New Evidences for the Formation of and for Petroleum Exploration in the fold-thrust zones of the Central Black Sea Basin

Semil Sen et. al 2013

Carly O'Neal

SUMMARY:

- Central Black Sea Basin contains more than 6 miles of sediments with a very complex geologic history.
- The area has poor → good hydrocarbon source rock potential with type II and II kerogen.
- Modeling studies show that source rocks began to generate oil and gas before the main period of trap formation.
- Assessment of the drilling history suggests that the wells did not penetrate potential reservoirs because of a 16,500 foot section of sediment.
- Reservoirs of the Caglayan Formation and Inalti Formations in the fold traps are excellent prospects for future exploration.

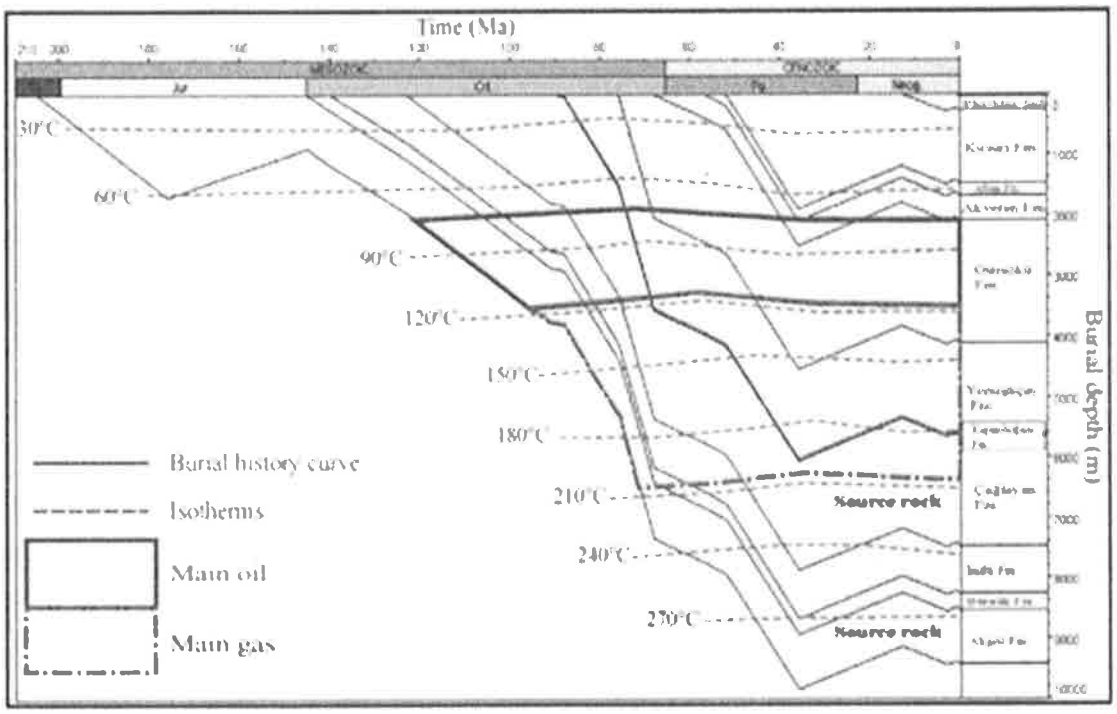


Figure 10. Generalized petroleum system graph showing burial history, isotherms, and maturity windows of the northern part of the central Black Sea Basin. Isotherms are accepted as mean 30°C/1000 m (30°C/3281 ft) (rift and arc sediments are higher than and passive margin and retroarc sediments are lower than 30°C/1000 m [30°C/3281 ft]). Fm = Formation; Jur = Jurassic; Plio-Mio = Pliocene–Miocene; Crt = Cretaceous; Pg = Paleogene; Neog = Neogene.

DyCAW

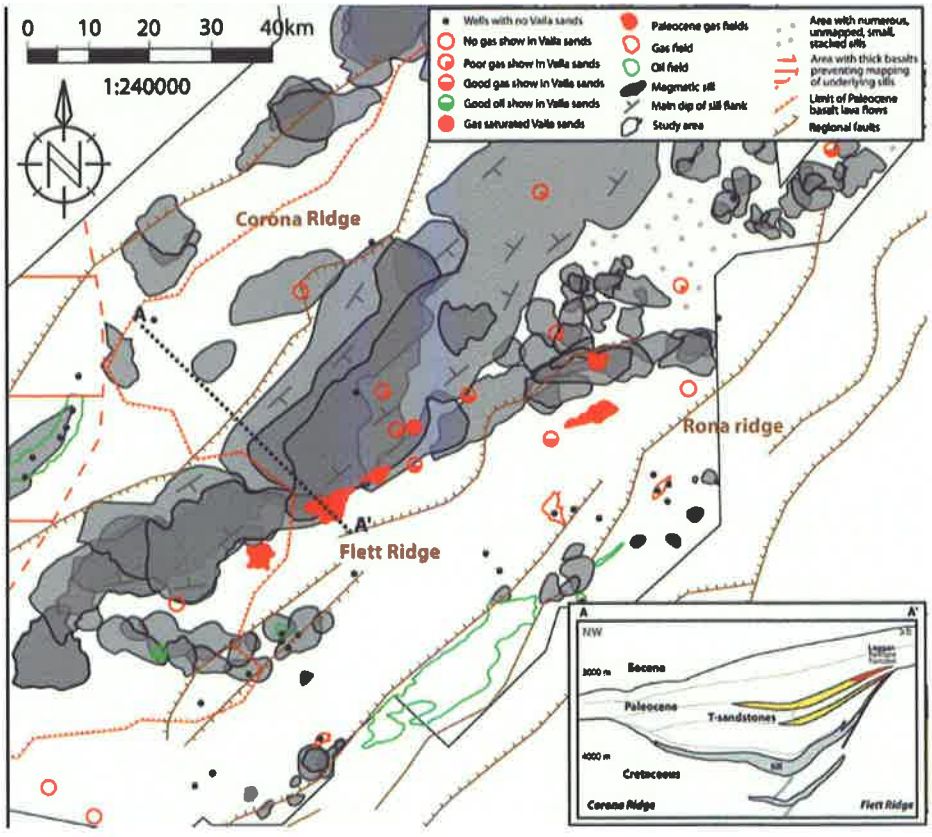
Igneous Intrusion and Hydrocarbon Accumulation in Shetland.

- Location: Between the Faroe and Shetland Islands in the North Sea

- Igneous Intrusion: magma that cools and solidifies before reaching the surface.
    - Sills, dykes, and batholiths
- Faroe-Shetland Basin (FSB): mainly large sill complex

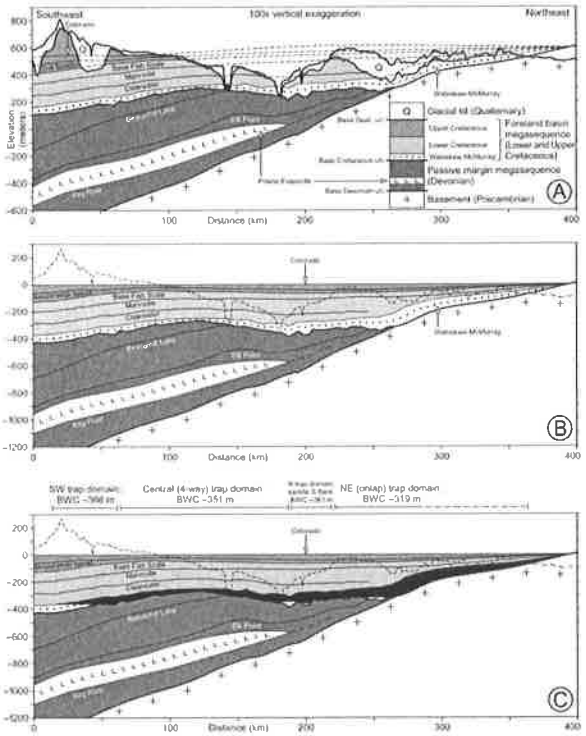
- Survey Methods: Seismic surveys and Well logs, including cores.
- Sills: Composed of Dolerite (similar to basalt)
    - Dolerite permeability factors; Vesicles, Metasomatism, and Fracturing
    - Core samples revealed little vesicle frequency and very little metasomatism.
- Some samples revealed fracturing. Likely a result of cooling and tectonic activity. Cores at depths of 4000-5000m below ocean floor

- Two main models of igneous intrusions proposed.
    - Compartmentalization of hydrocarbons between sills
    - Hydrocarbons migrate and accumulate at sill edges.



Athabasca Oil Sands

- What is it?
  - Surficial and near surface bitumen sources in Northeast Alberta, Canada
- What are we trying to figure out?
  - Trap destroyed due to flexural loading, with subsequent uplift and erosion
  - What did the trap look like? When did it form?
  - How did the bitumen form?
- Methodology
  - Restoring of the paleohorizon of the Colorado Group (84 Ma)
  - Showed four-way anticline
    - Megatrap!
- Low depth of formation kept temperature too low for petroleum pasteurization
  - Biodegradation to impermeable bitumen
- Coeval charge of petroleum and biodegradation
  - Happened at the same time
  - Allowed oil to change to bitumen before tilting occurred
- Six trap domains were identified
  - Large structural trap (anticline)
  - Onlap trap
    - Shallowest trap; contained gas cap
  - Four peripheral traps
    - Late petroleum charge
    - Sealed by immobile bitumen prior to charge
- Bitumen-Water Contact
  - Used to determine timing of charge of each domain
  - 1. Structural trap
  - 2. Onlap trap
  - 3. Peripheral traps
- Kimberlite
  - Age dating of Kimberlite pipe provides time correlation with bitumen charging
  - Northern peripheral trap charged no earlier than 78 Ma



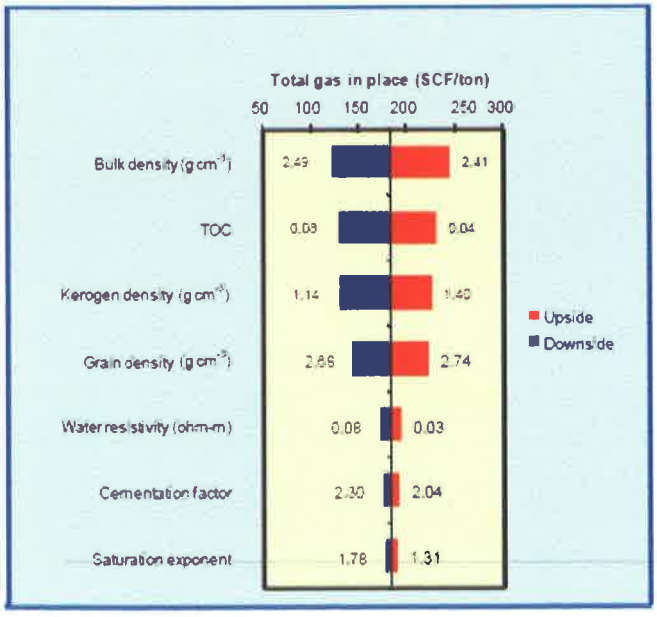
Robert Patton
3-10-2015
Nile river delta

- Reconstructing the previous routes of the Nile river
- This article talks about the development of the Nile river
- Evidence shows that the Nile must have had a large catchment around 30 Ma.
- The Res sea rift shoulders, which supply about half of the classic sediment.
- Changes in the shoulder and the basin cause Niger River plus many others to change direction and flow up in to the Nile, which eventually exit in the Mediterranean.
- The sediments in the basin were eventually deposited around from the rivers that eventually connected up with the Nile.
- The rate of sediment flow has changed over time.
- The older sediment deposits in the Nile are perfect reservoirs to contain oil.

TIM

Petrophysics of shale gas Reservoirs

- Shale Reservoirs do not fit the criteria for an "Archie" type reservoir because they have thin beds with multiple rock types, are mostly heterogeneous, the materials within the beds have different strengths depending on their orientation "Anisotropic", the presents of organic solids in the form of kerogen, and the variability of the connate water within the reservoir.
- This paper displays the problem that with the current models being used for analyzing the hydrocarbon content of shale reservoirs, there is some inaccuracy due to the fact that the model was based upon a different type of reservoir.
- In order to create new model, Key wells need to be put in place with core analysis and borehole geophysical techniques to refine and give ground-truthing data.
- To establish better data the key wells core samples should be analyzed with a larger variety of instruments including, X-ray diffraction, X-ray fluorescence, fluid extraction, Nuclear magnetic resonance, Pyrolysis, and pulse decay permeability readings. Along with the standard logs. Standard logs include: SP logs, Pressure, temperature, resistivity, gamma ray, neutron, sonic and density.
- Figure 4 below (left) shows the variables associated with uncertainty in the process of estimating the total amount of gas in place with the larger bars having more impact on the outcome.
- The Right figure shows the steps needed to create the parameters for finding the OGIP "Original Gas in Place" for the core data is represented in green and the field data in brown.



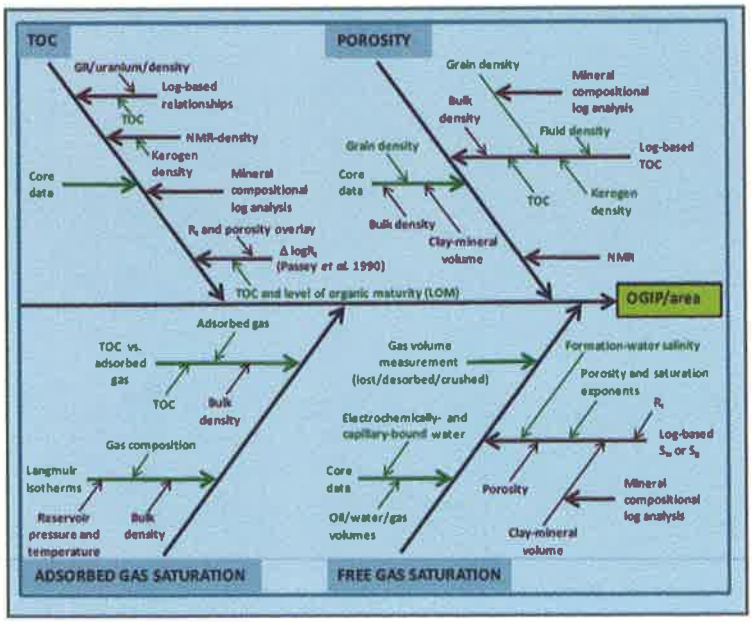


Fig. 4. Tornado chart summarizing the sensitivity analysis.

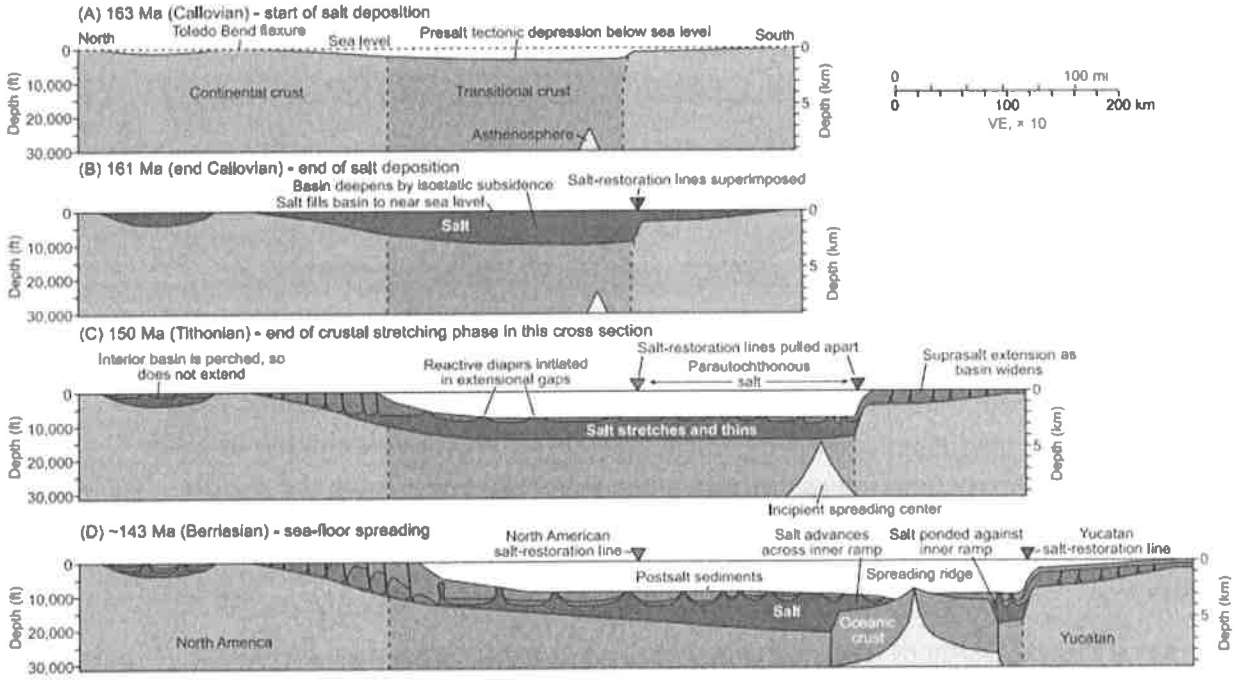
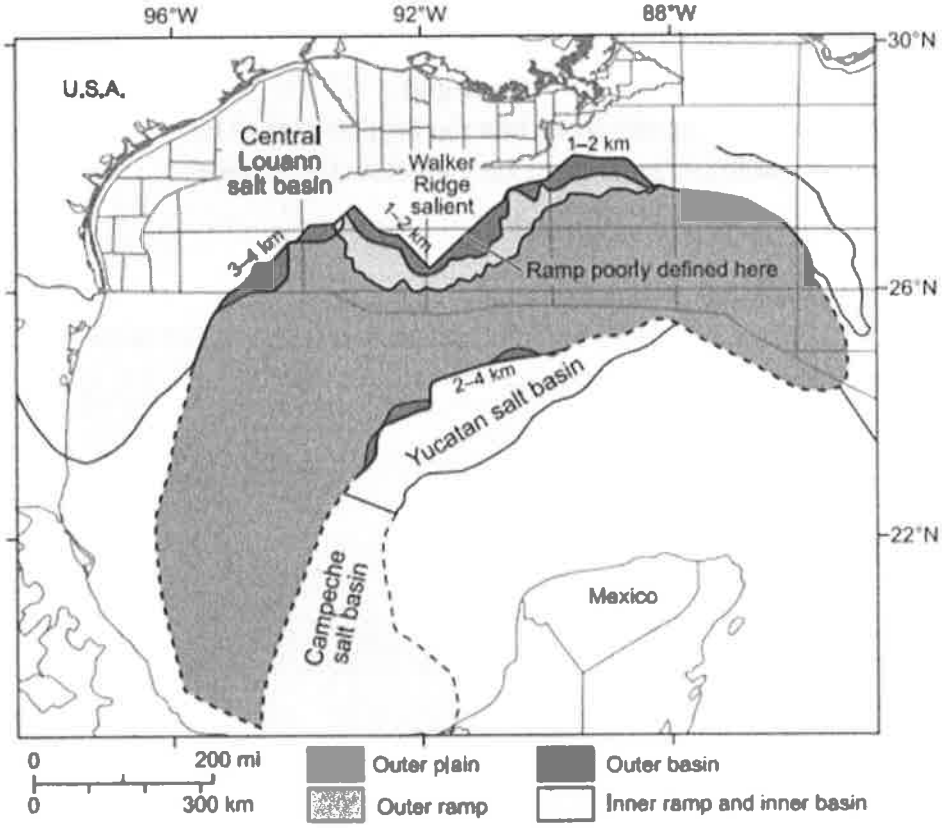


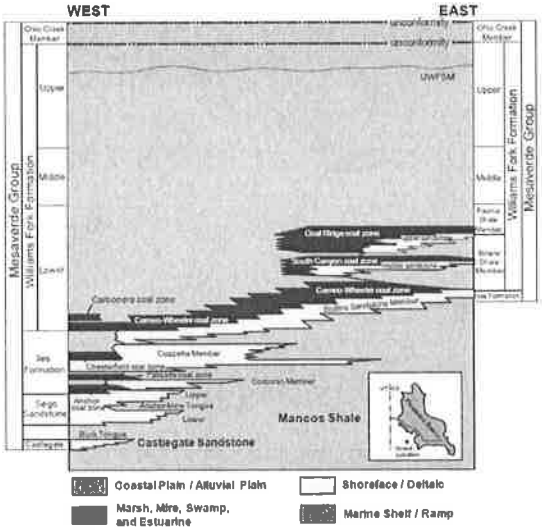
Figure 14. Schematic section restoration of basin evolution, emphasizing salt and its overburden. Internal structures in the crust are not shown. Line of section passes through the Walker Ridge salient, where sea-floor spreading began relatively late. Restoration was constructed using LithoTect software. VE = vertical exaggeration.

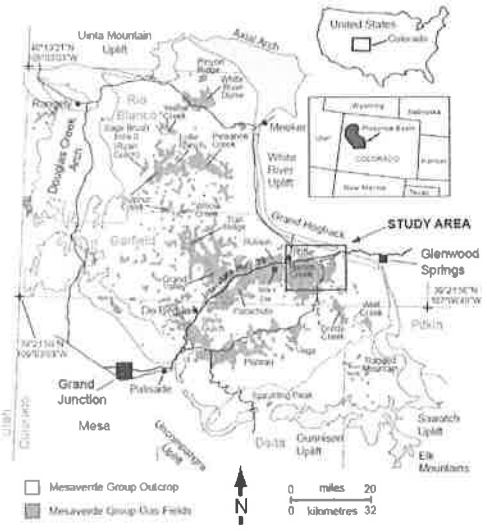


Ian McBride

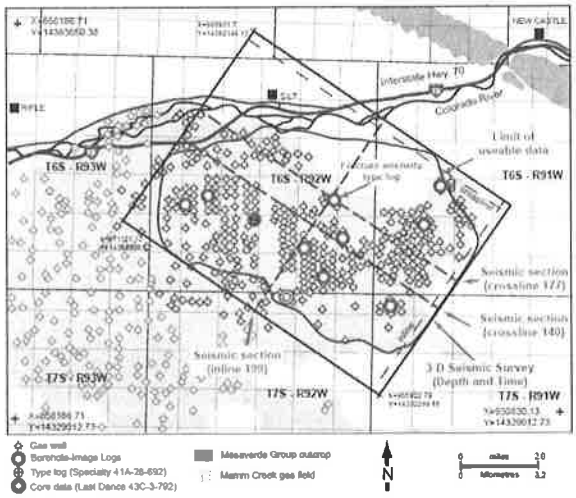
Fault and Fracture Distribution within Tight-Gas Sandstone Piceance Basin, Colorado USA

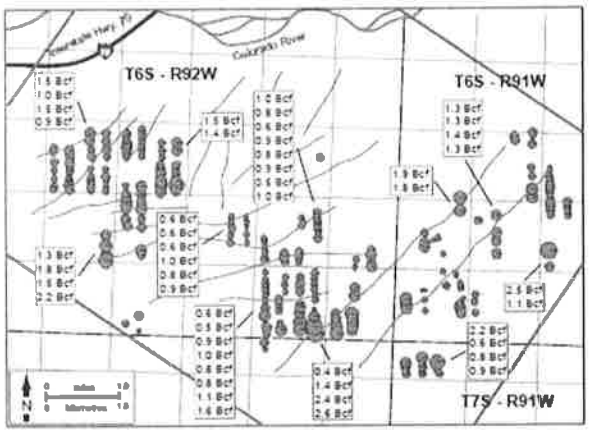
Geologic Environment





Shift in Drilling Techniques





Old

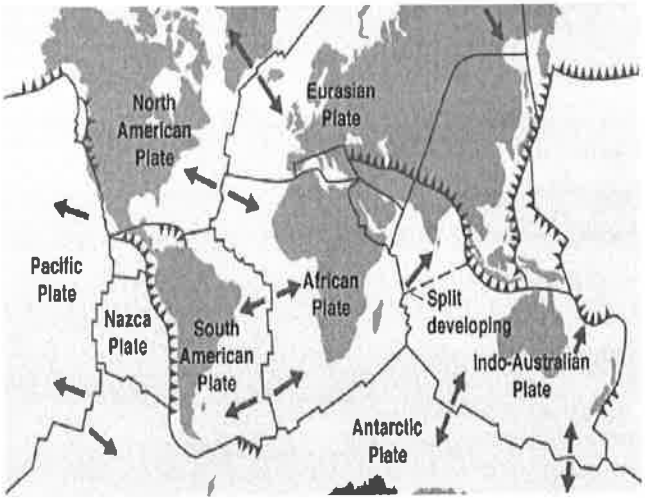
New

Esteban Quiles

Petroleum Geology

Tectonic subsidence history and source-rock Maturation in the Campos Basin, Brazil

(Handout)

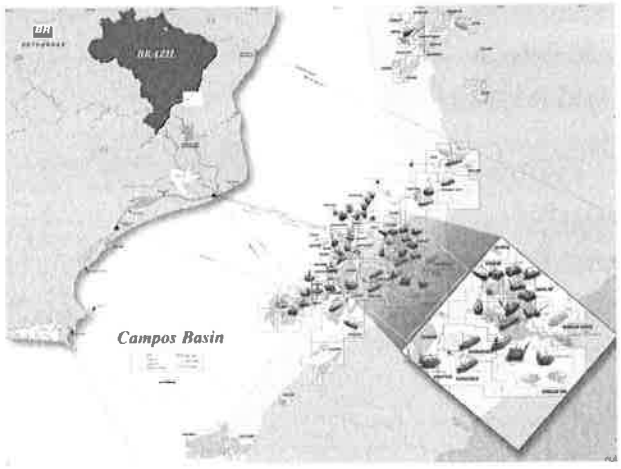


Facts

- Marginal Sag Basin
- The Campos Basin is located on the passive continental margin offshore the state of Rio de Janeiro
- Area of approximately 100 000 km2
- Produces more than 85% of Brazils crude oil.

Key terms

Halokinesis: The study of salt tectonics, which includes the mobilization and flow of subsurface salt, and the subsequent emplacement and resulting structure of salt bodies.



Well "Backstripping": A geophysical analysis technique used on sedimentary rock sequences - the technique is used to quantitatively estimate the depth that the basement would be in the absence of sediment and water loading.

Key points of article:

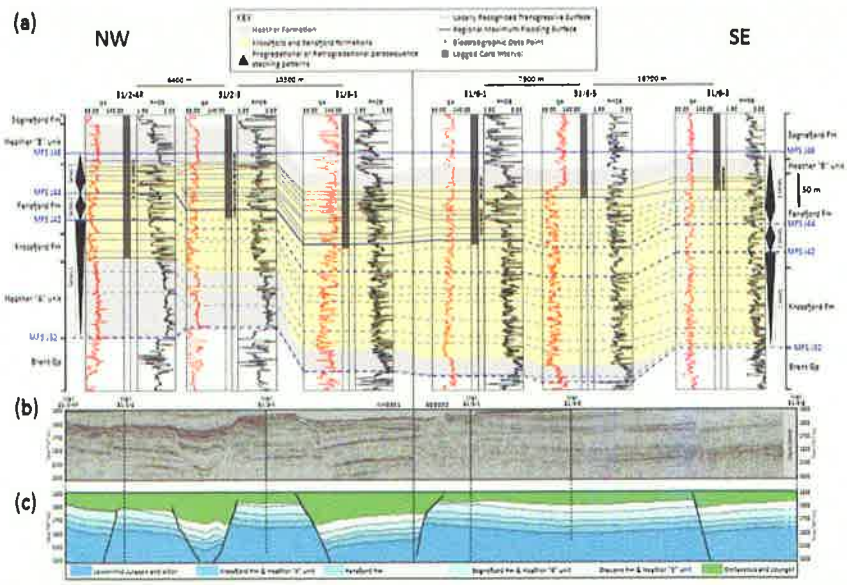
Estimated that the Campos Basin has yet more undiscovered oil reserves (kerogen Types I and II).

Continued movement of salt bodies has the potential to move undiscovered hydrocarbon bodies. They also have the potential to destroy existing hydrocarbon bodies.

Sedimentology and sequence stratigraphy of the Middle-Upper Jurassic Krossfjord and Fensfjord formations, Troll Field, northern North Sea

Richard Brown

- Located on the Horda Platform in the North Sea
- Initial extension in Permo-Triassic as a continental rift
- Regional uplift event
- Tectonic quiescence and uniform subsidence
- Another regional uplift event and formation of North Sea thermal dome
- More extension in Mid-Late Jurassic as a marine rift
- Three major sandstone formations
- Krossfjord Fm.
- Fensfjord Fm.
- Songefjord Fm.
- Pinch out into the Heather Fm.
- Used well cores and seismic reflections to gather data
- Eleven different facies were identified, grouped into six associations
- 1: Offshore
- 2: Wave-dominated lower shoreface
- 3: Wave-dominated upper shoreface and foreshore
- 4: Wave-dominated, tide-influenced upper shoreface
- 5: Tide-dominated, wave-influenced embayment
- 6: Delta Front



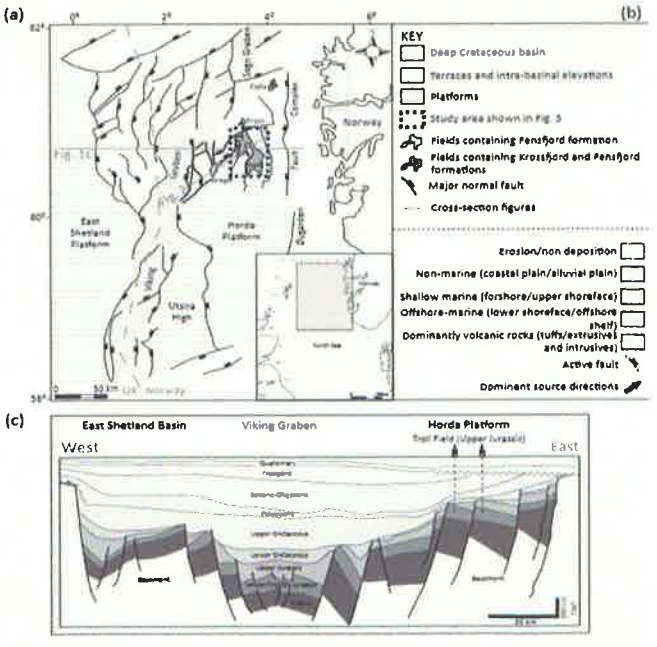


Fig. 9. (a) NW–SE-oriented (depositional strike-oriented) well-log correlation panel across Troll Field (see Fig. 3 for the location), using the MFS J46 as a flattened datum surface, (b) corresponding, uninterpreted composite seismic section and (c) geoseismic interpretation along the well-log correlation panel.

Western Greece and Ionian Sea Petroleum Systems

Compiled by: Thomas Licata

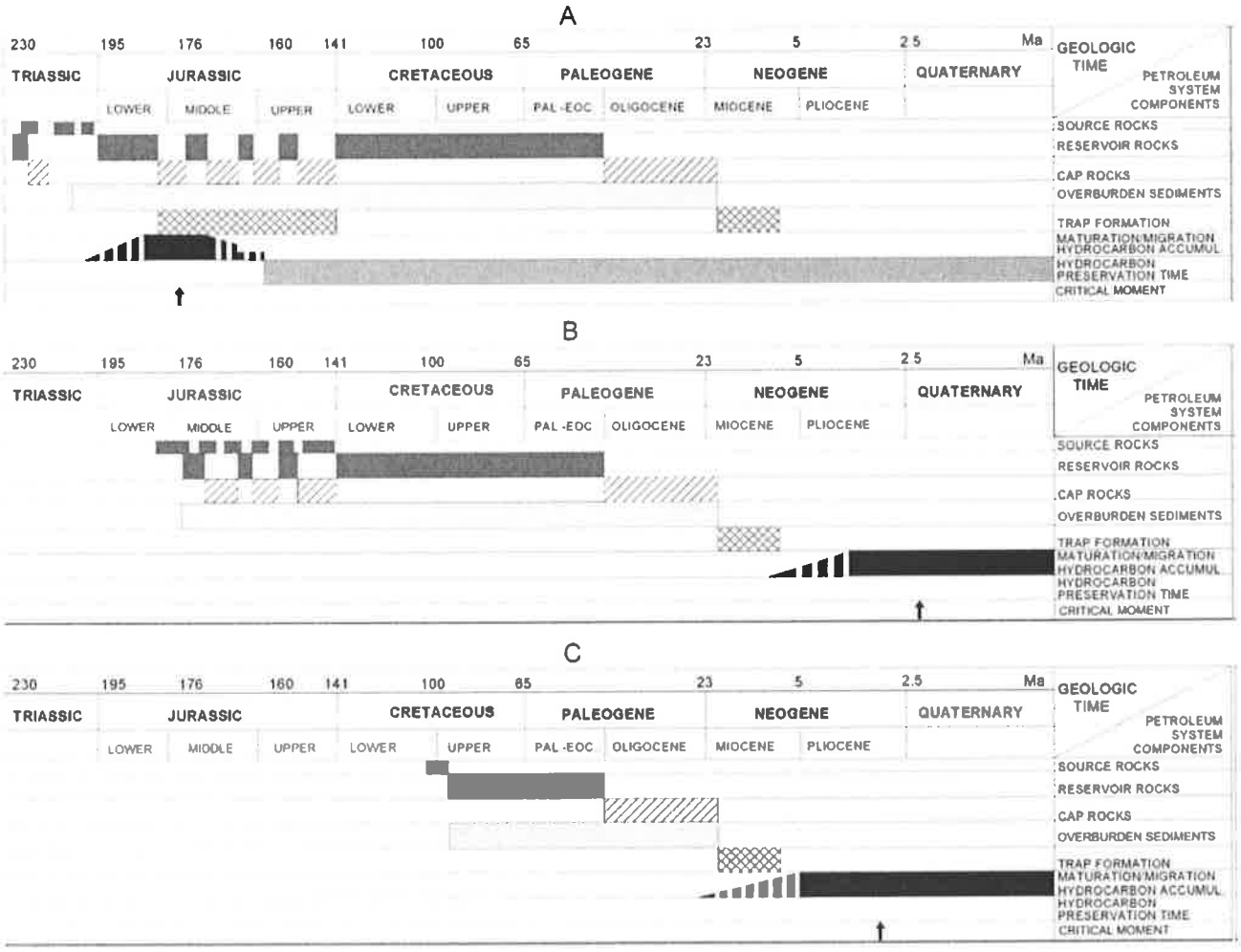
Oil has been found in the area since 484-430 BC

The areas Resevoirs lie within the Ionian, Pre-Apulian, and Apulian zones.

There are multiple settings where we could expect large resevoirs of oil.

More systematic exploration is needed before jumping to conclusions

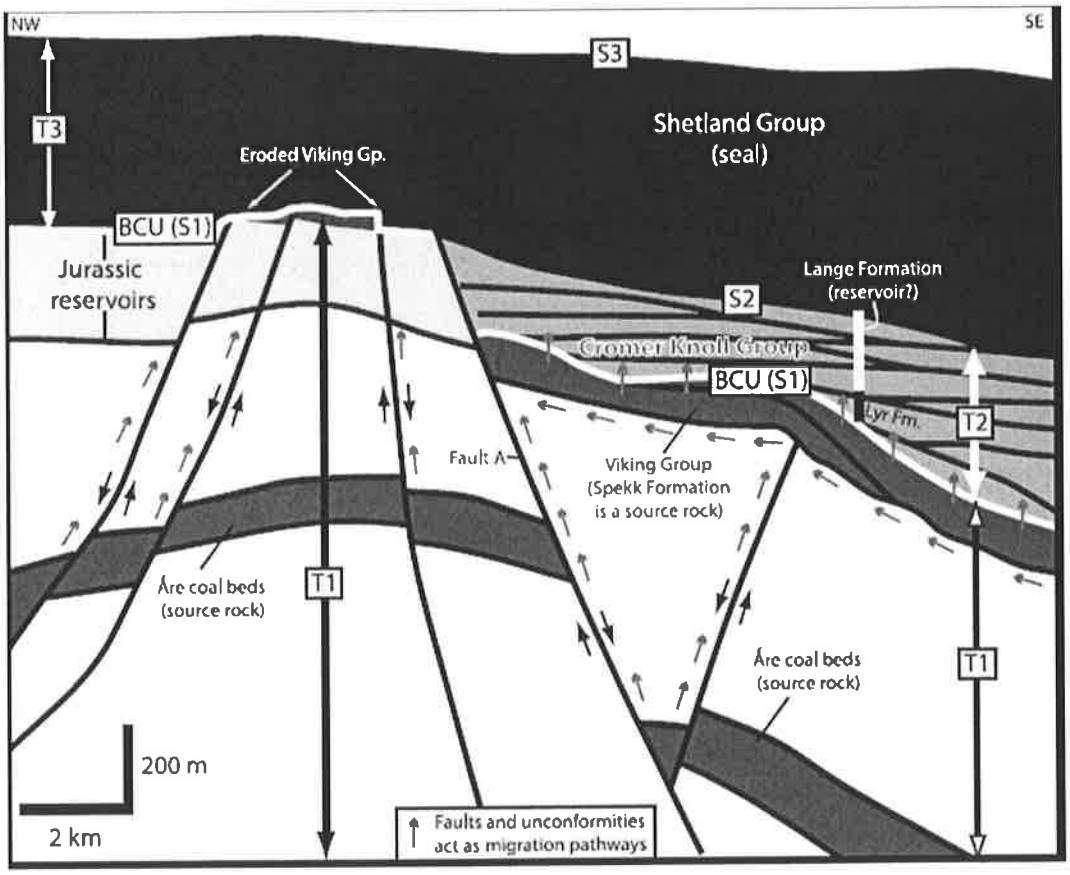
Summary of Ionian Sea Petroleum Systems.



Seismic geomorphological analysis and hydrocarbon potential of the Lower Cretaceous Cromer Knoll Group, Heidrun Field, Norway
Written by: Moscardelli and Wood

Katie Halvorson

- Narrow continental shelf off of Norway called Halten Terrace. Within the Halten Terrace, there is Heidrun Field.
- They think oil may be located at Heidrun field in the Lower Cretaceous Cromer Knoll Group.
- Jurassic rocks within structure have been taped out and the Cretaceous rocks have potential of a seal, reservoir and source rock.
- Used 3D seismic reflection data and well data to examine the Lower Cretaceous wedge to evaluate if oil could be found.
- Researchers think there are high possibilities it can be found here.



Lee Lindley

Gas Reservoirs in the Marcellus Shale, Appalachian Basin

By: Daniel Kohl, Rudy Singerland, Mike Arthur, Reed Bracht, and Terry Engelder

Summary:
In this scenario, the deposition of the Marcellus Shale is separated into 5 systems tracts (LST, TST, HST, EFSST, FSST) that describe different periods of deposition coeval with changing environments. Going back in time to the middle Devonian, before the Appalacchian mountains formed, the area that now encompasses Pennsylvania, and parts of Ohio, West Virginia and New York was a large inland sea with a delta draining into it. After the beginning of deposition of carbonates into the Appalachian basin (whenever the reef creatures started making limestone LST-TST), base level began to raise increasing calcite production, eventually, the base level changed too quickly for the reef creatures to accommodate and production ceased and they were drowned out (HST). Shortly after the base level rose, the base level dropped (climactic or eustacy related) causing the delta to move further over the inland sea depositing mudstone, siltstone, and shale over the top of it providing both a reservoir and a seal for the oil that would later be generated by the copious amount of biomass left in the inland sea basin (EFSST-FSST). This seal was impermeable so until fracking techniques were learned, it was near impossible to extract oil from. There are 500 trillion cubic feet of oil estimated to be trapped in the Marcellus Shale so understanding its deposition is critical.

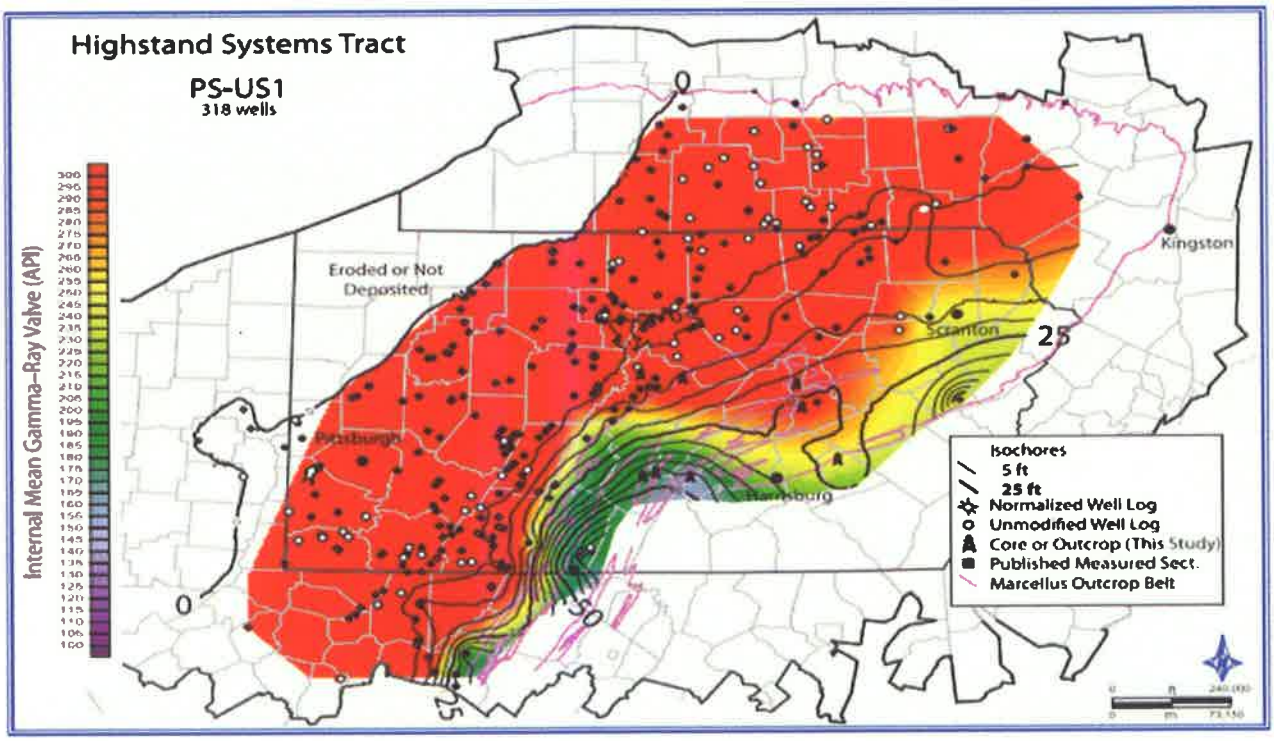


Figure 15. Mean gamma-ray and isochore thickness map of the highstand systems tract, which is composed of the first Union Springs member parasequence (PS-US1). A relatively low-GR lobate feature as much as 50 ft (15 m) thick exists west of Harrisburg, Pennsylvania. This is interpreted to be the result of clastic input into the basin from the highstand Mahantango delta complex. Strata thin generally to the northwest and pinch out in western Ohio, northeastern Pennsylvania, and western New York.