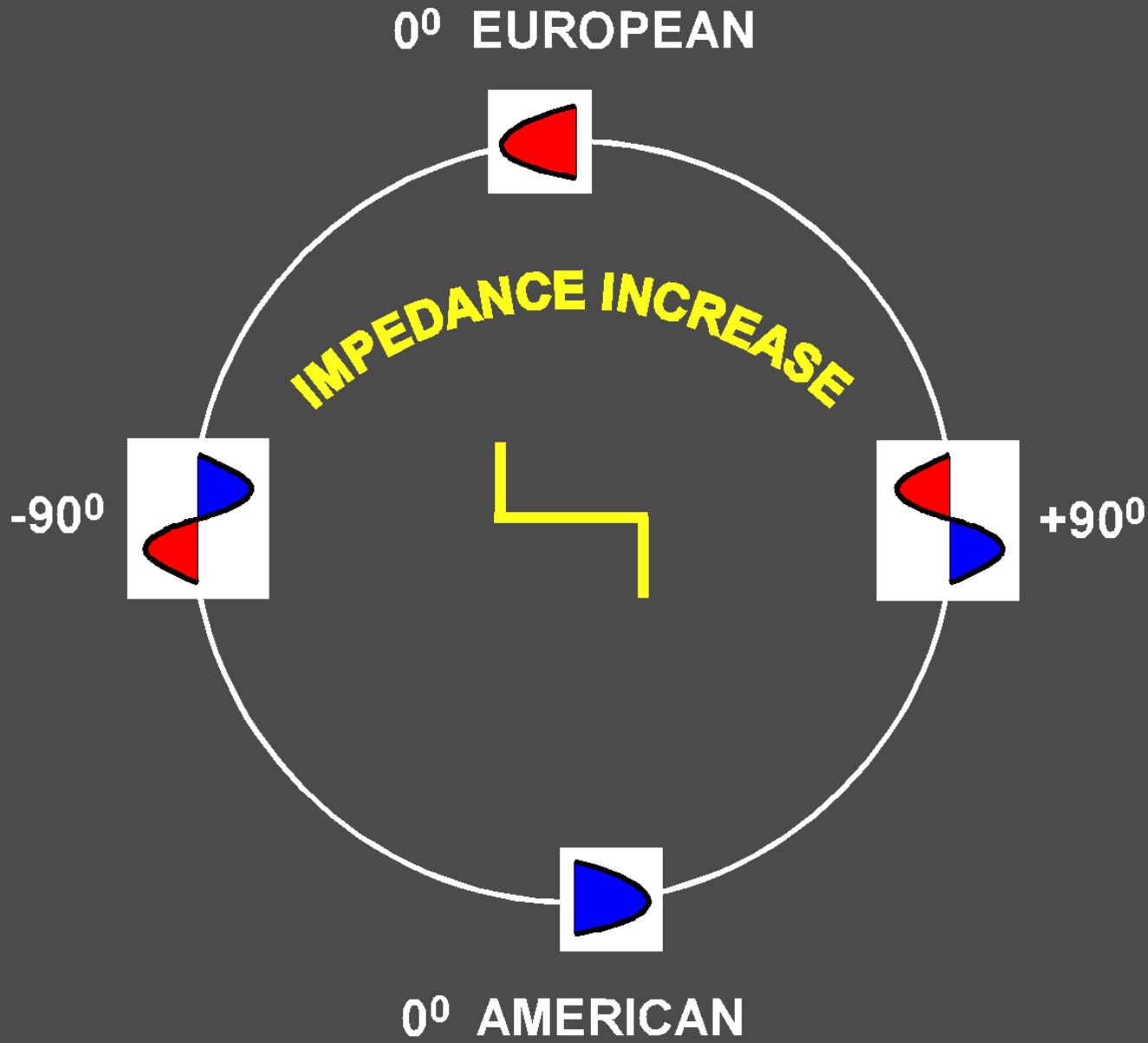
OPPORTUNITIES ASSESSMENT

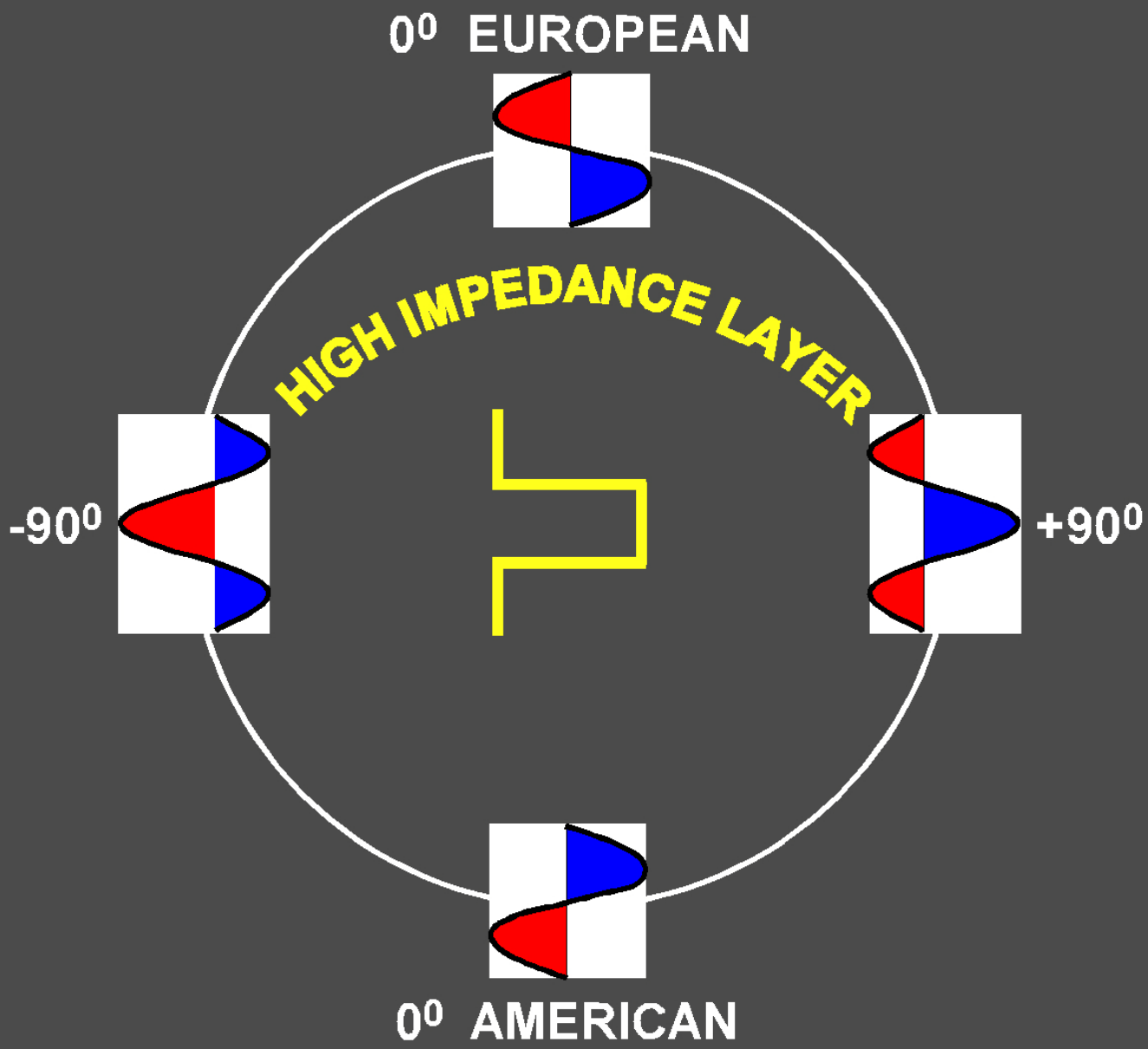


# INTERPRETIVE ASSESSMENT OF PHASE AND POLARITY

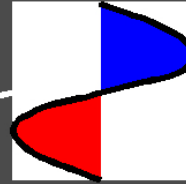
- EXAMINE CHARACTER OF HIGH AMPLITUDE REFLECTIONS
- RELATE TO GEOLOGIC UNDERSTANDING  
ONE OR TWO INTERFACES?
- PAY PARTICULAR ATTENTION TO TERMINATIONS  
AND TO UNCONFORMABLE REFLECTIONS
- SEEK CONSENSUS AMONG SEVERAL OBSERVATIONS

**IT'S NOT EASY BUT IT'S IMPORTANT**





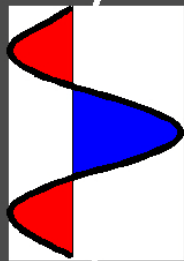
0° EUROPEAN



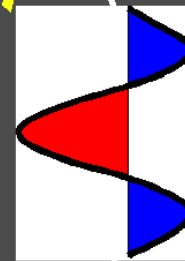
LOW IMPEDANCE LAYER



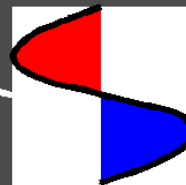
-90°



+90°

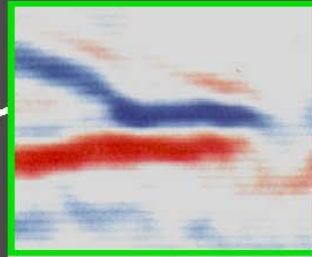


0° AMERICAN



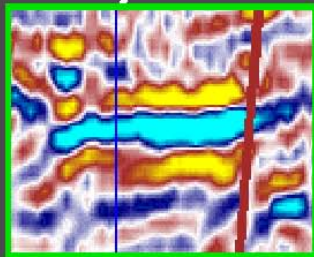


0° EUROPEAN

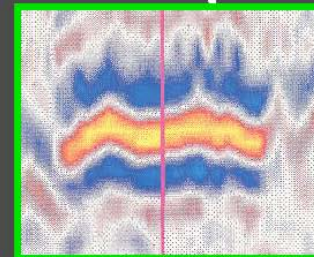


LOW IMPEDANCE LAYER

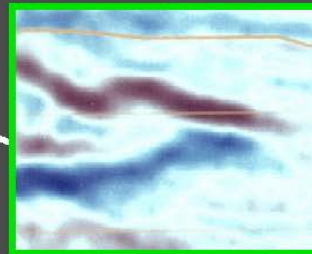
-90°



+90°

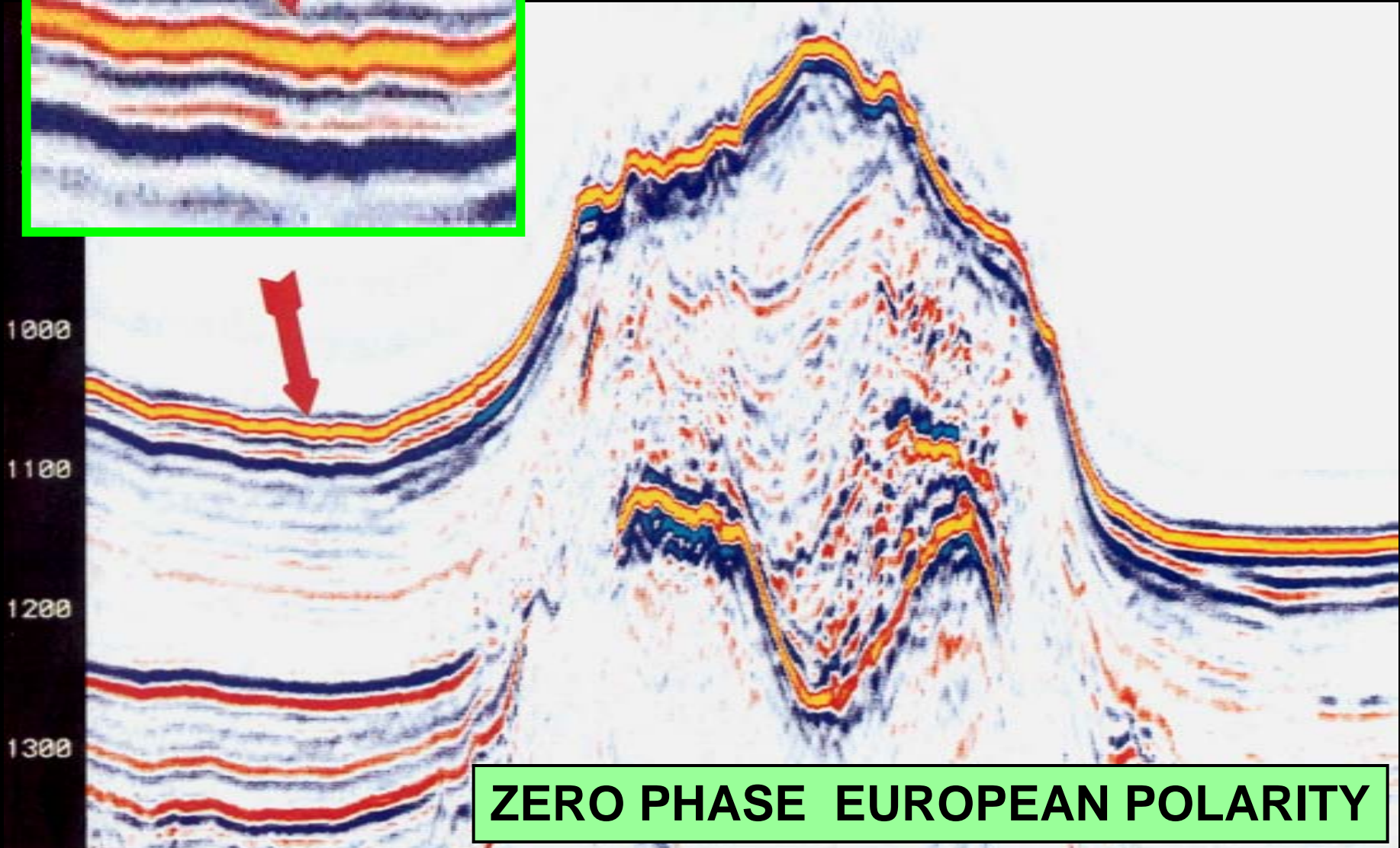
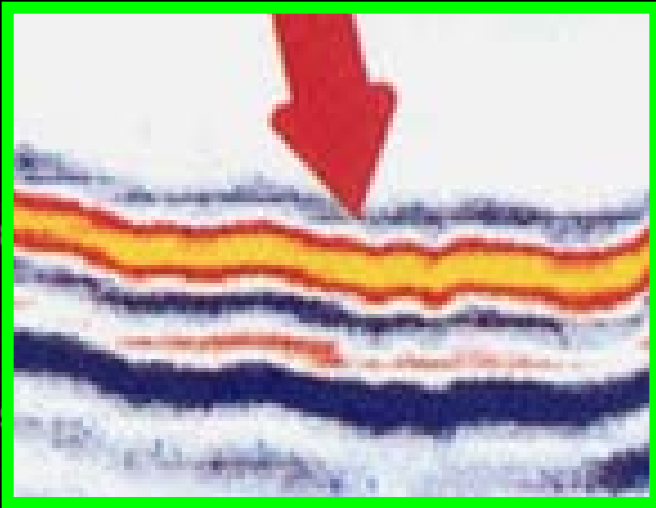


E.G. HYDROCARBON SAND



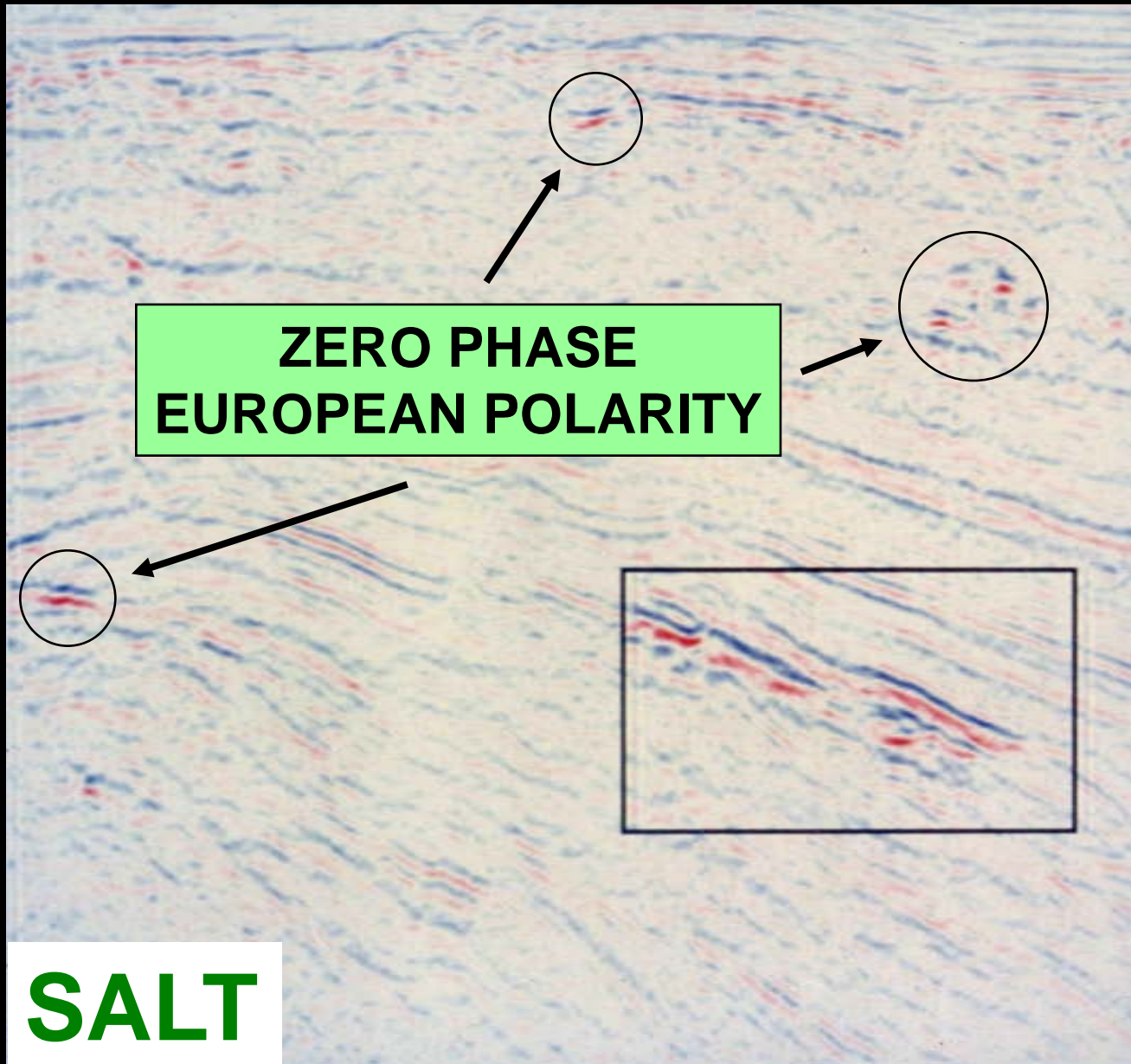
0° AMERICAN

# GULF OF MEXICO



**ZERO PHASE EUROPEAN POLARITY**

# SHALLOW GAS GULF OF MEXICO





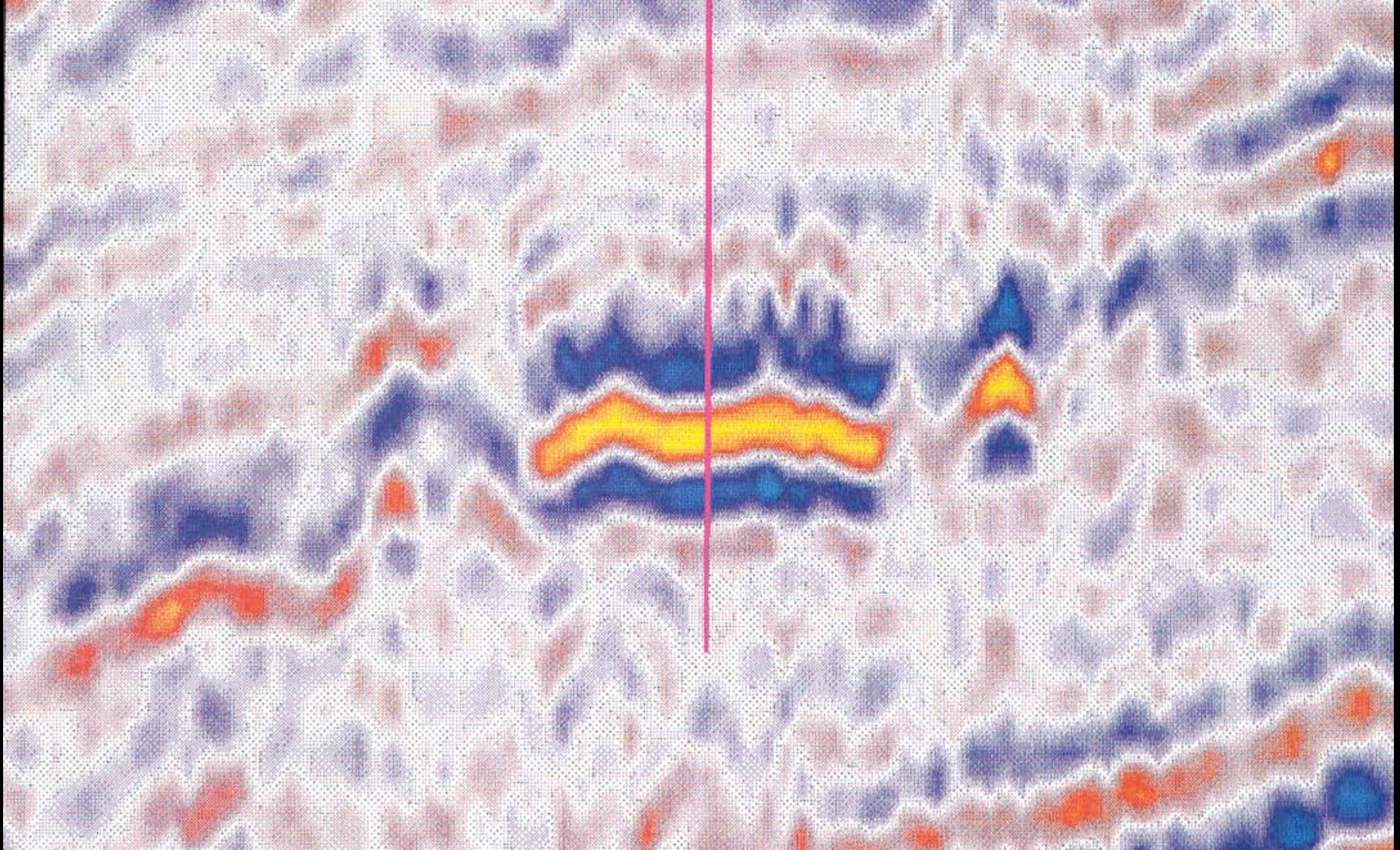
# SHALLOW GAS GULF OF MEXICO



**PHASE = +90<sup>0</sup>**



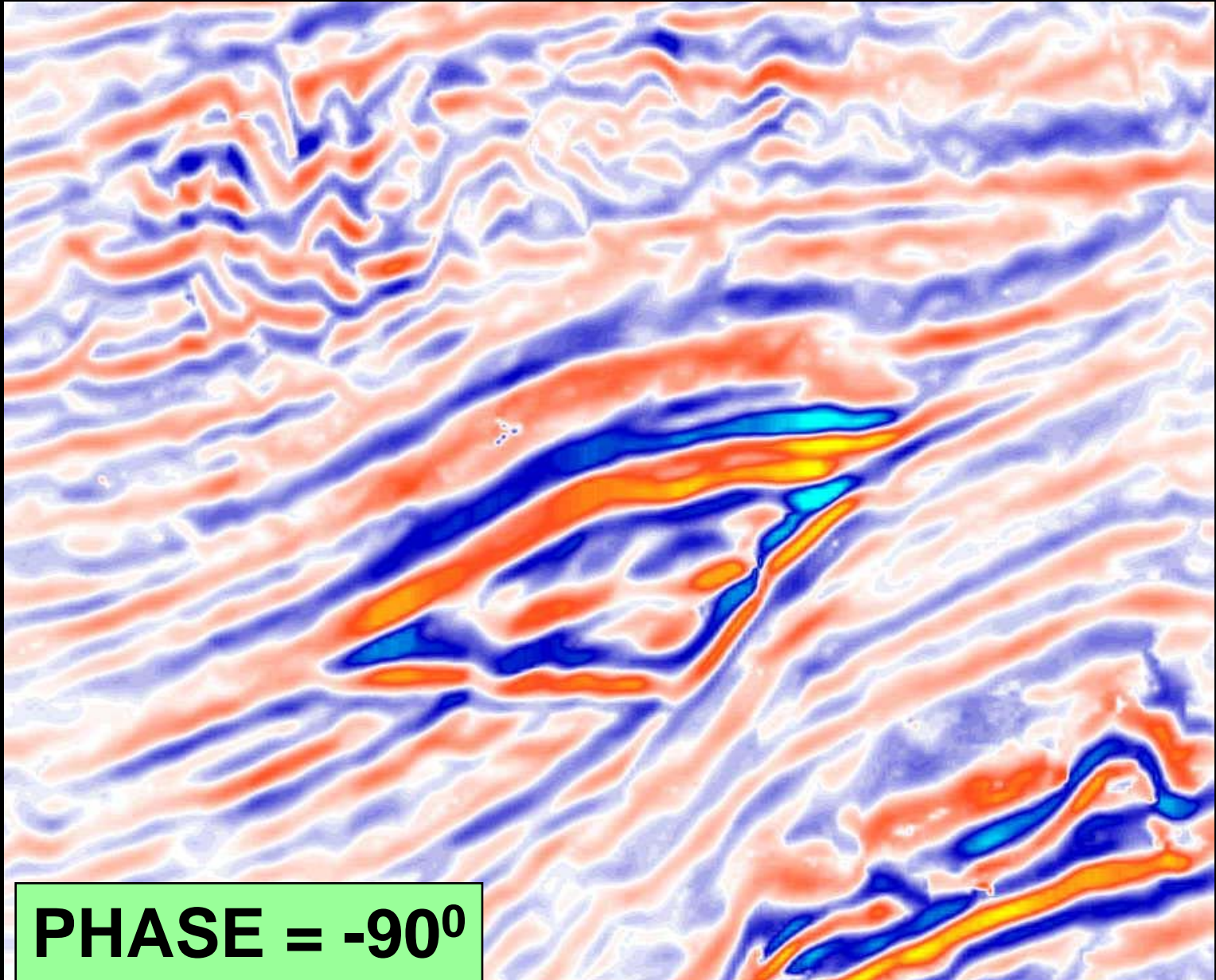
# MIOCENE GAS GULF OF MEXICO



**PHASE = +90°**



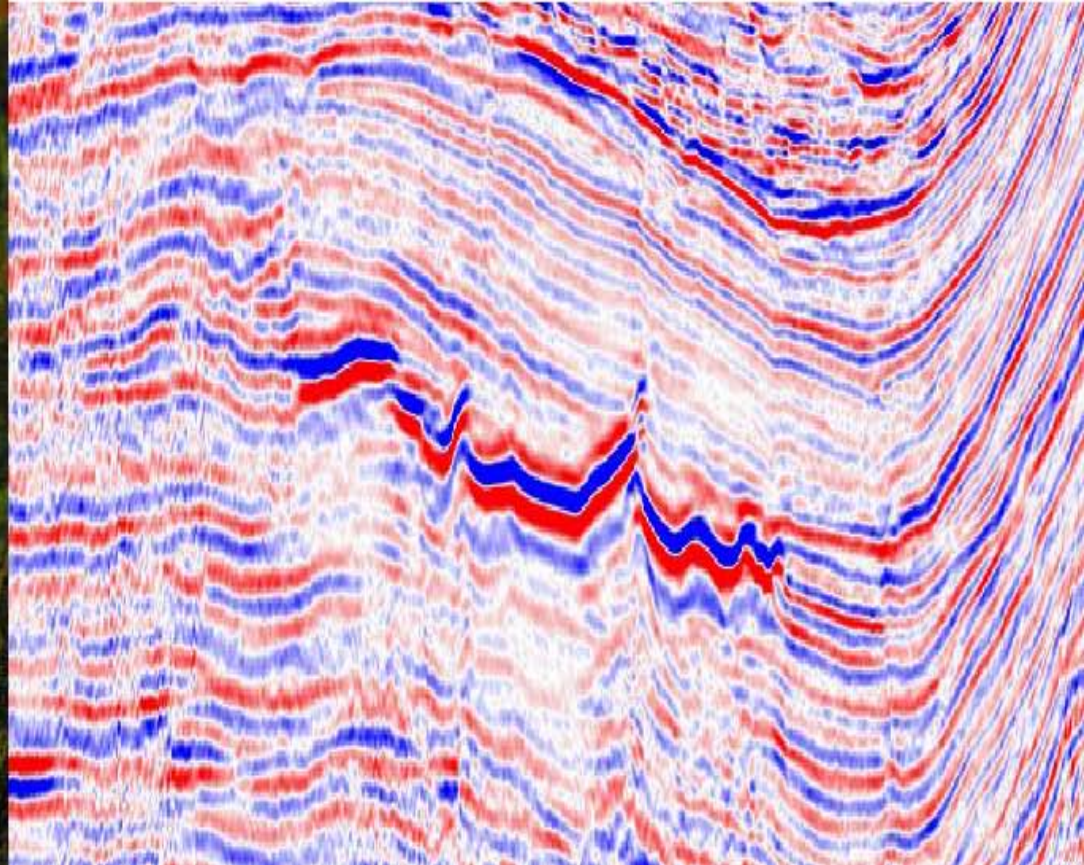
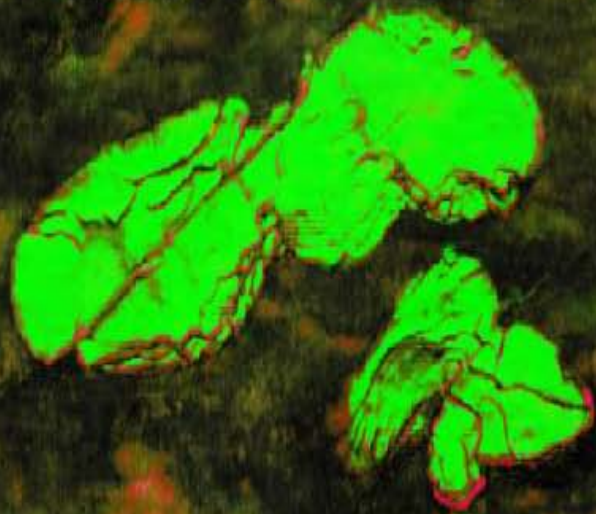
# ITALIAN PLIOCENE FLUID CONTACT



**PHASE = -90°**



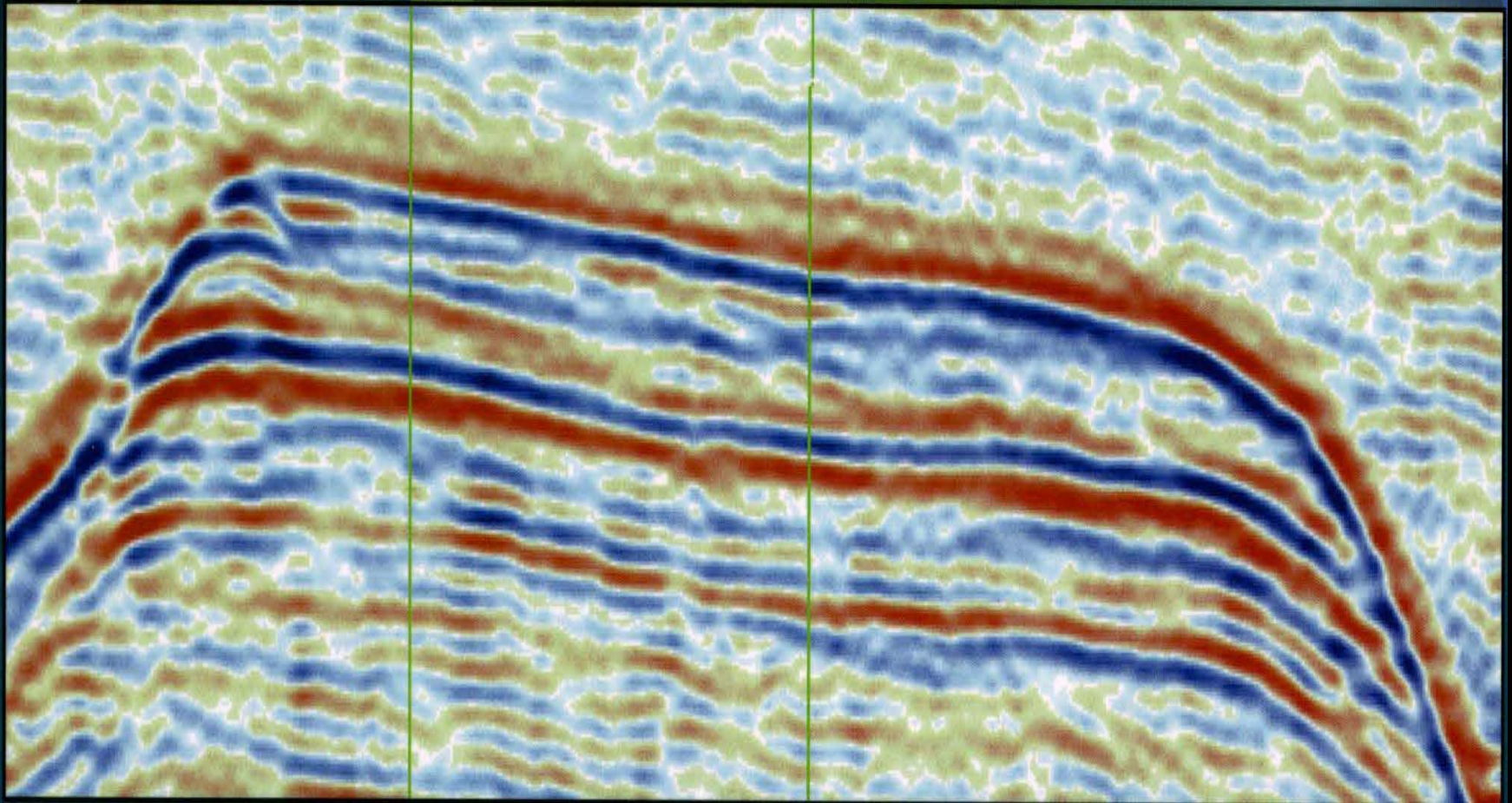
# IGNEOUS INTRUSIVE ROCK



**ZERO PHASE  
AMERICAN POLARITY**



# MALAYSIAN CARBONATE BUILDUP



**PHASE +90°**

**Don't assume the  
phase and polarity  
of your data.**

**Confirm them with  
interpretive observation.**