Giant Oil and Gas Fields of the World

Online Resources

THE WORLD'S GIANT OILFIELDS
This energy white paper sets out the best data that now exists on how many giant oilfields there are, where they are located, their ages, and their probable current production.
http://www.simmonsco-intl.com/files/giantoilfields.pdf

Giant Oil Fields of the World Presentation
Presentation, AIM Industrial Contact Day, Monday 23rdMay 2005, Fredrik Robelius, M.Sc. Petroleum Engineering (almost…), M.Sc. Engineering Physics
http://www.peakoil.net/AIMseminar/UU_AIM_Robelius.pdf

FOCUS: Iraq Awards 2 Giant Oil Fields, Expects More Saturday (posted 12-11-09)
BAGHDAD (Dow Jones)--Iraq succeeded Friday in awarding two supergiant oil fields to two consortia--led by Royal Dutch Shell PLC (RDSB.LN) and by China National Petroleum Corp.--as it began the second oil-licensing auction since the Saddam Hussein era.
http://online.wsj.com/article/BT-CO-20091211-709493.html

The Swan Hills Formation at Kaybob South Field, Alberta: An Example of Remaining Reserves Potential within Mature Fields
The "rediscovery" of reserves within mature fields can occur when new technologies are applied and integrated. Fundamental building blocks are the integration of geological, geophysical, and petrophysical concepts to guide the renewed development plan. The Devonian Swan Hills Formation at Kaybob South is a case study for this opportunity.
www.cspg.org/conventions/abstracts/2008abstracts/234.pdf

Sedimentology and diagenesis of Swan Hills Simonette oil field, west-central Alberta basin by James P. Duggan, B.Sc.
The partly dolomitized Swan Hills Simonette oil field (Givetian-Frasnian) of west-central Alberta reached maximum burlal (6500 m, Tpeak=160°C) during the Paleocene. Five buildup stages are recognized. The most consistently porous facies comprise grainy, proximal reef lithofacies. Early calcite spars occluded pores which influenced fluid flow during burlal diagenesis. Dolomites have the highest porosities (up to 20%) due to leaching of calcite fossils. Penneability is greatest (up to 1000 rnD) in porous dolomitized matrices. Fractures are typically plugged with pyrobitumen. Dolomite distribution is controlled by the more porous primary lithofacies and by proximity to faults. Most limestones are cemented tight although sorne contain up ta 10% irreducible pores. Late-stage fluids that precipitated dolomites, calcites and sulphides (87Sr/86Sr=O.7370) probably were derived from the crystalline basement. These data can be explained by vertical flow of Laramide hydrothermal fluids along faults and laterai flow along the more porous and permeable facies.
http://digitool.library.mcgill.ca/R/?func=dbin-jump-full&object_id=27518&local_base=GEN01-MCG02 (click on the PDF logo)

Salt Creek Field (Blog)
Salt Creek Field Background
The Salt Creek Field is a geological formation discovered in the 1880's located near Midwest, Wyoming in Natrona County. Salt Creek field and its associated Salt Creek Field unit produce mainly light crude oil.
http://saltcreekfield.com/

HELICOPTER SURVEYS FOR LOCATING WELLS AND OILFIELD INFRASTRUCTURE
Prior to the injection of CO2 into geological formations, either for enhanced oil recovery or for CO2 sequestration, it is necessary to locate wells that perforate the target formation and are within the radius of influence for planned injection wells. Locating and plugging wells is necessary because improperly plugged well bores provide the most rapid route for CO2 escape to the surface. This paper describes the implementation and evaluation of helicopter and ground-based well detection strategies at a 100+ year old oilfield in Wyoming where a CO2 flood is planned. This project was jointly funded by the U.S. Department of Energy's National Energy Technology Laboratory and Fugro Airborne Surveys.
http://ipec.utulsa.edu/Conf2006/Papers/Hammack_7.pdf

Enhanced Oil Recovery Revives Petroleum Fields and Reduces Greenhouse Gas Emissions (Blog - V1 Magazine) January 2009
Carbon dioxide is not always the villain. It can actually be quite beneficial for companies like Houston-based Anadarko Petroleum Corporation, which is using the greenhouse gas for enhanced oil recovery, a process that involves injecting otherwise tapped out wells with CO2 to produce additional oil. Anadarko uses GIS to track pipeline maintenance, view land reclamation, and keep up with

revegetation of native grasses. By calling up layers on a GIS-based map, they can map every piece of infrastructure from flow lines, pipelines, buildings and wells.
http://www.vector1media.com/articles/features/5832-enhanced-oil-recovery-revives-petroleum-fields-and-reduces-greenhouse-gas-emissions

Salt Creek Field: CO2 Flood Performance (Powerpoint Presentation by Anadarko)
http://eori.uwyo.edu/downloads/CO2_Conf_2009/Presentation%20PDF/James%20Page%20EORI%202009.pdf

HISTORY OF THE WILMINGTON FIELD - 1986-1996
The Wilmington Reid is the third largest oil field in the United States, based on cumulative production. Original oil in place was approximately 8.8 billion barrels. Cumulative oil production to date is approximately 2.4 billion barrels leaving a target of 6.4 billion barrels for improved recovery methods. This history will update the work of Mayuga (1970) and Ames (1987).
http://www.searchanddiscovery.com/documents/2007/07014priority/fields%20of%20la%20basin/17.pdf

Long Beach aims to boost output from Wilmington oil field 09-2008
The state Legislature passes a bill to let the city negotiate a contract with Occidental Petroleum.
http://www.latimes.com/business/la-fi-lboil9-2008sep09,0,5385310.story

Three-dimensional Geologic Modeling and Horizontal Drilling Bring More Oil out of the Wilmington Oil Field of Southern California
The giant Wilmington oil field of Los Angeles County, California, on production since 1932, has produced more than 2.6 billion barrels of oil from basin turbidite sandstones of the Pliocene and Miocene. To better define the actual hydrologic units, the seven productive zones were subdivided into 52 subzones through detailed reservoir characterization. The asymmetrical anticline is highly faulted, and development proceeded from west to east through each of the 10 fault blocks. In the western fault blocks, water cuts exceed 96%, and the reservoirs are near their economic limit. Several new technologies have been applied to specific areas to improve the production efficiencies and thus prolong the field life.
http://198.173.87.70/pdf_files/evarticles/3DGeoModWilmington.pdf

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http://www.dgi.com/earthvision/evarticles/2003-2008/evarticles_3DWilmington.html

Long Beach Considers New Drilling in Oil Field: Study underway into environmental impact. 12-27-2009
Long Beach - Long Beach officials are studying the environmental impact of tapping a depleted underground oil field that could be pump $130 million into the city's general fund, it was reported today.
http://www.myfoxla.com/dpp/news/local/long-beach-wilmington-oil-field-20091227

Three-Dimensional Seismic Imaging and Reservoir Modeling of an Upper Paleozoic “Reefal” Buildup, Reinecke Field, West Texas, United States
Reinecke field is an upper Pennsylvanian to lowest Permian carbonate buildup in the southern part of the Horseshoe Atoll, west Texas, United States. The field and surrounding areas have been imaged with three 3-D seismic surveys and penetrated by many wells. Although Reinecke is commonly referred to as a reefal reservoir, deposition occurred in stratified sequences, 50-100 ft (15-30 m) thick, dominated by wackestones, packstones, and grainstones. Boundstones (mainly rich in phylloid algae) constitute only 16% of the buildup. Seismic reflectors within the buildup parallel sequence boundaries and are truncated at the margins of the buildup. Three-dimensional seismic surveys show that the top of the Reinecke buildup is highly irregular with more than 470 ft (143 m) of relief. Deep-marine shales overlie the reservoir and act as a seal for this stratigraphic trap. Reinecke's irregular, mounded morphology is the result of localized carbonate growth and erosional truncation. Much of the erosional truncation probably occurred in a deep-marine environment.
http://www.searchanddiscovery.net/documents/2006/06144saller/index.htm

Tectonic setting of the world's giant oil fields
A "giant" oil field is defined as one containing proved reserves exceeding 500 million bb1; a giant gas field contains proved reserves of greater than 3 Tcf. [2] "Reserves" refer to the ultimate recoverable amount and include the amount produced to date. Some fields are giants only when viewed on a boe basis. [3]

http://findarticles.com/p/articles/mi_m3159/is_9_222/ai_78902384/

Short and Long term Management of El Furrial Field, Venezuela

The El Furrial Field, discovered in 1986, is one of the major oil field assets of Venezuela. Its current production of nearly 390,000 BOPD makes it a giant oil field based on world standards. Major development of the field to increase production to a target rate of 450,000 BOPD has been a priority for the last 5 years. In 1997, final stages to begin high pressure gas injection to augment water injection will be completed.

http://www.onepetro.org/mslib/servlet/onepetropreview?id=00038781&soc=SPE

Eni: giant gas discovery in offshore Venezuela

San Donato Milanese (Mi), 16 October, 2009 – Eni made a world class gas discovery at its Perla field, in the shallow water of the Venezuelan offshore, successfully drilling an explorative well in the Perla field, located in the Cardon IV block, in the Gulf of Venezuela.

http://www.eni.com/en_IT/media/press-releases/2009/10/2009-10-16-Eni-giant-gas-discovery.shtml

Challenges opportunities and reservoir management, of a giant field in Venezuela

The Naricual formation of the El Furrial field is a deep anticline oil reservoir. It was originally highly overpressure and the reservoir temperature was quite high. The medium-type crude oil has a large asphaltene content and the fluid properties change significantly with depth. The field is sealed off from the underlying aquifer by a 200 feet tar mat. The primary production mechanism is fluid and rock expansion. A major data collection campaign for reservoir definition was set up right from the start of production. It resulted in a pressure maintenance programme whose objectives were the acceleration of oil production and the maximisation of the oil recovery and profitability. The pressure maintenance project and the enhanced recovery methods that have been implemented were based on 400,000 barrel/day water injection, later to be increased to 550,000 barrel/day and 450 million standard cubic feet per day of miscible gas injection. Together with the primary recovery these projects were estimated to produce 3,210 million barrel oil, and increase the oil recovery by 33 % of the original oil inplace. An integrated reservoir management and a continuing actualisation of the reservoir model was required from the start. As an illustration, the geological model was refined eight times during the past 13 years and the ongoing exploitation plan was adjusted accordingly. Its implementation required flexibility of facilities and production operations. This paper describes the field monitoring techniques of the water and gas injection. Tools and methods used to improve production and injection patterns have also been addressed. The application of resins, emulsions and diverting agents to control production and injection was excluded mainly due to the extreme reservoir conditions. Sand plugs have been set and intervals have been re-perforated with the aim of obtaining a more uniform injectivity and productivity. Their success ratio exceeded 70 %.

http://cat.inist.fr/?aModele=afficheN&cpsidt=6173887

Managing a Giant" 50 years of Groningen Gas

The Groningen Field is the largest on-shore gas field in North West Europe (100 Tcf). It was discovered in 1959 by well Slochteren-1 and started production in late 1963. The gas is contained in a high quality sandstone reservoir at approximately 2900 meters below the surface. The initial field development took some 15 years during which 29 production locations (clusters) were built and over 300 wells were drilled and completed.

http://netherlands.spe.org/images/netherlands/articles/70/Dijksman%20abstr-bio.doc

Lacq Gas Field, France: ABSTRACT

The Lacq gas field, France's most important, was discovered in 1951 by geophysical methods. The field is just north of the major overthrust separating the southern edge of the Aquitaine basin from the Nord Pyrenees foredeep. Directly under the field is a paleo-high flanked by two strongly subsided basins: the Arzacq basin on the north and Upper Cretaceous flysch trough on the south.

http://search.datapages.com/data/doi/10.1306/5D25C3E3-16C1-11D7-8645000102C1865D

Monitoring of subsidence and induced seismicity in the Lacq Gas Field (France): the consequences on gas production and field operation

Between 1957, when the Lacq gas field was first put into production, and 1967, 2.5 cm of subsidence occurred. This corresponded to a period in which the pressure had been depleted by 30 MPa. Further depletion from 1967 until 1989, of 25 MPa induced an additional subsidence of 3.0 cm, which coincided with more than 1000 earthquakes; 44 with magnitudes greater than 3, and 4 with magnitudes greater than 4. The strain energy release rate by seismic events increased for the period 1969–1979 and now decreases yearly.

http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V63-47YJGXG-22&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=47e222787262148f6cf08009cf379115

Analysis of the induced seismicity of the Lacq gas field (Southwestern France) and model of deformation
The goal of this paper is to propose a model of deformation pattern for the Lacq gas field (southwest of France), considering the temporal and spatial evolution of the observed induced seismicity. This model of deformation has been determined from an updating of the earthquake locations and considering theoretical and analogue models usually accepted for hydrocarbon field deformation. The Lacq seismicity is clearly not linked to the natural seismicity of the Pyrenean range recorded 30 km farther to the south since the first event was felt in 1969, after the beginning of the hydrocarbon recovery. From 1974 to 1997, more than 2000 local events (ML < 4.2) have been recorded by two permanent local seismic networks. Unlike previously published results focusing on limited time lapse studies, our analysis relies on the data from 1974 to 1997. Greater accuracy of the absolute locations have been obtained using a well adapted algorithm of 3-D location, after improvement of the 3-D P-wave velocity model and determination of specific station corrections for different clusters of events. This updated catalogue of seismicity has been interpreted taking into account the structural context of the gas field. The Lacq gas field is an anticlinal reservoir where 3-D seismic and borehole data reveal a pattern of high density of fracturing, mainly oriented WNW–ESE. Seismicity map and vertical cross-sections show that majority of the seismic events (70 per cent) occurred above the gas reservoir. Correlation is also observed between the orientation of the pre-existent faults and the location of the seismic activity. Strong and organized seismicity occurred where fault orientation is consistent with the poroelastic stress perturbation due to the gas recovery. On the contrary, the seismicity is quiescient where isobaths of the reservoir roof are closed to be perpendicular to the faults. These quiescient areas as well as the central seismic part are characterized by a surface subsidence determined by repeated levelling profiles. Moreover, the temporal evolution of the distribution of the seismicity clearly exhibits a spatial migration from the centre to the boundaries of the reservoir. We conclude that the entire field is strained but this deformation is seismically expressed only where faults are parallel to the isobaths of the reservoir roof and where these faults plunge towards outside the field according to one of the two theoretical deformation models considered in our study. Then we propose a temporal scenario of deformation along the principal axis of seismic deformation.
http://www3.interscience.wiley.com/journal/119410283/abstract?CRETRY=1&SRETRY=0

Poroelastic stressing and induced seismicity near the Lacq gas field, southwestern France by Paul Segall
Journal of Geophysical Research, Vol. 99, No. B8, Pages 15, 423-15, 438, August 10, 1994
Hundreds of shallow, small to moderate earthquakes have occurred near the Lacq deep gas field in southwestern France since 1969. These earthquakes are clearly separated from tectonic seismicity occurring in the Pyrenees, 25 km to the southwest. The induced seismicity began when the reservoir pressure declined by ~ 30 MPa. Repeated leveling over the field shows localized subsidence reaching a miximum of 60 mm in 1989. Segall (1989) suggested that poroelastic stressing, associated with volumetric contraction of the reservoir rocks, is responsible for induced seismicity associated with fluid extraction. To test this model, we compare the observed subsidence and hypocentral distributions with the predicted displacement and stress fields. We find that the relationship between average reservoir pressure drop and subsidence is remarkably linear, lending support to the linear poroelastic model. Displacements and stresses are computed based on a priori knowledge of the reservoir geometry, material properties, and reservoir pressure changes. The computed vertical displacements are found to be in excellent agreement with the subsidence observed from leveling. Stress perturbations accompanying gas extraction, computed using the same parapeters, are found to be ~0.2 MPa or less. Changes in Coulomb failure stress are computed assuming that slip occurs on optimally oriented planes. The predicted failure zones correlate very well with the spatial distribution of earthquakes if the perturbing stresses are small in comparison to the ambient regional deviatoric stresses and if the minimum regional compressive stress axis is vertical. Accurate determination of focal mechanisms of the induced events would allow a more rigorous test of the poroelastic model and could lead to important inferences about the crustal stress state.
http://pangea.stanford.edu/research/CDFM/pdfs2/segall1994.pdf

Asmari Limestone of Iran: A Giant of Oil and Gas Production
Authors: M. Lackpour; G. V. Chilingar; A. Kalantari
http://www.informaworld.com/smpp/content~content=a794174599&db=all

A SOURCE BED STUDY OF THE OLIGO-MIOCENE ASMARI LIMESTONE IN SW IRAN
Detailed geological and geochemical investigations in the folded belt of the Zagros geosyncline reveal that the source rocks for the very large Asmari oil accumulations may not be the PabdehGurpi and/or Kazhdumi formations as has been suggested; the hydrocarbons are more likely to be indigenous to the Asmari. Most previous investigators have assumed that only organic-rich marls and shales serve as effective source rocks. However, geochemical analysis shows that the organic content of the Asmari carbonate, although not very rich, compares favourably with the source beds proposed by earlier workers.
http://www3.interscience.wiley.com/journal/120037186/abstract

Asmari Oil Fields of Iran: ABSTRACT by Cedric E. Hull, Harry R. Warman
The Asmari oil fields of Iran are truly giants, most of them having recoverable reserves greater than 1 billion bbl, in many fields much more than that. The fields are closely packed in a region of relatively constant stratigraphy and structure, and have a common

genetic relationship. The individual accumulations occupy very large rock volumes in large-amplitude folds and, although the reservoir properties of the Asmari are poor in terms of porosity and matrix permeability, very high production rates are possible because of extensive reservoir fracturing. These rates can be maintained for very long periods because of the great vertical extent of the oil columns. The Asmari fields are prime examples of anticlinal traps and of the effect of fracturing on reservoir performan e.
http://search.datapages.com/data/doi/10.1306/5D25C357-16C1-11D7-8645000102C1865D

Comparison of Asmari, Pabdeh and Gurpi formation's fractures, derived from image log
Small scale fractures around the wellbore, strongly affect the hydrocarbon production. Identification of fracture plays a main role in production and development plans of oil fields. Image logs are one of the powerful tools in fracture study in wells. Image log is a high resolution “pseudo picture” of borehole wall. Using these logs help to identify the exact orientation, depth and type of natural fractures. In this study, image logs of a well in a naturally fractured reservoir were interpreted in order to extract fractures. Statistically analysis has been done to identify the fracturing pattern. Present study shows that pattern of fracturing in Asmari and Pabdeh is similar but, the Gurpi formation is completely different. Fractures density in thin bedded intervals is high hence the maximum fractures density observed is in the upper Asmari and Pabdeh formations. Fracture density log shows two descending trends that are related to mechanism of folding.
http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VDW-4VW554R-1&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=6b8c0caf9ee2ff15cb9f486d3c59d00f

Spatial Distribution of Fractures in the Asmari Formation of Iran in Subsurface Environment: Effect of Lithology and Petrophysical Properties
The distribution of fractures and its dependence on lithology and petrophysical properties of rock in the Asmari Formation were examined using three wells data of one of the largest oil fields of southwestern Iran. Fractures were measured on cut cores. Mineral content and petrophysical data were obtained through thin section study and core plug measurement respectively. Influence of mineral composition and petrophysical property of rocks on fracture density was explored statistically. Increasing quartz (sand) and anhydrite content of rocks decrease and dolomite increases the threshold of fracture densities, however no significant relation was observed between calcite content of rock and fracture density. Increasing porosity and permeability of rock decrease the threshold of fracture density in some of the defined lithology groups. There are significant differences between the lithology groups in terms of fracture density, although the results in the three wells are not the same. In whole data, the highest fracture density can be observed in dolostone. Limestone and impure carbonates hold broader spaced fractures and sandstones display the least fracture density. The average fracture densities in the wells are strictly different. These differences are the result of the structural position of the wells and also the trend of the well and fractures. The distribution of fractures in most lithology groups can be explained by the function: , where F is relative frequency, D is fracture density and a, b, and c are constants.
http://www.springerlink.com/content/1121140421w11580/

Sedimentary basins and petroleum geology of the Middle East By A. S. Alsharhan, A. E. M. Nairn (Page 723)
Source Rocks and Oil Geochemistry
With the advent of modern geochemical techniques (Young et al., 1977; Ala et al., 1980), it has been possible to show that of the potential source rocks, the Eocene-Paleocene Pabdeh Formation, the Maastrichtian Gurpi Formation, the Neocomian-Turonian Garau Formation, the Albian Kazhdumi Formation, the Middle Jurassic Sargelu Formation and the Silurian Gahkum Formation. The bulk of the oil in the Zagros Forland Basin in Iran and Iraq was derived from Early Cretaceous source rocks containing marine, oil-prone, algal type II kerogen. Over most of the basin, the Pabdeh and Gurpi formations are immature, and the Silurian may have sourced the non-associated gas in the Permian reservoirs, but it is the maturation of the organic matter in the Kazhdumi Formation during the late Eocene that became the major source, with lateral contributions from the Garau and Sargelu formations that reached the oild window during the late Cretaceous (Ala, 1990). Evidence for the early maturation, attributed to the late Cretaceous deformation and obduction overburden, is found in the presence of bitumen pebbles in Upper Cretaceous-Paleogene clastics (Dunnington, 1958; Kent et al., 1951).
http://books.google.com/books?id=0Ug0GdmopWMC&pg=PA723&lpg=PA723&dq=asmari+oil+fields&source=bl&ots=yrxaoJUkrO&sig=Fj6FHWTBtX4C9Bl7sVPogzsHfj8&hl=en&ei=tHo7S8fROo6vtgeEp_SFCQ&sa=X&oi=book_result&ct=result&resnum=9&ved=0CDQQ6AEwCA#v=onepage&q=asmari%20oil%20fields&f=false

The age of the Asmari Formation: Oligocene or Miocene?
Although the Asmari Formation is one of the most prolific oil producing sequences in the world, relatively little is published of its stratigraphic palaeontology. The essential biostratigraphy of the Asmari Formation was outlined in the early 1950's. This was the only published record of the biostratigraphy before the Asmari Formation was formally described in the mid 1960's. The traditional Iranian biostratigraphy is based on unpublished reports. Unfortunately, the reports were written in a period when the Aquitanian stage was under debate. Thus, sediments ascribed to "Aquitanian" may in fact be Chattian in age.
http://www.cprm.gov.br/33IGC/1345235.html

OIL-OIL CORRELATION OF ASMARI AND BANGESTAN RESERVOIRS USING GAS CHROMATOGRAPHY AND STABLE ISOTOPES IN MARUN OILFIELD, SW IRAN*

For this study, Asmari (Oligo-Miocene) and Bangestan (Cretaceous) reservoir oils from the Marun oilfield were studied geochemically. Gas chromatograms and stable isotopes of carbon and sulfur in different oil fractions were studied. Normal alkanes nC15 + are as high as 93% with a saturate percentage up to 53.9% which reveal a high maturity of Asmari and Bangestan reservoir paraffinic oils. Carbon Preference Index of both reservoir oils are around one, indicating mature oil samples. Pr/nC17 and Ph/nC18 ratios have confirmed this conclusion. The Pr/Ph ratio is less than one and the plot of δ13CAro.(‰) versus δ13CSat.(‰) both indicate a marine reducing environment during the deposition of their source rocks. The organic matter deposited in these sediments is of kerogen Type II (Algal). Stable carbon isotope results versus Pr/Ph ratio indicate that both oils originate from the same shaley limestone of the Mesozoic age. This study also proves that H2S gas polluted Asmari oils have a similar isotopic range as Bangestan reservoir oil, hence the source of contamination must have originated from the Bangestan reservoir. Isotopic and geochemical results, for the first time, introduce three oil families; two H2S polluted families and one non-H2S polluted oil family; in the entire Marun oilfield.

http://www.sid.ir/en/VEWSSID/J_pdf/10012007A303.pdf

Amal Field, Libya: ABSTRACT by J. M. Roberts

Oil was discovered in November 1959 at Amal field, Libya, located in the eastern part of the Sirte basin, in well B1-Concession 12. The exploration technique utilized was reflection seismic because there is no surface topographic expression in this area. The field now includes more than 100,000 acres and extends north-south for 30 mi and east-west for approximately 10 mi. To date 81 wells have been drilled in the field, 76 of these being producers. The outer configuration of the gross reservoir has been defined on the north and on the southeast. The gross oil column is as thick as 600 ft in the most favorable areas.

http://search.datapages.com/data/doi/10.1306/5D25C3AD-16C1-11D7-8645000102C1865D

Framework for the Exploration of Libya: An Illustrated Summary

Recoverable reserves being produced in Libya, from more than 300 fields, exceed 50 billion barrels of oil and 40 trillion cubic feet of gas (Rusk, 2001, 2002). Even so, the Sirte (Sirt), Ghadamis, Murzuq, and Tripolitania basins (Figure 1) are yet to reach full maturity in exploration. Of the 24 giant fields, 20 were discovered prior to 1970. Deep plays are expected to be a large part of upcoming exploration efforts.

http://www.searchanddiscovery.net/documents/2004/libya/images/gong.pdf

Case Study: The Application of a Sand Management Solution for the Sarir Field in Libya

Sand production from the Sarir field became a major concern for AGOCO at the end of the 1980s when ESPs were introduced to the field. The sanding severely impaired the performance of field, and consequently led to significant economic loss.

http://www.onepetro.org/mslib/servlet/onepetropreview?id=SPE-112904-MS&soc=SPE

Technical Paper: The Application of a Sand Management Solution for the Sarir Field in Libya (Schlumberger version)

Sand production from the Sarir field became a major concern for AGOCO at the end of the 1980s when ESPs were introduced to the field. The sanding severely impaired the performance of field, and consequently led to significant economic loss.

http://www.slb.com/content/services/resources/technicalpapers/spe/112904.asp

THE GEOLOGY AND HYDROCARBON HABITAT OF THE SARIR SANDSTONE, SE SIRT BASIN, LIBYA

The Jurassic — Lower Cretaceous Sarir Sandstone Cformerly known as the Nubian Sandstone) in the SE Sirt Basin is composed of four members which can be correlated regionally using a lithostratigraphic framework. These synrift sandstones unconformably overlie a little known pre-rift succession, and are in turn unconformably overlain by post-rift marine shales of Late Cretaceous age.

http://www3.interscience.wiley.com/journal/119826664/abstract

The Geology of the Sarir Oilfield, Sirte Basin, Libya

The Sarir Oilfield (Nelson Bunker Hunt-British Petroleum) lies near the southeastern margin of the late Cretaceous-Tertiary Sirte Basin of Libya. The Upper Cretaceous oil-bearing sandstone reser- voir overlies basement and is capped by Upper Cre- taceous shales. This variable sandstone is subdivided into five members, four of which are partly truncated by unconformity over the structure. The structural trap is due to normal faulting and sedimentary drape over minor faults. The faults caused periodic uplift during the general epeirogenic subsi- dence of the basin and die out upwards. The structural closure is about 400 feet and the oil column 300 feet. Résumé Le Champ de Sarir (Nelson Bunker Hunt-British Petroleum) se situe vers la bordure sud-est du bassin Crétacé Supérieur-Tertiaire de Syrte en Libye. Les grès réservoirs pétrolifères d'âge Crétacé Supé- rieur reposent sur le socle en sont couverts par des argiles de même âge. Subdivisés en cinq membres ils sont partiellement tronqués par discordance. Le piège structural résulte de failles normales et de flexures mineures des couches. Ces failles ont causé un soulèvement périodique,

d'importance décroissante progressivement vers le haut, durant l'abaissement épeirogénique général du bassin. Fermeture de la structure: 400 pieds environ, hauteur imprégnée: 300 pieds.
http://www.onepetro.org/mslib/servlet/onepetropreview?id=WPC-12117&soc=WPC&speAppNameCookie=ONEPETRO

The distribution of the oil derived from Cambrian source rocks in Lunnan area, the Tarim Basin, China
There are great differences in biomarks between Cambrian oil and Middle-Upper Ordovician oil. In this stuty, the authors analyzed 40 oils found in Lunnan area by GC-MS and calculated the content of Cambrian oil in the 40 oils according to the steroid indexes of typical oil mixture and match experiment. The results show that it is a general phenomenon in Ordovician reservoir that the oil derived from Cambrian source rock mixed with the oil derived from Middle-Upper Ordovician source rock in Lunnan area, the mixture degree of the two oils is lower in Carboniferous reservoir than in Ordovician reservoir, and the oils kept in Triassic reservoir have single source, Middle-Upper Ordovician source rock. The mixture oils mainly composed of Cambrian oil (>50%) distributed in Sangtamu fault zone, and the oils found in Lunnan fault zone are Middle-Upper Ordovician oil. This distribution of oils in Lunnan area is owing to that Lunnan fault zone is located in anticline axis part, Lunnan fault zone underwent serious erosion, and the oils from Cambrian source rock accumulated in Lunnan fault zone were degraded completely during Caledonian-Hercynian movement. But the Cambrian oil accumulated in Sangtamu fault zone was not degraded completely and some of them were left for the location of Sangtamu fault zone is lower than Lunnan fault zone. Later, the oil derived from Middle-Upper Ordovician source rock mixed with the remained Cambrian oil, and the mixture oil formed in Sangtamu fault zone.
http://www.springerlink.com/content/183m520u1162p314/

Cambrian Oil & Gas Reports Progress at the Beshkent-Togap Water Injection Project in the Kyrgyz Republic
Cambrian Oil and Gas Plc announces the following progress at its Beshkent-Togap water injection project in the Kyrgyz Republic.
Key Points
- The project has been producing positive operating cash flow since May
- Consistent incremental oil production from a number of Beshkent wells
- Additional injection being initiated at Togap
- Full scale expansion of the project under consideration

http://www.oilvoice.com/n/Cambrian_Oil_Gas_Reports_Progress_at_the_BeshkentTogap_Water_Injection_Project_in_the_Kyrgyz_Republic/17661223.aspx

Cambrian Oil Field of Hassi Messaoud, Algeria: ABSTRACT
The Hassi Messaoud oil field was discovered in 1956 by S.N. REPAL on the Saharan permits of the CFP(A) and S.N. REPAL Association, following a seismic-refraction study, which was the only method able to give, at that time, valuable data beneath the thick Mesozoic cover.
http://search.datapages.com/data/doi/10.1306/5D25C39F-16C1-11D7-8645000102C1865D

The Homer Field, Cambrian Oil and Gas Production Within the Rome Trough of Kentucky
Homer Field petroleum geology is discussed within the context of the Conasauga Petroleum System and the Rome Trough. The charge, migration, and entrapment components of the Conasauga Petroleum System are characterized within the Rome Trough of eastern Kentucky and with respect to the Homer Field. Additional prospective Conasauga and Rome sand play areas within the Rome Trough are projected and reviewed relative to the insights gained from the evaluating the Homer Field Cambrian-age hydrocarbon production.
http://www.searchanddiscovery.net/documents/abstracts/2004eastern/lynch.htm

Chemical composition of oils from recently discovered fields in West Lithuania
Four minor oil discoveries have been made in West Lithuania in recent years. Studies of the oil composition show that its physical and chemical properties (density, viscosity, petrol content, etc.) and the group composition of hydrocarbons (content of saturated and aromatic hydrocarbons, tars and asphaltenes) mainly depend on the formation conditions and distances of migration between the kitchen and accumulation areas. According to the distribution patterns of n-alkanes and isoprenoids, the examined oils are comparable and generated from sapropel organic matter. There are certain differences in biomarker and carbon isotope data, indicating oil generation from different source rocks containing organic matter of different catagenesis.
http://versita.metapress.com/content/r045881288485t46/

Triassic Gas Field of Hassi er R'mel, Algeria: ABSTRACT
After the first important Saharan stratigraphic test (Berriane) had shown encouraging results, S.N. REPAL intensified its reconnaissance studies. Seismic refraction and reflection, carried out together with field geology, located the structure of Hassi er R'mel, about 60 mi southwest of Laghouat oasis. In 1956 the HR-1 well was spudded, and led to the discovery of the gas field of Hassi er R'mel.
http://search.datapages.com/data/doi/10.1306/5D25C375-16C1-11D7-8645000102C1865D

Effects of the Permian-Triassic boundary on reservoir characteristics of the South Pars gas field, Persian Gulf

The Permian-Triassic boundary (PTB) is a world-wide event characterized by the most extensive mass extinction in the history of life. In the Persian Gulf, the rock record of this time interval host one of the most important hydrocarbon reserves in the world: the South Pars Gas Field and its southern extension, the North Dome (or North Field). These carbonate and evaporite successions were sampled in eight wells for petrographic, geochemical and porosity-permeability studies. An important characteristic of the Dalan and Kangan formations is the centimetre-scale lithological heterogeneities caused by facies changes and diagenetic imprints that led to the compartmentalization of these reservoirs. These Permian-Triassic (P-T) sediments were deposited in a shallow marine homoclinal ramp. The PTB in this hydrocarbon field is represented by a reworked coarse-grained intraclastic/bioclastic grainstone facies deposited during a marine transgression. Prolonged subaerial exposure in the P-T transition caused hypersaline and meteoric diagenesis, including extensive cementation, dolomitization and some dissolution, influencing reservoir characteristics of bordering units. Both 18O and 13C values in this succession mirror worldwide excursions typical of other P-T sections, with some variations due to diagenetic alterations. A pronounced decline in 87Sr/86Sr values, reflective of global seawater geochemistry for most of the Permian is evident in our data. Reservoir quality declines through the late Permian, as a result of facies change and diagenesis. The Late Permian is succeeded by a Triassic transgressive facies and decline in reservoir quality.

http://www3.interscience.wiley.com/journal/122268506/abstract

The Alwyn North Triassic Development : Developing a Large Gas-Condensate Reservoir While Making Maximum Use of Existing Facilities

The Alwyn North Triassic reservoir is a deep gas condensate accumulation underlying the currently producing Alwyn North Brent and Statfjord reservoirs in quadrant 3 of the Northern North Sea. Two early exploration wells in quadrant 3 had encountered Triassic gas-bearing sands with only the second one, a subsea well, tested but at a non economical rate. However, in 1995 a third well, drilled from the Alwyn North platform, successfully tested at 1.3 Mscm/d of gas and 3,300 stb/d of condensate. A platform extended well test (EWT) was then performed by simply connecting the well to the Alwyn North gas manifold and gas processing train to obtain long term production performance.

http://www.onepetro.org/mslib/servlet/onepetropreview?id=00056926&soc=SPE

PSEvidence of Deep-Water Carbonate for Kaijiang-Liangping Trough and Its Role in Giant Gas Accumulations in the Sichuan Basin, Southwest China*

In the past decade, the proved reserves of the gas reservoirs in Changxing Formation, Upper Permian, to Feixianguan Formation, Lower Triassic (Figure 1), in northern Sichuan Basin in southwest China have been up to 1×1012 m3. The statistical data of the gas reserves show that about 95 percent of them are in the dolomite reservoirs of reefs and oolitic shoals on carbonate platform around trough facies. It is the trough, formed and developed from the Late Permian to the Early Triassic, that has exerted significant influence on type, scale and distribution of the reefs in the Upper Permian and the oolitic shoals in the Lower Triassic in the northern Sichuan (Figures 2 and 3).

http://www.searchanddiscovery.net/documents/2008/08204wang/images/wang.pdf

Killing of a Gas Well: Successful Implementation of Innovative Approaches in a Middle-Eastern Carbonate Field—A Field Case

A casing collapse occurred in a gas producing well with about 2.5 million cubic meters per day gas flow rate at a depth of 216 ft due to tectonic movements. As a result, the well blew out and different serious procedures were put into play to kill the well (Figure 1). This paper aims to review the practical and innovative approach that was used to secure and extinguish the well.

http://www.onepetro.org/mslib/servlet/onepetropreview?id=SPE-114573-MS&soc=SPE

ORIGIN OF NATURAL GAS IN SOUTH OF IRAN

Isotopic geochemical characteristics were determined in gases and condensates from southern Iran, which is one of the world's richest gas-bearing territories. The isotopic composition of methane and its homologues, the carbon isotope composition of CO2, the chemical composition of gases, the isotopic composition of condensates, and the proportions of individual hydrocarbons in the condensates were analyzed. The analytical results demonstrated fairly uniform chemical compositions for gases and isotopic compositions of methane and its homologues in the section overlying the anhydrite zone. For instance, the values d13C of methane in samples from this part of the section (Late Permian Dalan Formation, zone D,C,E and Early Triassic Kangan Formation) varied from -39.95 to -41.28‰. This allows us to conclude that gas accumulations in the carbonate collectors of the Kangan and upper part of Dalan formations represent a single gas reservoir. Quite different characteristics are displayed by gases from the lower zone (below the anhydrite) of the Dalan Formation (zone G). These gases are characterized by considerable depletion in the light carbon isotope. For instance, methane from the lower part of Dalan formation have d13C = -26.22‰.

http://www.igu.org/html/wgc2009/papers/docs/wgcFinal00029.pdf

Petroleum geology of the Persian Gulf basin

The Persian Gulf Basin is an elongate, margin sag-interior sag, sedimentary basin spanning the last 650 Ma along the northeastern subducting margin of the Arabian Plate and is the largest basin with active salt tectonism in the world. This basin is asymmetrical in NE-SW cross section with sediments thickening from 4,500 m near the Arabian Shield to 18,000 m beside the Main Zagros Reverse Fault. In fact, this basin is situated in the offshore of Zagros Fold Belt (Edgell, 1996). The Persian Gulf Basin is the richest region of the World in terms of hydrocarbon resources. According to different estimates, the basin contains 55–68% of recoverable oil reserves and more than 40% of gas reserves (Konyuhov and Maleki, 2006). The Permo-Triassic Khuff gas and Jurassic Arab oil reservoirs are well known in this area.
http://www.scribd.com/doc/17343286/Petroleum-Geology-of-the-Persian-Gulf-Basin

Geologic Significance of Landsat Data for 15 Giant Oil and Gas Fields
If land satellite data had been available and applied to areas in which giant fields later were found, how effective would have been the use of the data in the exploration effort, and what kind of useful geologic information would have been generated from the satellite images? This was a question which obsessed the writer and prompted the effort to find the answer by obtaining satellite images of 15 giant fields in various parts of the world and interpreting whatever geologic data the images provided. The studies clearly proved that the images would have been of considerable value in exploring for and pinpointing the locations of most of the giants under study. Such a conclusion would indicate that land satellite images and remote sensing data should be a top priority in he search for the future giants to be found in the remaining prospective areas of the earth.
http://search.datapages.com/data/doi/10.1306/2F91891E-16CE-11D7-8645000102C1865D

The nature and origin of Upper Cretaceous basin-margin rudist buildups of the Mesopotamian Basin, southern Iraq, with consideration of possible hydrocarbon stratigraphic entrapment
The Cenomanian Mishrif Formation is the main carbonate Cretaceous reservoir in southern Iraq. The reservoir units of the formation consist of bioclastic and peloidal limestones, derived mainly from rudist banks within the formation. The banks are found to be of two types, either basin margin buildups occupying a narrow belt along the present day Iraq-Iran border, or as patchy buildups on the crestal parts of the giant structures such as at West Qurna, Rumaila and Zubair. These buildups were eroded as they shallowed to reach the wave-base zone. Data from the Dujaila Field in southern Iraq suggest that these buildups may act as stratigraphic traps that produced oil from a relatively structurally lower well, while the higher well was found to be dry. This finding is of significant exploration value and may prove the existence of large hydrocarbon accumulations in the Mishrif (as well as the Shu'aiba and Mauddud formations) in areas beyond the known structures.
http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6WD3-4FNP2C4-1&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=bfe93359dac1dcfb9d9271b8fefc2a4f

Petroleum Developments in Middle East Countries in 1970
Petroleum production in Middle East countries in 1970 totaled 5,064,946,000 bbl at an average rate of 13,876,564 b/d, compared with 4,525,475,000 bbl or 12,398,561 b/d in 1969. The principal production increases were in Iran, Kuwait, the Neutral Zone, Saudi Arabia, and Abu Dhabi.
http://search.datapages.com/data/doi/10.1306/819A3D18-16C5-11D7-8645000102C1865D

Burgan Field: Kuwait's Biggest Oil Field Starts to Run Out of Oil
It was an incredible revelation last week that the second largest oil field in the world is exhausted and past its peak output. Yet that is what the Kuwait Oil Company revealed about its Burgan field.
http://www.mindfully.org/Energy/2005/Burgan-Field-Kuwait12nov05.htm

The Burgan Field of Kuwait
The Burgan Field is second most important oil field in the Middle East behind the Ghawar Field in Saudi Arabia. It accounts for most of the current and historical oil production of Kuwait. Recent press reports that production at Burgan will have to be scaled back from 1.9 to 1.7 million barrels per day have called attention to this major oil field.
http://www.gregcroft.com/burgan.ivnu

Burgan and the other fields in Kuwait (Thread)
The news that Matt Simmons announced to the World Oil Conference, that the Burgan field is apparently in trouble, is beginning to reach a wider audience. (Thanks Greyzone).
The recent IEA outlook on the Middle East has this to say of relevance
Kuwait has four major oil producing areas, north Kuwait, west Kuwait, south-east Kuwait and the Neutral Zone. . . . North Kuwait consists of two major fields, Raudhatain and Sabriyah, and currently produces around 600 kbd. West Kuwait contains several minor fields that make up the two major fields, Minagish and Umm Gudair, and produces around 400 kbd. South-east Kuwait contains the

multi-reservoir Greater Burgan field that is producing around 1.4 mbd Kuwaits's share of production from the Neutral Zone is currently around 300 kbd.
http://www.theoildrum.com/story/2005/11/14/03928/018

Designing Seismic Surveys in Greater Burgan Field, Kuwait, Utilizing Forward Modeling Concepts
The Greater Burgan field consists of the Burgan, Magwa and Ahmadi structures. The Burgan structure is an anticlinal dome with a large number of faults. The three main reservoir units in the Greater Burgan field are the Wara, Mauddud, and the massive Burgan sandstones. The deeper reservoirs, namely the Lower Cretaceous Ratawi and Minagish limestones and the Jurassic Marrat Formation also contain significant oil reserves but are less substantial. Between 1976 and 1987, 2-D seismic data were acquired across the field. From 1996–1998 3-D conventional seismic data was acquired and during 2005, two pilot surveys were acquired utilizing single-sensor technology to assess the applicability of this technology in enhancing both spatial and temporal resolution. Processing and analysis of legacy and single-sensor data indicated that the signal/noise ratio and bandwidth of the reflection response might be strongly influenced by near-surface transmission effects. We used finite-difference modeling to understand these effects and to test whether various acquisition techniques employing surface and buried sources and/or receivers might improve data quality. Near-surface visco-elastic property estimates, derived from log data, combined with geostatistical simulations of lateral Earth properties were used to generate 1-D and 2-D models. These data were processed to illustrate the effects of the shallow geological section on deeper reflection returns. It is anticipated that based on this study future field trials can be designed so as to provide a step change in the seismic data quality in the Greater Burgan field.
http://www.searchanddiscovery.net/abstracts/html/2008/geo_bahrain/abstracts/dutta02.htm

Things just got worse
NO, MAKE IT A LOT WORSE. Word just came out that Kuwait, long regarded as home to some of the world's largest reserves of petroleum, may possess only half the amount of oil reserves that it officially has been stating for many years.
http://www.energybulletin.net/node/12336

Burgan field set for pressure increase
Kuwait Oil Company plans water injection scheme to maintain production levels at the giant reservoir
http://www.meed.com/sectors/industry/petrochemicals/burgan-field-set-for-pressure-increase/3002513.article

The Application Of A Mechanical Earth Model On Rejuvenation Of A Mature Field In Libya
AGOCO is facing tremendous challenges to maintain the production of the mature giant Messla field. Water breakthrough, well shut-in due to sanding and reservoir depletion are among the problems causing a decline in the production. In order to maintain production, or even improve it in the near future, new technology and methodology are required to address the current challenges. Geomechanics, through a full characterization of mechanical properties and state of in-situ stresses of the reservoir and overburden formations, plays an essential role in achieving these objectives. This geomechanical knowledge forms a mechanical earth model (MEM) of the field that will enable appropriate technology to be deployed in the field.
http://www.onepetro.org/mslib/servlet/onepetropreview?id=SPE-114633-MS&soc=SPE

Geology of a Stratigraphic Giant--Messla Oil Field, Libya: ABSTRACT
The Messla oil field is the most recent addition to the imposing list of 20 giant fields which have been discovered within the prolific Sirte basin of Libya. The field, discovered in 1971, is located in the southeastern part of the Sirte basin, approximately 40 km north of the supergiant Sarir oil field. Although in an early stage of development the field is estimated to contain approximately 3 billion bbl of original oil in place. The essential trapping mechanism is the updip truncation of the Lower Cretaceous Sarir Sandstone on a broad structural flexure.
http://search.datapages.com/data/doi/10.1306/C1EA57D3-16C9-11D7-8645000102C1865D

Framework for the Exploration of Libya: An Illustrated Summary
Recoverable reserves being produced in Libya, from more than 300 fields, exceed 50 billion barrels of oil and 40 trillion cubic feet of gas (Rusk, 2001, 2002). Even so, the Sirte (Sirt), Ghadamis, Murzuq, and Tripolitania basins (Figure 1) are yet to reach full maturity in exploration. Of the 24 giant fields, 20 were discovered prior to 1970. Deep plays are expected to be a large part of upcoming exploration efforts.
http://www.searchanddiscovery.com/documents/2004/libya/index.htm

THE GEOLOGY AND HYDROCARBON HABITAT OF THE SARIR SANDSTONE, SE SIRT BASIN, LIBYA
The Jurassic — Lower Cretaceous Sarir Sandstone Cformerly known as the Nubian Sandstone) in the SE Sirt Basin is composed of four members which can be correlated regionally using a lithostratigraphic framework. These synrift sandstones unconformably overlie a little known pre-rift succession, and are in turn unconformably overlain by post-rift marine shales of Late Cretaceous age.
http://www3.interscience.wiley.com/journal/119826664/abstract?CRETRY=1&SRETRY=0

Practical Approach To Achieve Accuracy in Sanding Prediction
Sand production can reduce oil production, cause erosion in downhole and surface facilities, require additional separation and disposal, and lead to significant economic loss. Precautionary, but unnecessary, sand prevention will result in unwarranted reduction in productivity. Overestimating or underestimating sanding risk increases the chances of serious economic loss. Reliable sanding-prediction analysis provides a basis for designs that achieve appropriate sand-management strategies and maximize economic production.
http://www.spe.org/spe-site/spe/spe/jpt/2007/09/Synopsis100944.pdf

The geology and hydrocarbon habitat of the Sarir Sandstone, SE Sirt Basin, Libya
The Jurassic -Lower Cretaceous Sarir Sandstone (formerly known as the Nubian Sandstone) in the SE Sirt Basin is composed of four members which can be correlated regionally using a lithostratigraphic framework. These synrift sandstones uncomformably overlie a little known pre-rift succession, and are in turn unconformably overlain by post-rift marine shales of Late Cretaceous age. Within the Sarir Sandstone are two sandstone-dominated members, each reflecting a rapid drop in base level, which are important oilreservoirs in the study area.
http://d.wanfangdata.com.cn/NSTLQK_NSTL_QK4407670.aspx

Modeling of Hydrocarbon generation and expulsion from Tannezuft and Aouinet Ouinine Formations in southern Tunisia - North Africa
The Ghadames Basin is part of the Saharan platform. It extended over more than 200 000 km² from eastern Algeria to western Libya and includes the southernmost of Tunisia. The Ghadames Basin is limited to the north by the west east trending Telemzane Arch and to the east by the Jeffara Basin. To the southwest and southeast, it is separated from the Illizi and Murzouk Basins by long lived structural highs (Fig. 1).
http://www.cspg.org/conventions/abstracts/2001abstracts/10-036.pdf

The Mineral Industry of Tunisia
Phosphate rock and phosphate-based fertilizers were Tunisia's major contributions to the international mineral supply. Tunisia was the world's fifth ranked phosphate rock producer and accounted for more than 5% of the world supply of phosphate rock. About 80% of Tunisian phosphate rock production was processed locally into fertilizers, such as diammonium phosphate and triple superphosphate, and phosphoric acid. Tunisia was a minor producer of petroleum and ranked 11th among African producers of crude oil (BP p.l.c., 2007, p. 8; Jasinski, 2007).
http://minerals.usgs.gov/minerals/pubs/country/2006/myb3-2006-ts.pdf

Permeability Characterization of Distributary Mouth Bar Sandstones in Prudhoe Bay Field, Alaska: How Horizontal Cores Reduce Risk in Developing Deltaic Reservoirs
Oil production from upstructure drill sites at Prudhoe Bay field, Alaska, is almost exclusively from fine-grained deltaic sandstones. Distributary channel and distributary mouth bar facies associations in the Triassic Ivishak Formation comprise the pay zones, but wells are preferentially completed in the lower-permeability distributary mouth bar deposits in an attempt to avoid high gas/oil ratio wells. Thin light-oil columns combined with complex stratigraphy and an overlying, highly mobile gas cap make planning, drilling, and completing economic wells challenging.
http://aapgbull.geoscienceworld.org/cgi/content/abstract/85/3/459

What Happens Once The Oil Runs Out?
PRESIDENT BUSH'S hopes for the Arctic National Wildlife Refuge came one step closer to reality last week. While Congress must still pass a law to allow drilling in the refuge, the Senate voted to include oil revenues from such drilling in the budget, making eventual approval of the president's plan more likely.
http://www.energybulletin.net/node/4883

How Much Oil Is There?
WASHINGTON (AP) - President Bush calls it the most promising source of untapped oil in America and the key to greater energy independence. But how much oil is there in Alaska's Arctic National Wildlife Refuge?
Nobody really knows for certain.
http://www.chiefengineer.org/content/content_display.cfm/seqnumber_content/2354.htm

Petroleum Exploration Methods (Powerpoint)
http://hunstem.uhd.edu/GEOAlliance/early%20exploration.ppt

Geology of Oil Fields of West Siberian Lowland

Since 1959 more than 114 oil and gas fields estimated to contain more than 4 billion tons (28 billion bbl) have been discovered in the West Siberian Lowland, a topographic and structural basin east of the Ural Mountains. About 1,750,000 sq km (675,000 sq mi), an area nearly three times that of Texas, is considered prospective. The bottom of the basin consists of igneous and metamorphosed Paleozoic rocks at an average depth of 3,000 m (10,000 ft) in the south, and 4,000 m (13,000 ft) in the north. All productive strata are sandstones of Late Jurassic and Cretaceous ages.
http://search.datapages.com/data/doi/10.1306/819A3E74-16C5-11D7-8645000102C1865D

Genesis of the West Siberian Basin and its Petroleum Geology: A Recent Interpretation
A prominent Western specialist on the geology of the oil and gas deposits of Russia provides an interpretation of the genesis of the West Siberian basin, relying, in part, on most recent Russian studies as well as information made available in 1994 evaluating the reserves of Russia's most important producing province. From Late Carboniferous through Middle Jurassic time, the region of West Siberia passed through orogenic, rift, and early platform stages. A domal high was present in the region during the orogenic stage, arising from cratonization of the Ural-Mongolian fold belt. Early Triassic rifting was part of a global rifting event and was a precursor to the subsequent crustal sagging that produced the West Siberian basin. The Early-Middle Jurassic was a time of cyclical marine and continental deposition, the sea moving back and forth from the north. The Talinskoye oil field occurs in Lower-Middle Jurassic sandstones that have the form of a river channel that extends more than 200 km. The Priobskoye field is associated with a Lower Cretaceous clinoform that has been traced N-S for more than 300 km. It is suggested that: (a) the oil in the Lower Cretaceous Neocomian sandstones was sourced by bituminous clays that interfinger with these sandstones on the west; and (b) that Upper Cretaceous Cenomanian gas was sourced in part by deeply buried Paleozoics and by overlying Upper Cretaceous Turonian clays. Predicted discoveries in West Siberia include several thousand small fields with reserves of less than 10 million tons, 250 to 300 medium-sized fields, and several large fields with 30 to 100 million tons.
http://www.informaworld.com/smpp/content~content=a910265757&db=all

Formation Volumes and Energy Characteristics of Gas-Cap Material from Kettleman Hills Field
Gas-cap material from Kettleman Hills Field was obtained in the form of gas and liquid samples from the trap of a well located high on the structure and operating at high gas-oil ratio. The gas sample, the liquid sample, and six different mixtures of them were studied at a series of pressures and temperatures. The results include both formation volumes and specific volumes of the mixtures and thermodynamic properties of the gas sample and of the liquid sample. It is indicated that a mixture of the samples in the same proportions as would correspond to the operating gas-oil ratio of the well sampled, when brought to equilibrium at conditions of temperature and pressure comparable to those probably existing in the gas-cap , sands, would be substantially all in the form of a gas phase.
http://www.onepetro.org/mslib/servlet/onepetropreview?id=API-36-158&soc=API&speAppNameCookie=ONEPETRO

Geology of Kettleman Hills Oil Field, California
The Kettleman Hills oil field is one of California's largest oil fields and will be numbered among the major oil-producing areas of the world. It is in Fresno and Kings counties, California, along the western foothills of the San Joaquin Valley, approximately 180 miles southeast of San Francisco.
http://search.datapages.com/data/doi/10.1306/3D932BAC-16B1-11D7-8645000102C1865D

Subsurface Stratigraphy of Kettleman Hills Oil Field, California
A comparative microscopic study of well cores at Kettleman Hills, and of cores and surface sections in adjacent areas, is presented. Relations between formations penetrated at Kettleman Hills, and variations in lithology and thickness within the area, are discussed. The Kettleman Hills section is correlated with sections at North Coalinga, Reef Ridge, Lost Hills, North Belridge, Belridge, and Gould Hills.
http://search.datapages.com/data/doi/10.1306/3D932C20-16B1-11D7-8645000102C1865D

Short chain aliphatic acid anions in oil field waters and their contribution to the measured alkalinity
High alkalinity values found in some formation waters from Kettleman North Dome oil field are due chiefly to acetate and propionate ions, with some contribution from higher molecular weight organic acid ions. Some of these waters contain no detectable bicarbonate alkalinity. For waters such as these, high supersaturation with respect to calcite will be incorrectly indicated by thermodynamic calculations based upon carbonate concentrations inferred from traditional alkalinity measurements
http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V66-48C8HNK-HJ&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=d2b3218cd7cf1fd4c75f05885444c4bb

The Influence of Private Contractual Failure on Regulation: The Case of Oil Field Unitization
This article analyzes the interdependence between regulation and private contractual failure. The analysis reveals that the feasible range of regulation is restricted by the same forces that block private agreement. The focus of the study is oil field unitization

regulation in Oklahoma, Texas, and Wyoming (federal lands) from 1948 through 1975. Despite large potential gains from unitization, private negotiations fail because of lease heterogeneities and information problems regarding lease value estimates. In response, the federal and state governments have adopted strikingly different policies to encourage unitization with different results. Only the federal government's regulations are effective because they surmount information problems. Texas has the least successful regulation. The paper argues that the policy differences are due to the political influence of small firms that benefit from nonunitized production.
http://www2.bren.ucsb.edu/~glibecap/LibecapWigginsJPE.pdf

OIL, GAS, AND GEOTHERMAL PUBLICATIONS INDEX
OIL AND GAS PUBLICATIONS INDEX, GEOTHERMAL PUBLICATIONS INDEX, APPENDIX A, Publications of the Division of Oil and Gas, APPENDIX B, Obtaining Publications
ftp://ftp.consrv.ca.gov/pub/oil/publications/pr3s.pdf

MULTIPHASE, MULTICOMPONENT COMPRESSIBILITY IN PETROLEUM RESERVOIR ENGINEERING
Adiabatic and isothermal compressibility below thle bubble point and production compressibility were computed with a thermodynamic model for single and multicomponent systems. The thermodynamic mod!el consists of an energy balance including a rock component, and a mass balance, with appropriate thermodynamic relationships for enthalpy and equilibrium ratios utilizing the virial equation of state. Runs consisted of modeling a flash process, either adiabatically or isothermally and calculating fluid compressibilities below the bubble point for H20. H20 - COz, nC, - iC, - C, - Clo, C1 - C7, and C1 - C7 - H20 systems. The production compressibility was computed for gas production, and for production according to relative permeability relationships for a one-component system. Results showed a two-phase compressibility higher than gas compressibility for similar conditions, and a production compressibility that could be larger than either the two-phase compressibility or the gas-phase compressibility, under the same conditions.
http://pangea.stanford.edu/ERE/research/geoth/publications/techreports/SGP-TR-088.pdf

Geological Characteristics in Cook Inlet Area, Alaska
The Cook Inlet basin is a narrow, elongate trough of Mesozoic and Tertiary sediments located north of latitude 59 degrees in south-central Alaska (Fig. 1). The basin covers approximately 11,000 square miles of the northern part of the Matanuska geosyncline and is bounded by the Kenai and Chugach Mountains on the east, the Talkeetna Mountains and the Copper River on the northeast, the Susitna basin on the north, the Chigmit Mountains and the Alaska Range on the west, and the Shelikof Strait on the south. In less than ten years the basin has achieved such a degree of prominence as a petroleum province that it ranks with off-shore areas in California and the Gulf Coast as the most promising future source of large domestic reserves. Oil and gas exploration in the basin has rapidly increased in the past few years and is currently at its highest level in history. Although the general characteristics of the basin are fairly well known, new informations as it is made available will cause many revisions of the stratigraphic and structural fabric before a complete geological picture is possible. This report revises and refines certain concepts of the basin which were discussed in an earlier work (Kelly, 1963). In certain aspects it may be considered a progress report that will require periodic updating as new information is made available.
http://www.onepetro.org/mslib/servlet/onepetropreview?id=00001588&soc=SPE

The petroleum resource potential of the Bering Sea region
The Bering Sea sedimentary basin comprises the Bering Sea and the adjacent intermontane depressions on the continents. It includes the following subordinate sedimentary basins: the Norton; Bethel; Saint Lawrence; Anadyr; Navarin; Khatyrka; Saint George; Bristol; Cook Inlet; and Aleutian consisting of the autonomous Aleutian, Bowers, and Komandor basins. All of them exhibit significant geological similarity. The Middle and Upper Miocene terrigenous sequences, which are petroliferous through the entire periphery of the Pacific Ocean, are characterized by their high petroleum resource potential in the Bering Sea continental margin as well, which is confirmed by the oil and gas pools discovered in neighboring onshore lowlands. The younger (Pliocene) and older (up to Upper Cretaceous) sedimentary formations are also promising with respect to hydrocarbons. The integral potential oil and gas resources of the Bering Sea sedimentary basin, including the continental slopes, are estimated by the US Geological Survey to be 1120 × 106 t and 965 × 109 m3, respectively.
http://www.springerlink.com/content/c640k913637644h6/

Biogenic and Thermogenic Origins of Natural Gas in Cook Inlet Basin, Alaska
Two types of natural gas occurrences are present in the Cook Inlet basin. The major reserves (1.8 × 1011m3) occur in shallow (less than 2,300 m), nonassociated dry gas fields that contain methane with ^dgr13C in the range of -63 to -56 per mil. These gas fields are in sandstones interbedded with coals of the Sterling and Beluga Formations; the gas fields are interpreted as biogenic in origin. Lesser reserves (1.1 × 1010 m3) of natural gas are associated with oil in the deeper Hemlock Conglomerate at the base of the Tertiary section; associated gas contains methane with ^dgr13C of about -46 per mil. The gases associated with oil in the Hemlock Conglomerate are thermogenic in origin.

http://payperview.datapages.com/data/open/offer.do?target=/bulletns/1980-81/data/pg/0064/0008/1100/1131.htm

Mechanics of seismic instabilities induced by the recovery of hydrocarbons
We review earthquake distributions associated with hydrocarbon fields in the context of pore pressure diffusion models, poroelastic stress transfer and isostasy theory. These three mechanisms trigger or induce seismic instabilities at both local scale (D5 km) and at regional scale (D20 km). The modeled changes in stress are small (1 MPa), whatever the tectonic setting. Each mechanism corresponds to different production processes. (1) Local hydraulic fracturing due to fluid injection induces seismic-slip on cracks (M L3) within the injected reservoir through decreasing the effective stress. (2) Pure fluid withdrawal causes pore pressure to decrease within the reservoir. It triggers adjustments of the geological structure to perturbations related to the reservoir response to depletion. Poroelastic mechanisms transfer this stress change from the reservoir to the surrounding levels whereM L5 seismic instabilities occur either above or below the reservoir. (3) Massive hydrocarbon recovery induces crustal readjustments due to the removal of load from the upper crust. It can induce larger earthquakes (M L6) at greater distance from the hydrocarbon fields than the two other mechanisms.
http://www.springerlink.com/content/g357p13323162757/

INTEGRATED PRE-STACK DEPTH MIGRATION OF VSP AND SURFACE SEISMIC DATA
In the conventional approach to VSP and surface seismic imaging, the VSP and surface seismic data sets are processed and migrated independently. The VSP image is then spliced into the surface seismic result. Although good images can be obtained in this way (e.g. Hinds et al., 1993; Zhu and Lines, 1994), this method has some drawbacks. First, the portion of the surface seismic image where the VSP image is spliced in is discarded, and secondly, the VSP image may not tie well with the surface seismic image on the first attempt if the velocity model and imaging algorithm used for migration of the two data sets were not exactly the same.
http://www.cseg.ca/publications/recorder/2001/11nov/nov01-integrated-prestack%20.pdf

LATE CAMBRIAN AGNOSTOID TRILOBITES FROM THE FAMATINA RANGE (LA RIOJA, ARGENTINA). BIOSTRATIGRAPHIC AND PALEOENVIRONMENTAL SIGNIFICANCE.
Guillermo Bodenbender (1916) firstly collected fossils (“Agnostus”, “Obolus”) from the Filo Azul Member of the Volcancito Formation at Río Volcancito (Famatina Range, La Rioja Province), and tentatively assigned the unit to the “Upper Cambrian or Lower Ordovician”. Recent studies have demonstrated that the Cambrian-Ordovician transition is well represented at Río Volcancito. The lower part of the section is composed of dark-coloured marls and shales with Late Cambrian trilobites (e.g., agnostoids and olenids), whereas the upper part is mainly composed of green shales containing the Lower Tremadocian Jujuyaspis keideli and Rhabdinopora. The agnostoids Lotagnostus (Lotagnostus) sp., Micragnostus vilonii Harrington and Leanza, Pseudorhaptagnostus (Machairagnostus) tmetus Harrington and Leanza, P. (Machairagnostus) corrugatus (Suárez-Soruco), Gymnagnostus perinflatus (Harrington and Leanza) and G. bolivianus (Hoek) have proved to have great biostratigraphic value as guide fossils for the uppermost Cambrian. They are especially diverse in beds deposited under low-oxygen conditions, a fact that could denote a benthic or nekto-benthic mode of life in a nutrient rich environment.
http://dgisrv15.unt.edu.ar/fcsnat/insugeo/geologia_19/pdf/16.pdf

Deep Oil Plays in Po Valley: Deformation and Hydrocarbon Generation in a Deformed Foreland*
In the western Po Valley, more than 5,000 meters deep, few gas and condensate fields are present in alpine compressional structures (Malossa type). Oil fields are found in Mesozoic extensional structures (Villafortuna-Trecate type); both these petroleum systems consist of Triassic reservoir and source rocks.
http://www.searchanddiscovery.com/documents/2003/bello/index.htm

OIL AND GAS ACCUMULATIONS IN OVERTHRUST BELTS - II
The occurrence of oil-and gasfields in overthrust belts follows the same principles that operate in normal basins. There is no essential difference, and, in order to avoid any personal bias or dogma, examples of productive areas in overthrust belts should speak for themselves. The examples below are selected only on the basis of available data. More examples would improve understanding but would not change the basic principles described. Unfortunately, the most convincing examples are locked away in company files.
http://www3.interscience.wiley.com/journal/120032242/abstract?CRETRY=1&SRETRY=0

Longitudinal distributions of two formation pathways of biogenic gases in continental deposits: A case study from Sebei 1 gas field in the Qaidam Basin, western China
The distribution of two formation pathways of biogenic methane, acetate fermentation and reduction of CO_2, has been extensively studied. In general, CO_2 reduction is the dominate pathway in marine environment where acetate is relatively depleted because of SRB consuming. While in terrestrial freshwater or brackish environment, acetate fermentation is initially significant, but decreases

with increasing buried depth. In this paper, character of biogenic gases is profiled in the XS3-4 well of the Sebei 1 gas field in the Sanhu depression, Qaidam Basin. It indicates that those two pathways do not change strictly with increasing buried depth. CO2 reduction is important near the surface (between 50 m and 160 m), and at the mesozone (between 400 and 1650 m). While acetate fermentation is the primary pathway at two zones, from 160 to 400 m and from 1650 to 1700 m. δ 13C of methane generated in those two acetate fermentation zones varies greatly, owing to different sediment circumstances. At the second zone (160–400 m), δ 13C1 ranges from −65‰ to −30‰ (PDB), because the main deposit is mudstone and makes the circumstance confined. At the fourth zone of the well bottom (1650–1700 m), δ 13C1 is lighter than −65‰ (PDB). Because the deposit is mainly composed of siltstone, it well connects with outer fertile groundwater and abundant nutrition has supplied into this open system. The high concentration of acetate is a forceful proof. δ 13C of methane would not turn heavier during fermentation, owing to enough nutrition supply. In spite of multi-occurrence of acetate fermentation, the commercial gas accumulation is dominated by methane of CO2-reduction pathway. A certain content of alkene gases in the biogenic gases suggests that methanogensis is still active at present.
http://www.springerlink.com/content/7g27j717u3w0nr66/

The Miocene Petroleum System of the Northern Apennines in the Central Po Plain (Italy)
We describe the Miocene petroleum system in the context of the geology of the Northern Apennines as a system fed by multiple sources including some potential for deep oil accumulation. The presence of sources deeper than the Miocene reservoir is required by the high thermal maturity of the oils, the thermogenic nature of methane and the high ion content, in the reservoir brines, deriving from decaying organic matter. This is in contrast with the lower thermal maturity measured in the Miocene reservoir coupled with its low organic matter content. A Miocene secondary source, however, is required by the presence of a Tertiary organic marker in the oil. The deeper sources charged reservoirs of different age, geometry and sediment provenance, mostly as a function of stepwise migration of the foredeep and the overlying Ligurian units toward the foreland, which provided rapid overburden. The porosity of the reservoir was preserved in the anticlines mostly because of up-dip migration into early formed structures in the foredeep units. Therefore, the structural evolution of the area, especially the time interval between deposition and deformation of the foredeep units, is crucial for the definition of the quality of the reservoirs. Finally, the Quaternary reactivation of the thrust sheets in the foothills changed the geometry of the reservoirs, inducing new accumulations and/or dismigration from deeper and older traps.
http://www.springerlink.com/content/l7n0812563423966/

The Alpine evolution of the Southern Alps around the Giudicarie faults: A Late Cretaceous to Early Eocene transfer zoneData supporting relevant Late Cretaceous–Early Eocene sinistral displacement along the Giudicarie fault zone and a minor Neogene dextral displacement along the Periadriatic lineament are discussed. The pre-Adamello structural belt is present only in the internal Lombardy zone, located W of the Adamello massif. This belt is unknown in the Dolomites and surrounding areas located to the E of the Giudicarie lineament. Upper Cretaceous–Early Eocene thick syntectonic Flysch deposits of Lombardy and Giudicarie are well preserved along the southern and eastern border of the pre-Adamello belt (S-vergent Alpine orogen). Towards the E, in the Dolomites and in the Carnic Alps and external Dinarides, only incomplete remnants of Flysch deposits, Aptian–Albian and Turonian–Maastrichtian in age, are present. They can be considered as equivalent to those of Lombardy and Giudicarie formerly in connection to each other along the N-Giudicarie corridor. To the S, the syntectonic Flysch deposits are laterally replaced by the calcareous red pelagites of the Scaglia Rossa and by the carbonate shelf deposits of the Friuli (to the E) and Bagnolo (to the S) carbonate platforms. The different location in the southern structural accretion of the eastern and western opposite blocks (the Dolomites versus the pre-Adamello belt) can be related to the Cretaceous–Eocene convergence. In this frame, the N-Giudicarie fault has been considered as part of a former transfer zone, which produced the sinistral lateral displacement of the Southern Alps front for an amount of some 50 km. During the Late Eocene to Early Oligocene the transfer zone was mostly sealed by the Paleogene Adamello batholith. Oligocene to Neogene compressional evolution inverted the N-Giudicarie fault into a backthrust of the Austroalpine units over the South-Alpine chain.
http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V72-4HWXKVY-2&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=943beb2e4118ee9b83a46413a3565c31

Hydrocarbon provinces in the Swiss Southern Alps—a gas geochemistry and basin modelling study
In order to evaluate the petroleum potential of southern Switzerland (south-Alpine fold-and-thrust belt), gas geochemical investigations including free and adsorbed gases were combined with a basin modelling analysis. The palaeotectonic setting and Alpine orogenic movements were recognized as main controls in the evolution of the petroleum generation potential. Three main hydrocarbon provinces are distinguished: (1) The Arbostora anticline which developed from an Early Jurassic high has excellent but immature source rocks which probably at no time generated hydrocarbons because of their swallow level in the nappe edifice, (2) the Stabio anticline south of the Arbostora anticline in southernmost Switzerland where wet gases are observed at the surface that are likely to have been generated from Late Cretaceous to present day from Triassic source rocks occurring deeper in the nappe pile, and (3) the M. Generoso basin with prevailing petroleum generation in the Early Jurassic and possible minor generation in marginal areas during Cretaceous and Tertiary times.

http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V9Y-3SVRC4V-1&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=fde76093e1b3336d801e81c1eff04495

Lithospheric weakening during "retroforeland" basin formation: Tectonic evolution of the central South Alpine foredeep
Beginning with the Late Cretaceous convergence between Europe and Adria caused the southward subduction of the European plate beneath Adrea. Contractional movements at high crustal levels were partly accommodated by southward thrusting (Southern Alps) causing flexure of the loaded Adriatic plate and the formation of the Late Cretaceous to Late Miocene South Alpine foredeep. With respect to the Alpine subduction system, the South Alpine foredeep is a retroforeland basin. In the Late Paleogene, dip values of the base foredeep varied between 3° and 5°. The shallower dips were found along profiles crossing domains which had undergone extension during previous Late Triassic to Middle Jurassic rifting. With ongoing convergence, the base foredeep along the entire basin steepened and dip values in the Tortonian are of about 7°-8°. The increase in dip goes hand in hand with an increase in the curvature of the loaded plate. Modeled effective elastic thickness (*Te*) values derived from the analysis of plate curvatures decrease from 15-20 km in the Late Paleogene to <5 km in the Tortonian. Preconvergence values obtained from modeling studies were even higher, in the 24-27 km range. A practically complete decoupling of the upper/middle crust from its mantle substratum enabled the increase in curvature of the hinge zone. The progressive weakening of the South Alpine lithosphere around the bulge zone is correlated with the its "upper plate" position with respect to the Alpine subduction system.
http://dare.ubvu.vu.nl/bitstream/1871/8891/1/1998.142.pdf

EVALUATION OF FRACTURED RESERVOIR ROCKS USING GEOPHYSICAL WELL LOGS
Recent economic forecasts place recoverable crude oil reserves from fractured reservoir rocks in excess of 40 billion stock tank barrels. Hence, over the past few years the petroleum industry has exhibited an ever increasing interest in fractured reservoirs.
http://www.onepetro.org/mslib/servlet/onepetropreview?id=00008938&soc=SPE

Insufficiency of compaction disequilibrium as the sole cause of high pore fluid pressures in pre-Cenozoic sediments
The method of indirect demonstration is used to investigate if compaction disequilibrium can account for high overpressures that occur in Mesozoic and older basin formations. First the equations governing compaction disequilibrium are analysed for the factors controlling overpressure levels. Then limiting values of these control parameters are sought which favour high fluid pressures. The analysis shows why 'close-to-lithostatic fluid pressures' in pre-Cenozoic basin units are difficult to attain by compaction disequilibrium alone. Subsequently, the limiting favourable conditions are used in a series of generic numerical model experiments. The experiments serve as templates to construct the upper bounds of overpressures due to sediment loading for most geological settings including those where shale seals have developed. Two regional examples are studied in some detail. It is shown that observed overpressures in Mesozoic strata on the Scotian Shelf can be explained by compaction disequilibrium, but require the limiting values assigned to the properties of shale. For the Central North Sea Graben these limiting conditions are not sufficient, providing evidence for an active role of other pressure-generating mechanisms.
http://www3.interscience.wiley.com/journal/119174751/abstract

STRATEGIC INFILL DRILLING TARGETED USING CROSSWELL SEISMIC – 'TWO CASE STUDIES'
Reservoir optimization has been identified by many as the last frontier of the oil and gas industry. As fewer giant fields are discovered, improving the low recoverability from existing oil and gas reservoirs will be the focus of increasing capital spending within the industry.
http://www.cseg.ca/publications/recorder/2001/10oct/oct01-infill-drilling.pdf

Conditional simulation of intrinsic random functions of order k
Conditional simulation of intrinsic random functions of orderk is a stochastic method that generates realizations which mimic the spatial fluctuation of nonstationary phenomena, reproduce their generalized covariance and honor the available data at sampled locations. The technique proposed here requires the following steps: (i) on-line simulation of Wiener-Levy processes and of their integrations; (ii) use of the turning-bands method to generate realizations in Rn; (iii) conditioning to available data; and (iv) verification of the reproduced generalized covariance using generalized variograms. The applicational aspects of the technique are demonstrated in two and three dimensions. Examples include the conditional simulation of geological variates of the Crystal Viking petroleum reservoir, Alberta, Canada.
http://www.springerlink.com/content/mur4n761h7285463/

Geostatistical Modeling of Gridblock Permeabilities for 3D Reservoir Simulators
A geostatistical method is presented to determine the absolute horizontal and vertical effective permeabilities at the reservoir block scale from core support-scale values required for 3D reservoir flow simulations. The key element of the geostatistical model is the definition of block support-scale permeabilities as the spatial power average of core-support values permeabilities as the spatial power average of core-support values over the volume of a reservoir gridblock. Block support-scale permeabilities are then found to

be a function of the permeability permeabilities are then found to be a function of the permeability variogram, the averaging volume, and a power-averaging constant, which is derived separately for horizontal and vertical flow with a numerical approach. The application of the proposed method requires that core-support values be available within each reservoir block. These values are generated with the technique of conditional simulation. This technique provides simulated values reproducing the actual core data at sampled locations and their statistical properties. The approach developed for the determination of permeability input to full-field simulators is demonstrated by an application to the Crystal Viking field "H" pool in Alberta.
http://www.onepetro.org/mslib/servlet/onepetropreview?id=00021520&soc=SPE

Traps Associated with Paleovalleys and Interfluves in an Unconformity Bounded Sequence: Lower Cretaceous Glauconitic Member, Southern Alberta, Canada (1)
The Glauconitic member in Badger, Little Bow, Retlaw, and Turin fields is an unconformity bounded sequence that formed on an ancient coastal plain in response to relative sea level fluctuations. The member consists of valley-fill and inter-valley strata. Valley-fill sandstone bodies are thick elongate pods that formed from inner estuarine bars when sedimentation was laterally confined between valley margins. Inter-valley sandstone bodies are thin discontinuous sheets that accumulated during highstands when outer estuarine embayments covered interfluvial areas adjacent to associated valleys.
http://search.datapages.com/data/doi/10.1306/BDFF8920-1718-11D7-8645000102C1865D

Estuarine Facies Models: Conceptual Basis and Stratigraphic Implications: PERSPECTIVE
The nature and organization of facies within incised-valley estuaries is controlled by the interplay between marine processes (waves and tides), which generally decrease in intensity up-estuary, and fluvial processes, which decrease in strength down-estuary. All estuaries ideally possess a three-fold (tripartite) structure: an outer, marine-dominated portion where the net bedload transport is headward; a relatively low-energy central zone where there is net bedload convergence; and an inner, river-dominated (but marine-influenced) part where the net transport is seaward. These three zones are not equally developed in all estuaries because of such factors as sediment availability, coastal zone gradient and the stage of estuary evolution.
http://search.datapages.com/data/doi/10.1306/D4267A69-2B26-11D7-8648000102C1865D

Approaches in Quantifying the Resolution of High-Resolution Time-Lapse Seismic: How Low is High?
The results from seismic reflection surveys across steam injection chambers in heavy oils reservoirs show anomalies much smaller than the corresponding size of the Fresnel zone. Since the classical concepts of seismic resolution assumes receiver spacing in the order of the Fresnel zone diameter, high-resolution surveys with a receiver spacing of only a small fraction of the Fresnel zone diameter require special interpretation. To increase the lateral resolution special data processing steps, such as deconvolution and migration, may be applied. The effectiveness of these procedures as well as their impact on the amplitude information are investigated through a re-examination of the theoretical concepts and testing new approaches through numerical and physical modeling.
Time-lapse seismic monitoring at Pikes Peak, Saskatchewan
We present two 2-D reflection seismic lines shot at the same survey location nine years apart at the Pikes Peak Heavy Oil field in Saskatchewan, Canada. Differences of the reflection data and acoustic impedance inversions are shown. The results indicate a lower impedance zone and a seismic traveltime increase associated with areas where steam has been injected into the reservoir formation, the Waseca member of the Mannville Group. Three wells located near the two lines were used to constrain the interpretation and impedance values for the inversion. Jason Geoscience and Hampson-Russell's Pro4D software were used to invert, calibrate and difference the reflectivity and inverted sections.
AVO analysis at Pikes Peak
An AVO study was performed to determine the potential of AVO to map the steam chamber, to aid in the enhanced oil reservoir production of the Pikes Peak Thermal Project. The study consisted of three phases: a rock physics study, a modeling study and a template seismic study. The rock physics study helped determine the relationship between the elastic properties of the reservoir and the extrinsic variables: temperature and pressure. This understanding was used along with log control to do a forward modeling study. Synthetic gathers were generated under a variety of reservoir conditions to model the seismic response of the reservoir. The knowledge gained from the modeling study was used to design and interpret the AVO study.
Modelling Inversion for Fluid Parameters in Enhanced Oil Recovery
We study the feasibility of detecting changes in pore pressure and fluid content from time-lapse impedence measurements derived from surface seismic, with only a limited knowledge of the rock parameters. The inversion procedure is non-linear, and the quality of the results depends on the amount of noise in the data and the estimates of the reservoir rock properties at each location. We obtain reasonable results from synthetic data with a realistic uncertainty in the rock properties, assuming the noise level is fairly low.
Rock Physics and Modeling in the Interpretation of Time Lapse Seismic Data
Time-lapse seismic monitoring involves the comparison of two or more surveys acquired at different times over an active producing field. Spurious differences between the seismic surveys, caused by seismic acquisition and processing as well as seasonal variations in the near surface, must be minimized to isolate and enhance the differences in seismic signal that are caused by the production

process. Once these production-related changes are identified, they must be properly interpreted and calibrated before the seismic information can be used to enhance the recovery process.

Crosswell Seismic Imaging for Horizontal Drilling of the High Porosity Sand. Crystal Viking Pool, Alberta, Canada.

TomoSeis Inc. (a division of Core Laboratories) acquired a crosswell seismic survey for Numac Energy Inc. in the Crystal Viking Oil Pool, in Alberta Canada, about 300 kilometers northwest of Calgary. The goal of the survey was to delineate a high porosity (F1) sand (as described in Reinson et al 1988, fine to medium grained sandstone) within the incised valley system of the Viking Formation for horizontal development drilling. Two crosswell profiles were acquired, modeled, processed and interpreted to help design the trajectory of a planned horizontal well. (See Figure 1).

http://www.cseg.ca/conventions/abstracts/2001/2001abstracts/4_D-Session.pdf

Lithology Of Paleovalley-fills From Petrophysical Data: Mannville Group, Lower Cretaceous, Southern Alberta, Canada

Reservoirs in the middle part of the Mannville Group in southern Alberta are hosted in permeable (10-500 mD) quartzose sandstones deposited in a variety of environments. The sandstones have commonly been incised by Upper Mannville paleovalleys filled with lithic sandstone and shale. Lithic sandstone is relatively impermeable (5-60 mD) so that Upper Mannville paleovalleys can form lateral seals to Middle Mannville reservoirs. Particularly where the sections adjacent to paleovalleys comprise siltstone or shale, difficulties are encountered in mapping the valley courses and knowledge of the lithologic variation and succession within valleys becomes critical. Lithology is determined from density-versus-neutron porosity and gamma-versus-"neutron-minus-density" porosity cross plots which resolve porous quartzose sandstone. cemented sandstone, lithic sandstone, calcareous shale and shale. Lithic sandstone modes are modified by the presence of shale intraclasts, occurring as pebbles, easily recognized in core, but also as sand-size intraclnsts that fomi part of the detrital grain framework. The presence of large and small intraclasts is consistent with the analysis of the total-gamma radiation spectrum. I n addition, shale intraclasts within lithic sandstone are characterized by relatively high thorium counts. In the modal lithic sandstone the spread between density and neutron porosity is about 10 porosity percentage units. A few wells have produced oil from Upper Mannville lithic sandstone, invariably from the most permeable medium-grained lithic sandstone. Use of the techniques illustrated herein help to evaluate the potential of lithic sandstone paleovalleys aiming to identify the location of medium and coarse-grained lithic sandstones.

http://www.onepetro.org/mslib/servlet/onepetropreview?id=SPWLA-2001-v42n5a3&soc=SPWLA

Geology and hydrocarbon provinces of the North Sea

The technically recoverable hydrocarbon reserves of the North Sea are currently estimated at 23 × 109 bbls of oil, condensate and NGL and 90 × 1012 scf of gas. The North Sea underwent a complex geological evolution. The oil and gas occurrences in the central and northern North Sea are tied to Mesozoic and Tertiary sediments; the gas fields of the southern North Sea are mainly contained in Permian series. The proven hydrocarbon provinces cover at best one third of the total area of the North Sea. It is estimated that in the early 1980's the oil production from the North Sea will meet 22% of the oil demand of Western Europe.

http://www.springerlink.com/content/mk75j15183200260/

Managing Drilling Risk in a Mature North Sea Field

As fields mature, drilling can become more difficult. The likelihood of losses increases as reservoir pressures decline while higher mud weights are needed to prevent collapse of overburden shales as targets are pushed further from the platform. Drilling parameters for the Forties field have become fairly well established after years of experience yet 65% of the wells drilled between 2002 and 2007 experienced incidents attributed to instability. As field production declined, economic viability demanded a step change in performance.

http://www.onepetro.org/mslib/servlet/onepetropreview?id=SPE-124666-MS&soc=SPE

4D Seismic Modelling of the Statfjord Field: Initial Results

As part of a major drive to improve recovery in the Statfjord Field, a large-scale 4-D seismic monitoring program was recently undertaken by the operator. One of the objectives of the 4-D program is to identify unswept oil pockets and zones experiencing early water influx in the producing sandstones of the Middle Jurassic Brent Group. A base 3-D seismic survey, acquired in 1979 at the beginning of production, plus two repeat surveys acquired in 1992 and 1997 have been processed and cross-equalized for 4-D analysis. To assist the interpretation of reservoir fluid movements from the timelapse seismic data, a detailed 3-D earth model has been constructed by integrating log data from 180 wells with flow simulation results. The model framework consists of a series of 3-D stratigraphic grids spanning the Upper and Lower Brent reservoirs plus the encasing formations. Grid-cell reservoir properties include static parameters such as porosity and volume of clay as well as pore pressure and water saturation predictions downscaled from the flow simulation grids for each seismic survey time. Time-dependent elastic parameters such as P-wave and S-wave velocity, density and acoustic impedance have been computed at the three survey times and stored as extra grid-cell attributes. This computation uses a rock physics model linking the elastic properties in each cell to porosity, volume of clay, and saturation and pressure values extracted from the flow simulator. Synthetic amplitude volumes have been generated via forward modelling of the 3-D elastic models for the three survey times. Difference volumes derived from the synthetic datasets are thus representative of the seismic signature of the fluid movements predicted by the flow simulator.

http://www.onepetro.org/mslib/servlet/onepetropreview?id=00056730&soc=SPE

Reservoir characterization from downhole mineralogy

It is now a relatively established procedure, with recent advances in logging technology, to be able to generate a comprehensive, continuous measurement of major element chemistry in the subsurface. Concurrent with these advances, strategies have been developed which transform elemental data, derived from nuclear logging measurements, into a set of mineral modes that accurately represent the mineralogy of a rock. Resulting mineralogy logs are potentially valuable on their own, especially for creating a geological model in the absence of (or to enhance) core measurements. Mineralogy logs can also be used for the determination of other petrophysically useful formation descriptors, such that in wells where core recovery is poor they can help to extend evaluation across poorly defined zones. A selection of applications are investigated; these show that, with good acquisition, derived mineralogy may be used effectively for inter-well correlation and for the determination of enhanced estimates of matrix density and porosity.
http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V9Y-40SFM4R-R&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=638299f17c22415fdd50d35c0d94bb38

Introduction to Petroleum Geology GEO4211 (Powerpoint)
http://folk.uio.no/ptn/PET.%20SYS.%20G%204211/HO/IntroductiontoPetoleumgeologyKB[1].pdf

Utilising seismic and pressure/production data to predict and locate reserves adjacent to the Borg Field

The Borg Field is a stratigraphic trapped field of a shallow marine beachline system in the Tampen area of the Northern North Sea. The 30 MSm3 oil field is currently being developed with 2 injectors and 2 producers as a satellite field to the adjacent larger Tordis and Gullfaks Fields. As a result of the Upper Jurassic play, more reserves are possible to add as satellite developments. The Borg Field proves the Upper Jurassic Volgian-Ryazanian syn-rift deposit to be economically favourable. In the hunt for reserve replacement this play is expected to be important in the Tampen area, but however increasingly harder to predict and locate. The presence and location of additional reserves has been integration of multi-disciplinary data. On the Borg Field pressure data acquired through RFT measurements in exploration wells indicated that the field was pressure depleted before production onset. By analysing pressure data from regional producing fields and exploration wells, this depletion is likely to be caused by production in the Statfjord Field to the Southwest. The oil migration into the Borg Field was interpreted to follow a route from the deep mature basin to the Statfjord Field and to the Borg Field along Upper Jurassic hanging-wall slumped and turbidite sand stones draped along the main Statfjord Fault. These were amalgamating with paleo-beachline sediments lining a restricted bay and finally connected to the Borg Field sandstone on the other side of the paleo-bay, These sand stones can be partially mapped on seismic data and are encountered in exploration / appraisal wells and forms the likely path of pressure communication between the Borg Field and the Statfjord Field. These oil traps have a stratigraphic nature and both the location and size of the reservoir sands are difficult to map location and size of directly from the seismic, however the sands can be of economically importance due to their close proximity to nearby producing fields. During seismic work on the Borg Field, a northern segment was observed detached from the southern segment by a fault zone. A paleo beachline and a delta fan could be predicted by seismic character and through AVO analysis these seismic-geo-bodies where likely to be sand-filled. The Borg Field was initially test produced for 6 months. During this test an influx of pressure was seen when the pressure dropped below the Statfjord Field, verifying earlier observations of pressure depletion from Statfjord, now being an influx. From analytical analysis of these data, the magnitude of the influx where calculated depending on pressure difference between the 2 fields. Well test analysis indicated that an additional volume was present outside of the main Borg Field. Through data integration in a reservoir model and sensitivity testing through the history matching process the presence of an extra volume of 15 MSm^3 was predicted.
http://cat.inist.fr/?aModele=afficheN&cpsidt=6173840

Tertiary structuration and erosion of the Inner Moray Firth

Seismic profiles and field data show that the Inner Moray Firth (IMF) experienced significant structural modification during Early Tertiary times with the development of inversion, strike-slip and extensional oblique-slip geometries as well as uplift and erosion at a mid-late Danian unconformity. Seismic reflection profiles across the IMF also show progressively older stratigraphic subcrop towards the west. Analysis of sonic velocities and vitrinite reflectance demonstrate that up to 1.5 km of basin fill has been removed from the IMF. The height of the sequences above maximum burial depth (apparent erosion) is at a maximum in the northwestern part of the basin, where inversion geometries are found, and decreases to zero in the Outer Moray Firth. However, if post-erosional burial is taken into account, the actual amount of erosion during Early Tertiary exhumation (total erosion) is shown to be more evenly distributed, and of greater magnitude throughout the IMF. Incorporation of the effects of Tertiary erosion into analysis of basin development requires much greater post-rift burial than if Tertiary erosion is ignored. It seems most likely that the Early Tertiary deformation of the IMF occurred in response to NE Atlantic (Thulean) and Alpine events.
http://sp.lyellcollection.org/cgi/content/abstract/90/1/249

Heterogeneous exhumation in the Inner Moray Firth, UK North Sea: constraints from new AFTA® and seismic data

Integration of regional seismic interpretation, sonic velocity, vitrinite reflectance and apatite fission-track analysis (AFTA®) studies has demonstrated that the western region of the Moray Firth rift arm (UK North Sea) experienced pronounced exhumation during the Cenozoic. Although this basin is usually considered to have experienced regionally uniform exhumation, interpretation of new seismic data has revealed the presence of a major system of post-Jurassic normal faults, with throws commonly in the range of 10–300 m and locally exceeding 1 km. New, high-quality seismic data are used in combination with AFTA and vitrinite reflectance data to investigate the role of extensional faulting during exhumation of this basin. Results of this interpretation not only confirm the offsets across major faults, but also show that greater exhumation and erosion occurred on their footwalls than on their hanging walls. We conclude that the localized, differential exhumation is the result of superposition of local or short-spatial-wavelength extensional tectonics upon regional, long-spatial-wavelength exhumation. These results suggest that differential exhumation might be characteristic of unroofed rift basins where normal faults subcrop the exhumation-related unconformity and that, in such cases, thermal histories from footwall locations may yield inaccurate predictions of the burial history of hanging-wall depocentres. Inaccurate burial histories will lead to a misrepresentation of the thermal history, with an impact on the estimation of hydrocarbon source rock maturity for petroleum basins.
http://jgs.geoscienceworld.org/cgi/content/abstract/159/6/715

Controls on Late Jurassic seismic sequences, Inner Moray Firth, UK North Sea: a critical test of a key segment of Exxon's original global cycle chart
A new interpretation of a comprehensive seismic- and well-database has resulted in the subdivision of the Mesozoic into four, basin-wide, seismo-stratigraphic depositional megasequences in the Inner Moray Firth (IMF) basin. Regional mapping of the megasequences has led to the construction of a new model for Mesozoic-Recent basin development in the IMF. It now appears that extensional tectonics was the main control on the basin's evolution during the Mesozoic. Structural geometries suggest that both the Triassic (Tr) and Rhaetian-mid Oxfordian (Jl) megasequences were controlled by regional broad-based subsidence associated with local extensional fault activity prior to the onset of renewed rifting in the IMF. In contrast, the late Oxfordian-Ryazanian (Berriasian; J2) megasequence developed in response to active extension characterised by half-graben development. Subsequent Early Cretaceous (Kl) deposition appears to have occurred during a further period of broad regional (thermal) subsidence. It is evident that strike-slip movement on the Great Glen Fault played a negligible role in Mesozoic basin development and it appears only to have had a local control on structural styles during its reactivation in the Tertiary as it accommodated regional uplift and basin inversion.
http://www3.interscience.wiley.com/journal/119843219/abstract

The biostratigraphic calibration of the Scottish and Outer Moray Firth Upper Jurassic successions: a new basis for the correlation of Late Oxfordian–Early Kimmeridgian Humber Group reservoirs in the North Sea Basin
The combined results of palynological sampling of Scottish onshore sections and offshore wells from the Outer Moray Firth and the re-appraisal of ammonites extracted from subsurface cores enable a revised, unified macropalaeontological–palynological correlation scheme to be proposed for the Late Oxfordian–Early Kimmeridgian (Regulare–Mutabilis ammonite zones) of the North Sea. The results contradict previous, controversial correlations, which were based upon reported ammonite recovery from boreholes in the Witch Ground Graben, a component part of the Outer Moray Firth Basin. It can now be shown that the Upper Jurassic biostratigraphy of Scotland and the North Sea is essentially comparable to that of the English counterpart, suggesting that no faunal provincialism persisted across the former North Sea Dome from uppermost Oxfordian times onwards. Having clarified and resolved previous conflicting views, the application of the revised scheme should aid exploration and production in the Moray Firth Basin through the construction of more accurate reservoir correlations and robust palaeogeographic (play fairway) maps.
http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V9Y-45CDF17-1&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=2bf385a1c0f5a8e9e775c4309e180d2d

Petroleum Geology of Norton Basin, Alaska
Basement rocks beneath the main part of the Norton basin were deformed and heated during the Late Jurassic and Early Cretaceous to the extent that these rocks were not capable of generating hydrocarbons when the basin formed during the latest Cretaceous or early Paleogene. Consequently, source rocks for oil, if they exist, are most likely to be within the basin fill. If the Norton basin began to form 65 m.y. ago, subsided at a nearly constant rate, and had an average geothermal gradient of between 35 and 45°C/km, then rocks as young as late Oligocene are in the oil window (vitrinite reflectance between 0.65 and 1.30%). The appearance on seismic sections of reflections from rocks in and below the calculated oil window suggests that these rocks were deposited in a nonm rine environment. Thus, gas and condensate are the most likely hydrocarbons to be present in the basin. Because of their shallow depth of burial, Neogene (possibly marine) rocks are not likely to be thermally mature anywhere in the basin. Deep parts of the basin formed as isolated fault-bounded lows; consequently, the volume of mature rocks makes up at most 11% of the total basin fill. Numerous potential traps for hydrocarbons exist in the Norton basin; the traps include fractured or weathered basement rocks in horsts, strata in alluvial fans on the flanks of horsts, and arched strata over horsts.
http://search.datapages.com/data/doi/10.1306/03B59AF8-16D1-11D7-8645000102C1865D

UTILIZATION AND DOCUMENTATION OF VERTICAL OIL MIGRATION IN DEEP BASINS

Use of the model of a hot, deep, origin of oil places rigid constraints on the migration and entrapment of crude oil. Specifically, oil originating from depth migrates vertically up faults and is emplaced in traps at shallower depths. Review of petroleum-producing basins worldwide shows oil occurrence in these basins conforms to the restraints of this hypothesis. Most of the world's oil is found in the very deepest sedimentary basins, and production over or adjacent to the deep basin is cut by, or directly updip from, faults dipping into the basin deep. Generally, the greater the fault throw, the greater the reserves.

http://www3.interscience.wiley.com/journal/119589879/abstract

Continental Stretching: An Explanation of the Post-Mid-Cretaceous Subsidence of the Central North Sea Basin

The North Sea is a major continental basin filled with early Paleozoic to Recent sediments. Though graben formation started in the Triassic, the last major period of extension occurred between the Middle Jurassic and the Mid-Cretaceous. Following the faulting and graben formation associated with this extension, subsidence within the central North Sea was widespread and uniform and has created a saucer-shaped sedimentary basin. This was filled successively by chalks, sandstones, and finally, during most of the Tertiary, by shales and mudstones. We examined the subsidence of six wells down the middle and two of the flanks of the Central Graben. In the period of widespread steady subsidence the water-loaded basement depth in the middle increased by 1100-1400 m. On the flanks the basement subsided 600-700 m. We suggest that most of this subsidence results from the thermal relaxation of the lithosphere which was thinned during a Middle Jurassic to mid-Cretaceous stretching of the crust. Assuming a crustal stretching and associated Lithospheric thinning of between 50 and 100% in the middle and decreasing on either side, we obtained a good match to the observed amplitude and rate of subsidence. The Middle Jurassic to mid-Cretaceous subsidence which is found within the graben proper we relate to the fault-controlled initial subsidence which occurred during the actual stretching. The measured heat flow is compatible with such a stretching model. Though there is no seismic refraction data across the Central Graben, this model is strongly supported by evidence of a thinner crust under the Viking Graben to the north and the Witchgroung/Buchan Graben complex to the east. Usint eh above observations as the basis for a geological interpretation, we examined the thermal maturity and hydrocarbon potential of certain sedimentary horizons in the northern section of the Central Graben. In analyzing the various wells we extended previous work on the compaction correction to handle overpressuring and mixed lithologies in backstripping studies. Further, we expanded these methods to include the variation of thermal conductivity, and calculations of the degree of thermal maturation of the deposited sediments, through time.

http://siogeoscience.ucsd.edu/publications/pdfs/sclaterchristie1980.pdf

Production-induced Normal Faulting in the Valhall and Ekofisk Oil Fields

In situ stress and pore pressure data from the Valhall and Ekofisk oil reservoirs indicate that at the onset of production in both fields an incipient state of normal faulting existed in the crest of the anticlinal structures. In contrast, on the flanks of the structures the initial least principal stress values indicate an almost isotropic state of stress. Oil production from both fields caused marked pore pressure reductions as well as poroelastic reductions of the least principal stress in both the crest and flanks of the two structures. We demonstrate that as a result of production-induced pore pressure and stress changes, normal faulting appears to have spread out from the crests of the structures on to the flanks. Further evidence of a normal faulting stress state at Valhall has been found using data from a passive seismic monitoring experiment. Numerous microearthquakes were recorded during a six week monitoring period that are located at the very top of the reservoir or in the shale caprock immediately above it. An inverse/ composite focal plane mechanism of these microearthquakes is consistent with a normal faulting stress regime.

http://www.geomi.com/AboutUs/publications/geo7.pdf

CAMBRIAN-ORDOVICIAN STRATA IN WASHINGTON-IDAHO-MONTANA INDICATE SEDIMENTATION ON AN ACTIVELY EXTENDING PASSIVE MARGIN

Lower Cambrian to Lower Ordovician passive margins sediments were deposited across northeastern Washington, northern Idaho and western Montana. Lower Cambrian strata record the Sauk transgression onto Laurentia and are restricted to northeastern Washington. Middle Cambrian to Lower Ordovician units were deposited across a much broader area and record the establishment of a western algal shoal complex that restricted water circulation in an intra-shelf basin that formed between the shoal and the craton toward the east. Pre-existing basement structures (i.e., Montania and the Lemhi Arch) controlled, in part, the location of the algal-shoal complexes and siliciclastic sediment input from the west. The size and shape of the algal-shoal complex influenced sediment distribution, salinity, dolomitization, current flow, faunal distribution, evaporation, and tidal range.

http://gsa.confex.com/gsa/2009AM/finalprogram/abstract_166005.htm

A new lower Cambrian eodiscoid trilobite fauna from Swedish Lapland and its implications for intercontinental correlation

A lower Cambrian eodiscoid trilobite fauna and an associated holmiid trilobite, Holmia sp., are described from a bioclastic limestone at the top of the Torneträsk Formation in the Luobákti section, south of Lake Torneträsk, northern Sweden. Other associated polymerid trilobites include Orodes? lapponica and Strenuaeva inflata. The precise age of the trilobite fauna cannot be determined, but its generic composition and stratigraphical position at the top of the lower Cambrian suggest that it was recovered from the

Ornamentaspis? linnarssoni Assemblage Zone. Two species of eodiscoids are present: Neocobboldia aff. dentata and Chelediscus acifer. The latter species is known previously from England and southeastern Newfoundland, and provides a novel link between upper lower Cambrian successions in Baltica and Avalonia.
http://journals.cambridge.org/action/displayAbstract;jsessionid=B6C4A89D2E4CE3009158E4D6AA9763DE.tomcat1?fromPage=online&aid=1390652

Nd isotopic variations of Chinese seawater during Neoproterozoic through Cambrian
Samples of sedimentary phosphatic rocks and manganese deposits were collected from the Neoproterozoic Sinian System and the Lower Cambrian Series in the Yangtze region, China. The results from Sm---Nd isotopic determinations show a considerable change in Nd isotopic composition of the Chinese seawater during the Neoproterozoic Period, which was similar to that of the Panthalassa ocean, buth with smaller swing. The Nd(T) values of the Chinese seawater were about −4.5 in the Nantuo ice age (corresponding to the Varanger ice age), falling within the range of the Panthalassa ocean, then gradually decreased and separated from the Panthalassa ocean after the Nantuo ice age, and finally reached the lowest point (about −8.0) at the beginning of the Early Cambrian, obviously distinct from the Panthalassa ocean (−20 to −10). As one might infer, the Chinese seawater was not co-oceanic with the Panthalassa ocean in terms of Keto and Jacobsen (1988) and belonged to another major ocean as a result from reconstruction of the global palaeoceanographic pattern during the Sinian (Vendian) through the Cambrian.
http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V5Y-3SVY5CD-8&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=3868d0a84fa564bea1455a45986767e5

Petroleum potential of the Riphean-Vendian Chunya sedimentary basin in the western Siberian Platform
The petroleum potential of the Riphean-Vendian Chunya sedimentary basin has been explored by seismic reflection profiling and drilling in recent years. The results of the study have been used to estimate the initial hydrocarbon resources in the basin and separately in four oil and gas areas distinguished in Riphean, Lower Vendian, and Vendian-Lower Cambrian reservoirs.
http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B8CXK-4S09P2N-6&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=bbc7f3ce2918908abded994a9025aec0

Stress, Pore Pressure, and Dynamically Constrained Hydrocarbon Columns in the South Eugene Island 330 Field, Northern Gulf of Mexico
Hydrocarbon phase pressures at the peak of two severely overpressured reservoirs in the South Eugene Island 330 field, Gulf of Mexico, converge on the minimum principal stress of the top seal. We interpret that the system is dynamically constrained by the stress field present through either fault slip or hydraulic fracturing. In two fault blocks of a shallower, moderately overpressured reservoir sand, hydrocarbon phase pressures are within a range of critical pore pressure values for slip to occur on the bounding growth faults. We interpret that pore pressures in this system are also dynamically controlled. We introduce a dynamic capacity model to describe a critical reservoir pore pressure value that corresponds to either the sealing capacity of the fault against which the sand abuts or the pressure required to hydraulically fracture the overlying shale or fault. This critical pore pressure is a function of the state of stress in the overlying shale and the pore pressure in the sand. We require that the reservoir pore pressure at the top of the structure be greater than in the overlying shale. The four remaining reservoirs studied in the field exhibit reservoir pressures well below critical values for dynamic failure and are, therefore, considered static. All reservoirs that are dynamically constrained are characterized by short oil columns, whereas the reservoirs having static conditions have very long gas and oil columns.
http://aapgbull.geoscienceworld.org/cgi/content/abstract/85/6/1007

Fluid flow in the South Eugene Island area, offshore Louisiana: results of numerical simulations
Numerical simulations of heat and fluid transport in the South Eugene Island (SEI) area, offshore Louisiana, suggest fluids migrate from deep, abnormally pressured sediments, along fault zones, and into overlying oil and gas reservoirs. In the simulations, fluid flow along the fault produces a narrow thermal anomaly around the fault. A negative thermal anomaly forms adjacent to the thermal maximum when permeable sediments dip away from the fault zone. In the simulations, this negative thermal anomaly dissipates 100–200 years after it forms. The presence of a similar negative thermal anomaly in the SEI area suggests that fluid movement in the area is a recent event. The observation that the thermal maximum in the study area is not centered about the fault zone further suggests that the primary vertical conduit for fluid flow in the SEI area is not a major fault but minor splay faults in the hanging wall.
http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V9Y-44B4SVP-2&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=3261ec072b053cacfd5814a873e178aa

Geophysics: A moving fluid pulse in a fault zone

In the Gulf of Mexico, fault zones are linked with a complex and dynamic system of plumbing in the Earth's subsurface. Here we use time-lapse seismic-reflection imaging to reveal a pulse of fluid ascending rapidly inside one of these fault zones. Such intermittent fault 'burping' is likely to be an important factor in the migration of subsurface hydrocarbons.
http://www.nature.com/nature/journal/v437/n7055/full/437046a.html

ON THE SPONTANEOUS RENEWAL OF OIL AND GAS FIELDS
Oil and gas fields are dynamic systems undergoing constant depletion by diffusion, effusion, and chemical decomposition, and constant renewal by influx of new volumes of hydrocarbons. Many oil and gas fields are recharging and effectively inexhaustible, but at rates of recharging typically much smaller than the rate of oil and gas withdrawal by production.
http://www.gasresources.net/OnSpontaneiousRenewalVasyl.htm

The “Abiotic Oil” Controversy
by Richard Heinberg
In recent months a few of the many web sites that challenge the official account of the events of 9/11/2001 have also attacked the idea of peak oil. I would prefer to ignore this controversy—and there are good reasons for doing so, as some of these web sites lack credibility on other counts; nevertheless, as these sites are magnets for large numbers of people who are just beginning to find their way out of the consensus societal trance, they appear to be doing some palpable harm. I have received at least a couple of dozen e-mails from sincere people wanting to know my response to claims that “peak oil” is a scam, and that oil is actually an inexhaustible resource.
So, once and for all, here is my take on the abiotic oil controversy.
http://www.energybulletin.net/node/2423

Eugene Island Block 330 Field, Offshore Louisiana: ABSTRACT
The Eugene Island Block 330 field is currently the largest oil-producing field on the Federal outer continental shelf of the United States. The field, located about 150 mi (240 km) southwest of New Orleans, Louisiana, was discovered by the Pennzoil 1 OCS G-2115 well in March 1971, following leasing on December 15, 1970. The field includes Blocks 313, 314, 315, 330, 331, 332, 337, and 338. Eugene Island area, South Addition, offshore Louisiana.
http://search.datapages.com/data/doi/10.1306/C1EA5A17-16C9-11D7-8645000102C1865D

Compartmentalization and time-lapse geochemical reservoir surveillance of the Horn Mountain oil field, deep-water Gulf of Mexico
Oil is produced at the Horn Mountain field (Gulf of Mexico, Mississippi Canyon blocks 126 and 127) from middle Miocene reservoirs M and J. Reservoir facies are characterized as sand-filled channels and associated overbank deposits and are positioned in combination structural and stratigraphic traps. Prior to initial production, several barriers and baffles were identified in both reservoirs by integrating geological, geophysical, petrophysical, pressure, PVT (pressure-volume-temperature relationships), and geochemical data and petroleum-filling history. A compartmentalization risk matrix was developed to facilitate and visualize the integrated evaluation of compartmentalization. During production, in addition to traditional surveillance technologies, we applied time-lapse geochemistry (TLG) to visualize petroleum sweep by monitoring changes in fluid composition and fingerprints across reservoirs. In this technology, appraisal and preproduction fluid samples are first analyzed to map fluid types across a static reservoir. Then, a surveillance program in which fluid samples are taken from producing wells at regular time intervals is designed and executed. The obtained production samples are geochemically fingerprinted and compared with preproduction fluids from the same well and surrounding wells. At Horn Mountain, interpretation of geochemical data allowed us to infer oil movement across reservoir M and helped to reevaluate reservoir models and reduce risks in managing reservoir performance. In reservoir J, an untapped compartment was identified, and an additional producer was justified for future drilling. Time-lapse geochemistry results were consistent with and complimentary to other surveillance data available to date. Our study demonstrates that TLG is a safe and cost-effective technology, which reduces uncertainties associated with other reservoir surveillance methods and appears to be valuable for reservoir management.
http://search.datapages.com/data/doi/10.1306/01090706091

Role of the 3D Seismic Technique in Improving Oilfield Economics
As the various disciplines interacting in our industry begin to recognize the need for an integrated approach, the three-dimensional (3D) seismic method has emerged to help reduce the uncertainty inherent in finding and recovering new reserves. The 3D method improves the accuracy of the subsurface information obtained from surface-recorded measurements over conventional seismic techniques by comprehending the spatial or 3D nature of the problem to be solved. The increased detail and accuracy obtained from the technique allow better definition and delineation of the structural (or stratigraphic) trap; hence, reservoir management can proceed with less uncertainty, enhancing the value of in-situ reserves. The most promising role for 3D techniques lies in the area of reservoir description. The 3D seismic method is uniquely capable of providing spatially continuous estimates of rock parameters. When it is providing spatially continuous estimates of rock parameters. When it is integrated with available well and core data, areal distribution of net pay, porosity, or hydrocarbon content across the reservoir can be derived pay, porosity, or hydrocarbon content

across the reservoir can be derived and add significantly to the quality of information provided by the integrated database input to the reservoir simulation process. Fewer dry holes, better well placement, earlier production, and greater total hydrocarbons recovered are the result. Thus the 3D seismic method offers positive leverage on the net present value of the field.
http://www.onepetro.org/mslib/servlet/onepetropreview?id=00013053&soc=SPE

Integrating Geology and Depth Imaging in a Mature Overthrust Area - A Case History
Mature hydrocarbon provinces are increasingly being re-explored to extend the productive lives of existing fields by testing outlier or deeper objectives for additional reserves. In recent years the introduction of affordable 3-D pre-stack depth migration (PSDM) has allowed very complex geology to be properly imaged to more fully assess hydrocarbon potential in many of these mature areas. This paper discusses a 3-D seismic depth reprocessing program undertaken in a complex U.S. Overthrust area to assess the validity of a deep structure (approx. 5500m) identified on 3-D time-processed data in this mature prolific gas producing province. The 1998 vintage seismic 3-D acquisition method did not allow a seismically derived velocity model capable of accurately representing the subsurface to be defined in this older/fast rock regime. A 3-D pre-stack depth migration velocity model-building solution is presented that overcame the limited sensitivity to velocity of these 1998 3-D seismic data. By collaborating with client geologic expertise to integrate key geologic insights into the 3-D velocity model-building process and tightly constraining the seismically derived velocity with available well control, a subsurface velocity depth model was obtained that provided an accurate depth image of the deep target zone in this geologically complex area.
http://www.rengeo.com/publications/k3d/3DGeo_P151.pdf

Three-dimensional structural model of the Painter and East Painter reservoir structures, Wyoming fold and thrust belt
The Painter and East Painter reservoir structures are located in the hanging wall of the Absaroka thrust in the Wyoming fold-thrust belt. Balanced cross sections and interpreted logs and dipmeter data from more than 50 wells have been integrated to develop a three-dimensional (3-D) structural model of the Painter reservoir structures. The structures are interpreted as a pair of asymmetric faulted detachment folds formed along the hanging-wall ramp in Triassic–Jurassic units in the Absaroka thrust sheet. The Painter reservoir structure verges to the southeast and has a gentle backlimb and a steeply dipping to overturned forelimb, whereas the East Painter structure displays steep dips on both limbs. The front limbs of both structures contain forelimb thrust faults with small displacements. A tight syncline separates the structures and contains several out-of-syncline thrusts in the Jurassic Twin Creek limestones. Cross sections through the structures are restored using line-length balancing for the Nugget formation and area balancing of the Ankareh-Thaynes-Woodside formations and the Twin Creek Formation. The structures are interpreted to have initiated as a pair of detachment folds cored by moderately ductile limestones and shales of Triassic age. Increasing shortening resulted in tightening of the structures, the development of out-of-syncline thrusts, and the propagation of thrust faults on the steep forelimbs. The tight geometry of the East Painter structure resulted from frictional resistance to fault slip along the hanging-wall ramp in the Triassic–Jurassic units. The balanced 3-D structural model ensures consistency of the geometry of all interpreted horizons and faults and can be used to construct improved structural maps of reservoir units in the Painter reservoir structures.
http://aapgbull.geoscienceworld.org/cgi/content/abstract/90/8/1171

Fold-Accommodation Faults
Fold-accommodation faults are secondary faults that accommodate strain variations related to structural and stratigraphic position during fold evolution. Four main types of fold-accommodation faults are commonly found. Out-of-syncline and into-anticline thrusts form primarily because of an increase in bed curvature within fold cores, although differential layer-parallel strain at different scales also contributes to fault slip. Depending on the kinematic evolution of the major fold, the thrusts may propagate along the steep or gentle limb of an asymmetric fold or along the hinge of symmetric folds. Wedge thrusts are primarily formed in competent units because of variations in penetrative layer-parallel strain between adjacent units. Limb wedges occur as hanging-wall and/or footwall fault-bend and fault-tip folds, whereas hinge wedges occur as multiple nested faults that tend to thicken the more competent units. Forelimb and backlimb thrusts form by a variety of mechanisms. Forelimb space-accommodation thrusts are low-displacement thrusts that resolve strain discontinuities resulting from increased curvature in fold cores. Forelimb shear thrusts form in the late stages of folding because of rotation and layer-parallel extension on the steep forelimbs of folds. Most backlimb thrusts originate as out-of-syncline thrusts. They may eventually link with forelimb thrusts to form forelimb-backlimb thrusts. Back thrusts accommodate hanging-wall strain during the formation of fault-related folds. They either form selectively in competent units or propagate through the section at the same rate as the main thrust. Although fold-accommodation faults are secondary features, they are important elements that define the geometry and size of structural traps in fold-thrust structures. Accurate mapping of these structures is therefore critical in interpreting the structural geometry of fold and thrust belts.
http://aapgbull.geoscienceworld.org/cgi/content/abstract/86/4/671

EVALUATION OF THE CONTROLS ON FRACTURING IN RESERVOIR ROCKS
The style, geometry and distribution of fractures within reservoir rocks can be controlled by numerous factors, including: rock characteristics and diagenesis (lithology, sedimentary structures, bed thickness, mechanical stratigraphy, the mechanics of bedding planes); structural geology (tectonic setting, palaeostresses, subsidence and uplift history, proximity to faults, position in a fold,

timing of structural events, mineralisation, the angle between bedding and fractures); and present-day factors, such as orientations of in situ stresses, fluid pressure, perturbation of in situ stresses and depth. The relative timing of events plays a crucial role in determining the geometry and distribution of fractures. For example, open fractures are commonly clustered around faults if the open fractures and faults formed at the same time, but clustering does not tend to occur if the open fractures pre-date or post-date the faults. Understanding these factors requires traditional geological skills, including the analysis of one-dimensional (line-sampling) data from core, borehole images and exposed analogues.
This paper reviews the factors that control fractures within reservoir rocks and discusses methods to assess those controls. Examples are presented from Mesozoic limestones in southern England. It is shown that traditional geological skills are of vital importance in determining the rock characteristics, structural and present-day factors that control fractures.
http://www3.interscience.wiley.com/journal/118694002/abstract

Fold–thrust styles in the Absaroka thrust sheet, Caribou National Forest area, Idaho–Wyoming thrust belt
The Bear Creek, Big Elk and Black Mountain anticlines are macroscopic structures located in the hanging wall of the Absaroka thrust within the Idaho–Wyoming fold–thrust belt. Structural mapping of the area was conducted by draping existing geologic maps and digital orthophotos over digital elevation models (DEM) to obtain a three-dimensional perspective of the area. The map was further refined by reconnaissance field mapping of selected outcrops. Construction of balanced cross-sections suggests that these structures detach at three stratigraphic levels, within the Cambrian Gros Ventre Formation, Devonian Darby Formation, and Triassic Dinwoody Formation. The folds in the upper stratigraphic package consist of symmetric to asymmetric detachment folds, which show variable vergence along trend. The structures in the lower stratigraphic packages primarily evolved as low-amplitude detachment folds, which were subsequently displaced over fault ramps to form fault–bend folds or duplexes. The duplex geometries in the Cambro–Ordovician units under the Bear Creek and Poker Peak anticlines vary from independent anticlines in the south to completely overlapping stacks in the north. The macroscopic structural patterns of folds proposed in this study will be useful in interpreting subsurface structures in other parts of the Idaho–Wyoming fold–thrust belt.
http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V9D-4DN12KK-2&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=82dd3364162b5b1b9487cf94433695afb

Heat flow in the Utah-Wyoming thrust belt from analysis of bottom-hole temperature data measured in oil and gas wells
Bottom-hole temperature (BHT) data from oil and gas wells represent a large, albeit low-quality, data base for heat flow determinations. A method for analyzing BHT data sets that directly addresses the problem of noise in the data is presented and illustrated by application to 303 BHTs from the Anschutz Ranch (AR), Cave Creek (CC), and Anschtz Ranch East (ARE) oil/gas fields in the Utah-Wyoming thrust belt, located in the Middle Rocky Mountain physiographic province of the western United States. Correction of raw BHT data by means of a Horner plot yields 81 corrected BHTs. An additional 90 BHTs, not suitable for a Horner correction, are corrected by means of a new BHT correction which may be applied to any single BHT for which a depth and time of measurement are known. The average geothermal gradient at both AR-CC and ARE is found to be 23 °C/km, although an average-gradient analysis fails to explain scatter in the data. Analysis of corrected BHTs, through inversion of a layered-earth model, yields estimates of formation thermal gradients and temperature fields at AR-CC and ARE that are stable and unique, with an average precision of 2° to 3 °C. Thermal conductivity measurements were made on 360 drill cutting samples representing 14 thrust belt formations; in situ conductivity is estimated using porosity from calibrated well logs. Heat flow is estimated by comparing temperature calculated by a two-dimensional finite element model with temperature estimated from analysis of BHT data. Analysis of BHT data from the AR-CC area yields an estimated regional heat flow of 60 mW/m2 (±8 mW/m2); a similar analysis at ARE results in an estimate of 58 mW/m2 (±8mW/m2). These estimates are close to values determined for the Wyoming Basin and the central Colorado Plateau and imply that a thermal transition from the Middle Rocky Mountains to elevated heat flow characteristic of the Basin and Range province (80 to 90 mW/m2) must take place within 50 km.
http://www.agu.org/pubs/crossref/1988/88JB03287.shtml

Generation and maintenance of abnormal fluid pressures beneath a ramping thrust sheet: Isotropic permeability experiments
We have investigated the mechanisms responsible for the evolution of excess pore pressures within and beneath a ramping thrust sheet (i.e. fluid flow, porosity compression, and thermal expansion of water) and the sensitivity of pore pressure to a variety of physical parameters (e.g. permeability, thrust sheet velocity, heat flux). Coupled pore pressure and temperature equations were solved numerically in two dimensions using a generalized hydrostratigraphy of North American thrust belts. Because of the lack of either symmetry or a steady-state in this problem, both deposition and thrust loading stages were simulated. The dominant mechanisms controlling pore pressure evolution were fluid flow and compression of pore space by vertical loading; thermal expansion of the fluids was found to be insignificant in generating excess pore pressures at common thrust loading rates. The results indicate that it is possible to generate high pore pressure to lithostatic pressure ratios (λ) within thrust sheets by depositional loading prior to thrusting. High values of λ are generated and maintained during thrust loading for reasonable assumptions about the conditions thought to have existed in thrust belts. Values of λ were not constant throughout the model. The highest λ values tended to concentrate near the surface of the model and within and below the toe of the thrust sheet. The magnitude and

distribution of excess pore pressures and λ values were found to be especially sensitive to variations in permeability. Excess pore pressure generation by compression exceeded pore pressure dissipation by fluid flow for permeabilities less than approximately 10−16 m2; permeabilities greater than approximately 10−16m2 produced hydrostatic pore pressure gradients. The models demonstrate that permeability inhomogeneity due to lithologic variations may exert a strong control on the magnitude and spatial distribution of excess pore pressures within thrust sheets. In addition, these models indicate that it is unlikely that fluid pressure is high everywhere in a moving thrust sheet.
http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V9D-3XK17NT-8&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=5ac614ac1e3eaf0adf61e09f3b7c0f75

MAJOR OIL PLAYS IN UTAH AND VICINITY
Utah oil fields have produced over 1.2 billion barrels (191 million m3). However, the 13.7 million barrels (2.2 million m3) of production in 2002 was the lowest level in over 40 years and continued the steady decline that began in the mid-1980s. The Utah Geological Survey believes this trend can be reversed by providing play portfolios for the major oil producing provinces (Paradox Basin, Uinta Basin, and thrust belt) in Utah and adjacent areas in Colorado and Wyoming. Oil plays are geographic areas with petroleum potential caused by favorable combinations of source rock, migration paths, reservoir rock characteristics, and other factors. The play portfolios will include: descriptions and maps of the major oil plays by reservoir; production and reservoir data; case-study field evaluations; summaries of the state-of-the-art drilling, completion, and secondary/tertiary techniques for each play; locations of major oil pipelines; descriptions of reservoir outcrop analogs; and identification and discussion of land use constraints. All play maps, reports, databases, and so forth, produced for the project will be published in interactive, menu-driven digital (web-based and compact disc) and hard-copy formats.
http://www.osti.gov/bridge/servlets/purl/833616-dZtXyW/native/833616.pdf

Regional Geology and Fossil Sites from Pocatello to Montpelier, Freedom, and Wayan, Southeastern Idaho and Western Wyoming
The goals of this guide are to: 1) Describe the geology along the U.S. Highway 30 from Pocatello to Montpelier, then east to Star Valley and north to Freedom, Wyoming, and west up the Tincup Highway to Wayan and Soda Springs (Fig. 1). A side trip covers the area near Bancroft and Chesterfield including the route of the Oregon Trail.
2) Describe several fossil sites appropriate for student field trips. These include Upper Mississippian rocks in Little Flat Canyon east of Chesterfield (Stop 1), the Ordovician Swan Peak Quartzite in St. Charles Canyon southwest of Montpelier (Stop 2), Jurassic Twin Creek Formation on Geneva Summit on Highway 89 (Stop 3), and several Upper Mississippian sites near Wayan (Stops 5 and 6). Field trip stop 4 is in folds along the Tincup Highway.
A general route map is shown in Figure 1; a stratigraphic column for the southeastern Idaho thrust belt is Figure 2. Geologic cross sections, keyed to Figure 1, and demonstrating thrust belt structure, are included as Figures 12, 13, and 17.
http://imnh.isu.edu/DIGITALATLAS/GEO/gsa/papers/gsac5p17.pdf

Predictions of Oil or Gas Potential by Near-Surface Geochemistry
Recent advances in surface geochemical prospecting have enabled age-old seep-detection technology to be used to determine the gas versus oil character of a potential fairway. Extensive field work has demonstrated that the chemical compositions of near-surface hydrocarbon soil gases, measured by flame ionization gas chromatography, are largely determined by the hydrocarbons in nearby underlying reservoirs. By using compositions and ratios of the light hydrocarbons, methane, ethane, propane, and butane, one may predict whether oil or gas is more likely to be discovered in the prospect area. Near-surface hydrocarbons are best represented by normalized histograms of composition data. These histograms are strongly correlative with those of reservoir gas and with compositions o gas from shows recorded in downhole mud logging. This correspondence with the actual formation gases suggests that the upward migration of reservoired light hydrocarbons into near-surface soils represents a viable mechanism, allowing surface geochemical exploration to be utilized for regional hydrocarbon evaluations. Geochemical profiles over known production areas are shown for the Sacramento and San Joaquin basins in California and for the Utah-Wyoming Overthrust belt. Geochemical predictions were documented by subsequent drilling near the Pineview field in Utah. The data imply that the Pineview field should extend westward into an area containing a dry hole. In addition, a new gas discovery--on the intersection of a Landsat lineament and a large methane anomaly--was made 6.5 km (4 mi) northeast of the Pineview field by Amoco in 1981. Most of the geochemical examples reported show direct anomalies over known fields. However, seeps can be laterally displaced in certain geologic settings. In addition, geochemical investigations indicate that seep magnitudes depend on tectonic activity to aid gas migration along faults and fractures, which appear to provide the major migration pathways. This fault association suggests that diffusion is of secondary importance. Geochemical prospecting must be used with caution, and only in conjunction with geologic and geophysical tools, because the location and shape of many geochemical anomalies are governed more by the local tectonic structure of the region than by the position and shape of the actual deposit. Regional groundwater flow is less significant. Thus, geochemical prospecting, when used alone, cannot predict whether a particular soil-gas anomaly is associated with a commercial deposit. It can only be used to verify the presence of petroleum hydrocarbons and to predict whether gas or oil is likely to occur in a potential structure. Geochemical prospecting yields excellent regional evaluations of hydrocarbon potential.

http://payperview.datapages.com/data/open/offer.do?target=/bulletns/1982-83/data/pg/0067/0006/0900/0932.htm

Regional structure and kinematic history of the Sevier fold-and-thrust belt, central Utah
The Canyon Range, Pavant, Paxton, and Gunnison thrust systems in central Utah form the Sevier fold-and-thrust belt in its type area. The Canyon Range thrust carries an ~12-km-thick succession of Neoproterozoic through Triassic sedimentary rocks and is breached at the surface by the Neogene extensional Sevier Desert detachment fault. The Pavant, Paxton, and Gunnison thrusts carry Lower Cambrian through Cretaceous strata and have major footwall detachments in weak Jurassic rocks. The Canyon Range thrust was active during latest Jurassic–Early Cretaceous time. The Pavant thrust sheet was emplaced in Albian time, formed an internal duplex beneath the Canyon Range during the Cenomanian, and then developed a frontal duplex during the Turonian. The Paxton thrust sheet was initially emplaced during the Santonian, and subsequently formed the Paxton duplex during the early to mid-Campanian. Some slip on the Paxton system was fed into a frontal triangle zone along the Sanpete Valley antiform. The Gunnison thrust system became active in late Campanian time and continued to feed slip into the frontal triangle zone through the early Paleocene. The Canyon Range and main Pavant thrust sheets experienced long-distance eastward transport (totaling >140 km) mainly because they are composed of relatively strong rocks, whereas the eastern thrust sheets accommodated less shortening and formed multiple antiformal duplexes in order to maintain suffi cient taper for continued forward propagation of the fold-and-thrust belt. Total shortening was at least 220 km. Upper crustal thickening of ~16 km produced crust that was >50 km thick and a likely surface elevation >3 km in western Utah. Shortening across the entire Cordilleran retroarc thrust belt at the latitude of central Utah may have exceeded 335 km. The Late Cretaceous paleogeography of the fold-and-thrust belt and foreland basin was similar to the modern central Andean fold-and-thrust belt, with a high-elevation, low-relief hinterland plateau and a rugged topographic front. The frontal part of the Sevier belt was buried by several kilometers of nonmarine and shallowmarine sediments in the wedge-top depozone of the foreland basin system. The Canyon Range thrust sheet dominated sediment supply throughout the history of shortening in the Sevier belt. Westward underthrusting of a several hundred-kilometer-long panel of North American lower crust beneath the Cordilleran magmatic arc is required to balance upper-crustal shortening in the thrust belt, and may be petrogenetically linked to a Late Cretaceous fl are-up of the magmatic arc as preserved in the Sierra Nevada Batholith.
http://www.geo.arizona.edu/web/DeCelles/pdf/DeCelles&Coogan_06.pdf

Geology - Geochemistry - Geophysics (has great pics)
The Geology-Geochemistry-Geophysics Division groups together the expertise principally relating to the knowledge and quantification of the various geological processes controlling sedimentary basins on various scales of time and space. Its remit is to provide expertise and equipment with a view to developing research projects proposed by IFP's business units, particularly in the field of exploration-production.
http://www.ifp.com/competences/les-directions-de-recherche/direction-geologie-geochimie-geophysique

Carbonate cementation patterns and diagenetic reservoir facies in the Campos Basin cretaceous turbidites, offshore eastern Brazil
Massive turbidite arkoses contain more than 80% of the oil reserves of the Campos Basin, the main petroleum province of Brazil. The porosity and permeability distribution in the Namorado (Albian-Cenomanian) and Carapebus (Turonian-Santonian) sandstones in controlled by carbonate cementation at shallow depths below the seafloor and by compaction and silicification of mud intraclasts. The carbonate cementation followed two patterns: (1) in the Albian sandstones, concretionary sulphate reduction and fermentation calcite cementation occurred around bioclastic levels with marine microcrystalline cement; (2) in the Upper Cretaceous sandstones, coarse sulphate reduction and fermentation carbonates precipitated along the intercalated shales. The sources of the carbonate cements included sea water, bioclasts, bacterial alteration of organic matter and Albian carbonate rocks. Four diagenetic reservoir facies were characterized: (1) massively cemented facies along bioclastic layers with marine cements and intercalated shales; (2) partially cemented facies bordering massively cemented facies with cements derived from the burial dissolution of early carbonates; (3) porous facies with dominantly primary porosity preserved due to the late subsidence and early oil saturation of the reservoirs; and (4) intraclastic facies in channel/levee deposits with mud intraclasts compacted to pseudo-matrix and silicified.
http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V9Y-40T9MGB-J&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=153a8d2ea9a8596c1c730d7554c49c12

Reservoir Geophysics: Seismic Pattern Recognition Applied to Ultra-Deepwater Oilfield in Campos Basin, Offshore Brazil
Usually, seismic data is used in a qualitative approach to detect changes in the waveform and to pick acoustic continuity of a peak and/or a through as a structural mapping tool. The seismic interpretation is a qualitative process for building a geological model. Today, many works try to use the seismic information in a quantitative approach. Seismic interpretation in a quantitative approach is a key process in the integration of geoscience data at scales from basin-wide studies, reservoir focused and field-development process. Quantitative modeling could be deterministic and/or probabilistic. We use, in many steps of a seismic processing sequence, examples of quantitative deterministic modeling like seismic migration, some seismic inversion methodology, etc. Probabilistic modeling can be gathered in two groups: multivariate statistics and geostatistics approaches. Close to probabilistic modeling, we

have also the neural network method. In this paper, we focus on the application of neural network modeling for seismic pattern recognition (seismic facies analysis) applied an ultra-deepwater turbidite oilfield reservoir in Campos Basin, offshore Brazil.
http://www.onepetro.org/mslib/servlet/onepetropreview?id=00069483&soc=SPE

Aromatic sulfur compounds as maturity indicators for petroleums from the Buzuluk depression, Russia
This study demonstrated that phase state and compositional variations of hydrocarbons in the Buzuluk depression, Russia, are related to maturity levels of Devonian source rocks. Maturity levels of organic matter of source rocks estimated by Rock-Eval Tmax and vitrinite reflectance (Ro%) are in the range from 'oil window' to 'overmature' and increase from east to west in the depression. The volume of the gas-condensate deposits increases in the same direction. Geochemical analyses using GC with dual FID/FPD and GC-MS show the variation in distributions of aromatic sulfur compounds in oils and condensates with different maturity levels. Very mature petroleums are characterized by very low concentrations of benzothiophenes (BTs) and abundant methyldibenzothiphenes (MDBTs). Maturity parameters such as the 4-MDBT/1-MDBT and newly proposed dimethyldibenzothiophenes (DMDBT) ratios of sulfur aromatics correlate well with other maturity indicators based on hydrocarbon distributions in gasoline-range and saturate fractions of petroleum. Sulfur aromatic parameters work well over a wide range of catagenesis, showing no reversal at the advanced levels of thermal evolution and can efficiently discriminate very mature petroleums.
http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V7P-3YCMMFY-1D&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=d20d39bfeea6716f01005f7093d5ea30

Reservoir Simulation Facilitates Synergism in Management of the Attaka Field
The Attaka field, located northeast of the Mahakam delta, offshore East Kalimantan, Indonesia, consists of complex arrangements of distributary/tidal channels and tidal/barrier bars. Over the last 18 years, the field has produced about 460 million STB of oil and 700 billion SCF of gas. Despite the mature status of the field, lateral correlation of the various sand bodies is uncertain. This paper describes how reservoir simulation is helping to characterize the field architecture. Matching the production history with simple reservoir models is providing a means for combining geological and engineering data and is serving as a catalyst for synergism.
http://www.onepetro.org/mslib/servlet/onepetropreview?id=00022352&soc=SPE

Burning Reserves For Greater Recovery? Air Injection Potential In Australian Light Oil Reservoirs
Air injection is an Enhanced Oil Recovery (EOR) technique with limited exposure in the Asia-Pacific region and no previous application in Australia. Analogy with successful air injection projects in the USA, suggests that it could be a suitable EOR process for onshore light oil fields in Australia; no evaluation has been conducted to date.
Using open file data, high level screening criteria are used in this study to identify prospective petroleum basins, and an individual candidate reservoir is examined through a simulation study. Key issues in the application of the technique are discussed, as are directions for implementation in Australia.
http://www.onepetro.org/mslib/servlet/onepetropreview?id=SPE-101099-MS&soc=SPE

A Geomechanical Modeling Approach In Deep Horizontal Well Development Designs
Knowledge of a well-constrained geomechanical model provides valuable information for designing development wells more efficiently for drilling and completion in a mature gas field. This paper presents results of a recent geomechanical analysis designed to evaluate reservoir and overburden rock behavior in order to drill horizontal wells in Badak field, VICO Indonesia's largest gas fields.
During development of the geomechanical model, an enormous effort focused on maximizing the use of available information from all the Badak wells in the field. Data included open hole logs, core data, pore pressure data, minifrac data, high-resolution image logs, previous drilling experiences and regional studies. The synthesis of this data resulted in a well-constrained geomechanical model that could explain the previously unsuccessful and problematic horizontal and vertical wells; but more importantly, it provided the needed information to predict well performances for future designs that minimize the risks associated with future horizontal wells. VICO has implemented this geomechanical approach to designing and drilling wells as part of VICO's low permeability development program. A deep horizontal well has successfully drilled to the main target using geomechanical modeling information.
http://www.onepetro.org/mslib/servlet/onepetropreview?id=00084901&soc=SPE

OIL RESERVOIR CHARACTERIZATION AND CO2 INJECTION MONITORING IN THE PERMIAN BASIN WITH CROSSWELL ELECTROMAGNETIC IMAGING
Substantial petroleum reserves exist in US oil fields that cannot be produced economically, at current prices, unless improvements in technology are forthcoming. Recovery of these reserves is vital to US economic and security interests as it lessens our dependence on foreign sources and keeps our domestic petroleum industry vital.
http://www.osti.gov/bridge/servlets/purl/836720-2VTBBt/native/836720.pdf

The tectonic evolution of western India and its impact on hydrocarbon occurrences: an overview

The largest hydrocarbon accumulations of India were localized in western India by a unique convergence of tectonic events. Mesozoic rifting along the structural trends of Proterozoic mobile belts formed the passive margin basins of the Indian coast. During the Campanian rifting of Madagascar from India, north-south-striking normal faults propagated into the area of the Cambay Graben. Late Maastrichtian doming over the incipient Deccan/Réunion hotspot imparted extensional stresses to the northwestern Indian coast and formed the fault block that became the Bombay High. After eruption of the Deccan flood basalts in Early Paleocene, extension continued in the weakened crust. This resulted in enhanced subsidence of the Cambay Graben and Surat (Danahu) Depression, rifting of the Seychelles microcontinent from India, and reactivation of normal faults on the emergent Bombay High. The Cambay Graben and the Surat (Danahu) Depression filled with organic-rich source shales as they underwent thermal subsidence. Shallow-water Eocene to Miocene carbonates developed on the slowly subsiding Bombay Platform, and sea-level oscillations fostered secondary porosity development. Late Tertiary maturation of the Surat (Danahu) Depression shales generated hydrocarbons that migrated into the carbonate reservoirs on the Bombay High. Konkan-Kerala, and the older basins of the east coast of India, were unaffected by the post-Campanian tectonic events, and lack the favorable play elements that characterize the giant fields.

http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V6X-4037VRT-D&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=0f4001502e817a9ff3e5abd94d7960a0

High resolution satellite geoids/gravity over the western Indian offshore for tectonics and hydrocarbon exploration

Satellite altimetry has recently emerged as an efficient alternative for expensive ship-borne gravity survey1,2 and powerful reconnaissance tool for exploration of offshore region. With the advent of more and more altimetric mission it is possible to develop a high-resolution gravity database of spatial resolution ~3.33 km. The averaged sea surface height over the Indian offshore (−10 to –108m) as obtained from satellite altimeter is a good approximation to the classical geoid. The undulations of the geoidal surface can be directly interpreted in terms of subsurface geological features such as sedimentary basins, basement highs and lows etc.2. The geoidal anomalies can be converted to free-air gravity anomalies which are useful in the deep sea where ship-borne geophysical data is unavailable or scanty. Rapp3 had developed a method for prediction of the gravity anomaly using spherical harmonic coefficients up to degree and order 30 and above. Sandwell and Smith4 have generated marine gravity field from Geosat and ERS-1 satellite altimetry. Majumdar et al.2 have developed a brief methodology for delineation of offshore structural features using altimeter data.

http://nopr.niscair.res.in/bitstream/123456789/4252/4/IJMS%2038(1)%20116-125.pdf

2. Comparative Geological and Geophysical Study of the Po Basin (Italy)

Section I/F, Paper 2 COMPARATIVE GEOLOGICAL AND GEOPHYSICAL SITCTDY OF THE PO BASIN BY T. ROCCO (*) SYNOPSIS. After a reference to the developnzent of thé oil explorataon which has been carried out during the Iast few years, gnaeral and critical information is given on the gravitational and seismic surveys made by AGIP Mineraria in thp Po Valley. The results obtained with these two geophysical methods and with extpnded stratigraphic studies on a large number of wildcats aw then compared in the light of the knowlfdge of the principnl strurtural features of the Po Basin. ReSUMlk Après avoir esquissé le développement, pendant ces dernières années, de l'exploration pour la recherche des hydrocarbures, on donne des informations générales et critiques sur les levées gravimétriques et sismiques que l'AGIP Mineraria a exécuté dans la Vallée du Pô. Les résultats qu'on a atteint par ces deux naéthodes gbophysiques et avec des études stratigraphiques étendues sur de nombreux forages esploratifs, sont ensuite CornparPS A In lumiere des connaissances des principales lignes d~ la structure du bassin du Pô. RIASSUNTO. Dopo aver accennato allo sviluppo della esplorazione per In ricerca degli idro- carburi, avutosi negli ultimi anni, vengono date informazioni generali e critiche sui rilievi gra- vimetrici e sismici che l'AGIP Mineraria ha eseguito nella Valle del Po. I risultati ottenuti con questi due metodi geofisici e con estesi studi stratigrafici su un notevole numero di pozzi esplo- rativi, vengono poi confrontati alla luce della conoscenza dpi principali lineamenti strutturnli del bacino del Po. Introduction The notes that follow deal with the Po Basin, considered as a geographical unit, i. e. limited to the plain bordered on the North and on the West by the Alps, on the South by the Apen- nines and ori the East by the Adriatic. The Ve- netian plain is not included, partly because it can be considered as a separate geological unit, and chiefly because our knowledge of this region is less advanced. A general picture of the Po Basin, as far as the southern part of its central portion is concerned, has already been given by Jaboli at the 3rd World Petroleum Congress (9 cum Bibl.). We also recall the information given by Facca (7) and Solaini (25) at the same Congress. More recently, Reeves (21 cum Bibl.) traced a com- prehensive sketch of Italg as a petroleum region, (*) AGIP Mineraria. Milano, I. -. ____ - but as far as the Po Basin is concerned, little was added which had not already been considered by Jaboli. The Po River Valley is a low plain, almost entirely covered by recent alluvial depos- its and therefore no surface geology is possible in this area. An increase in our knowledge therefore can only be gained by geophysical surveys, by the drilling of wells, the consequent stratigraphic studies and the geological inter- pretation of the results. AGIP Mineraria has carried out a considerable number of geophysica

http://www.onepetro.org/mslib/servlet/onepetropreview?id=WPC-6039&soc=WPC

Isotopically light methane in natural gas: bacterial imprint or diffusive fractionation?

The evaluation of the economic importance of bacterial methane is still a matter of discussion, linked to the evolution of the geochemical understanding. Methane occurrence or accumulations with light isotopic ratios, both for carbon and hydrogen, were thought in earlier days to be primarily due to migration. Then, from several works presented in the eighties, it was claimed that (a) bacterial methane had the same light isotopic signatures as those found in some gas accumulations, mainly at shallow depths, where bacterial activity is possible, and that (b) migration could not induce measurable isotopic fractionation. This gave a non ambiguous origin (bacterial occurrence) for any gas having 12C-enriched methane. Looking back at the experimental and physical evidence of this last assessment, and taking into account the consequences of some new series of gas migration experiments, we now consider that both explanations for isotopically light methane (bacterial generation or migration fractionation) are realistic. Using a simple diagram (ethane over methane versus the carbon isotopic ratio of methane), and modelling the two discussed processes (mixing of bacterial and thermal gas, or diffusion of thermal gases), it is possible in several cases to decipher the origin of the gas series. It would appear for example that Italian gases correspond grossly to a simple mixture between bacterial and thermogenic gases, whereas other gases of various origins (head space gases, gases from German coals, shallow gas pockets in recent sediments, Mexican deep overmature gases) show a trend that we interpret as a result of diffusive fractionation.
http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V5Y-3T7CHWC-3&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=9e70584be9b598b9ccdfe278b42f1df1

Paleocene coralgal reefs of the western Pyrenean basin, northern Spain: New evidence supporting an earliest Paleogene recovery of reefal ecosystems
The rate of recovery of photic reefal ecosystems after the Cretaceous–Tertiary crisis is controversial. Most reports from earlier authors concluded that Paleogene reef systems did not completely recover from that crisis at least until Oligocene–Miocene times. Several other authors, however, have pointed out that such conclusion was biased by poor preservation and/or inaccessibility of many early Paleogene successions and that the recovery of reefs might have been a faster process. The latter possibility is here strongly supported with data from the Pyrenean basin, where Paleocene shallow-water carbonate deposits are thickly developed and outcrop widely. Five growth phases of reef development have been recognized and age dated with calcareous nannofossils, which together define a complete sequence of expansion-reduction of reef ecosystems during the Paleocene epoch. Reef growth phase 1 (early Danian, lower–middle NP3 calcareous nannofossil Zone), the initial step of that sequence, demonstrates that coral-dominated reef systems came back into existence less than 2 Ma after the K/T boundary, a comparatively short time considering the magnitude of the end-Cretaceous biological crisis. The climax of the sequence is recorded by growth phase 3 (late Danian, NP4 Zone), when a thick barrier-reef complex was developed, which was at least 200 km in length (but probably much larger) and made up by a well diversified coralgal assemblage. Reef growth phases 4 and 5 (early and middle Thanetian, NP6 to NP8 Zones) were characterized by low-relief reef banks dominated by encrusting calcareous algae and had less well-diversified coral assemblages, features that point to a deterioration of environmental conditions, tentatively interpreted in terms of a climatic cooling. Reef bioconstruction almost disappeared in the Pyrenean basin during late Thanetian times, although in all likelihood this is a regional effect of no evolutionary relevance. The new data suggest that the Cenozoic recovery of reefs was rapid but punctuated, with a phase of important reef expansion already in the late Danian.
http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V6R-4GG2M1F-1&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=f6c6e1b2ba716cad971cf05ed9965ef5