

Comparison of Mesozoic and Cenozoic Source Rock Characteristics

**Puale Bay Outcrops and NAS COST 1 Well
Alaska Peninsula – North Aleutian Basin**

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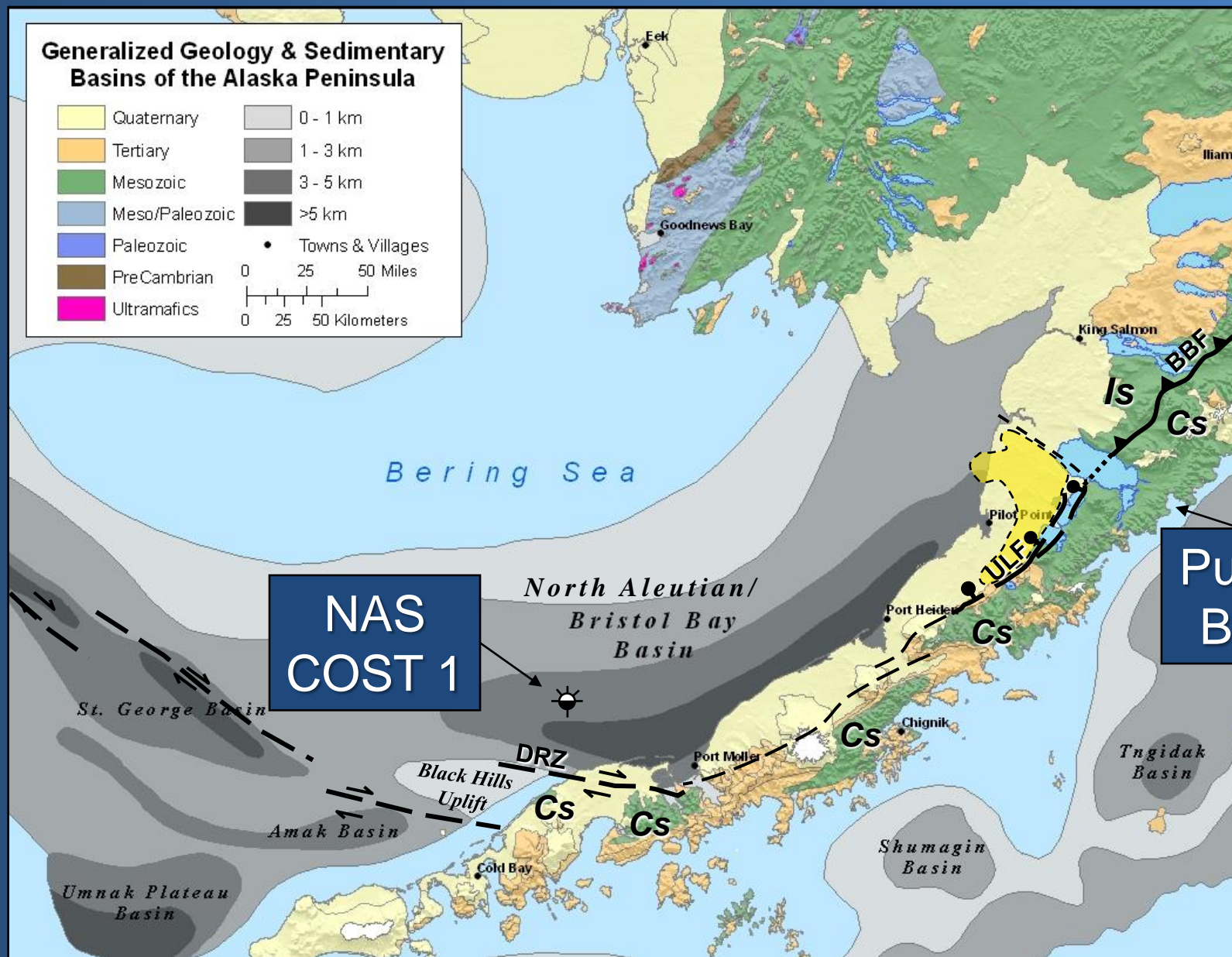
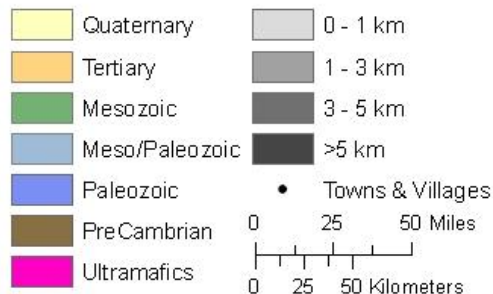
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DNR Spring Technical Review Meeting, BP Energy Center

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Generalized Geology & Sedimentary Basins of the Alaska Peninsula



Alaska Peninsula Stratigraphic Column

- Miocene Bear Lake Fm
- Eocene-Oligocene Stepovak Fm
- Paleocene-Eocene Tolstoi Fm
 - Nonmarine (coaly) to shallow marine

NAS COST 1 well

- Middle Jurassic Kialagvik Fm
(Tuxedni Gp equivalent)
 - Marine-nonmarine? sh-slts-ss

Puale Bay outcrops

- Upper Triassic Kamishak Fm
 - Shallow Marine carbonate

AGE		ROCK UNIT	THICKNESS RANGE (FT)
QUATERNARY		Alluvial and glacial deposits	
TERTIARY		Volcanic rocks and deposits	
	PLIOCENE	Milky River Fm.	1500 – 3000
	MIOCENE	Bear Lake Formation	0 – 7500
		Unga Fm.	0 – 1000
	OLIGOCENE	Stepovak Formation	5000 – 6500
CRETACEOUS		Meshik Volcanics	
	EOCENE	Tolstoi Formation	0 – 5000
	PALEOCENE		
		Hoodoo and Kaguyak Formations	0 – 3000
	LATE	Chignik Formation	600 – 2500
JURASSIC		Pedmar Fm.	0 – 270
	EARLY	Herendeen Fm.	0 – 900
		Staniukovich Fm.	0 – 800
	LATE	Naknek Formation	3500 – 13,000
	MIDDLE	Shelikof Formation	2500 – 5000
TRIASSIC		Kialagvik Formation	2500 – 4000
	EARLY	Talkeetna Formation	1000 – 5000
	LATE	Kamishak Formation	2500 – 4500
	MIDDLE		
	EARLY		
MID-PERMIAN		Unnamed limestone	30+

Puale Bay Sample Locations

Kialagvik Fm (n = 39)

07RR027-038

Js/Jk contact uncertain

07PD183-188 (SE-NW)

05RR208-210 (SE-NW)

05EF100-103 (NW-SE)

07BG225-233(SE-NW)

07PD181-182
07MW003-004
07RB04-08

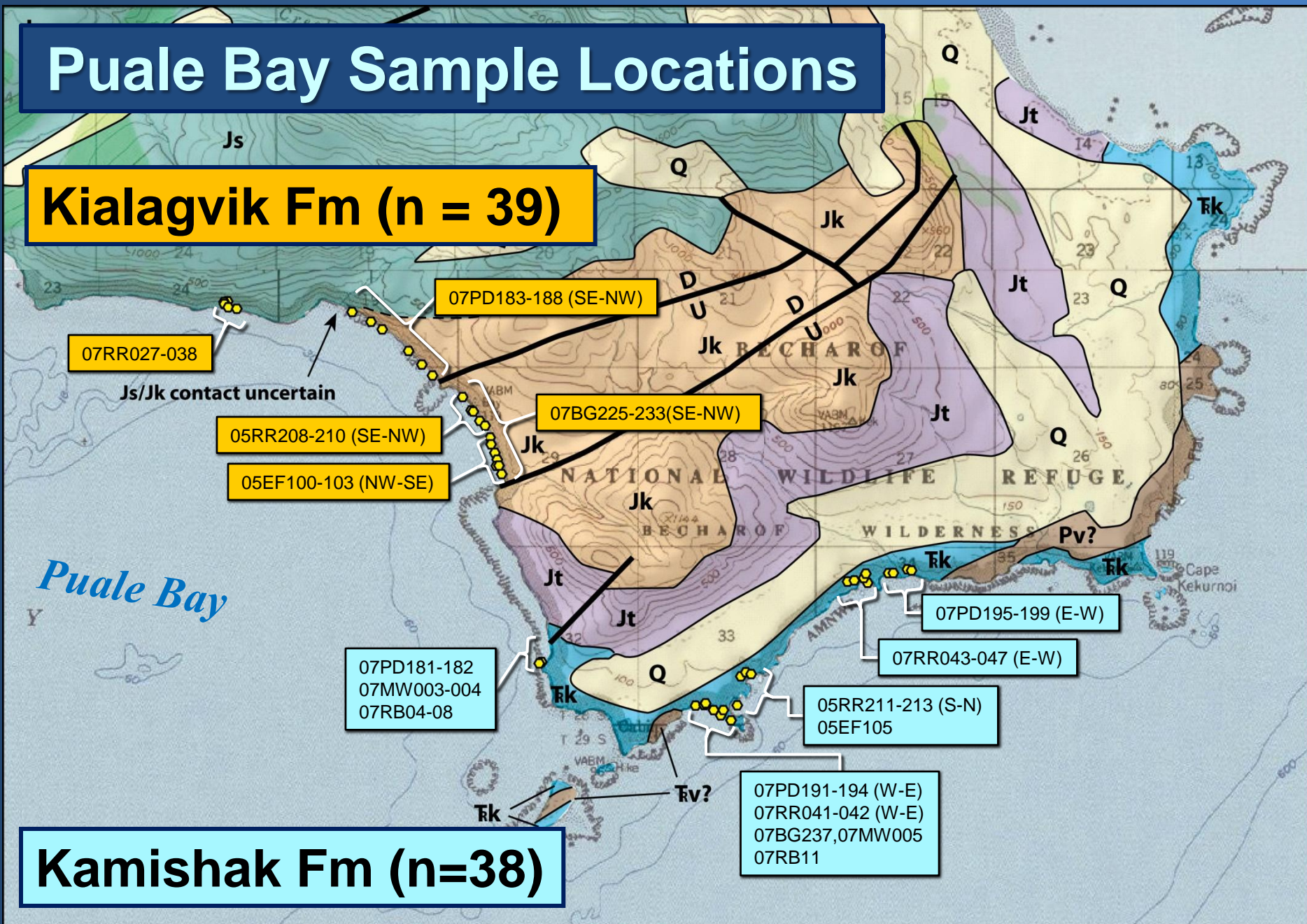
07PD195-199 (E-W)

07RR043-047 (E-W)

05RR211-213 (S-N)
05EF105

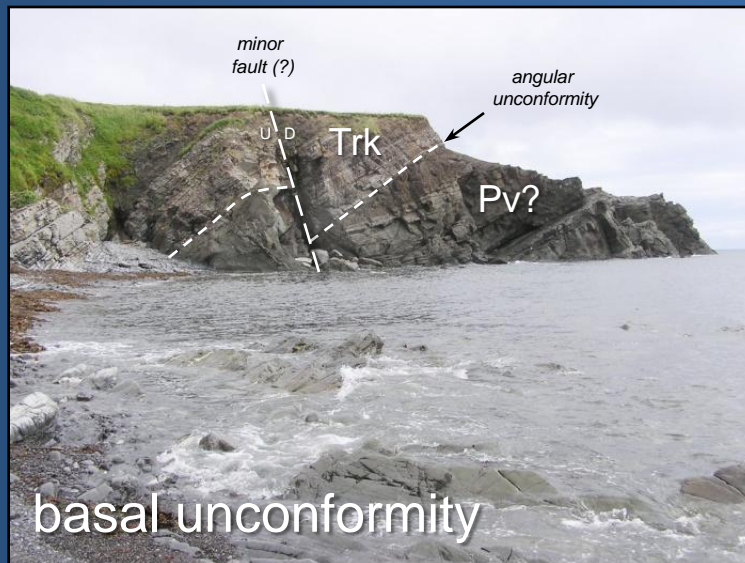
07PD191-194 (W-E)
07RR041-042 (W-E)
07BG237, 07MW005
07RB11

Kamishak Fm (n=38)



Upper Triassic Kamishak Fm Outcrops

Puale Bay



Middle Jurassic Kialagvik Fm Outcrops

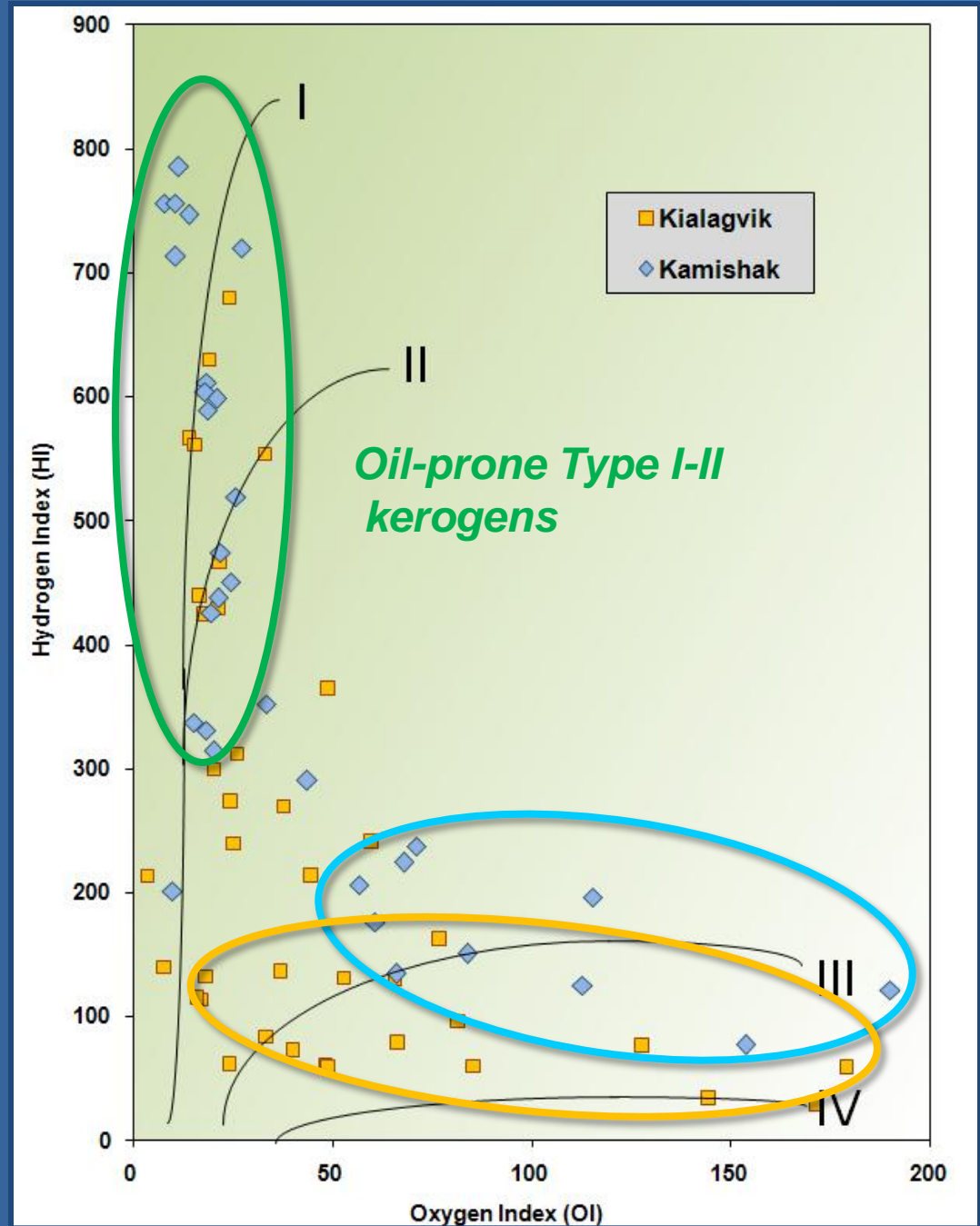
Puale Bay



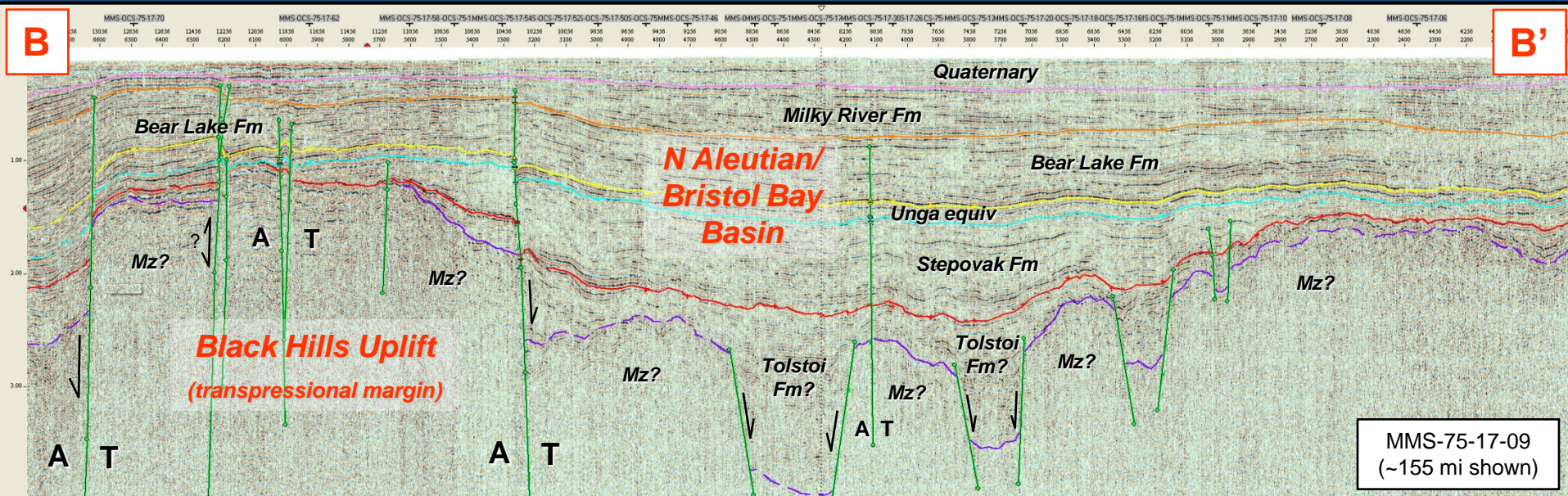
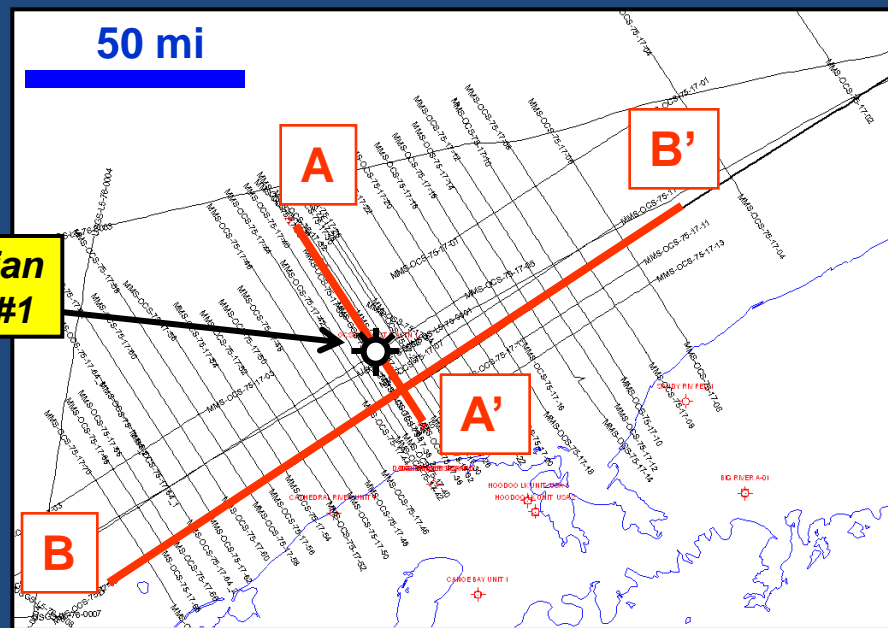
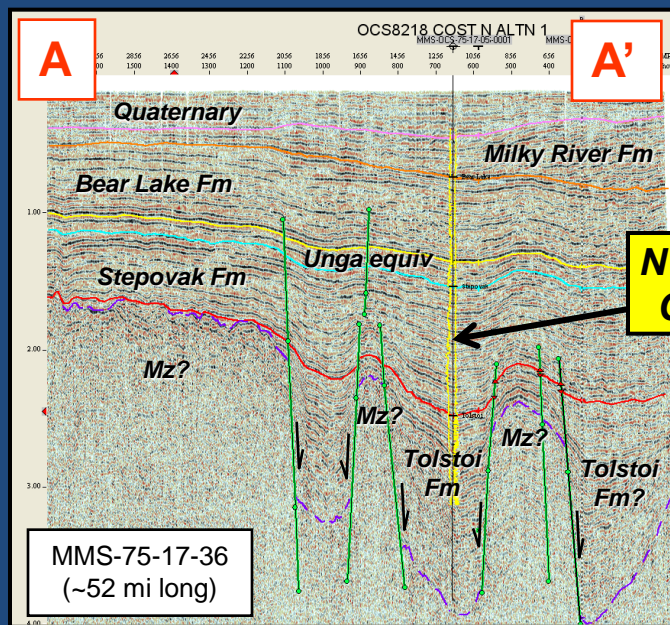
Modified Van Krevelen Diagram

Mesozoic Units

Puale Bay outcrops



North Aleutian Basin

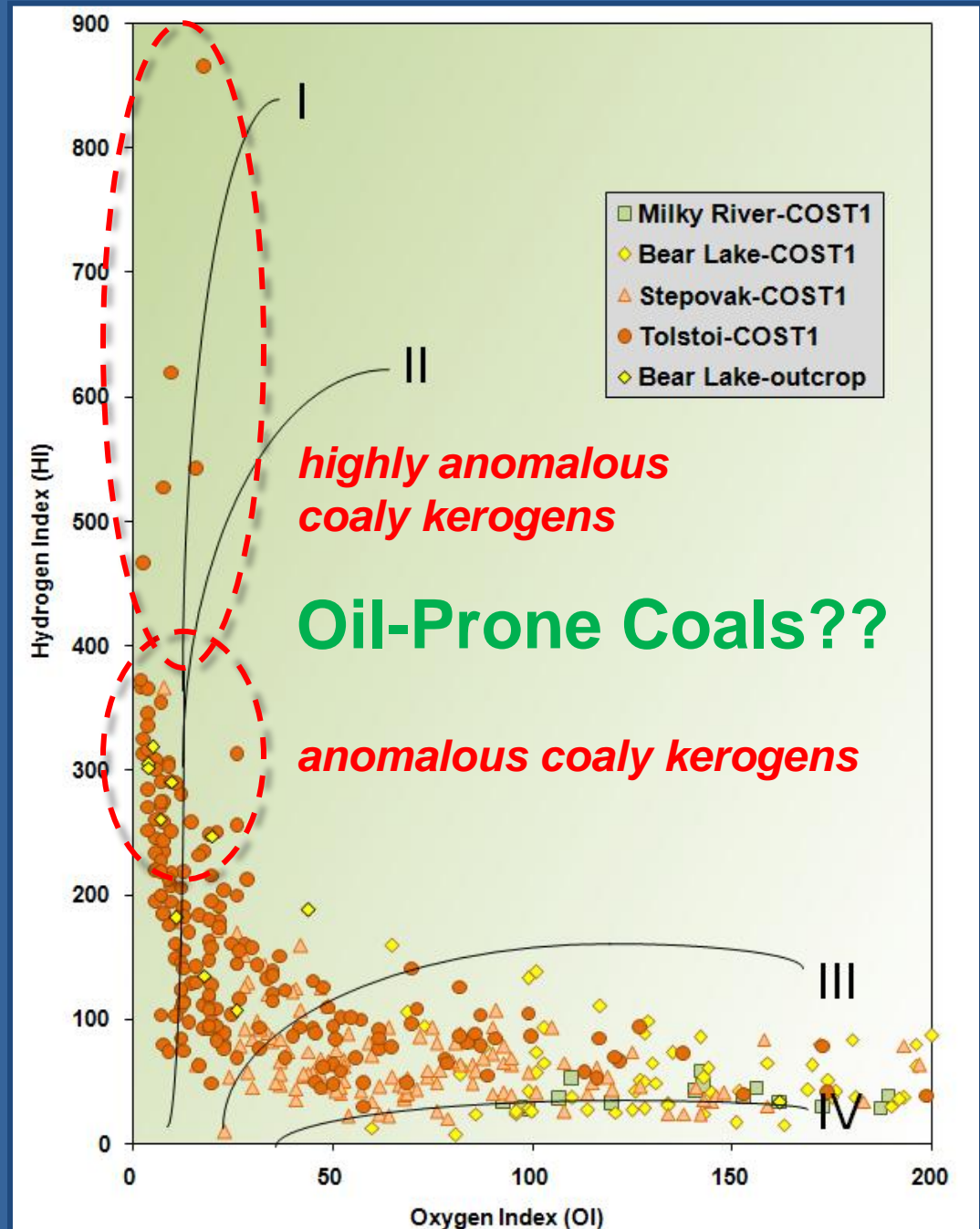


Modified Van Krevelen Diagram

Cenozoic Units

NAS COST 1 well

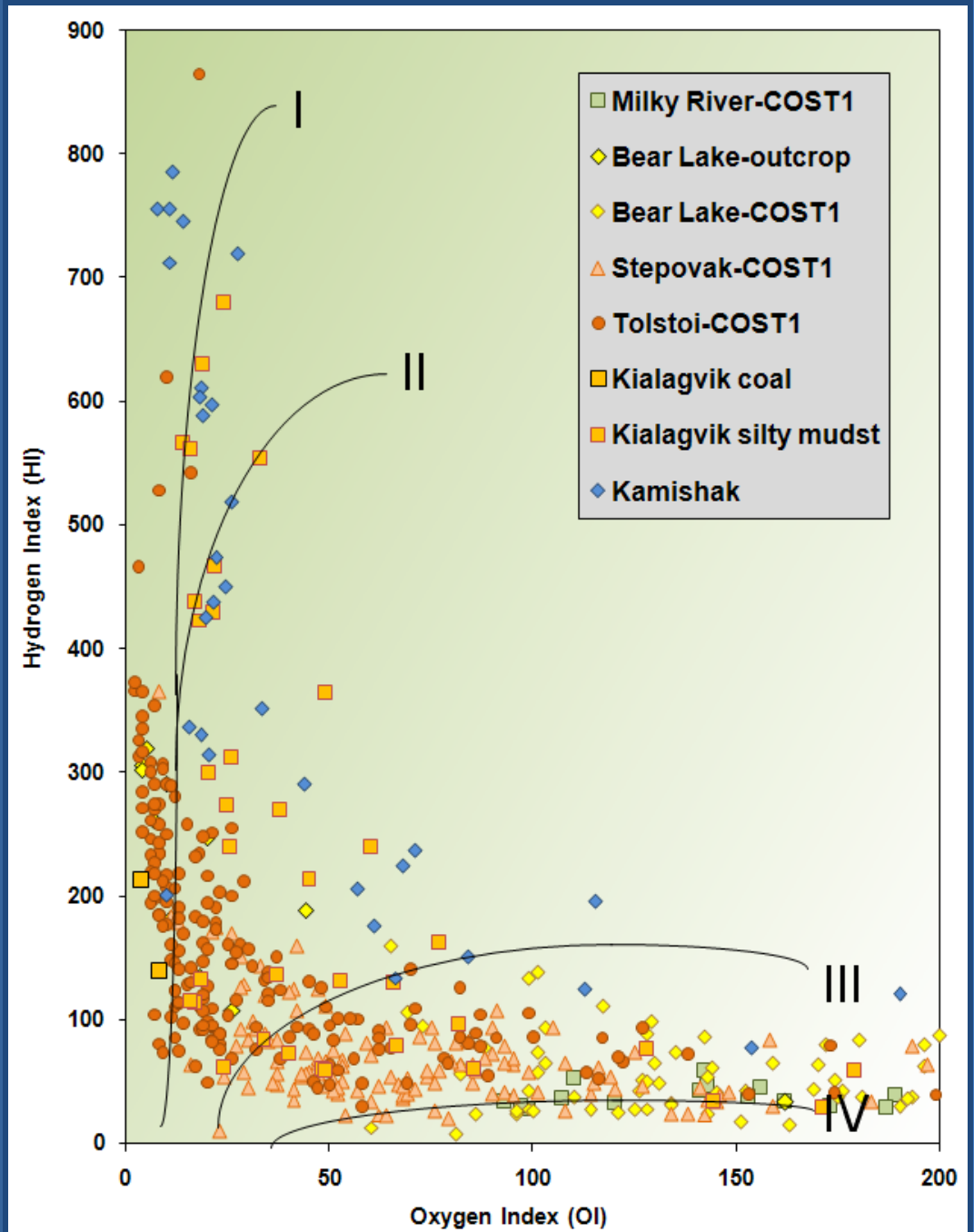
- 420 Rock-Eval/TOC analyses
- Pyrolysis can overestimate HC liquid-generation potential of coaly source rocks
- Kerogen microscopy and H/C, O/C atomic ratios data



Modified Van Krevelen Diagram

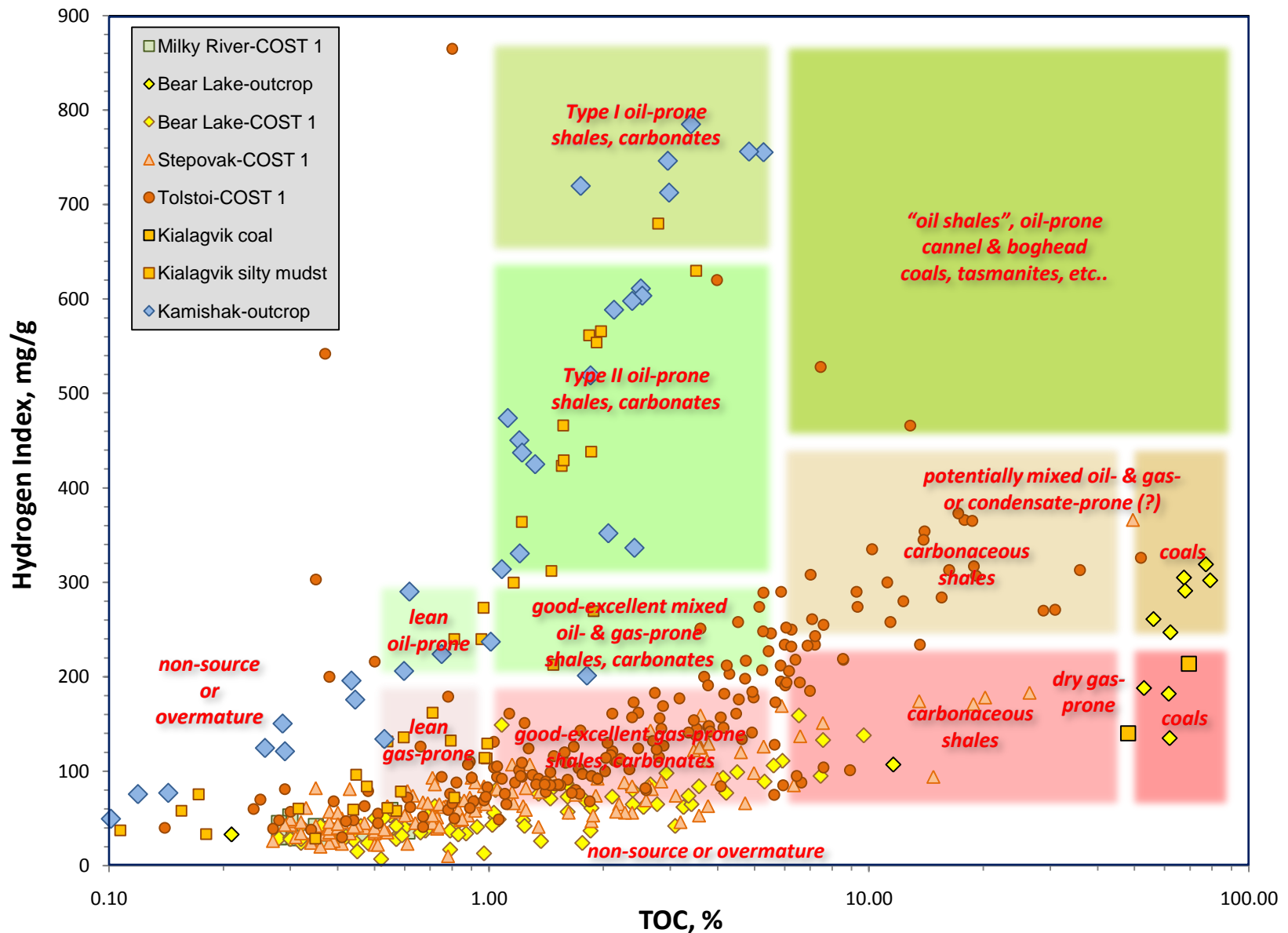
Mesozoic and Cenozoic Units

Puale Bay and NAS COST 1



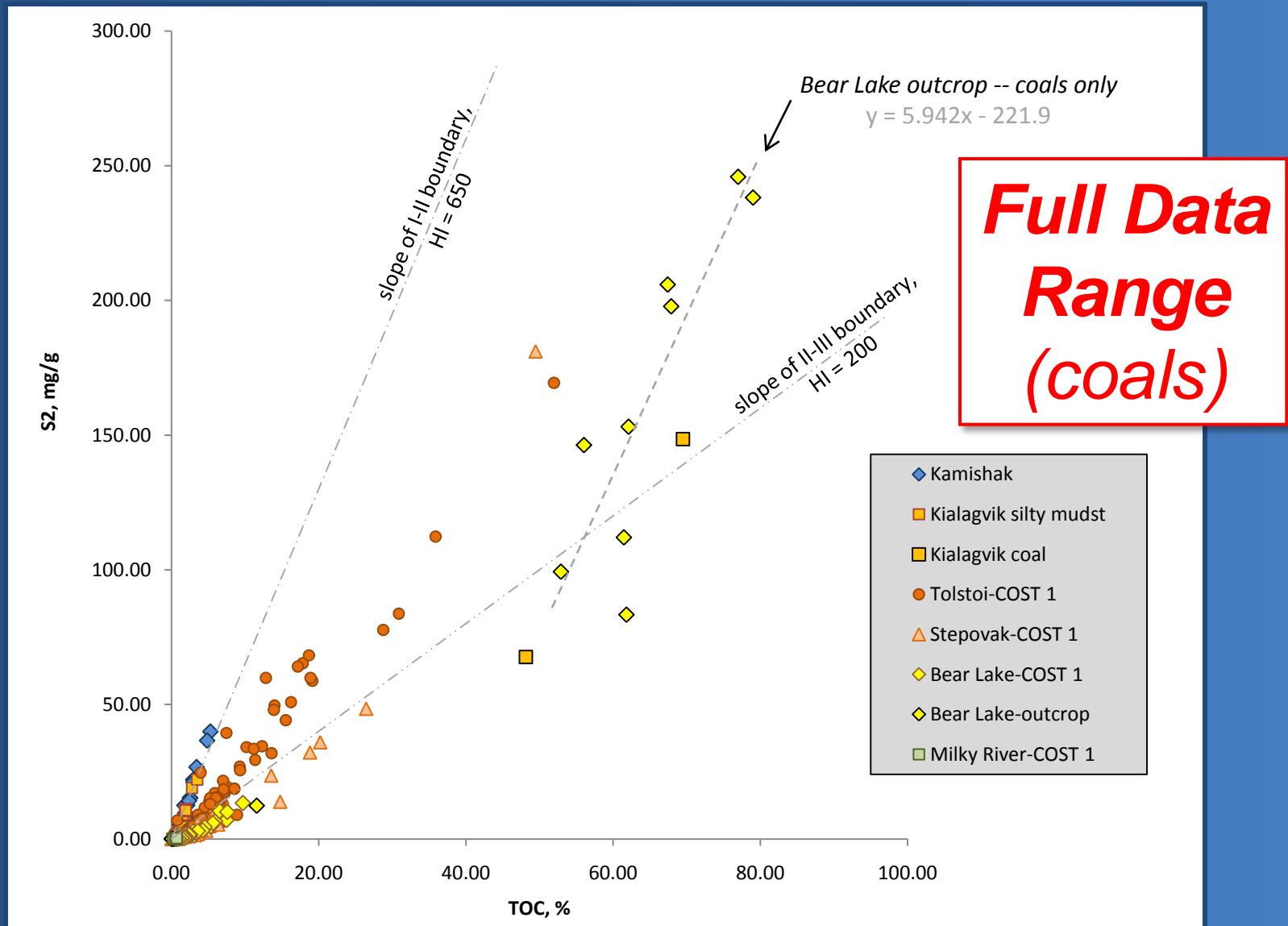
Hydrogen Index vs TOC

Type and Quantity
of Organic Matter



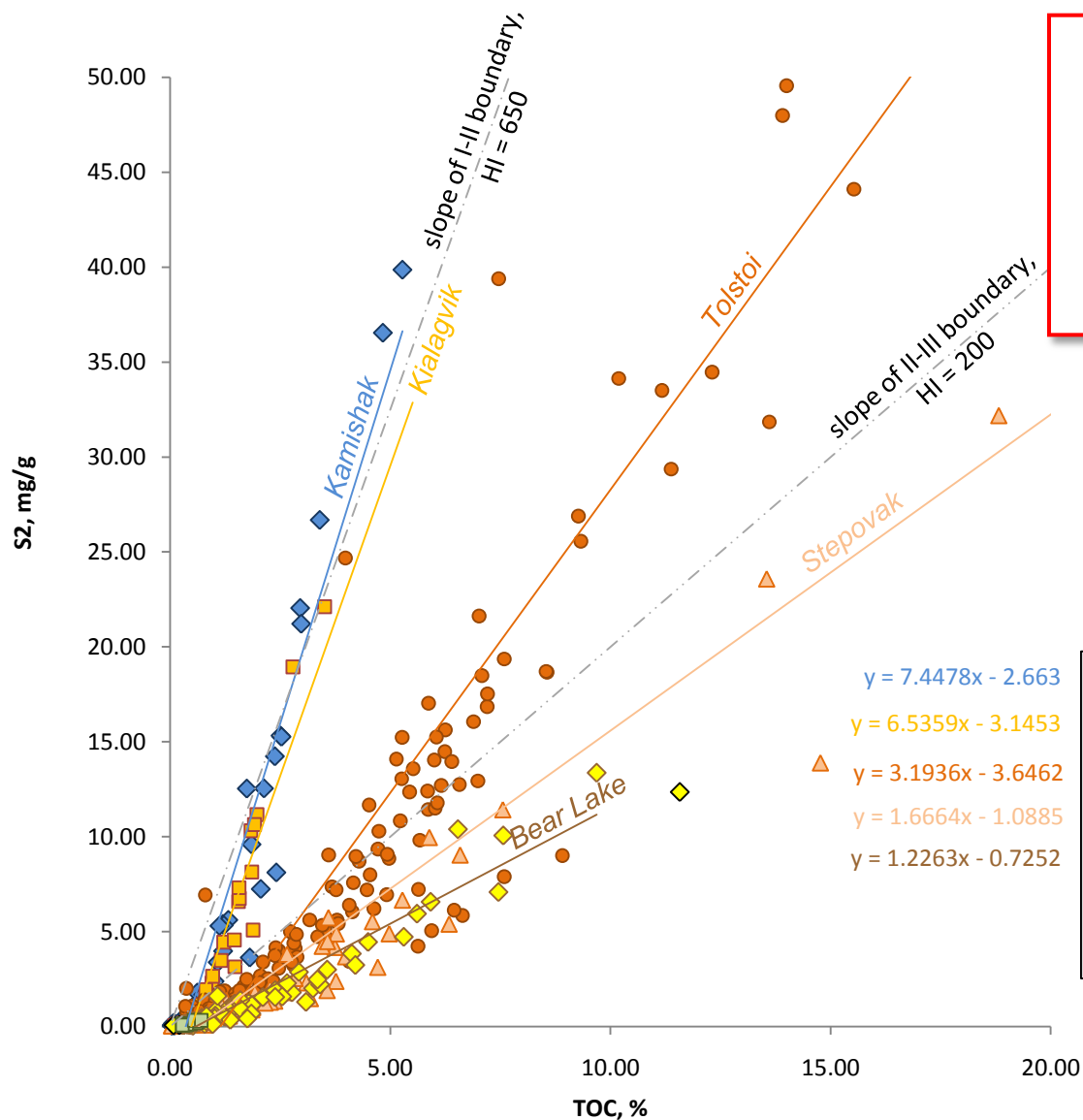
Pyrolyzed HC (S2) vs TOC

*True Average
Hydrogen Index*



Pyrolyzed HC (S2) vs TOC

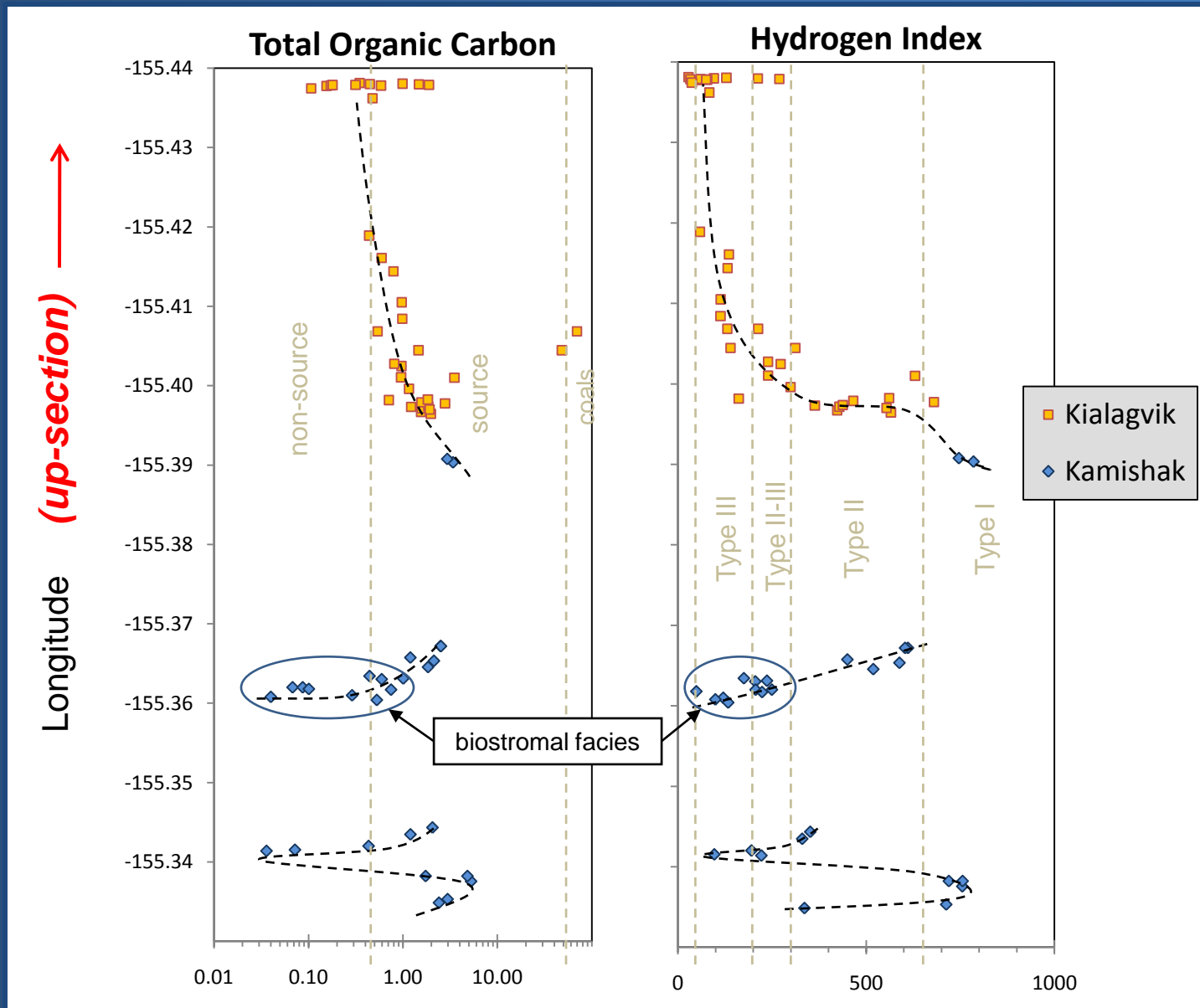
True Average
Hydrogen Index



**Restricted
Data Range
(no coals)**

Variation by Stratigraphic Position

Kamishak and Kialagvik Fms, Puale Bay

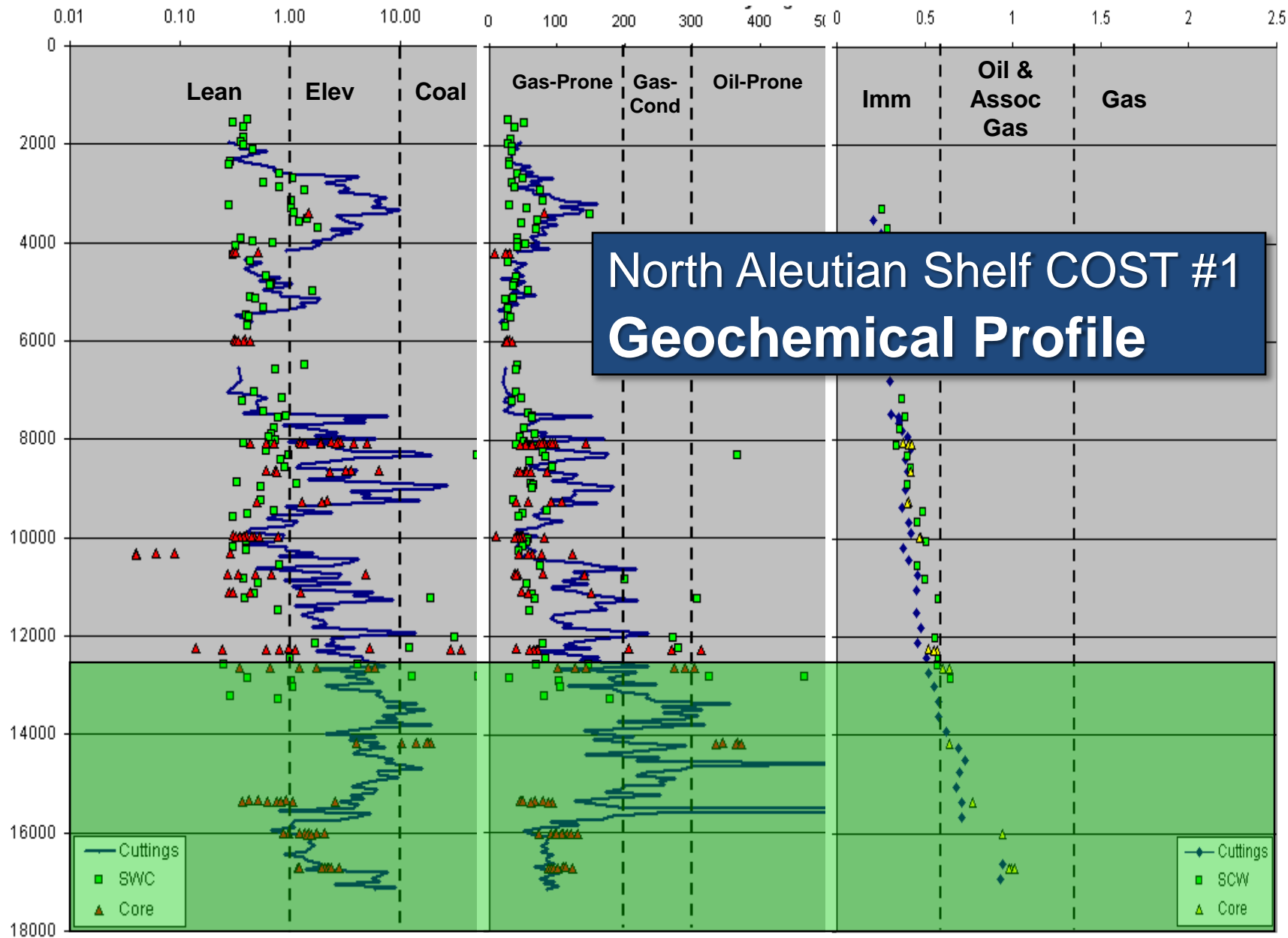




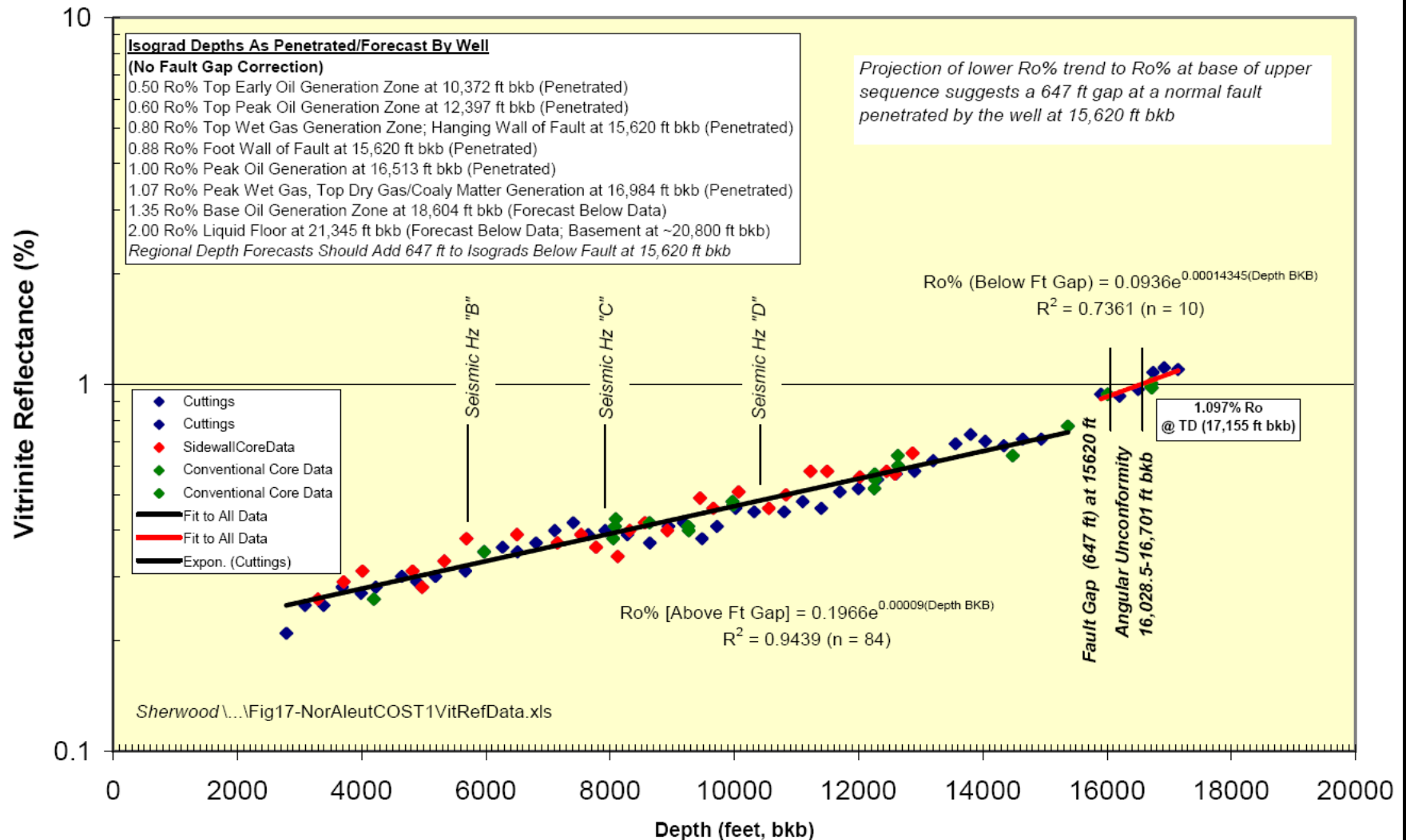
TOC

HI

Ro



NAS COST 1 Vitrinite Reflectance



Conclusions

- **Puale Bay Mesozoic units include highly oil-prone source rocks**
 - **Upper Triassic Kamishak Fm:** especially brown-gray micritic limestone facies (avg HI = 745 mg/g)
 - **Middle Jurassic Kialagvik Fm:** lower part, fissile dark gray siltstone facies (avg HI = 654 mg/g)
- **NAS COST 1 well Cenozoic units are coaly & dominantly gas-prone, minor liquid-prone coals?**
 - **Eocene Tolstoi Fm:** (avg HI = 319 mg/g)
 - **Eo-Oligocene Stepovak Fm:** (avg HI = 167 mg/g)
 - **Miocene Bear Lake** (avg HI = 123 mg/g)