

# **A review of hydrocarbon exploration in Western Greece and its potential**

Angelos Mavromatidis, Abu Dhabi, United Arab Emirates

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Opportunities’ September 29th 2011, Technical University of Crete  
Mineral Resources Engineering Department,  
Chania, Greece

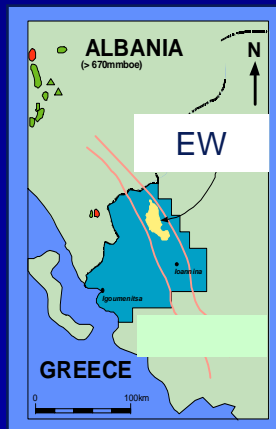
# Presentation Summary

- Objective of this presentation
- General geological setting of Western Greece: Geology & exploration well and Conclusions
- General Discussion and some analogs
- Modern History of Hydrocarbon Exploration in Greece
- Conclusions
- Movie

## Objective

- Show broadly that available data indicate there is good prospectivity and hence start exploration programs ASAP!
- Why now? Let's not forget or repeat
  - Energy resources is the vital element of economic growth
  - Exploration & drilling is not against environment
  - Present time is the best for all parties, i.e. government-foreign policy- investors

# GREECE, Regional setting - subthrust plays



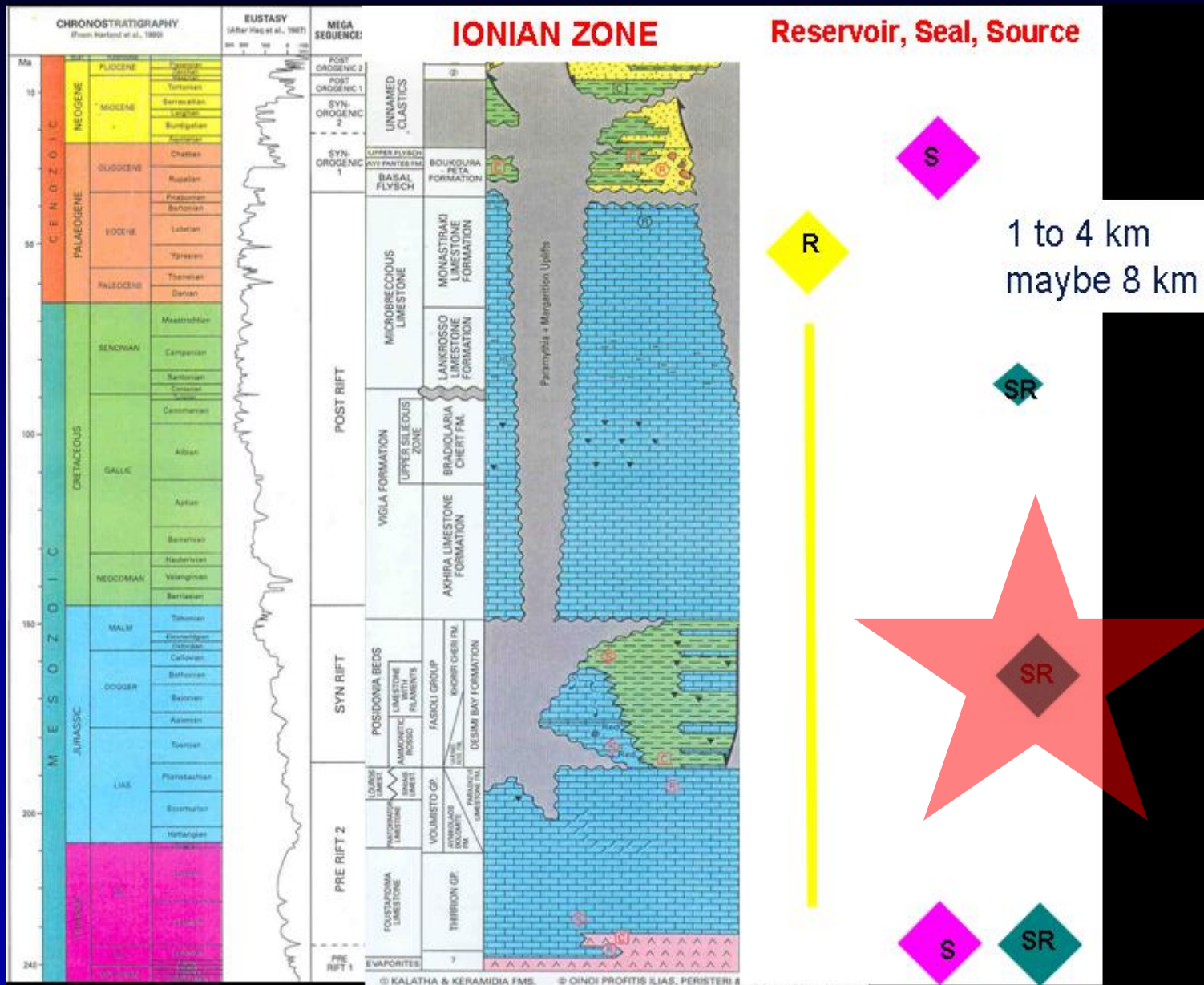




## Chronostratigraphic summary of Sazan, Ionian and Kruja zones in Albania.

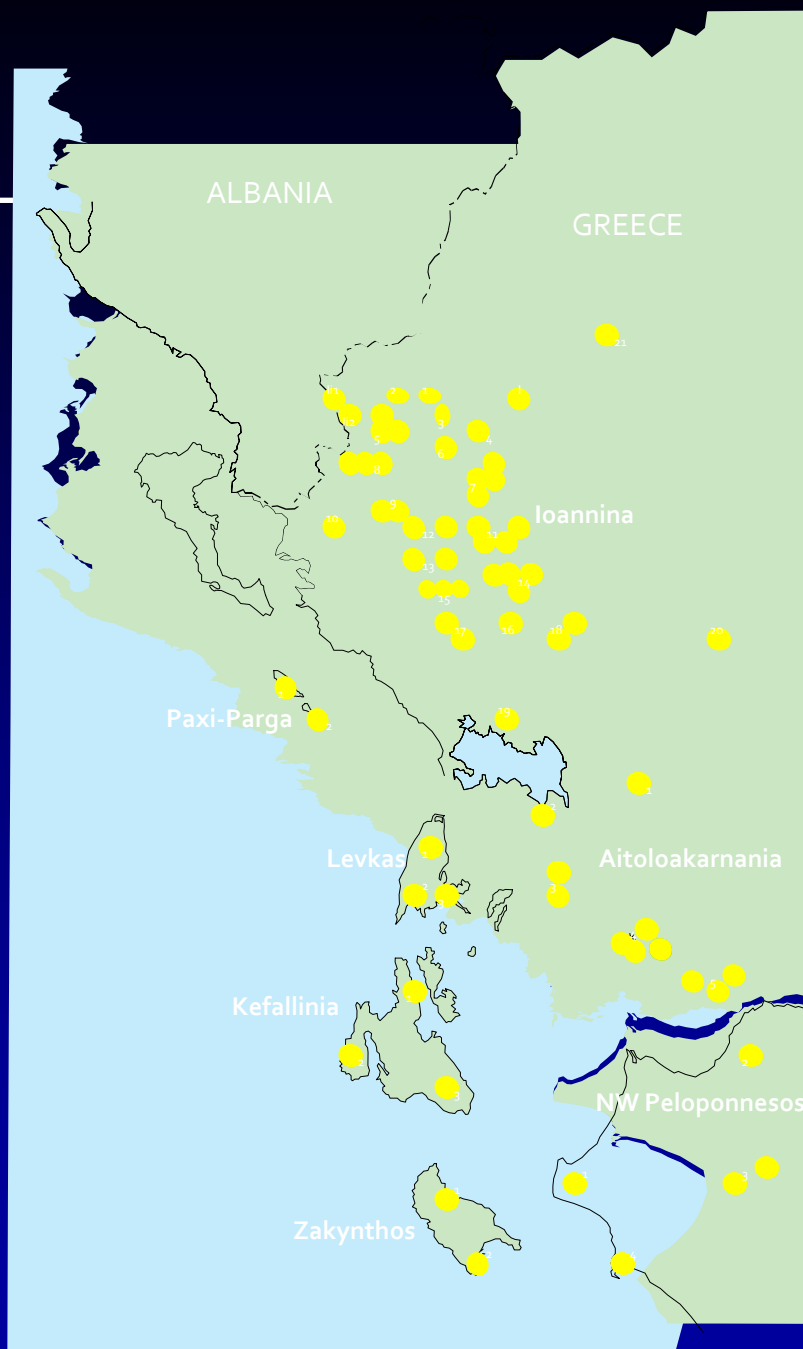


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# Oil seeps

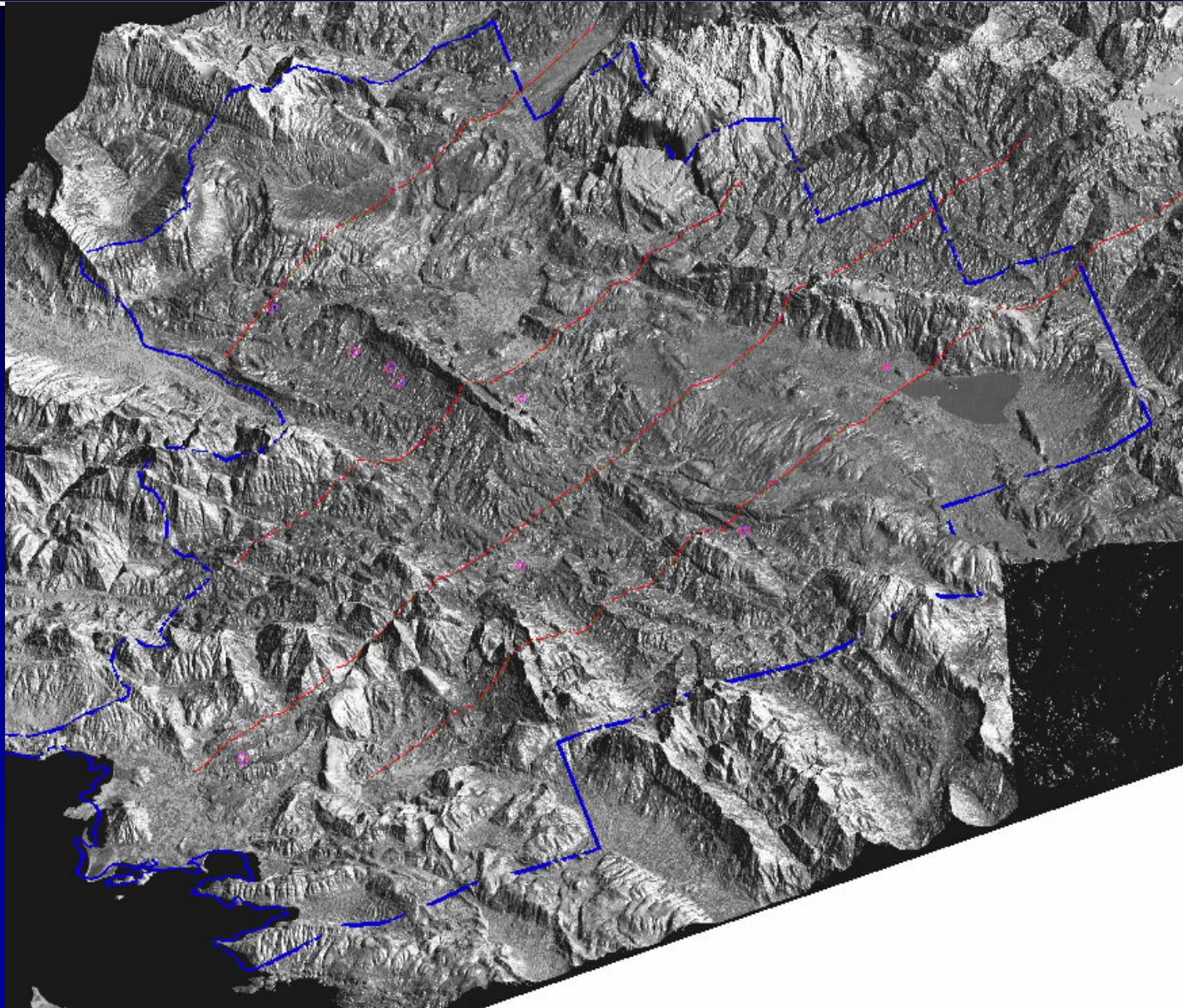
VERY important



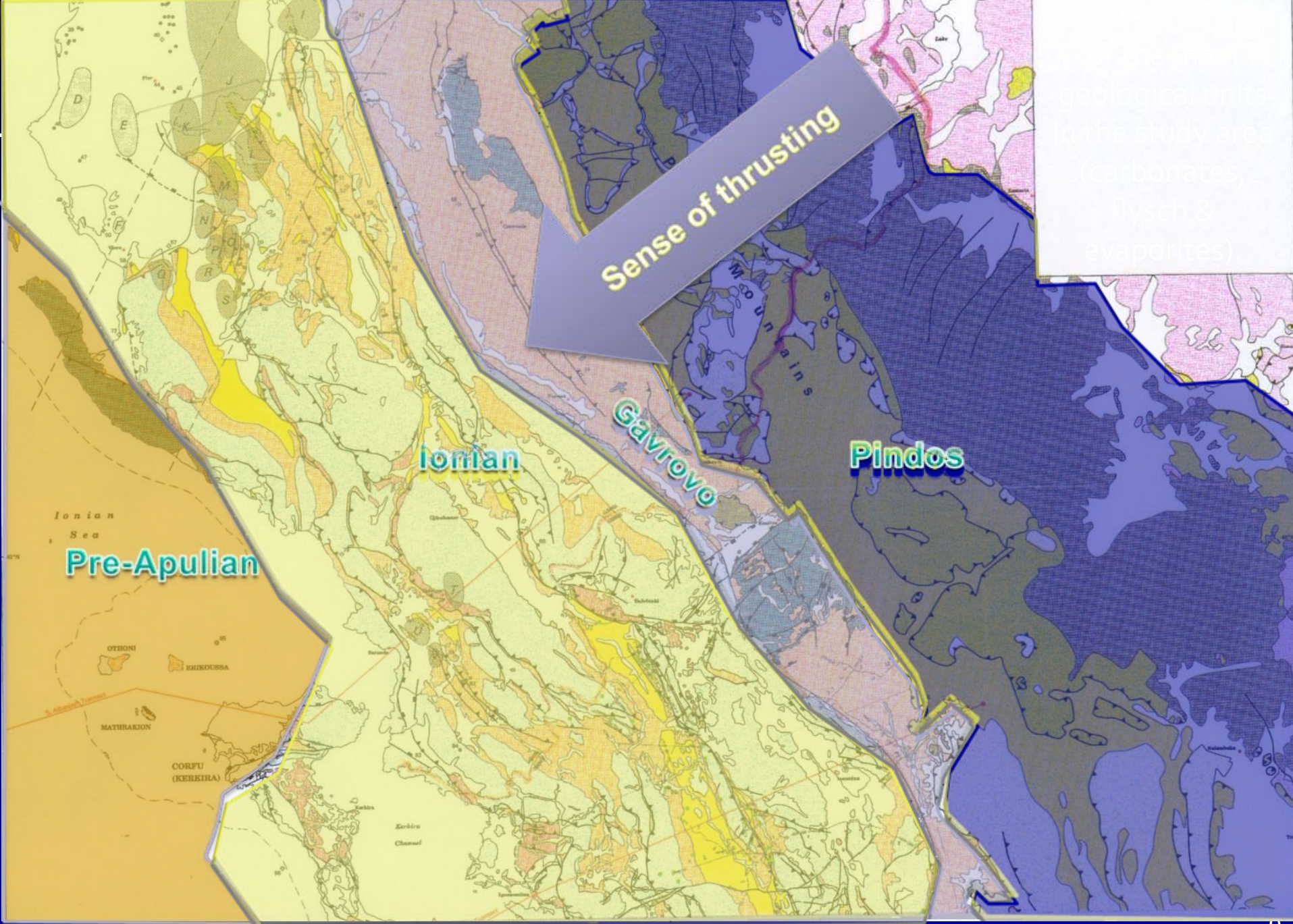
Geographical distribution of observed oil seeps in western Greece.



# Recent exploration activities 1998-2002



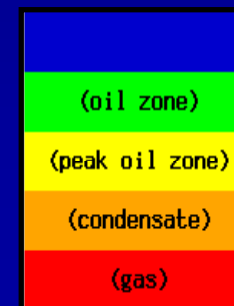
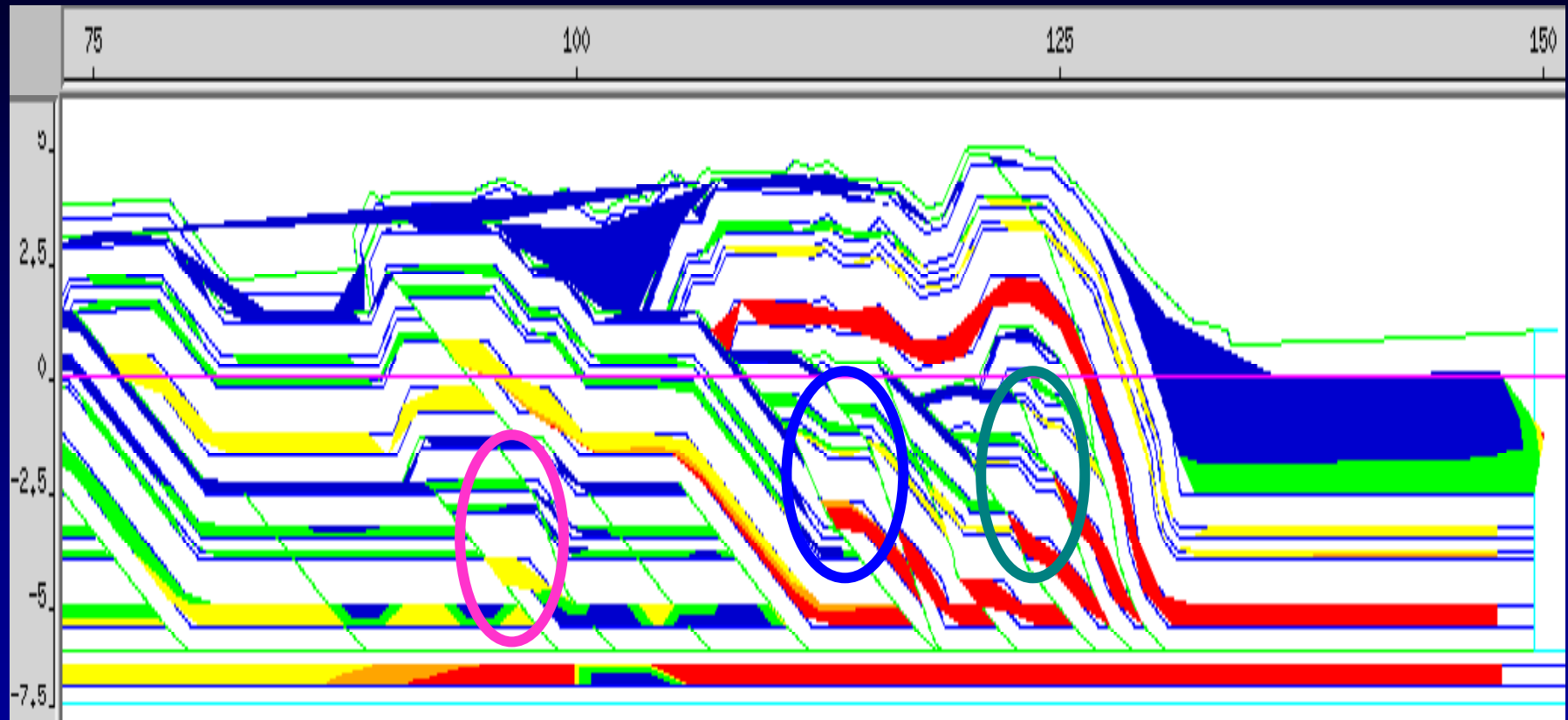




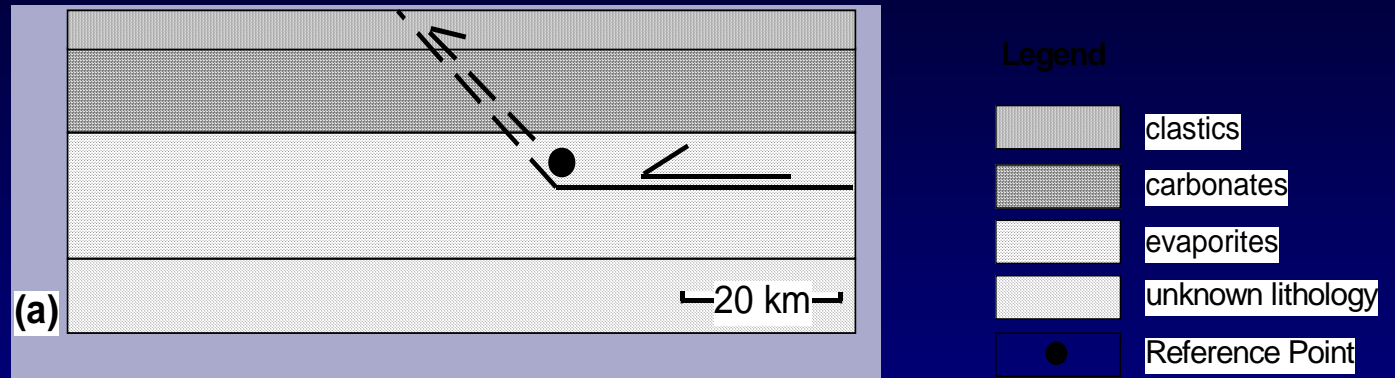
geological units  
in the study area  
(carbonates,  
flysch &  
evaporites)

# Thermal Maturity modelling (Thrustpack)

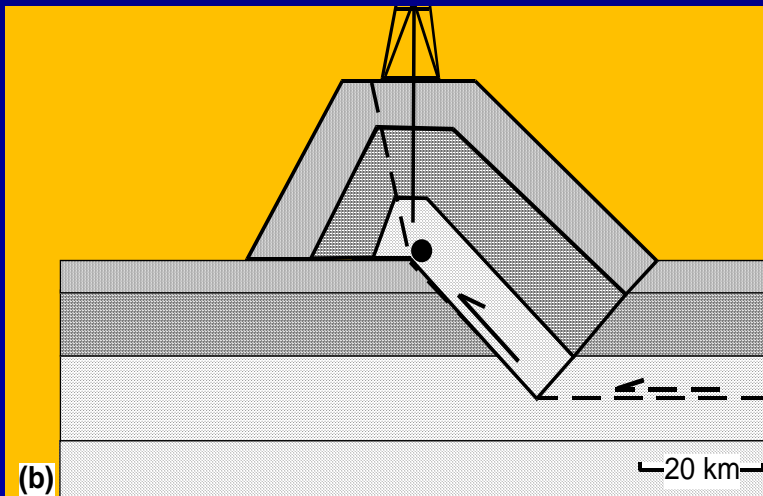
Present day



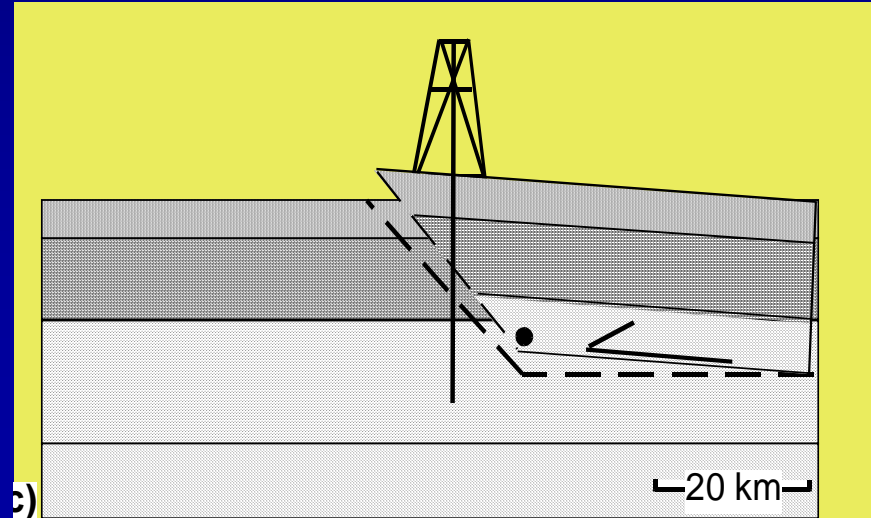
# Tectonic Scenarios



Model 1

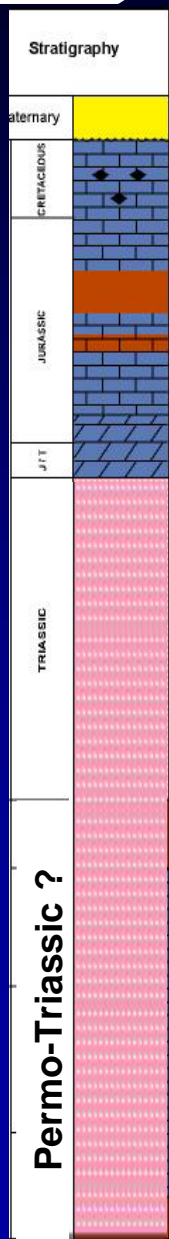
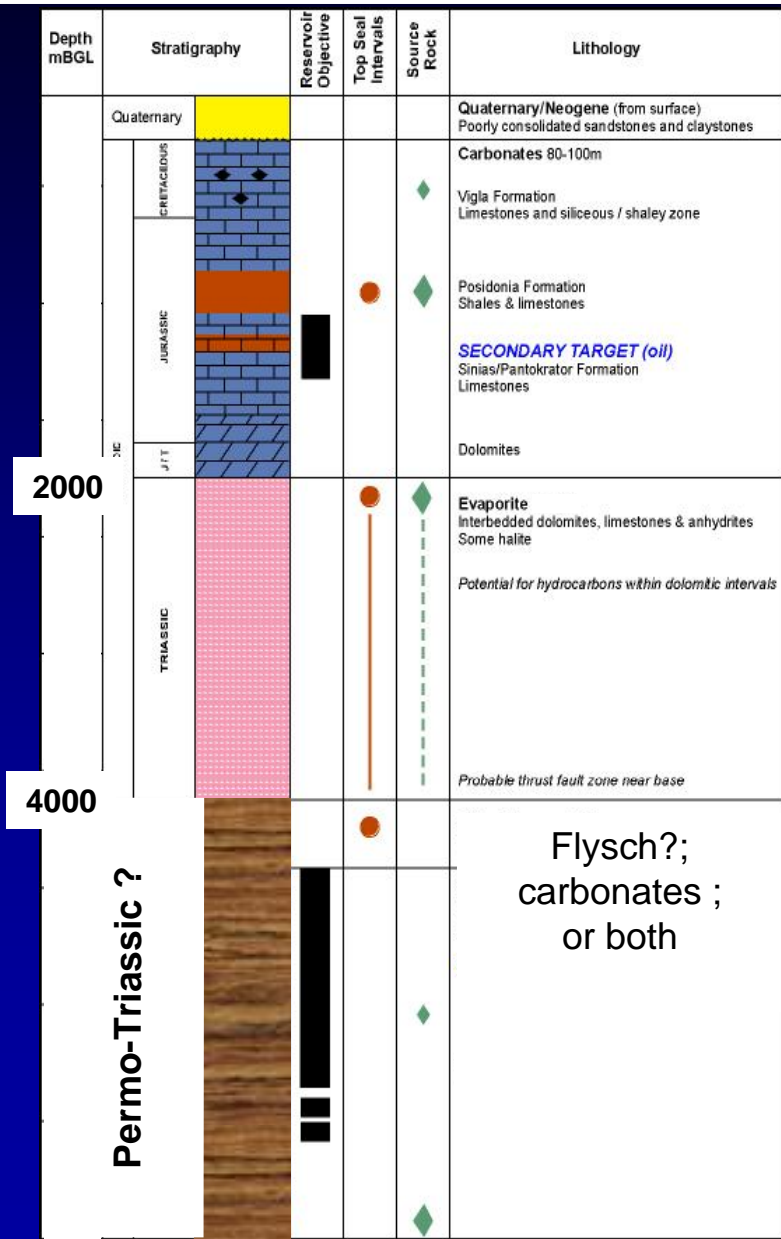
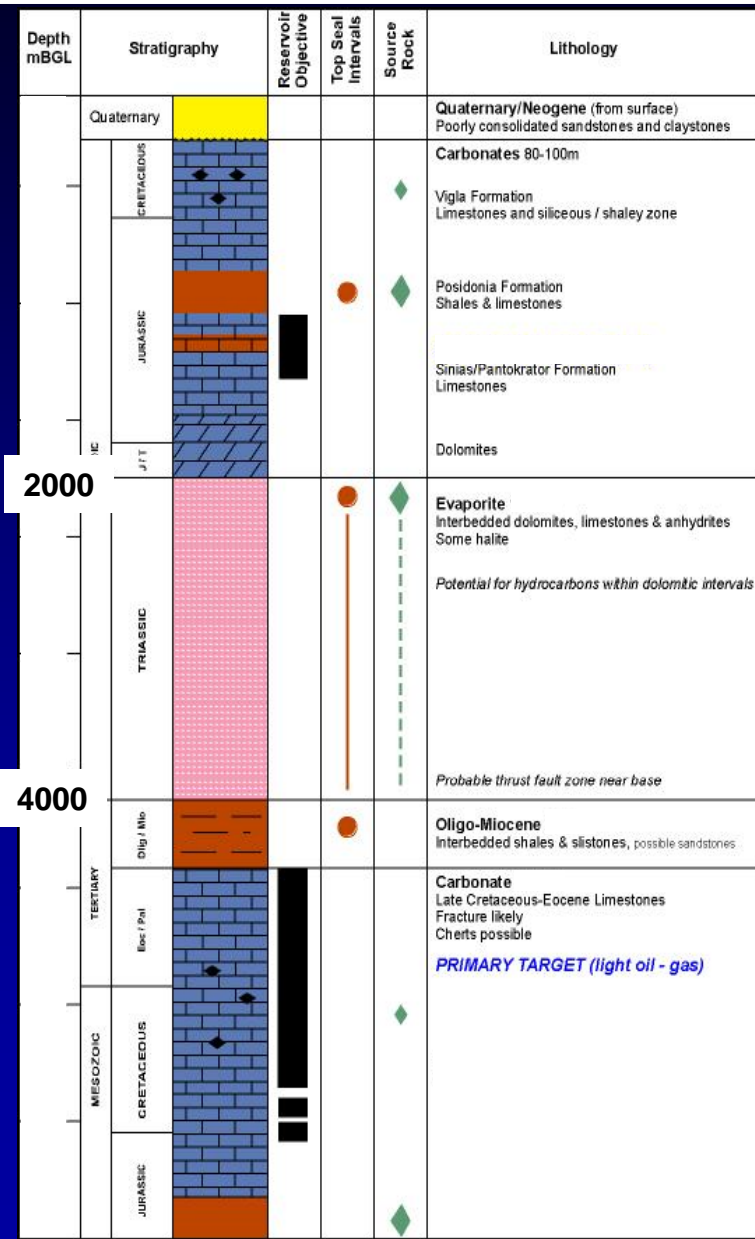


Model 2





# Well prognosis and hydrocarbon geology



# Well Location



# How? Causes of High Pressures

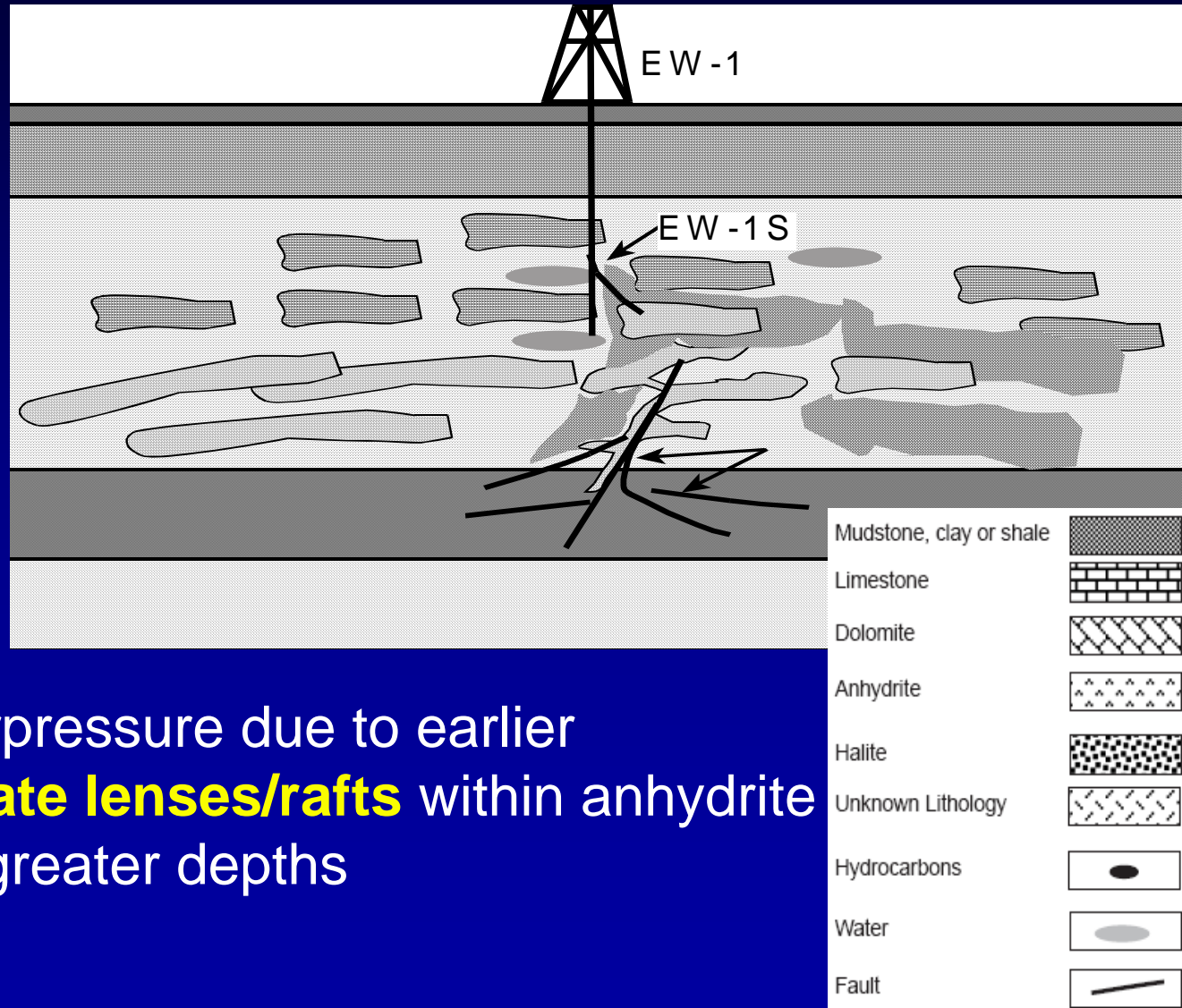
- ❖ Anomalously high pressure kick was totally unexpected
- ❖ No change in cuttings (anhydrite with dolomite interbeds)
- ❖ What is the pressure mechanism?
- ❖ Young & Lepley (2005); Swarbrick et al. (2002)
  - ~~Undercompaction ?~~ Young Sediments, Clay-sand lithology
  - Fluid expansion ? Thermal effects, clay diagenesis, HC maturation
  - Tectonic Activity ? Cross along faults, overthrust, compressional loading
- ❖ Change of lithology? Base of evaporites?



# High pressures not close to change of lithology, still in evaporites

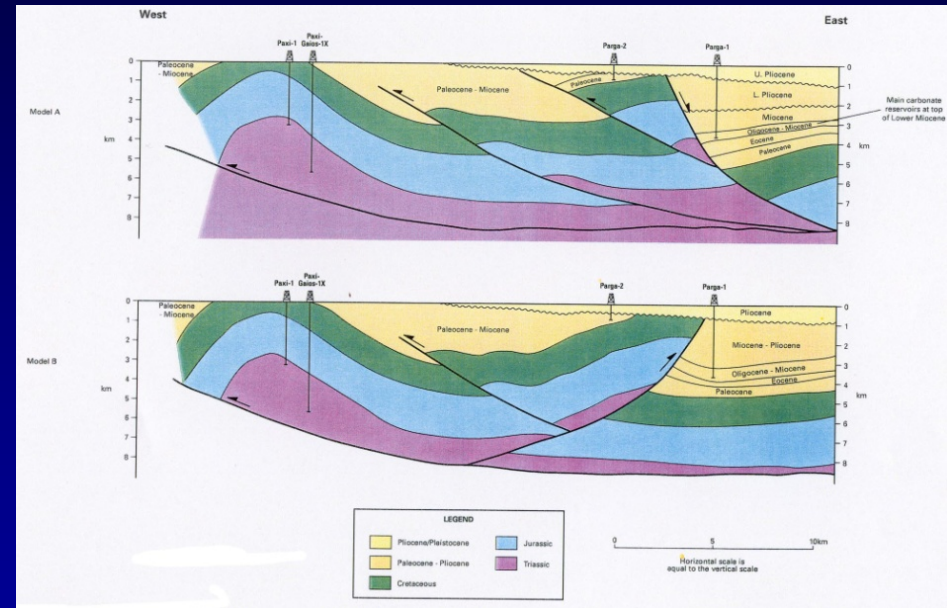
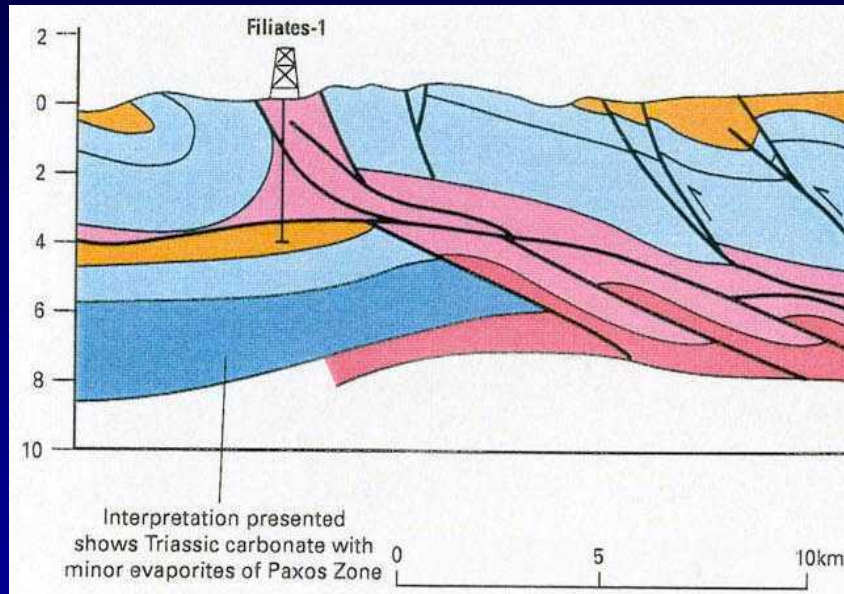
Dolomitic lenses  
have been  
'pressurized'  
due to flysch  
overpressure  
Smectite to  
illite

Gypsum–anhydrite



Intra-evaporite overpressure due to earlier  
isolation of **carbonate lenses/rafts** within anhydrite  
while they were at greater depths

# Evaporites never drilled before?



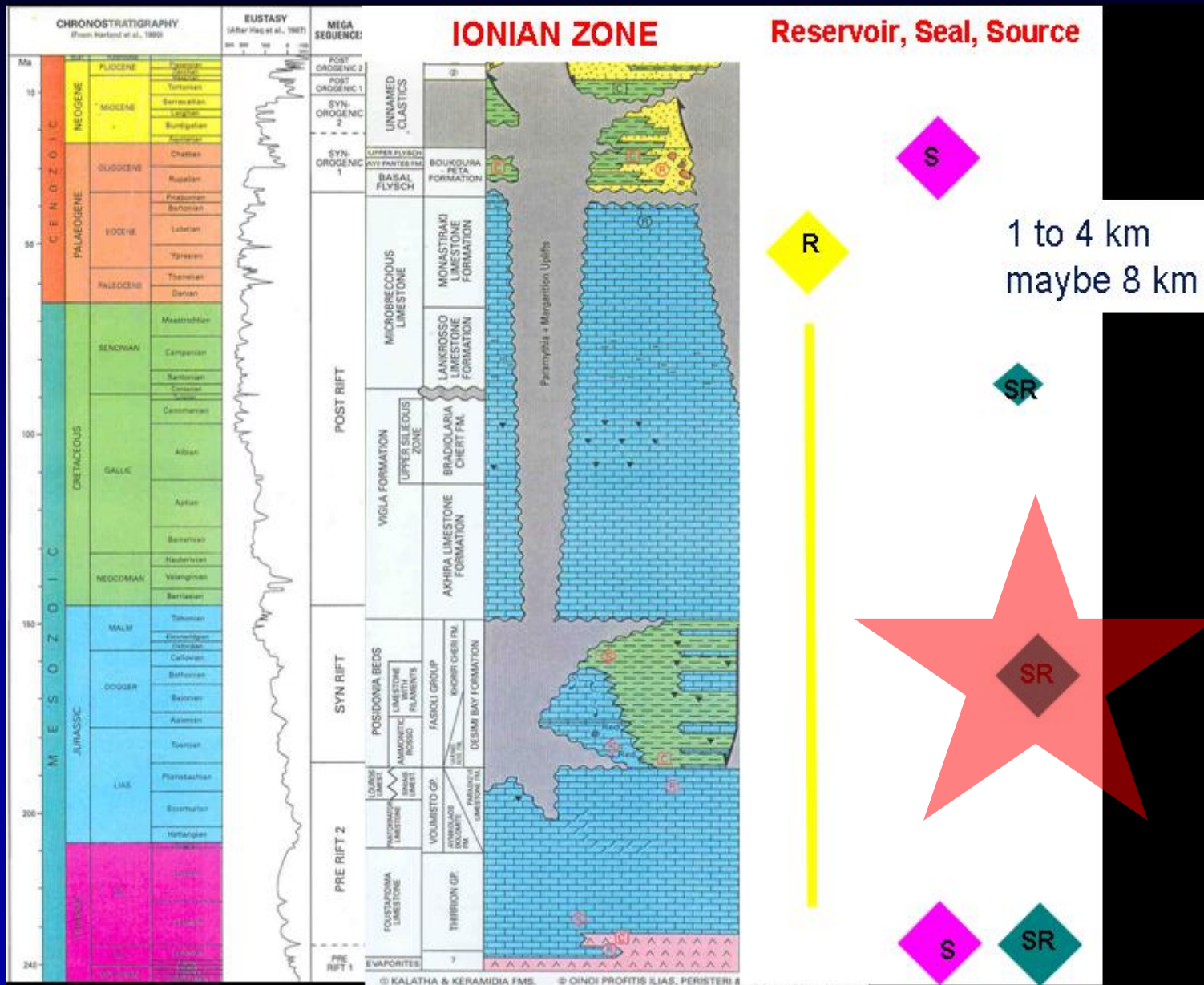
- Yes, but not totally
- Never seen before such high pressures

# Conclusions and recommendations from Demetra

- ❑ Despite all pre-drilling preparations, **unexpected** high pressures can be encountered.
- ❑ Proper **post-drilling** analysis could allow for assessment of causes of overpressure and **better preparation** for future drilling activity.
- ❑ Use of **advanced drilling technology** and the better formulation of drilling fluids, capable of operating with minimal problems under these harsh conditions.
- ❑ The availability of better **detection pore pressure mechanisms**, like ability to see ahead of bit.
- ❑ No well has ever penetrated the whole Triassic evaporitic strata in the Ionian Zone.



## 18



# An other one from mother earth?

## NATURAL GAS FOR EUROPE

HOME NATURAL GAS SHALE GAS NEWS BY COUNTRY PIPELINES TECHNOLOGY ENVIRONMENT  
TIGHT GAS SHALE OIL COAL-BED METHANE OIL SHALES LIQUIFIED NATURAL GAS

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### Realm adds Shale Expertise

Realm Energy International Corporation has announced the appointment of Mr. Mike Mullen as Chief Operating Officer.

A shale stimulation petrophysicist, Mr. Mullen is credited with thirty years of experience in unconventional reservoir characterization, including Tight Gas, CBM and Shale Oil and Gas. Most recently, he was with Halliburton as a Technical Professional Manager. Realm and Halliburton have been co-operating on technical analysis of European shale oil and gas resource plays.

This May, Realm announced that was awarded the Aschen Concession in the Weser-Ems region in the Lower Saxony Basin, Germany. The concession covers an area of 15,888 acres (approx. 64sq km) and contains two mature, organically rich shale formations known as Wealden Shale and Posidonia Shale.

In a news release, Realm stated that proximal to the Aschen concession, partially on contiguous lands, an unnamed multinational corporation had drilled on these shale formations.

An article in Oil and Gas Insight suggested that the multinational in question is “likely to be either ExxonMobil or RWE, which are the dominant explorers in Lower Saxony.”

# Modern History of Hydrocarbon Exploration in Greece



1930-59 - 16 wells  
1960s - 19 wells  
1970s - 8 wells  
1980s - 38 wells  
1990 – 2011 **4 wells !!!**

STRATIGRAPHIC STUDIES  
ON THE MESOZOIC AND LOWER TERTIARY CARBONATE SUCCESSION  
OF WESTERN GREECE

BY

D. BERNOULLI, H. VAN DEEMTER AND C.W. WAGNER

MARCH 1966

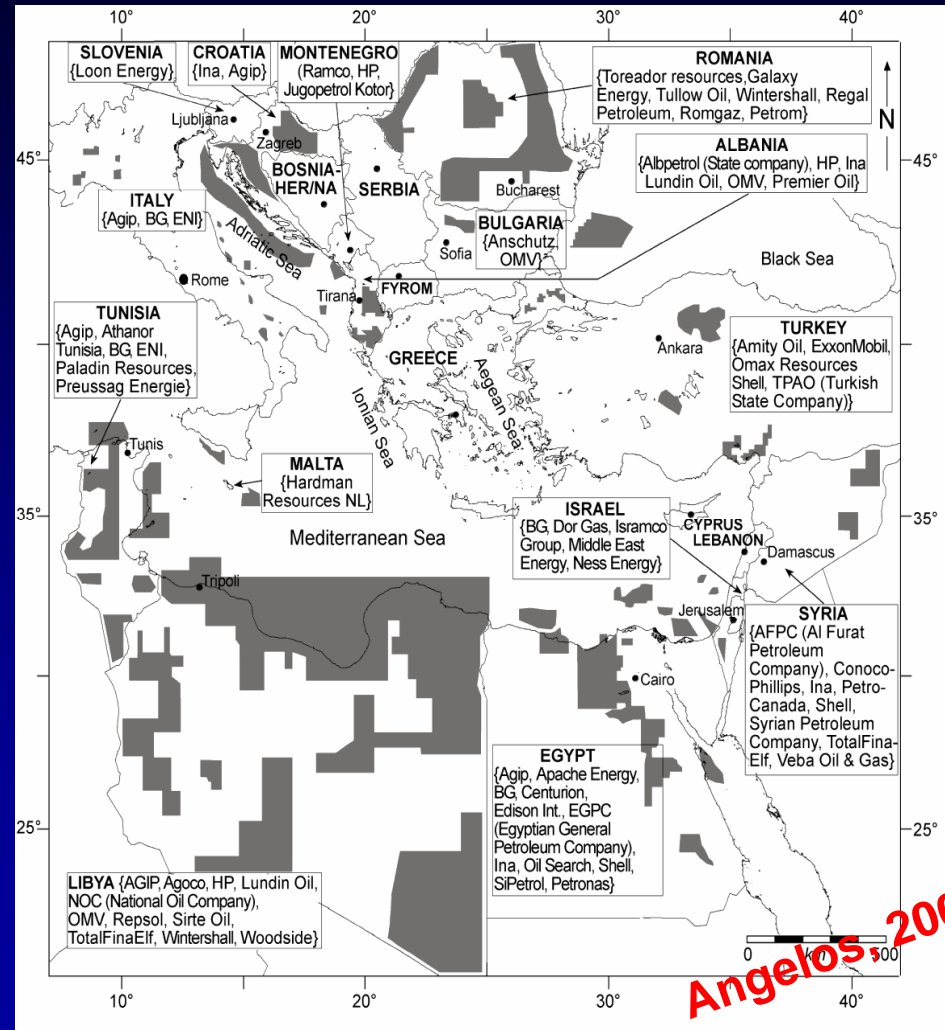


1930-2011 !



# Politics & recent 'history', i.e. upstream absence

- <http://www.aapg.org/explorer/2003/08aug/licensing.cfm>. The Second International Licensing Round, initially scheduled for 2001, then in late 2002, was postponed again due to the proposed partial privatization of Hellenic Petroleum. Following the rejection of Lukoil's offer for a 23 percent stake, developments concerning the bid round are not expected until late 2003.
- <http://www.eia.doe.gov/emeu/cabs/greece.html>. In May 2002, Greece announced that it would hold its second oil exploration licensing by early 2003. The round is to include both offshore and onshore areas in northwestern and southwestern Greece, plus unexplored blocks in the Ionian Sea.



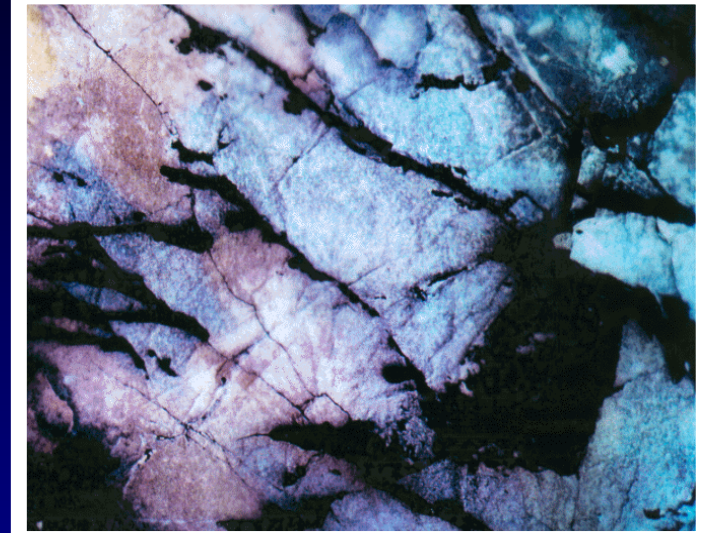
2007 Athens, AAPG, a real disaster !

# Conclusions and recommendations

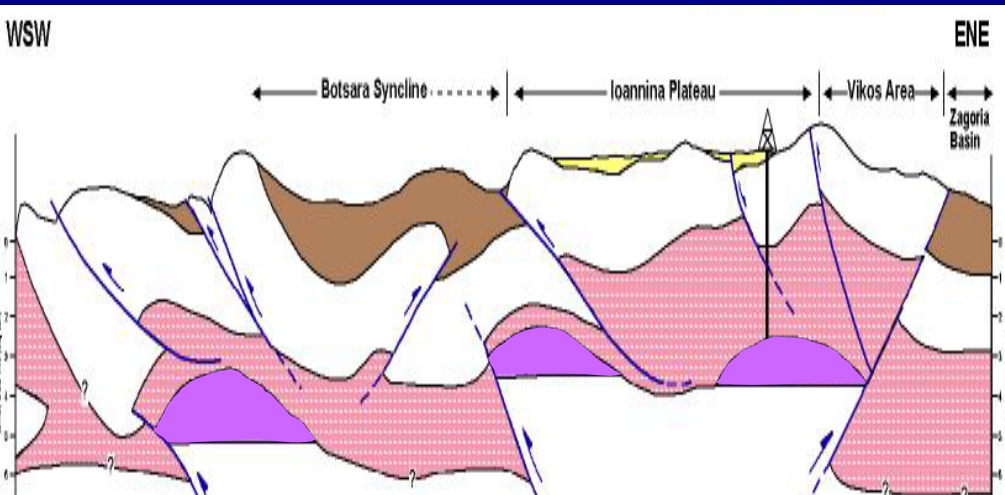
- ❑ More studies are important for the Ionian Zone and generally for western Greece, such as the pre-Apulian Zone, which has similar lithology to the Ionian Zone, and the Gavrovo Zone.
- ❑ These studies must trace the deep evaporitic strata and target areas where the evaporites will be fully penetrated.
- ❑ **Drilling in western Greece should continue**
  - there are some 25 oil and gas fields in Albania,
  - only one discovery has been made so far in western Greece (west Katakolon)
- ❑ This is highly significant as it proves the existence of a viable play and its continuation throughout western Greece



# Holy Triad: Source Rock, Reservoir, Seal



The 'cursed' evaporites maybe a blessing!



Let's give it a go, let's unravel the myth

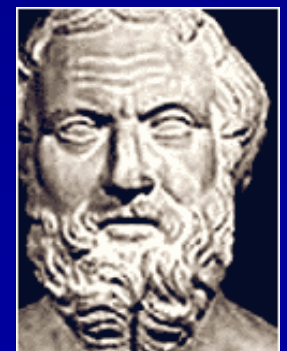
and show Herodotus

that the mystery

liquid he reported BC fulfils

part of the present energy

needs



**Let's give it a go, *'unless we drill we never know'*  
(Prof. Kelesidis)**

