

# Sedimentary Basins of Alaska and The Nenana Basin

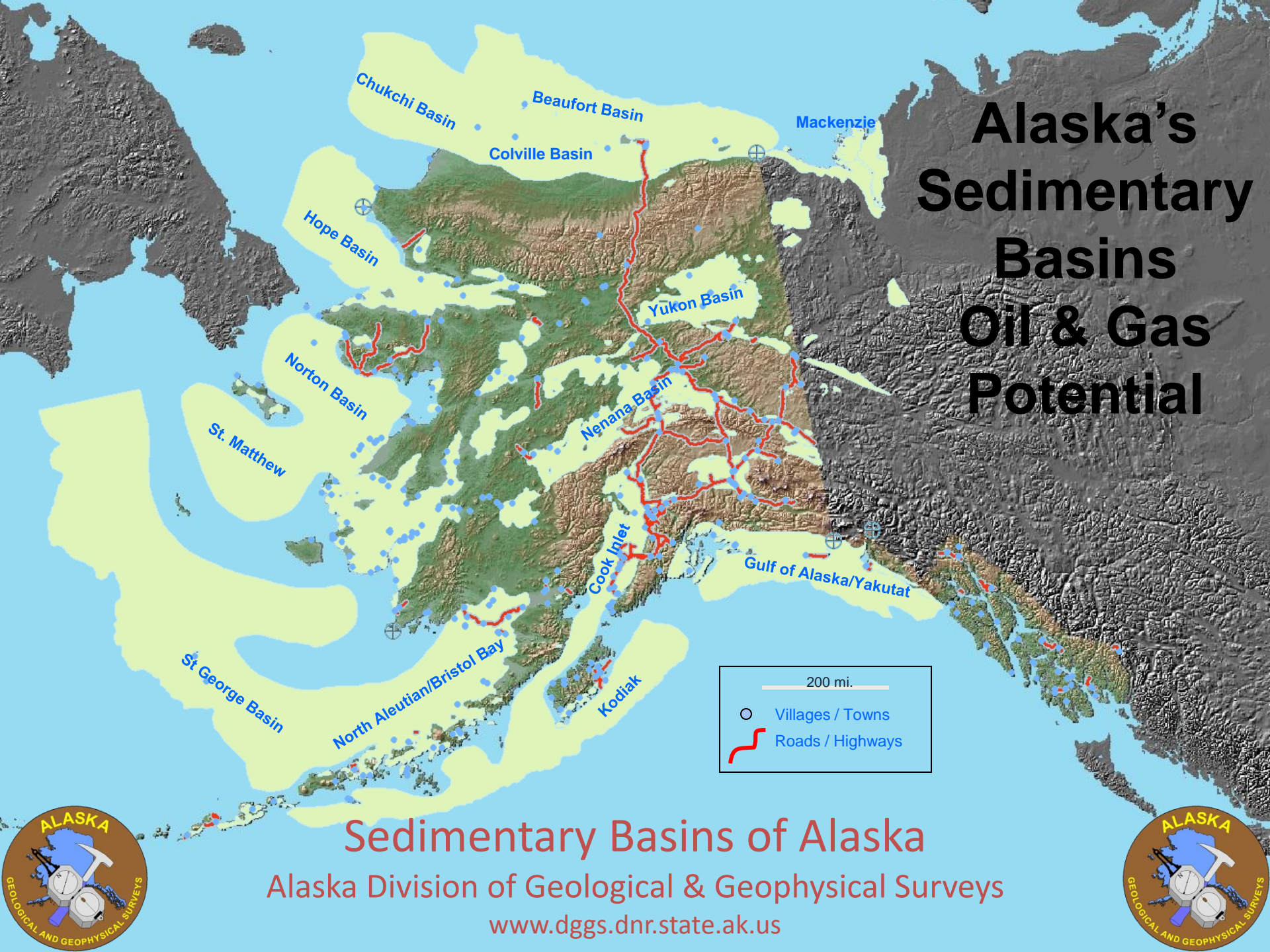


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**State Geologist**  
**Alaska Division of Geological & Geophysical**  
**Surveys**





# Alaska's Sedimentary Basins Oil & Gas Potential



## Sedimentary Basins of Alaska

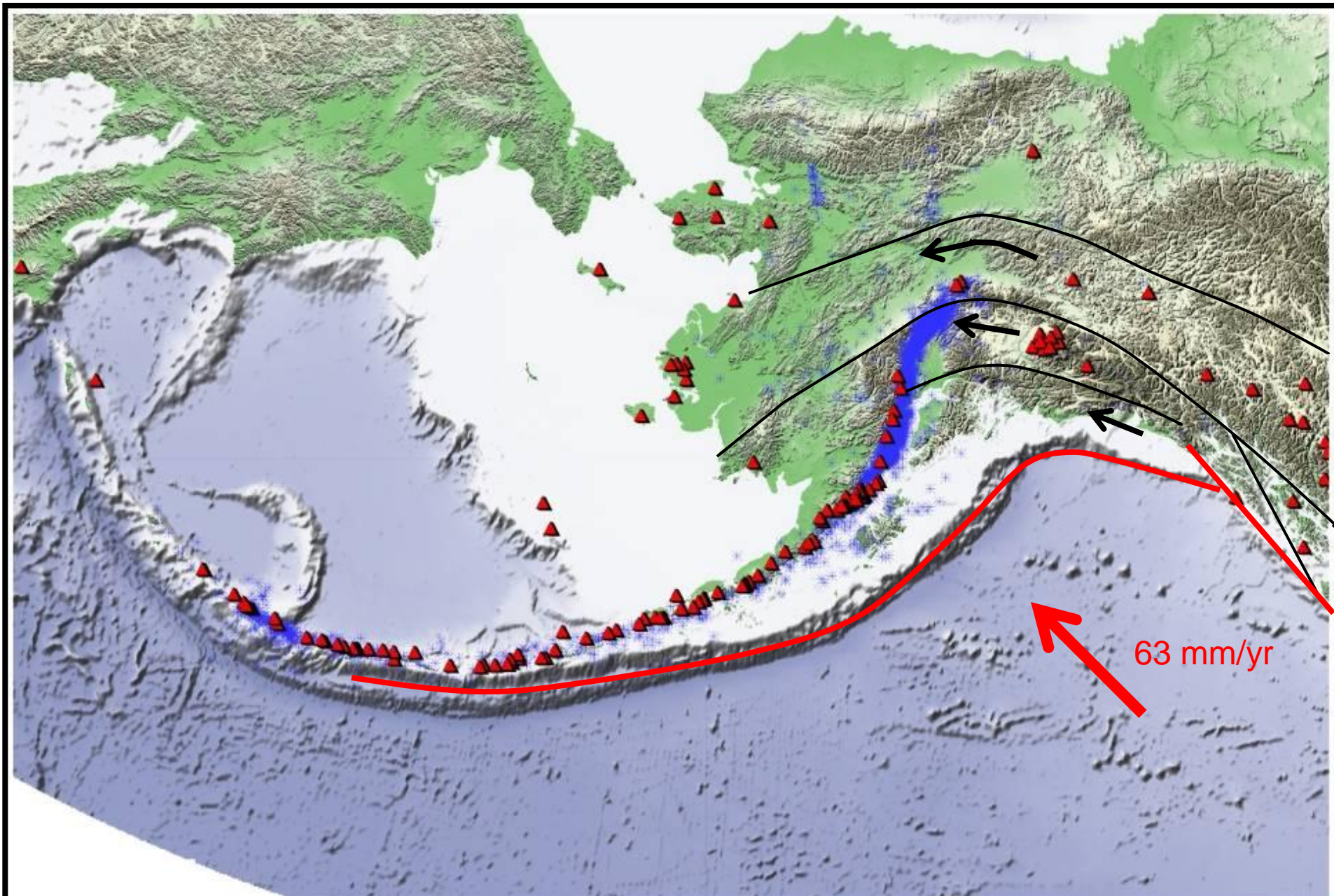
Alaska Division of Geological & Geophysical Surveys

[www.dggs.dnr.state.ak.us](http://www.dggs.dnr.state.ak.us)



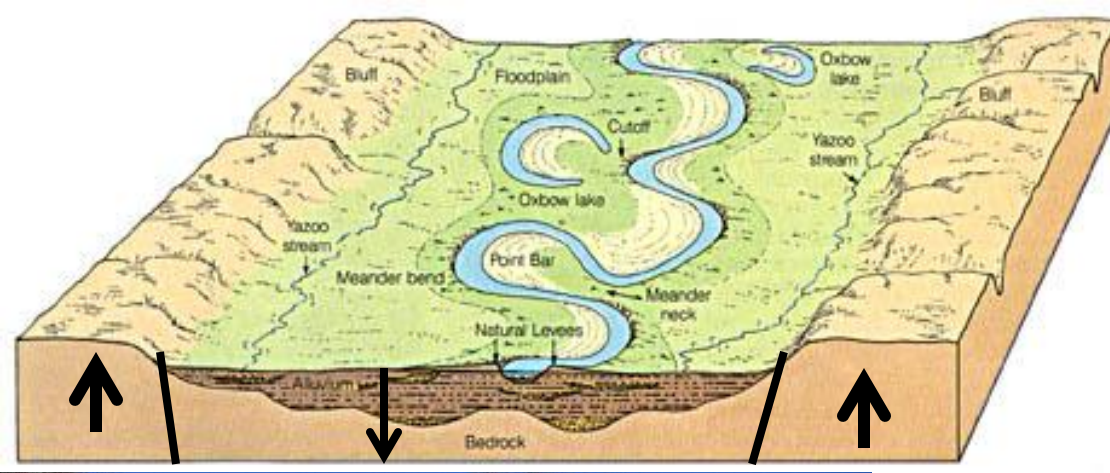


# Alaska is Complex, Both Topographically & Geologically



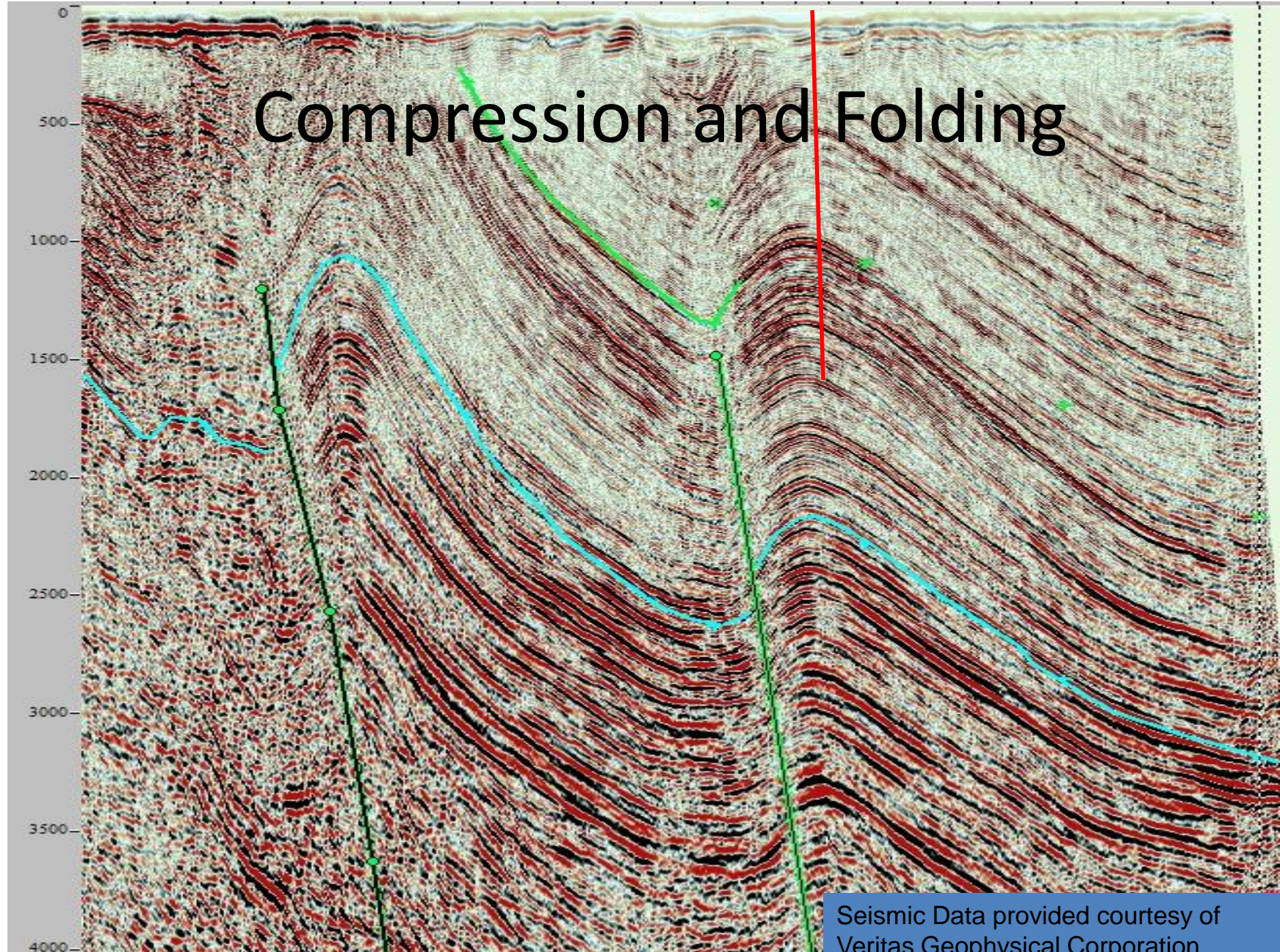


# Tertiary Basin Depositional Systems





# Compression and Folding



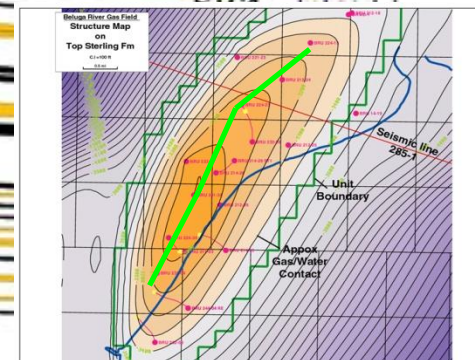
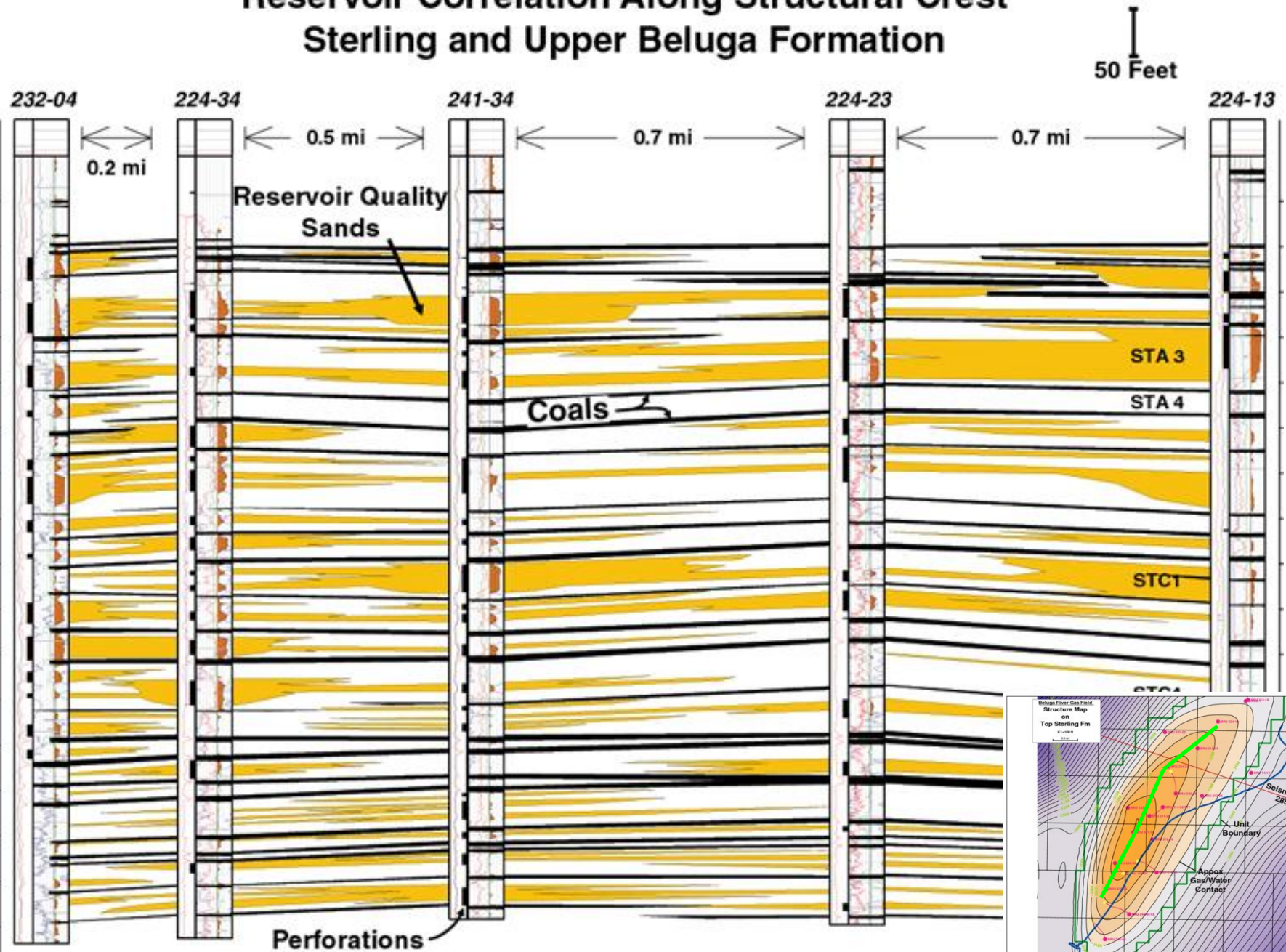
Seismic Data provided courtesy of  
Veritas Geophysical Corporation



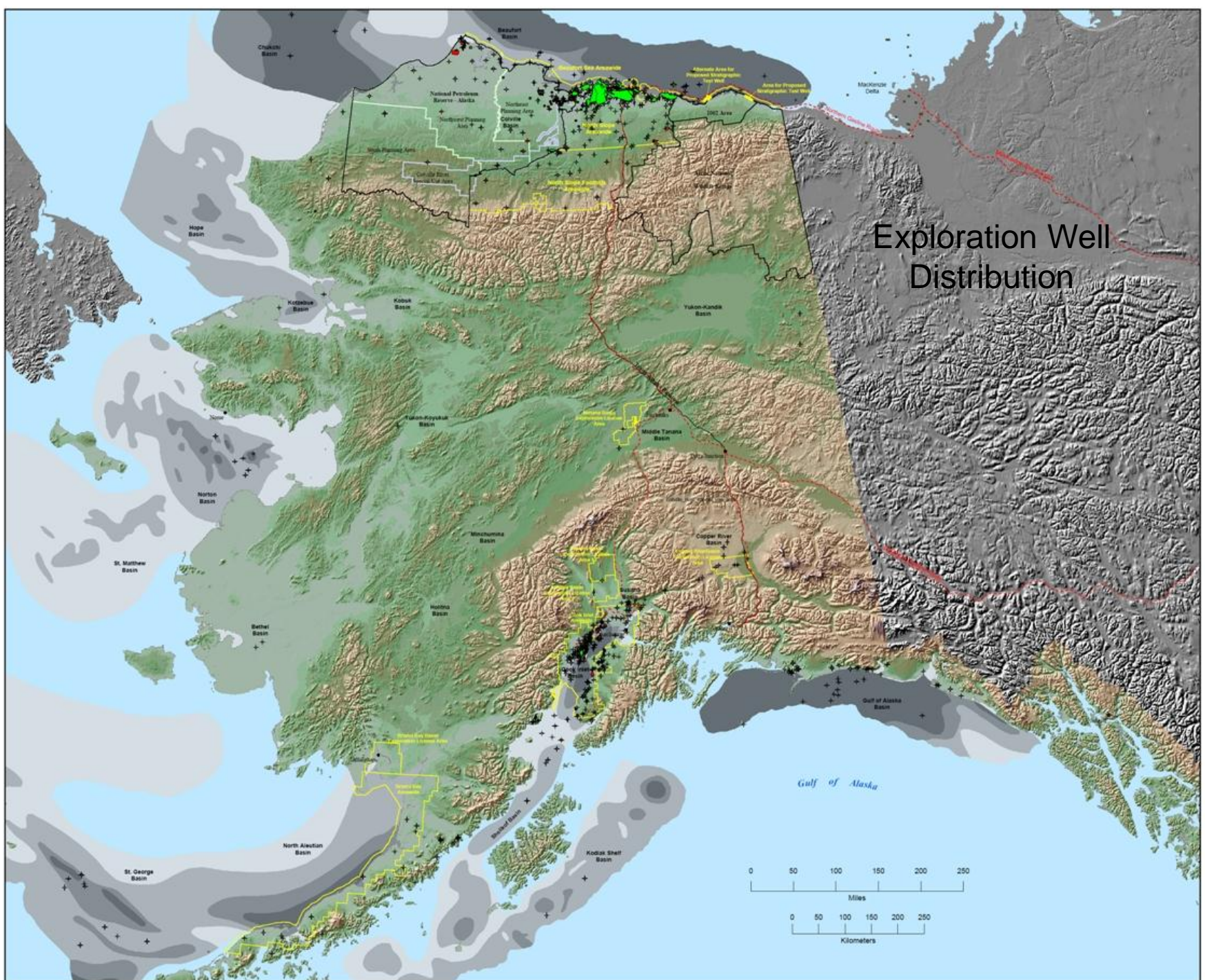
# Beluga River Gas Field

## Reservoir Correlation Along Structural Crest

### Sterling and Upper Beluga Formation



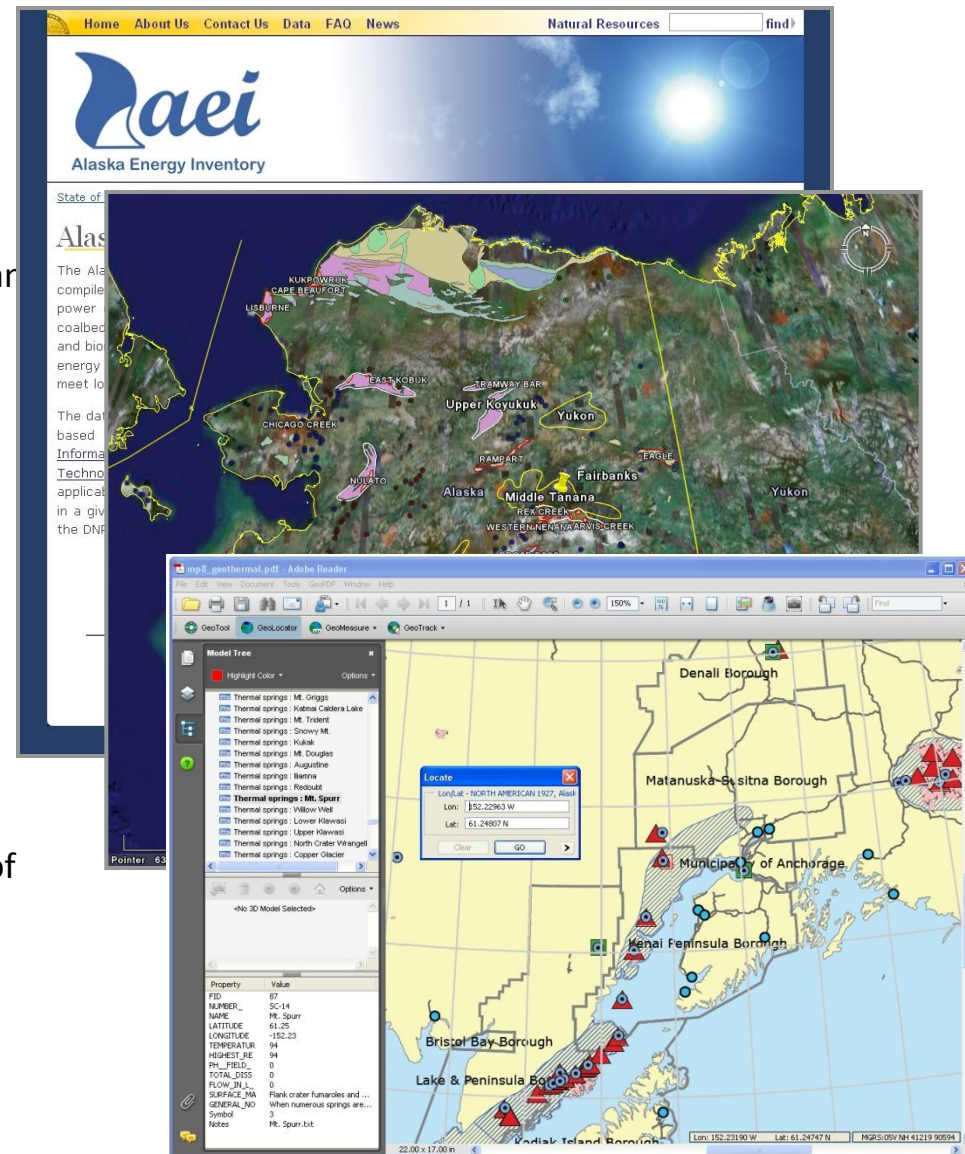






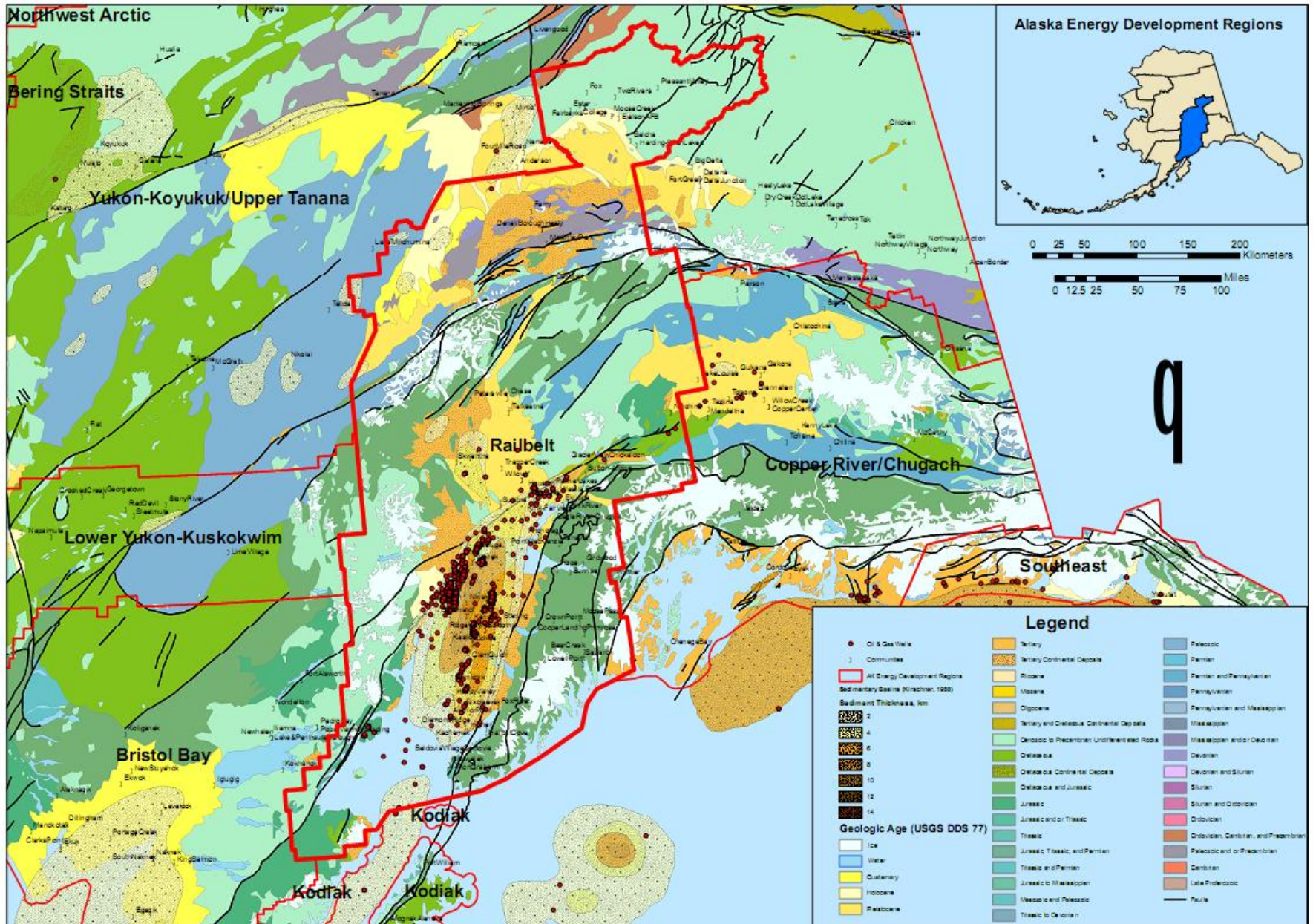
# Alaska Energy Data Inventory

- Consolidating Alaska's energy resources data
  - Resource data suitable for electrical power generation and space heating needs
  - Natural gas, coal, coalbed and shalebed methan gas hydrates, geothermal, wind, hydro, and biomass
  - Available energy meeting local needs?
- Making the data accessible
  - Alaska Mapper, Google Earth, and Terrago Technologies' GeoPDF format
  - <http://energyinventory.alaska.gov>
  - Query and download data; view data with existing infrastructure
- Involvement
  - DGGS, Alaska Energy Authority, DNR Division of Forestry, DNR LRIS, UAF/GINA
  - CCHRC, USGS, USDOE, DNR DOG, BLM, DMLW, Div. Agriculture, DEC



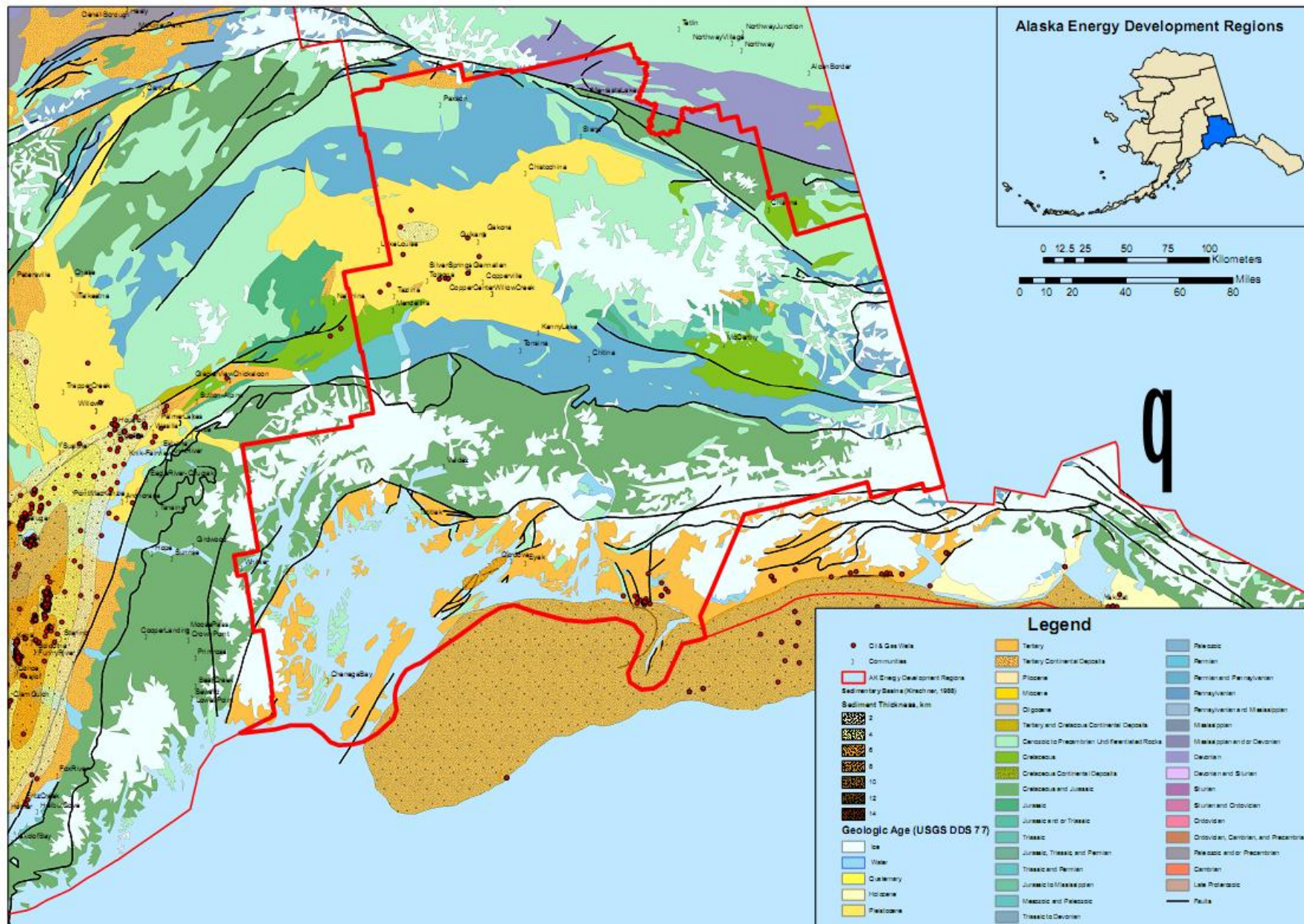


# Geology of the Railbelt Energy Region, Alaska



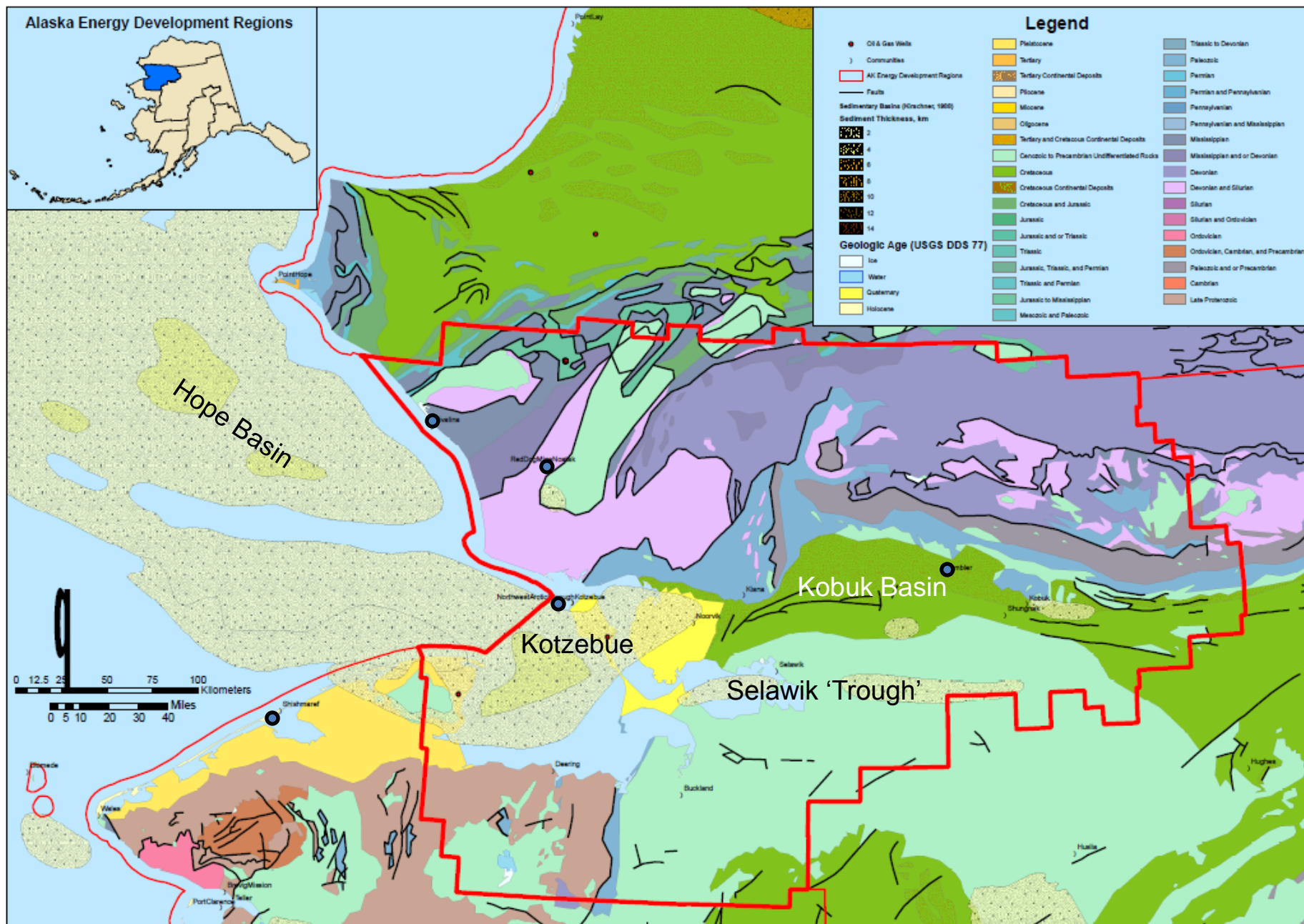


# Geology of the Copper River/Chugach Energy Region, Alaska



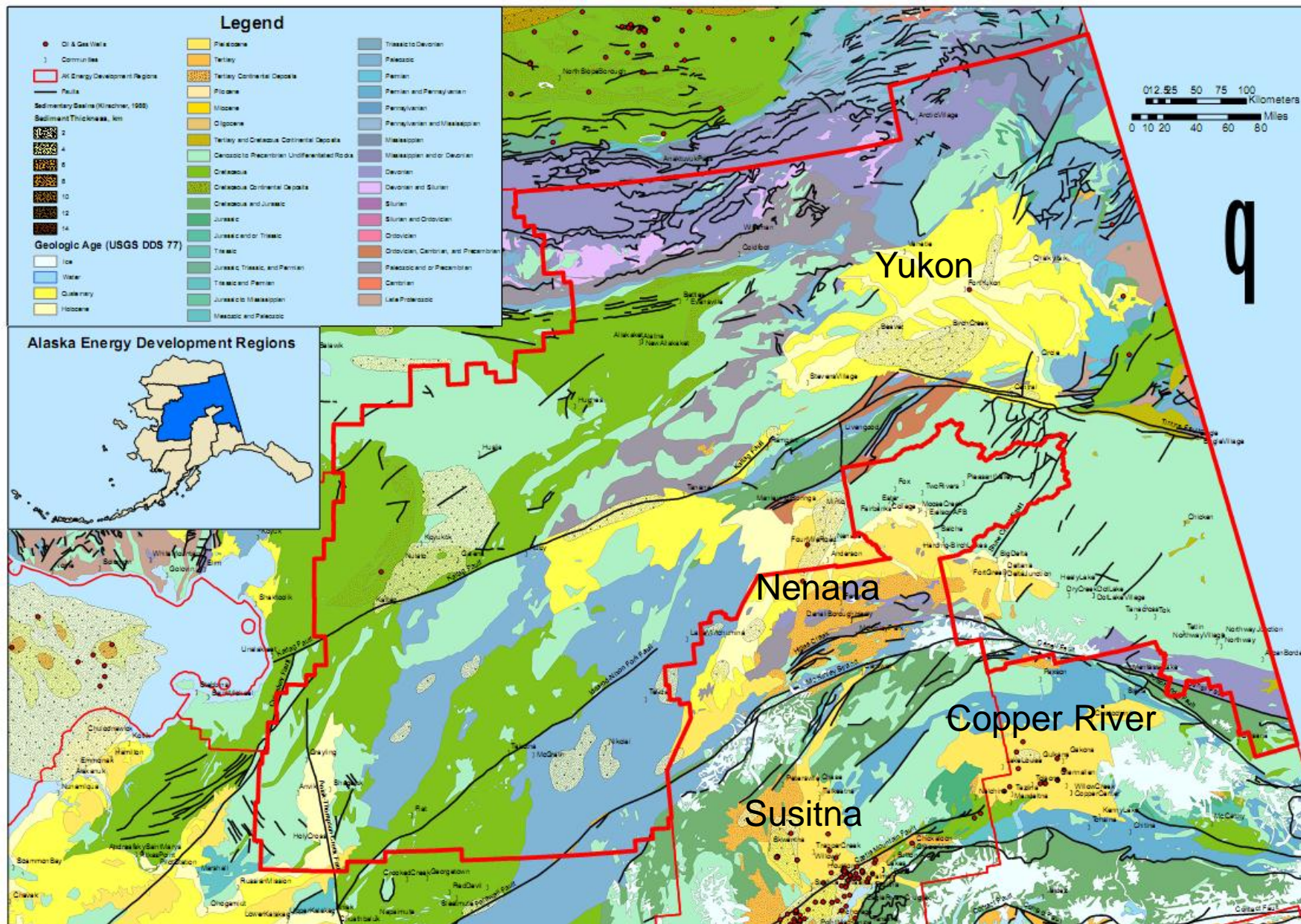


# Geology of the Northwest Arctic Energy Region, Alaska





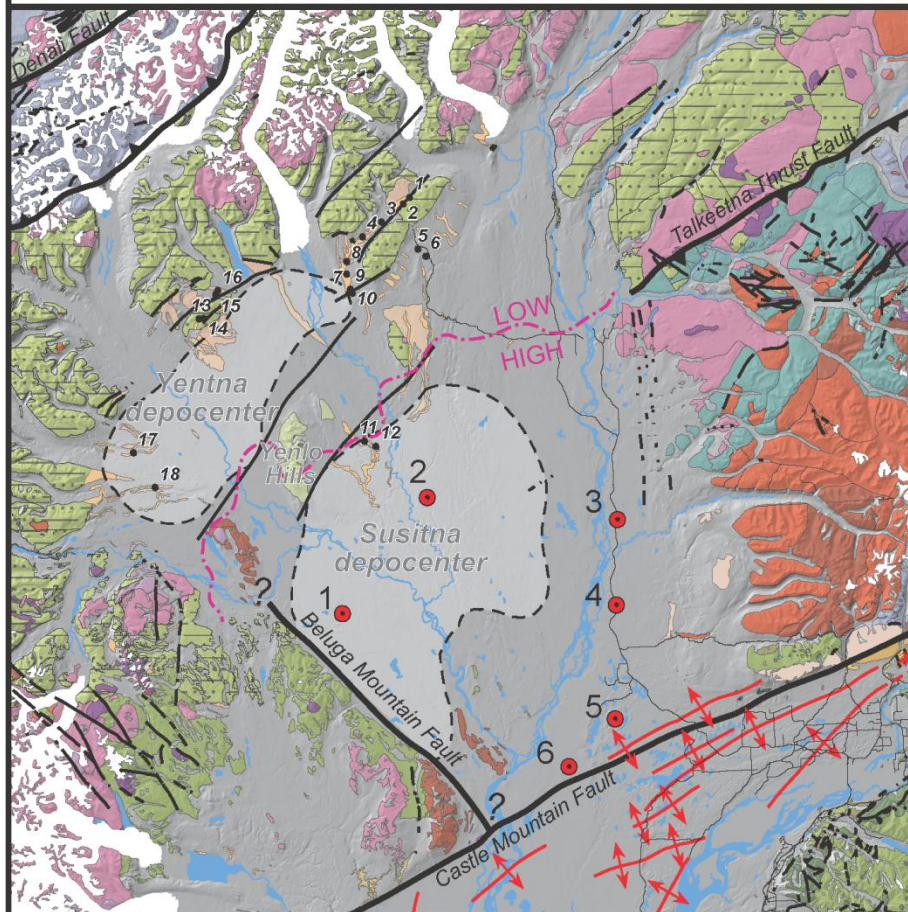
# Geology of the Yukon-Koyukuk/Upper Tanana Energy Region, Alaska



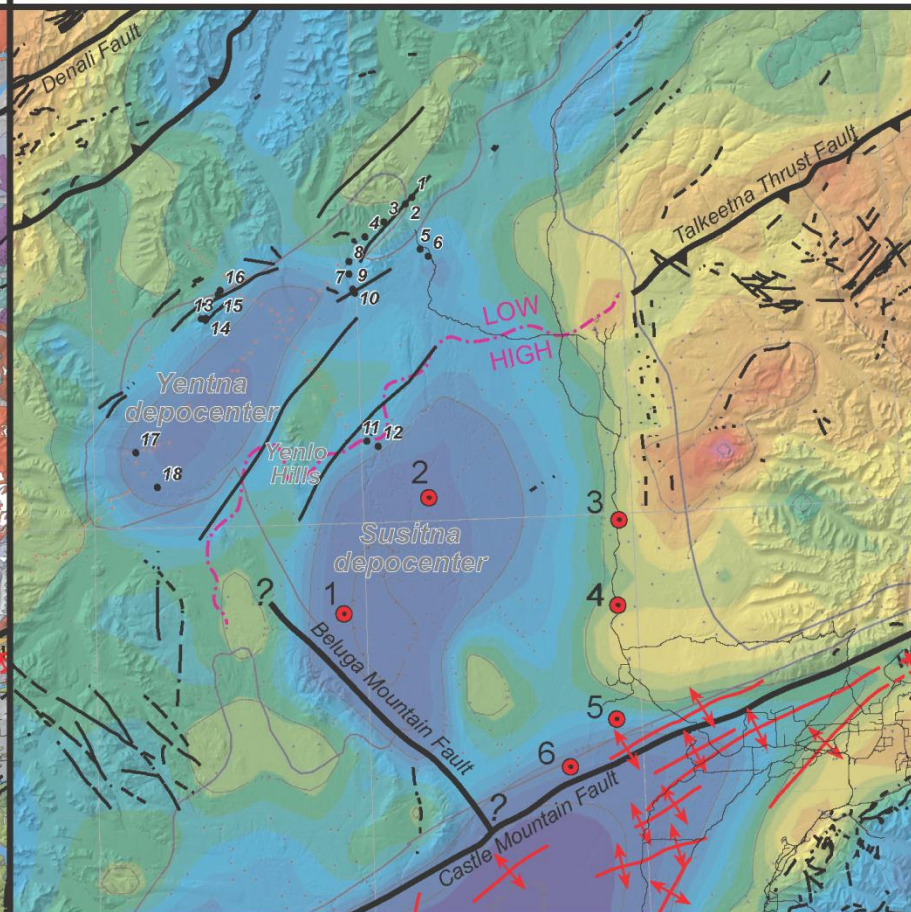


# Susitna Basin

Generalized geologic map of the Susitna lowlands  
(adapted from Wilson and others, 2009)



Bouguer gravity map of the Susitna lowlands  
(from Meyer, 2005)



- Tertiary sedimentary rocks, undivided
- Tertiary volcanic rocks, undivided
- Tertiary intrusive rocks, undivided
- K-T intrusive & volcanic rocks, undivided
- Jurassic-Cretaceous Kahiltna assemblage, undivided

- Mesozoic sedimentary, metasedimentary, and volcanic rocks undivided
- Mesozoic intrusive rocks, undivided
- Triassic sedimentary rocks, undivided
- Paleozoic sedimentary rocks, undivided
- Location of Dickinson (1995)
- Kenai Group measured sections

- Well location ●
- Well Labels:
1. Trail Ridge Unit #1
  2. Pure Kahiltna Unit #1
  3. Sheep Creek #1
  4. Kashwitna Lake
  5. Red Shirt Lake #1
  6. Fish Creek #1

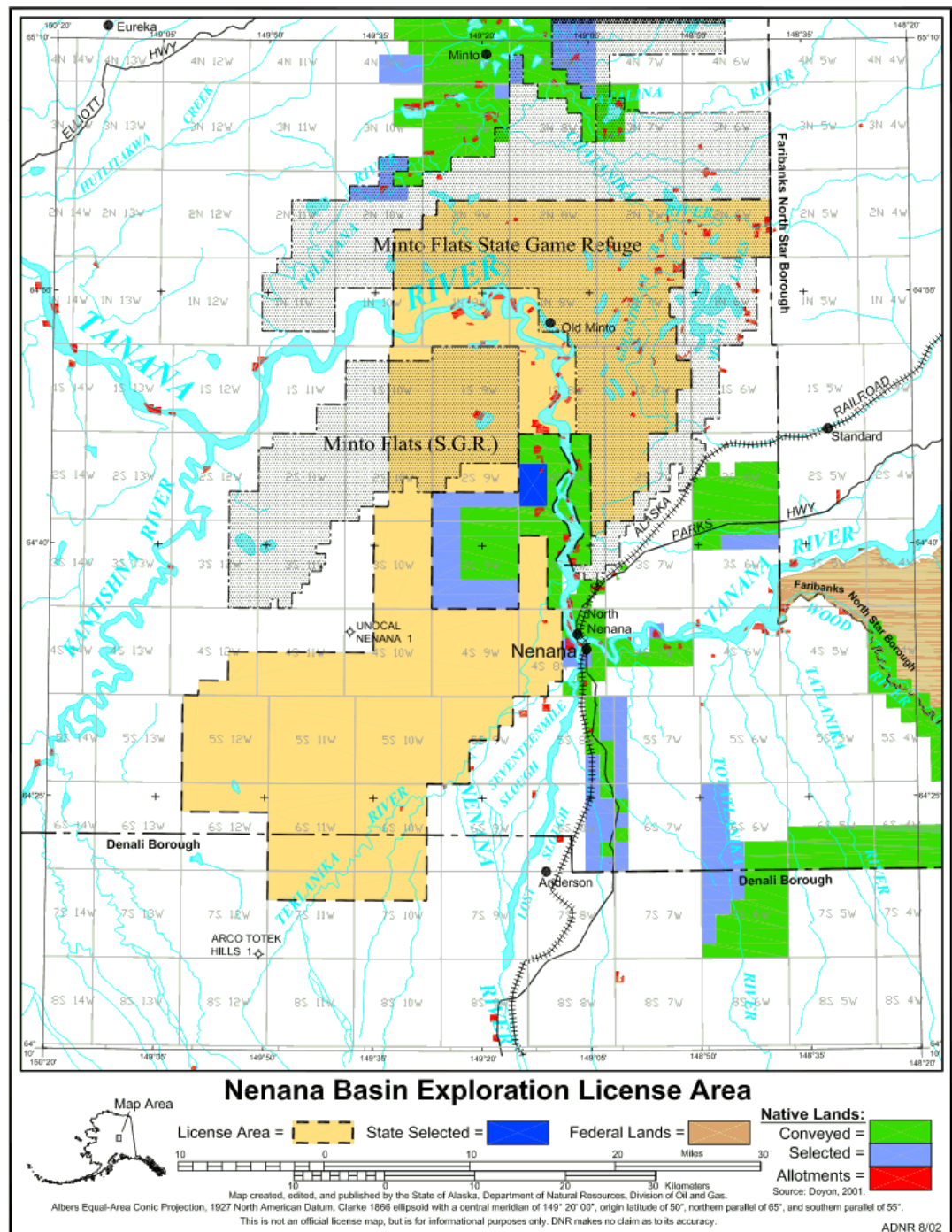
Magnetic discontinuity (after Saltus and Shah, unpublished data)

LOW  
HIGH

0 5 10 20 30 40 Kilometers



# Land Status Nenana Basin Area

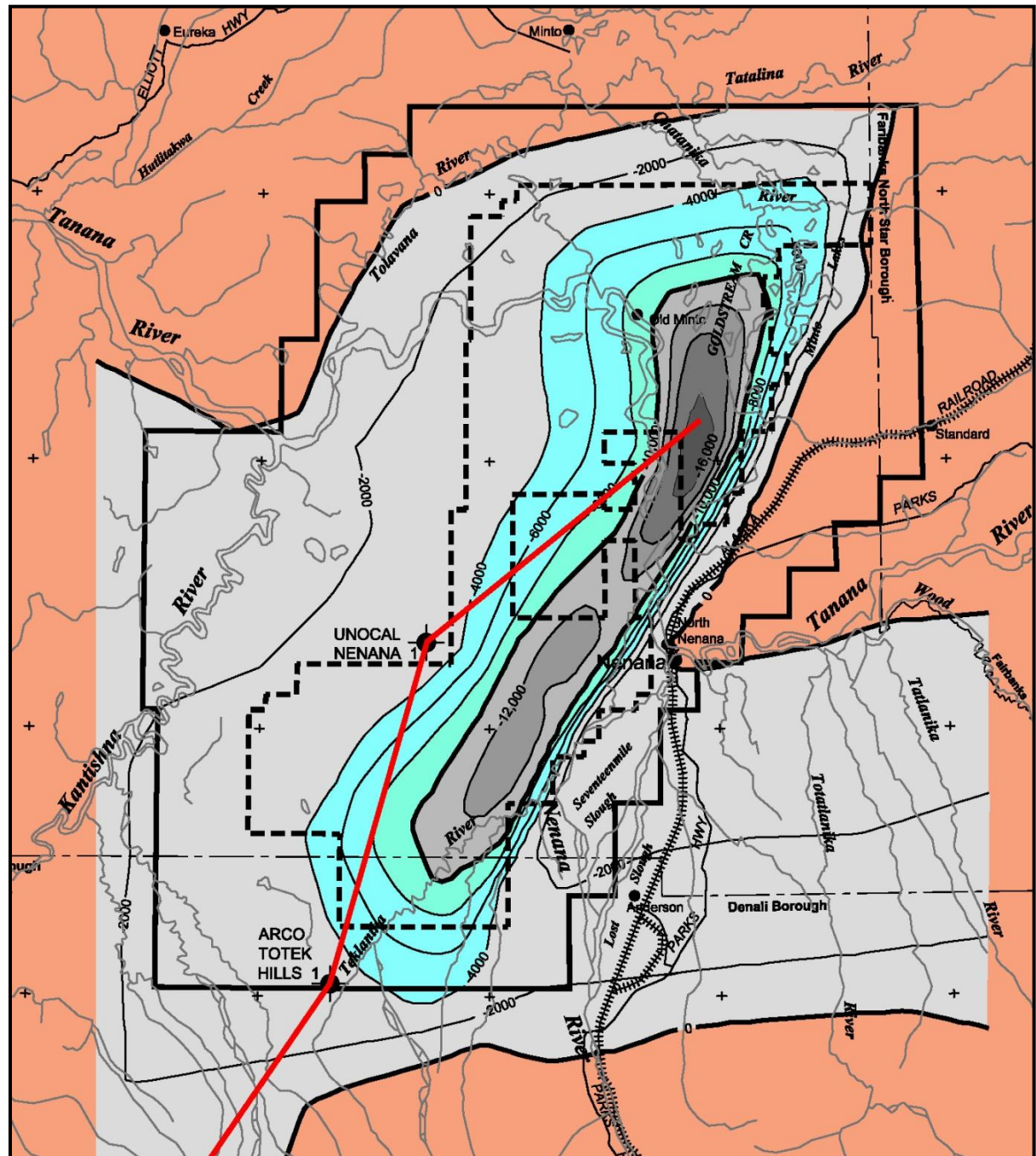




# Nenana Basin

Thickness of Sedimentary Basin  
Interpreted Gravity

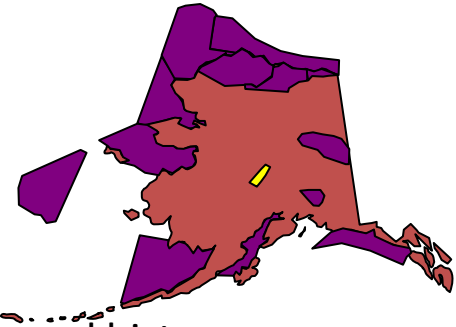
Contour Interval = 2,000 Ft.





# Nenana Basin Statistics

## Pre - 2009



- Tertiary Non Marine Basin Fill
  - Up to 18,000 Ft Thick (Seismic).
  - Time-equivalent to Cook Inlet's productive Kenai Group.
  - Potential for oil is low due to thin low-organic source rocks & thermal history.
  - 350 miles 2-D seismic data in southern and central basin areas (1981-82)
- The range of possible reserve outcomes is wide and poorly constrained
  - Terrestrial Kerogens and Coal Sourced Gas
- 2 Wells Drilled on Basement Highs
  - Unocal Nenana #1 (1962) – 3,062' deep, coal seam gas shows.
  - ARCO Totek Hills #1 (1984) – 3,590' deep, coal seam gas shows.
  - Entire Section not Penetrated
  - Good Reservoir in Shallow Section
  - Potential for CBM and conventional gas is good
  - Potential for oil unknown
- Significant Deformation on Southern Margin
  - Likely Associated with Southern Basin Bounding Faults



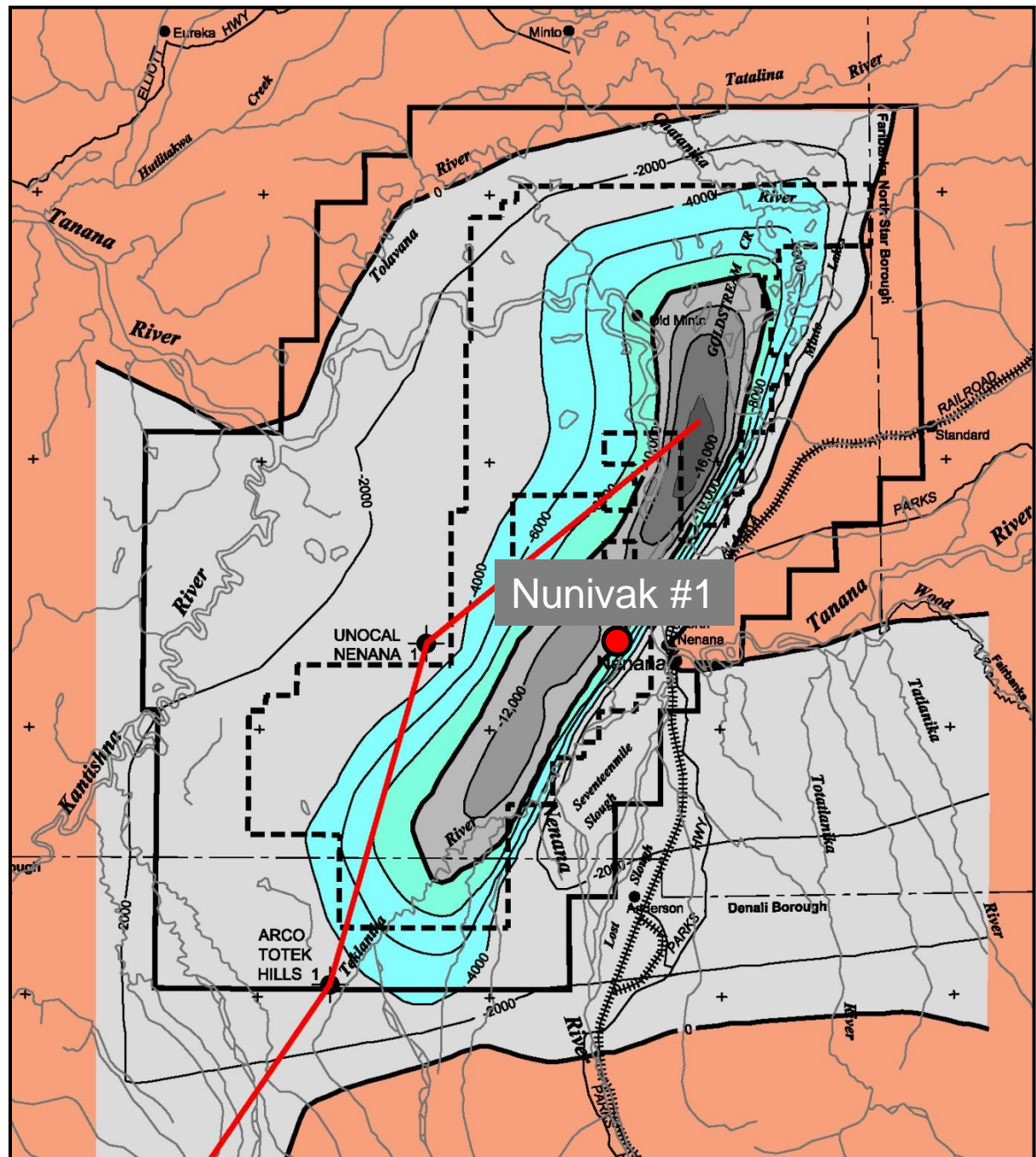
# Nenana Basin

Thickness of Sedimentary Basin  
Interpreted Gravity

## Recent Activity

- 2D seismic
- Nunivak #1 Drilled 2009
- Calibration of basin models with new data

Contour Interval = 2,000 Ft.



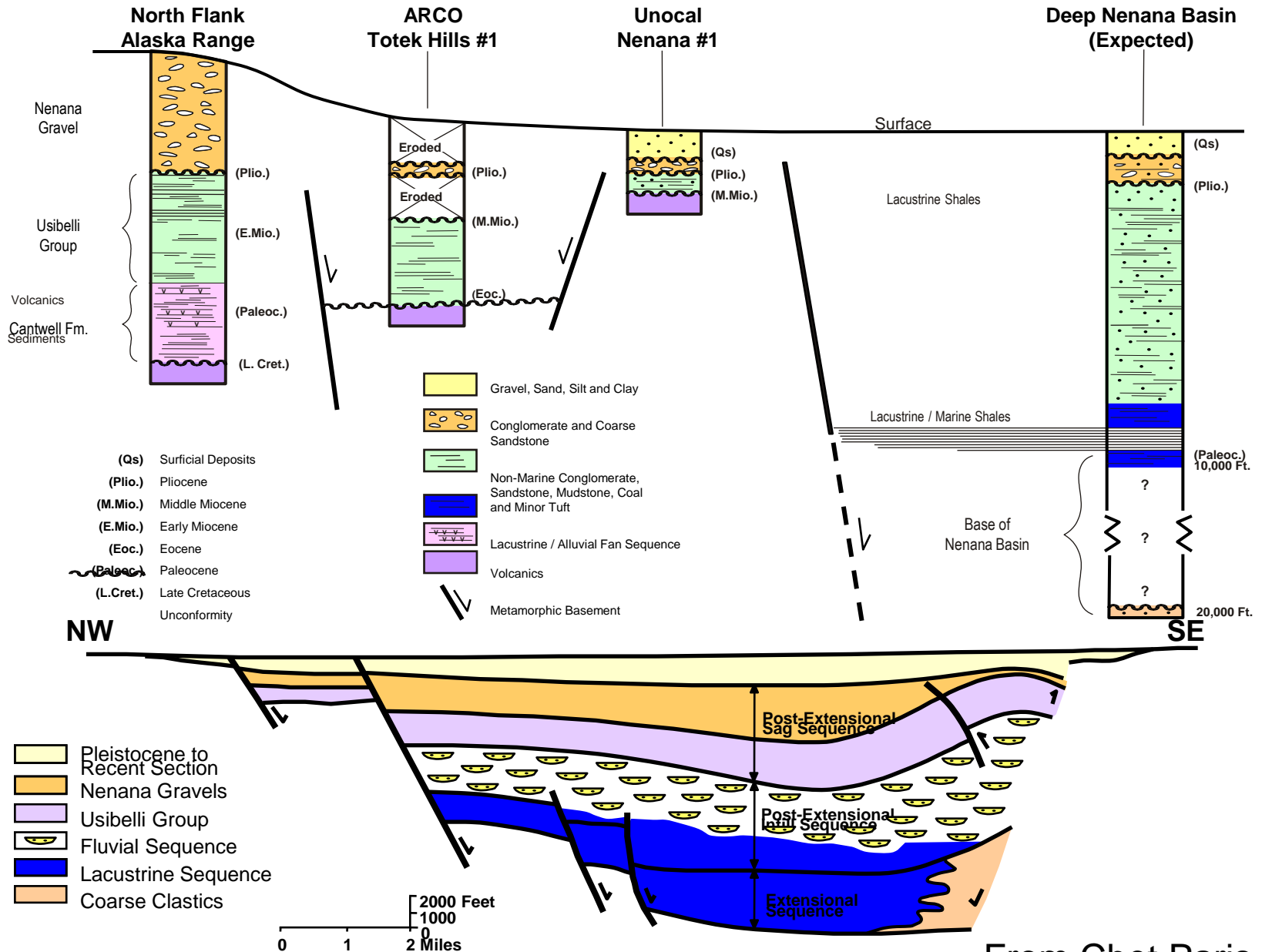


# Recent Data On Nenana Basin

- Oil & Gas Journal, January 9, 2012
- Significant Findings by Authors
  - Up to 25,000 ft of Tertiary strata
  - Thick Paleocene section encountered
  - Trace oil & gas shows noted in Paleocene section during drilling
  - Geochemical analysis of drill samples shows elevated levels of H<sub>I</sub> and S<sub>2</sub> values -- oil prone
  - Basin history modeling suggests potential for active petroleum system



# Nenana Basin



From Chet Paris, PRA



# Summary of Interior Basins Hydrocarbon Potential

- Relatively small with complex geologic histories
- Non-typical petroleum systems, if present
- Very little known about sub-surface geology
- Costly exploration targets, limited infrastructure
- Potential for biogenic gas and thermogenic hydrocarbons poorly understood
- “Wildcat” exploration targets