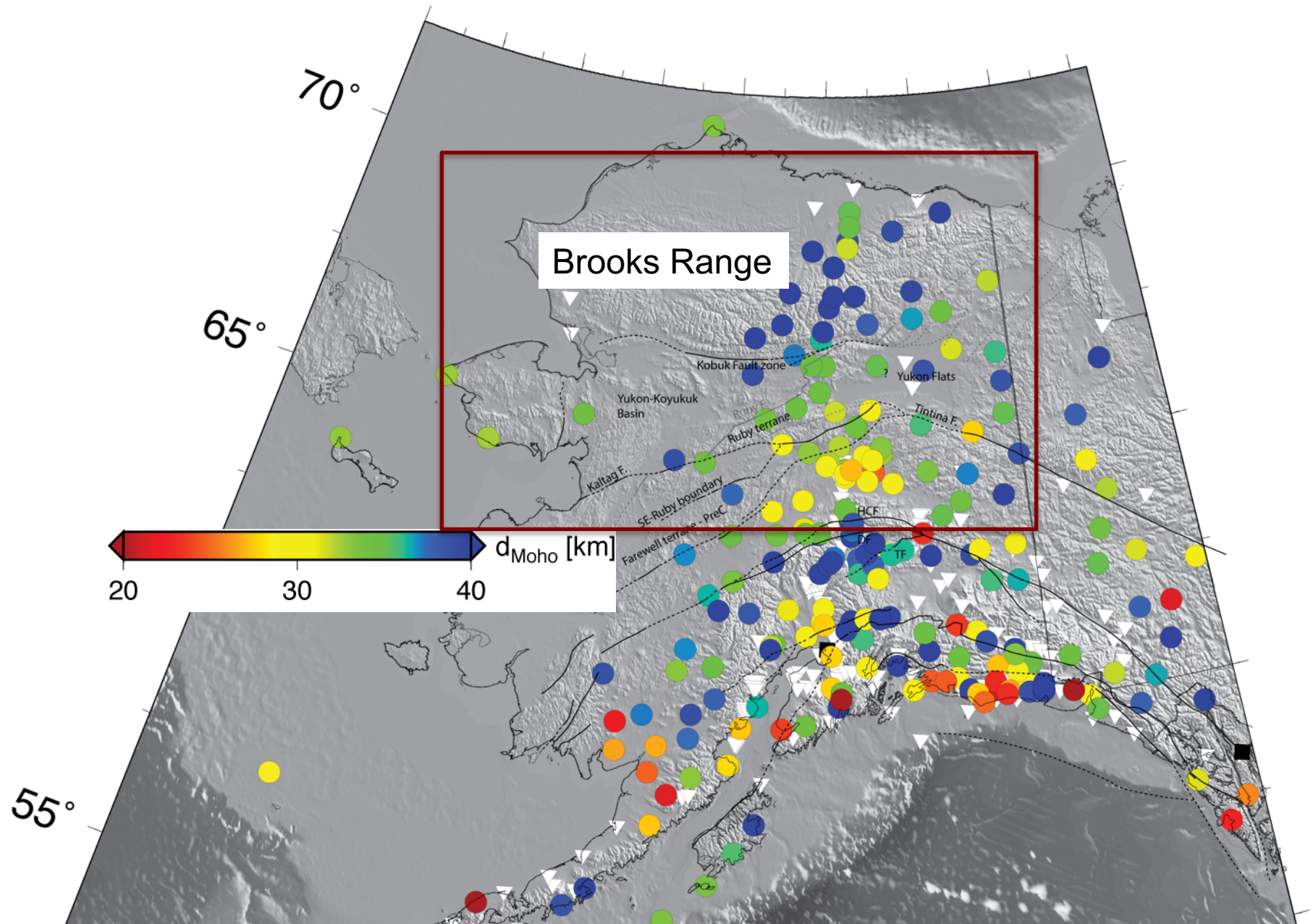


MSMiller Moho picks with major faults



Large Vertical Offsets of Moho Coincide with Major Mesozoic Transform Faults in Northern Alaska

Roeske, Sarah (UC Davis)
Till, Alison (USGS-Anchorage)
Miller, Meghan S., (ANU)
Saltus, Rick (NOAA-Boulder)
McClelland, Bill (Univ. Iowa)



Synthesis of Geologic Studies with Preliminary TA results

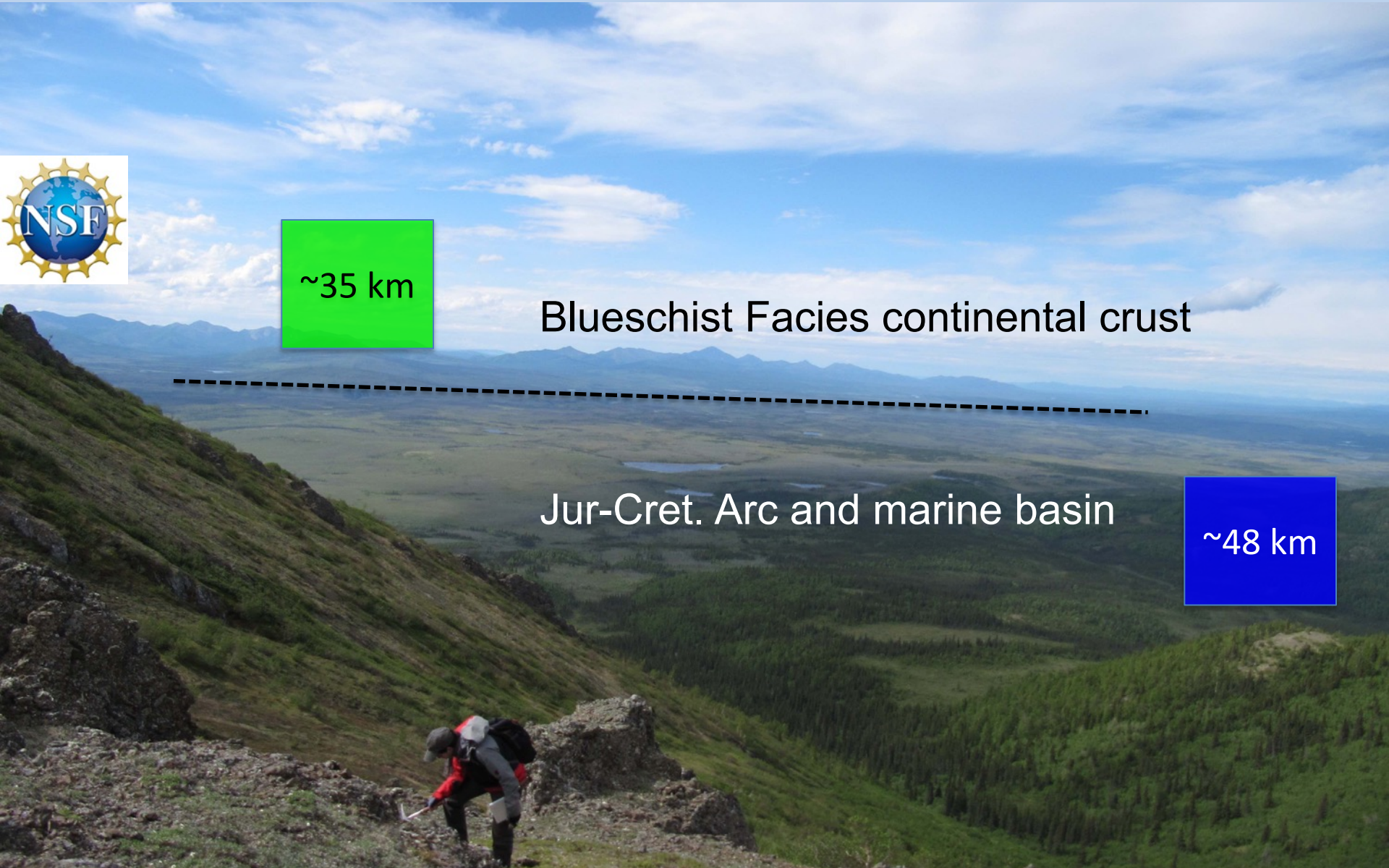


~35 km

Blueschist Facies continental crust

Jur-Cret. Arc and marine basin

~48 km



Synthesis of Geologic Studies with Preliminary TA results

Ruby fault – cryptic strike-slip terrane boundary formed during opening of the Canada Basin



~35 km

Blueschist Facies continental crust

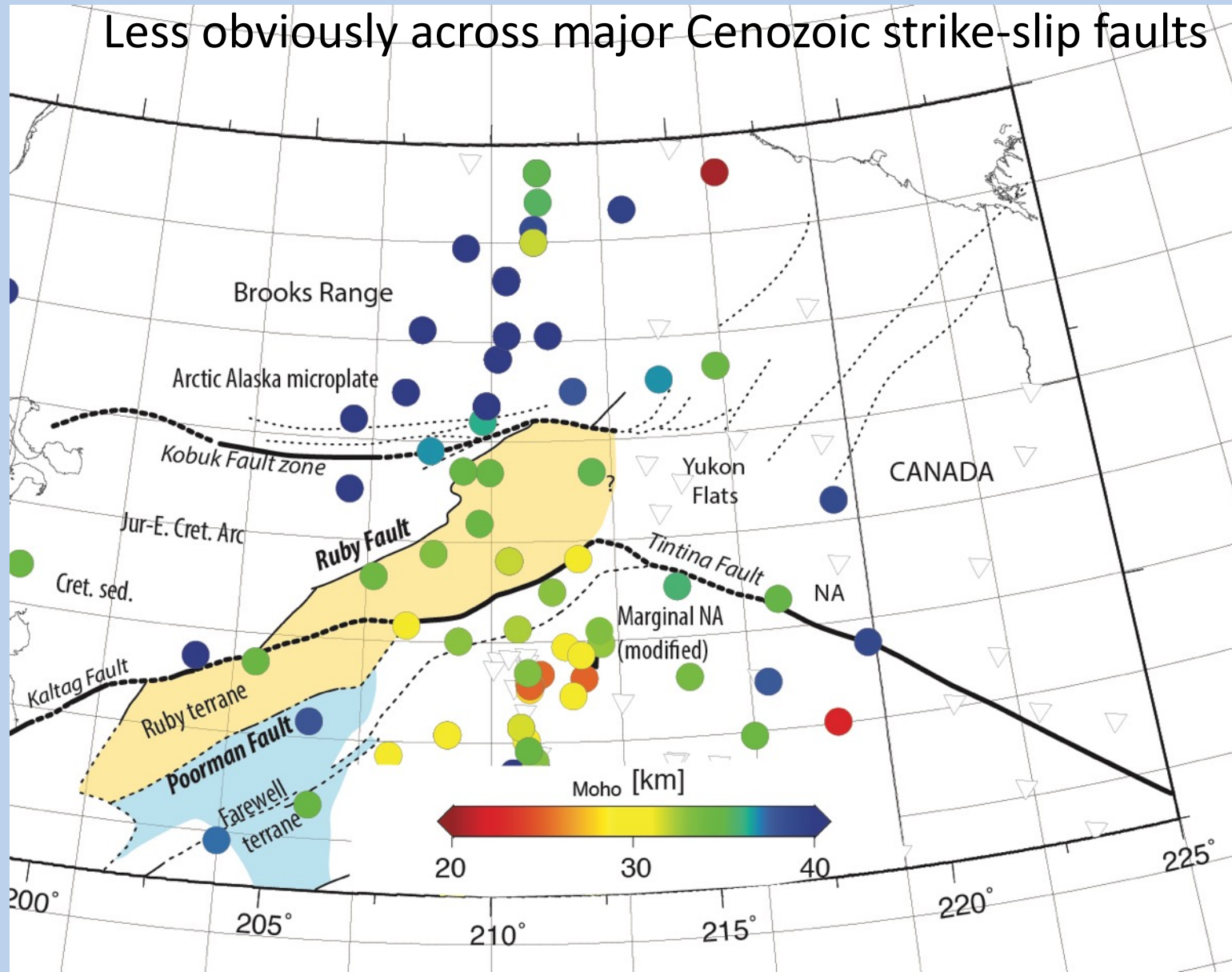
Jur-Cret. Arc and marine basin

~48 km



Significant steps in Moho across Mesozoic terrane-bounding faults

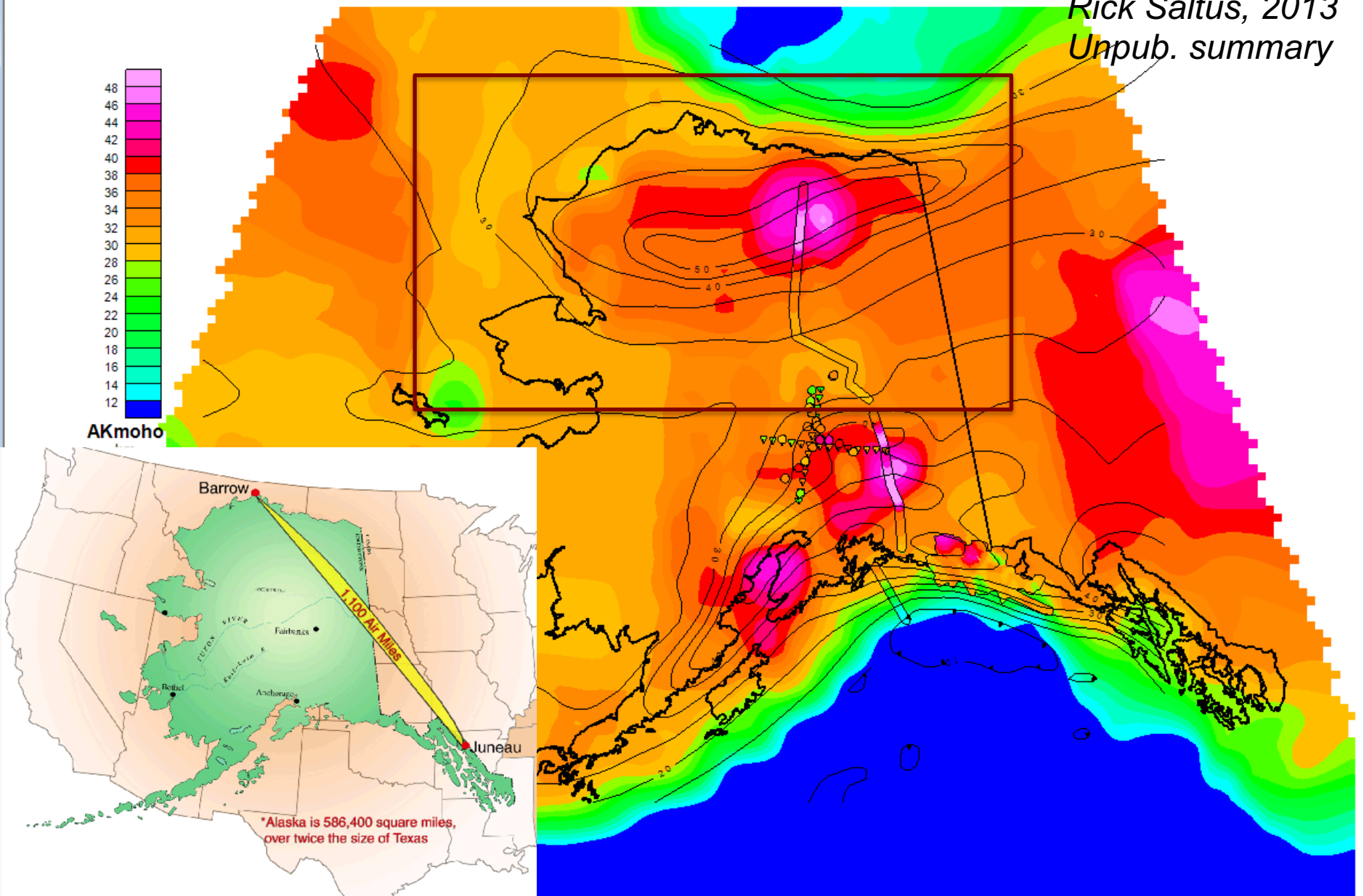
Less obviously across major Cenozoic strike-slip faults



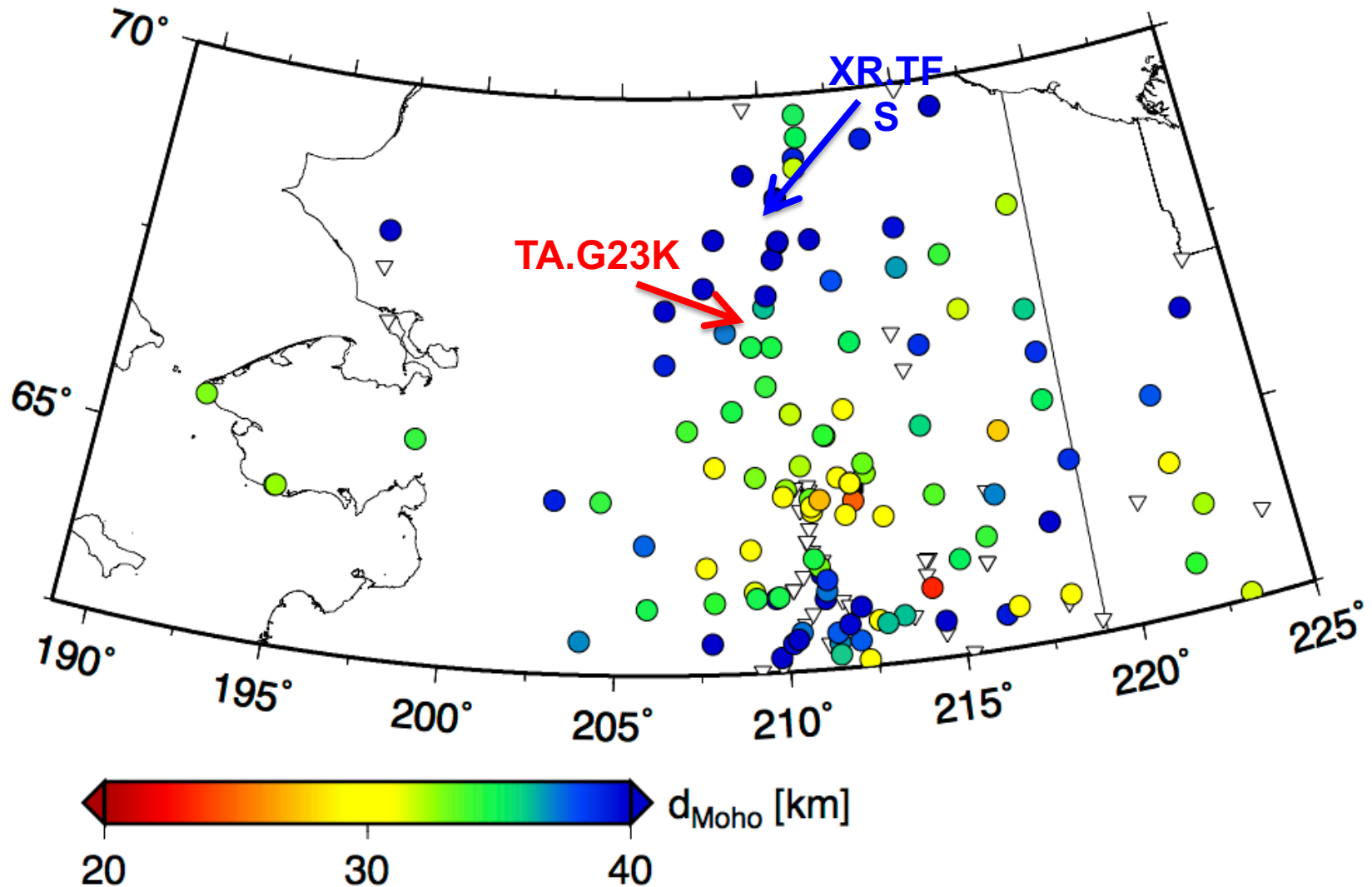
From Laske global moho model and geophysical transects

AKmohoKM.map

Rick Saltus, 2013
Unpub. summary

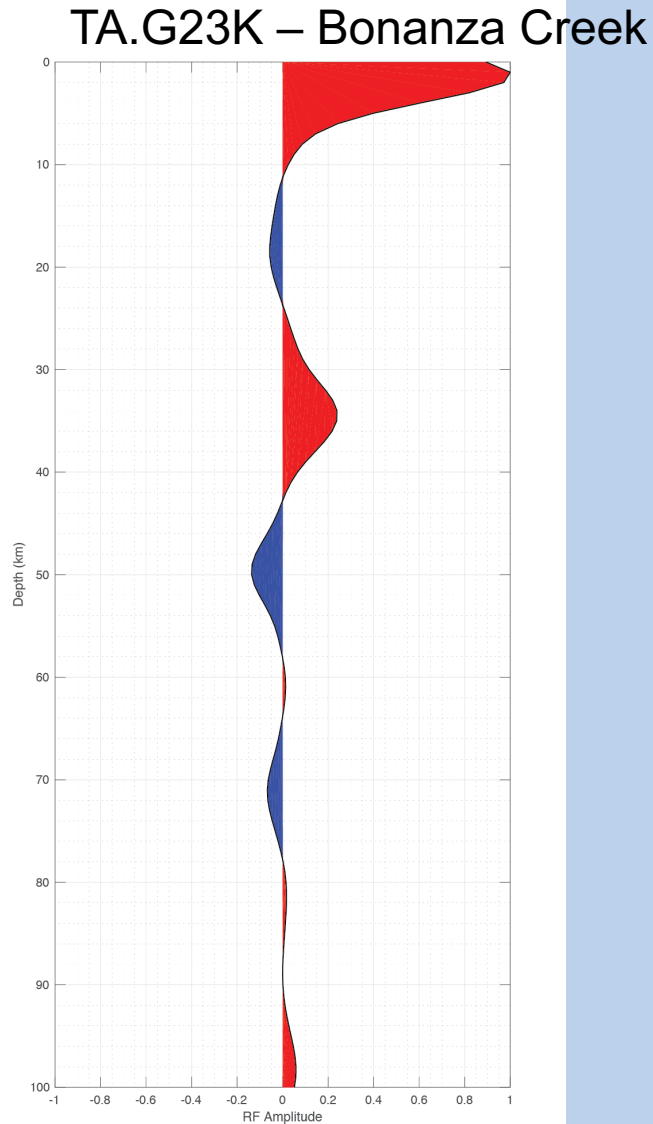


Methods – Receiver Function Stacks



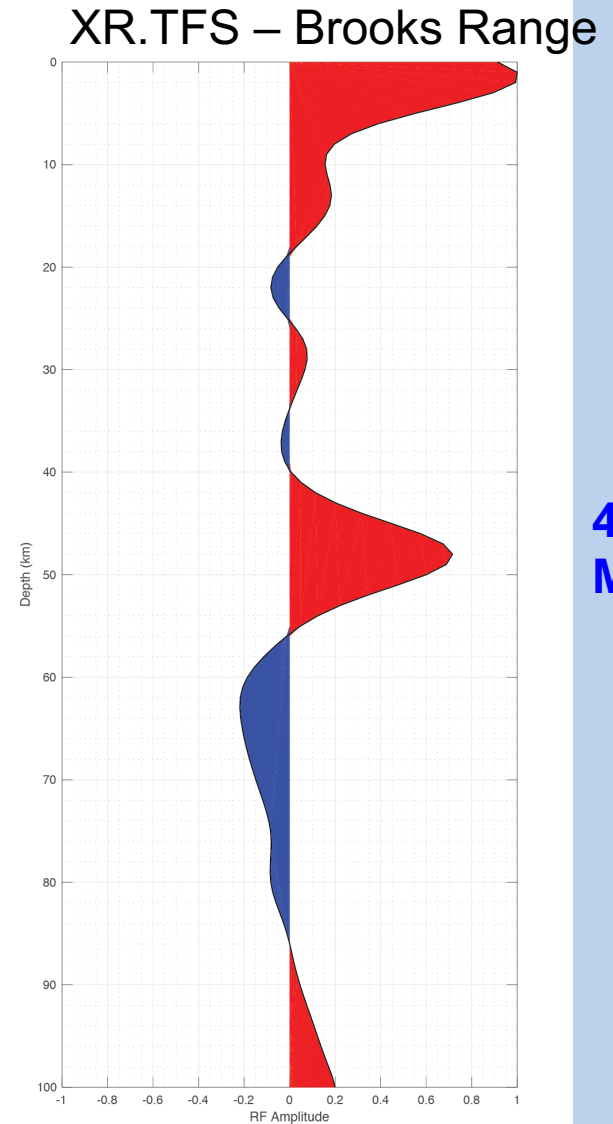
Receiver function stacks – Moho picks

**35 km
Moho**



36 receiver functions

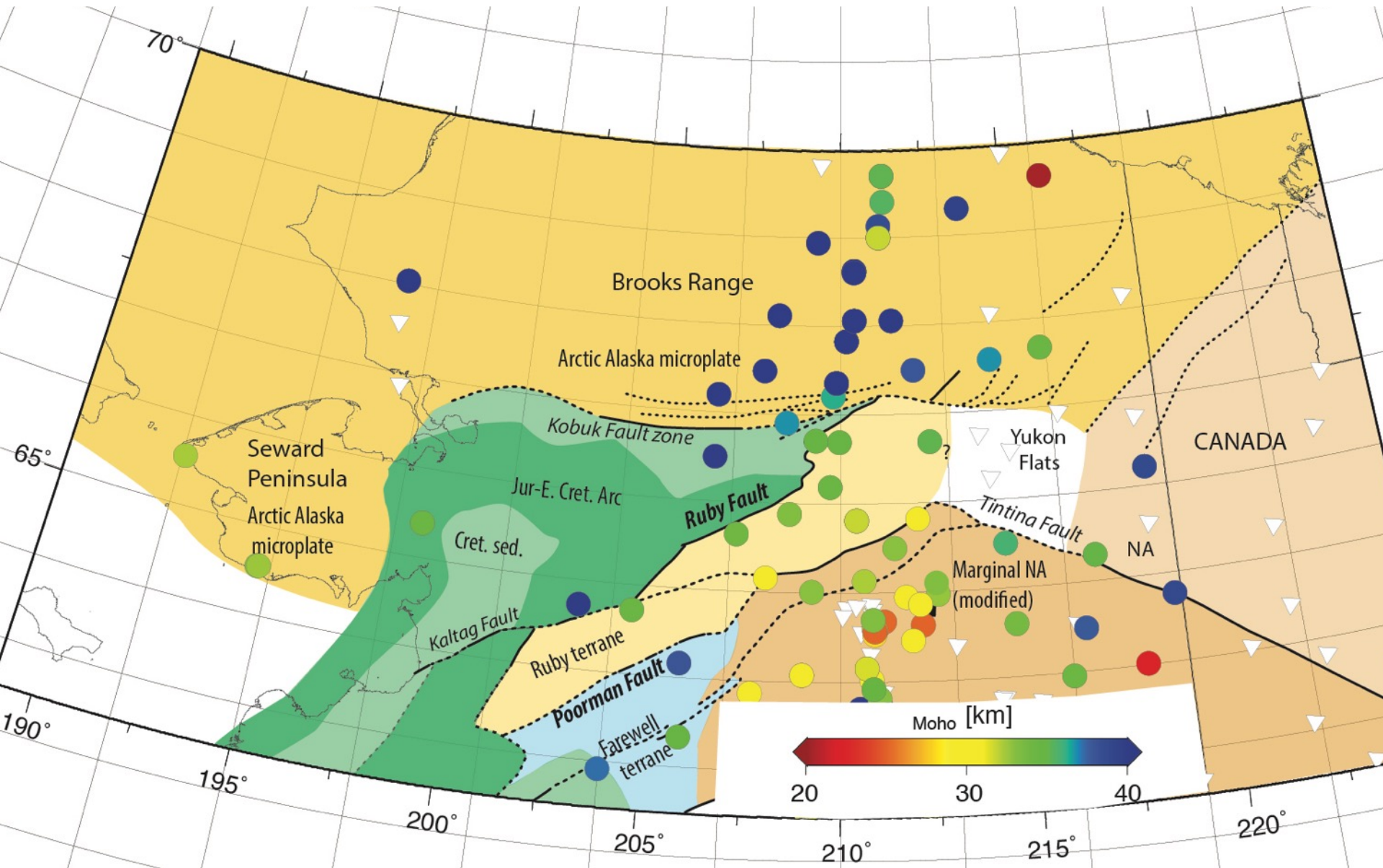
**48 km
Moho**



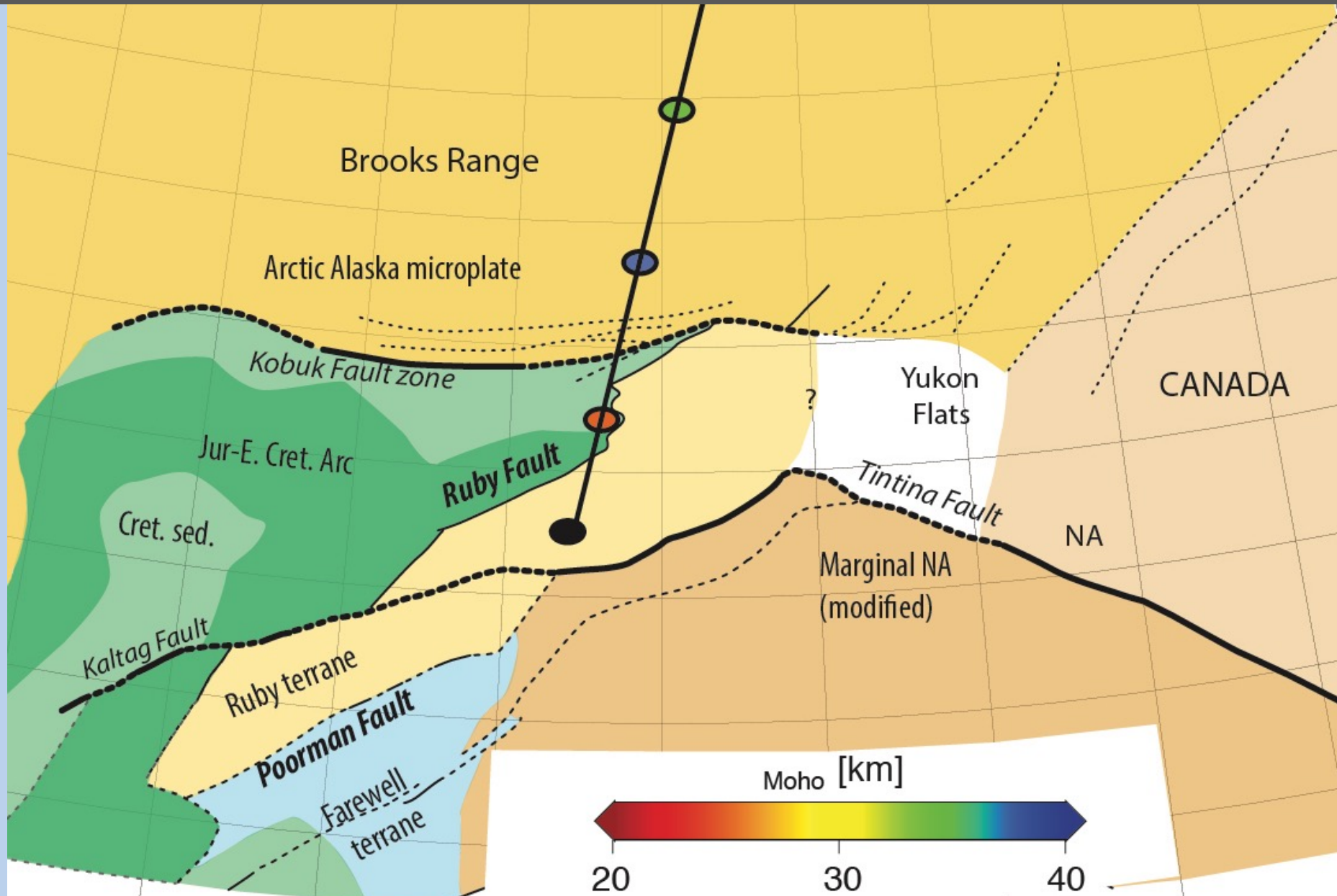
99 receiver functions

Terranes of Northern Alaska

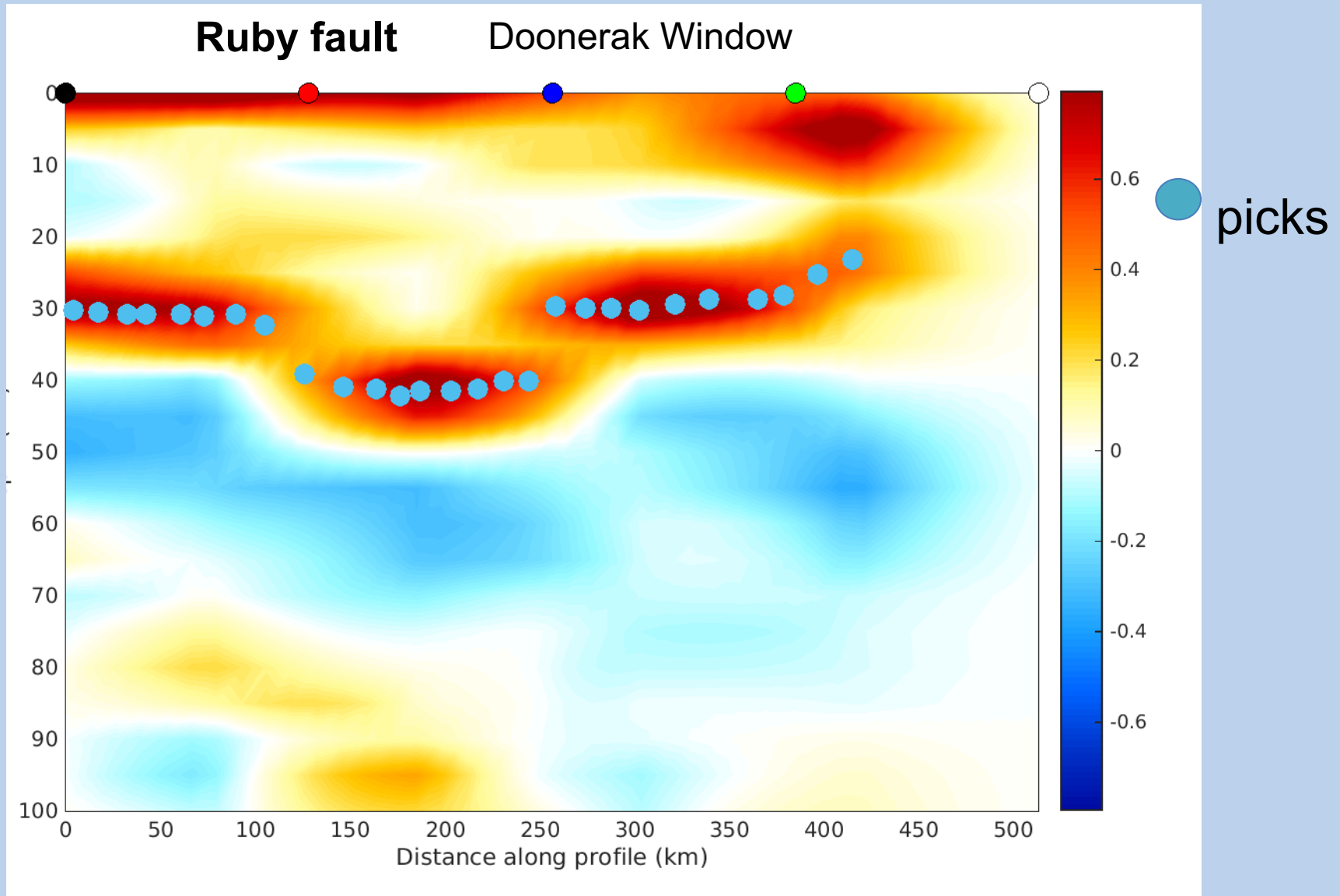
Continental Margin Wraps Around Ocean Island Arc



Mesozoic terrane-bounding fault, the Ruby fault, is a high-angle fault

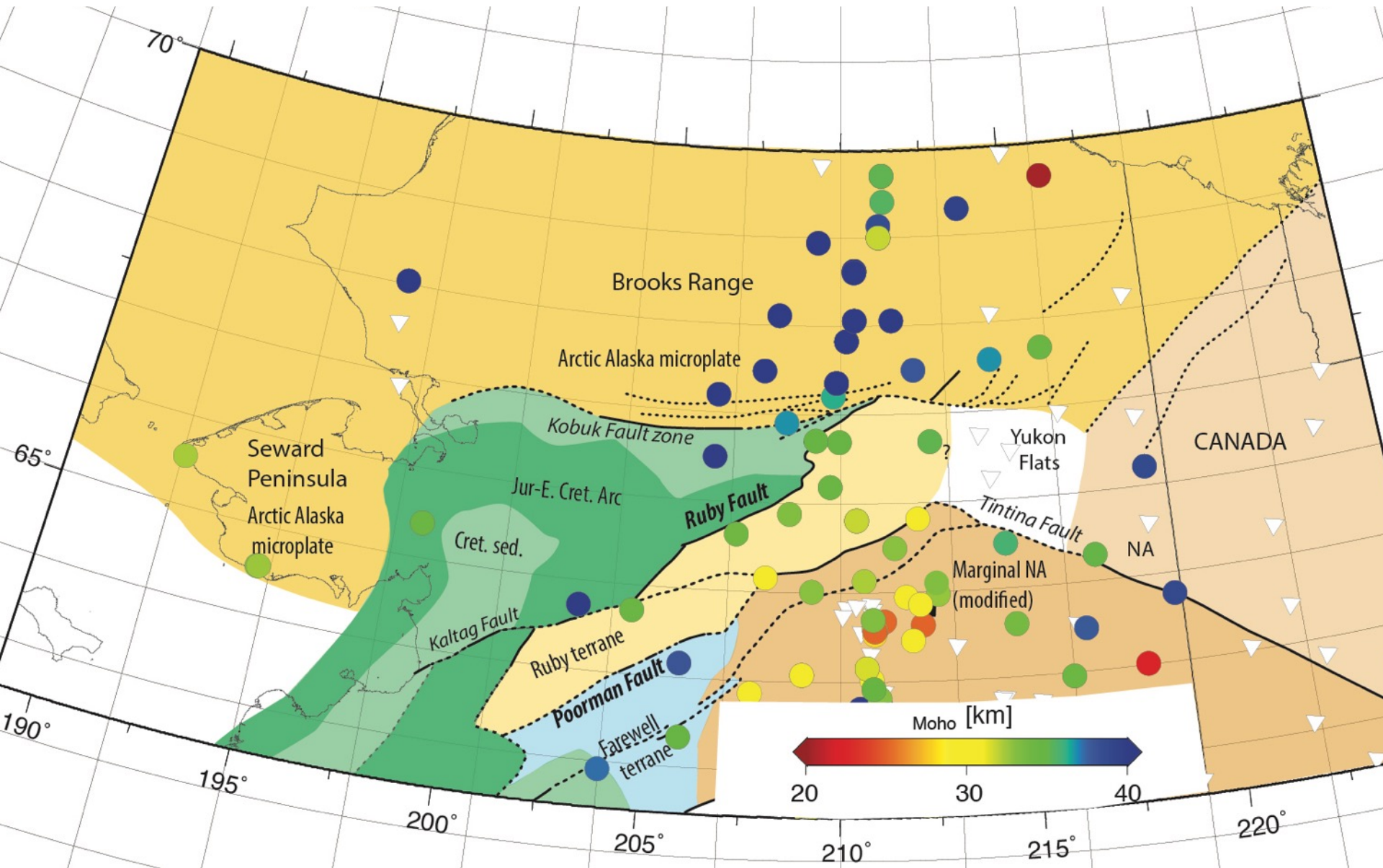


Cross-section through CCP image – Moho picks



Terranes of Northern Alaska

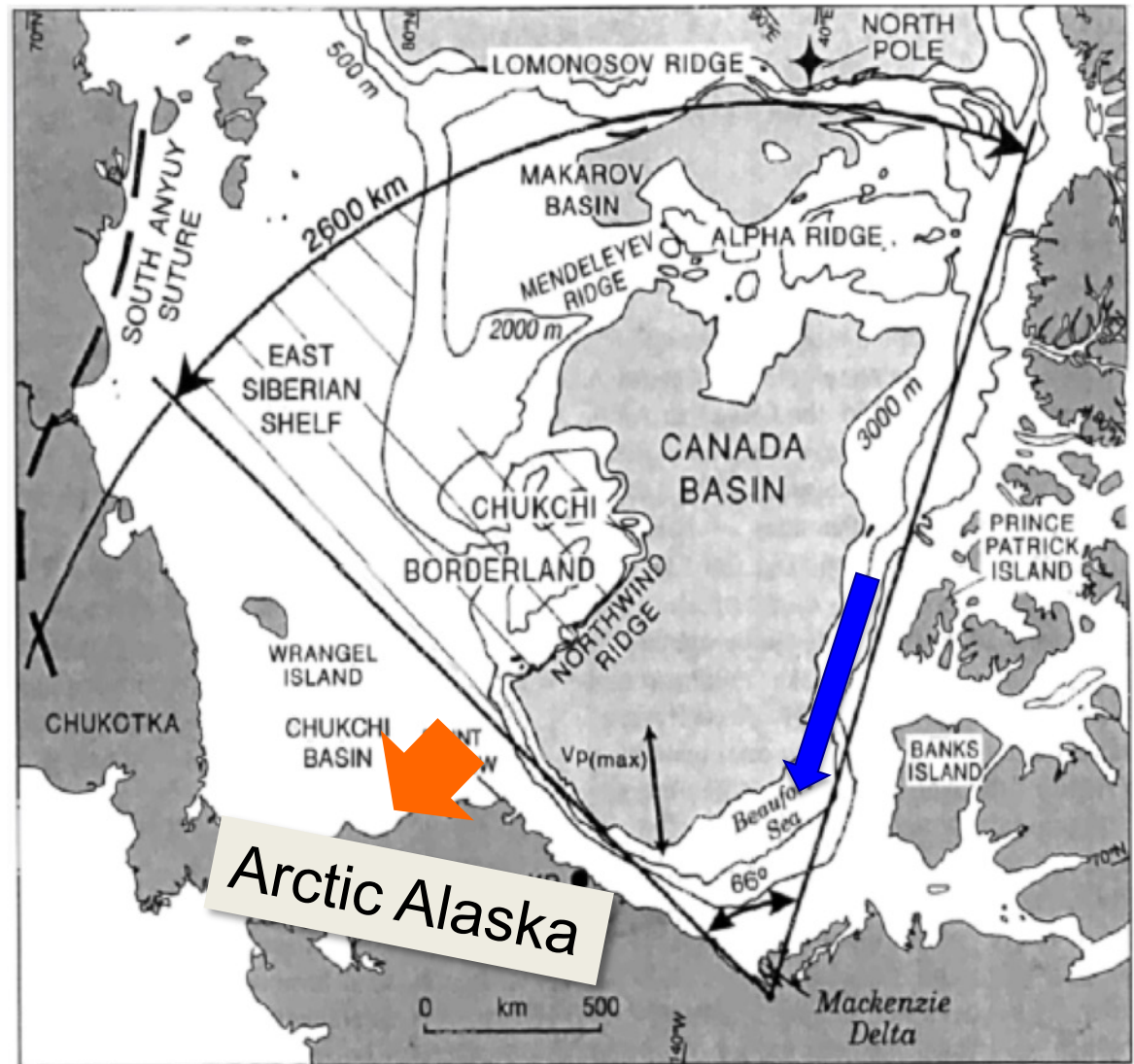
Continental Margin Wraps Around Ocean Island Arc



Two hypotheses for opening of the Amerasian basin

CCW rotation
("Windshield wiper
model")

Sinistral Transform

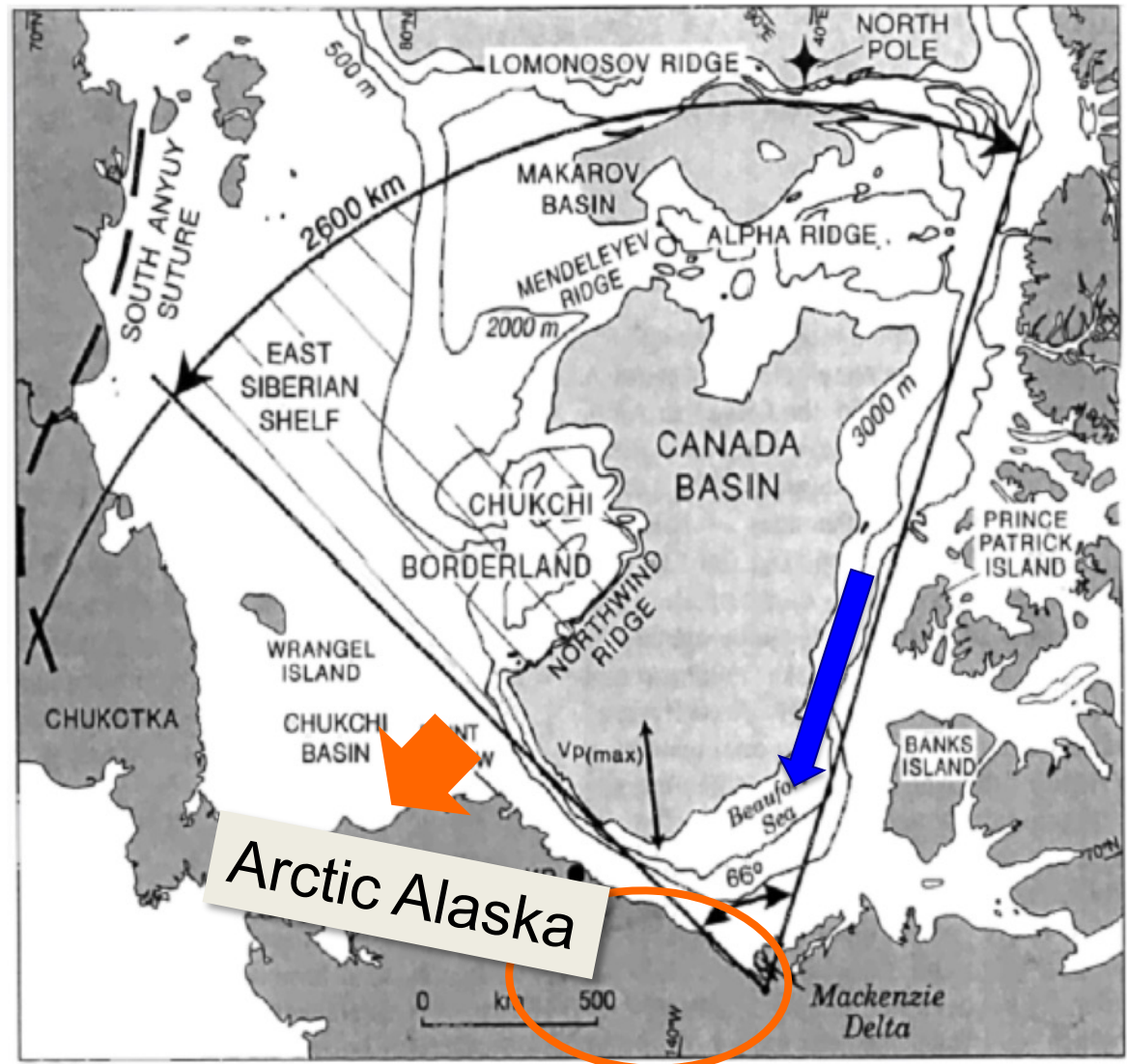


Two hypotheses for opening of the Amerasian basin

CCW rotation
("Windshield wiper
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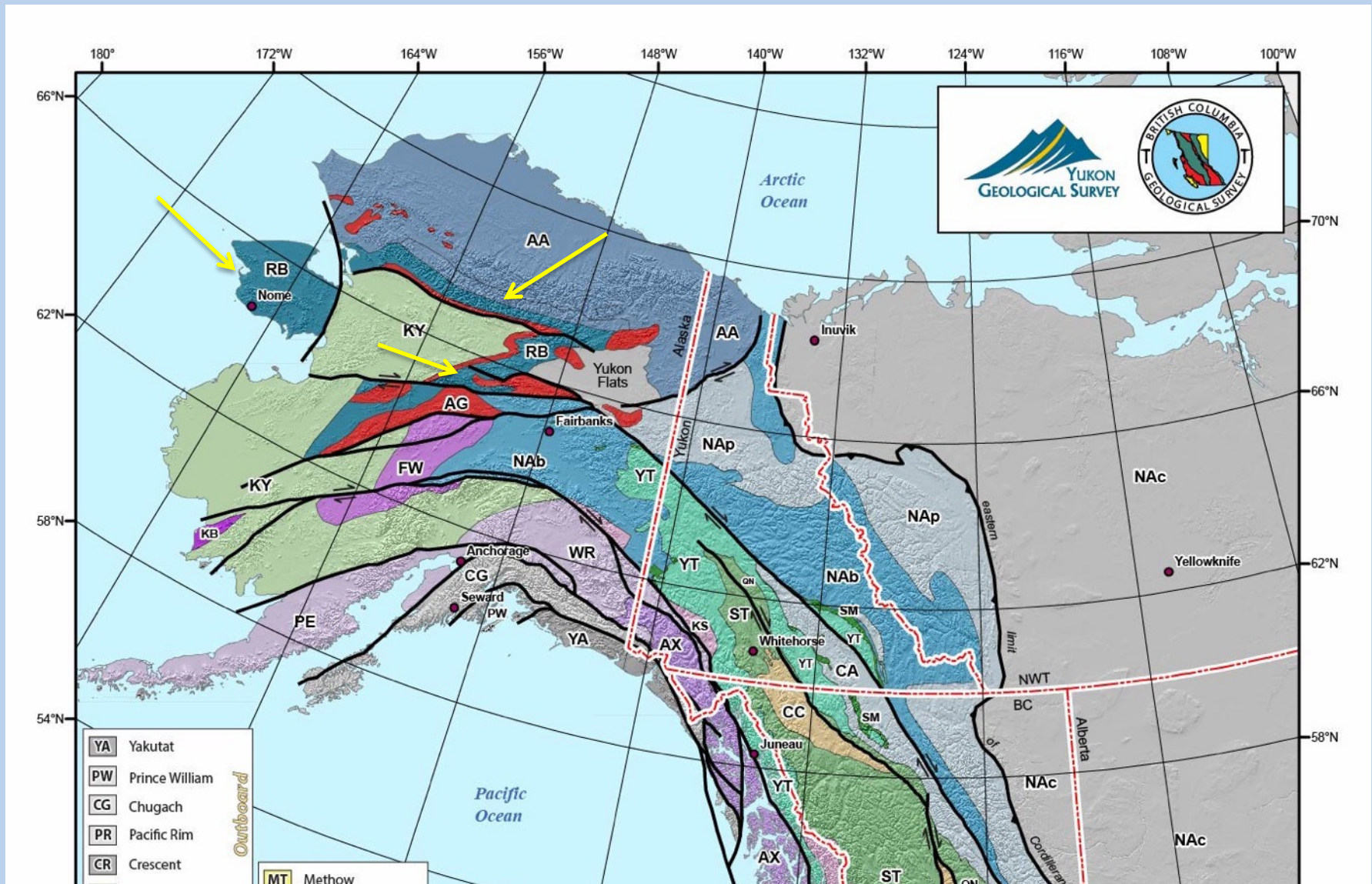
Sinistral Transform

Focus on
structure(s) that
accommodated
movement in
vicinity of the
pole of rotation.



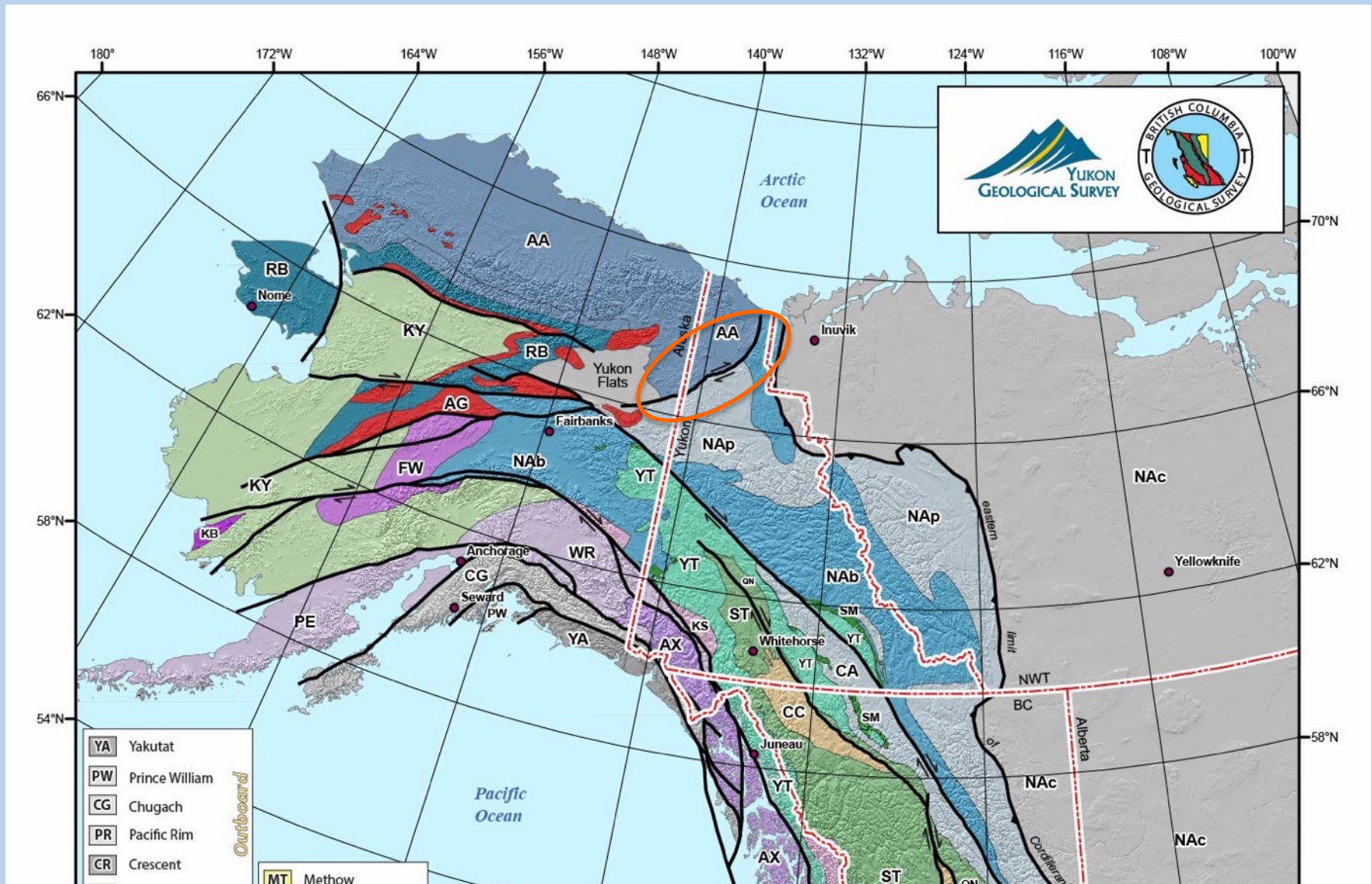
Terranes of N. Cordillera dominated by continental margins and basement, as old as 2.0 Ga

Colpron and Nelson 2011

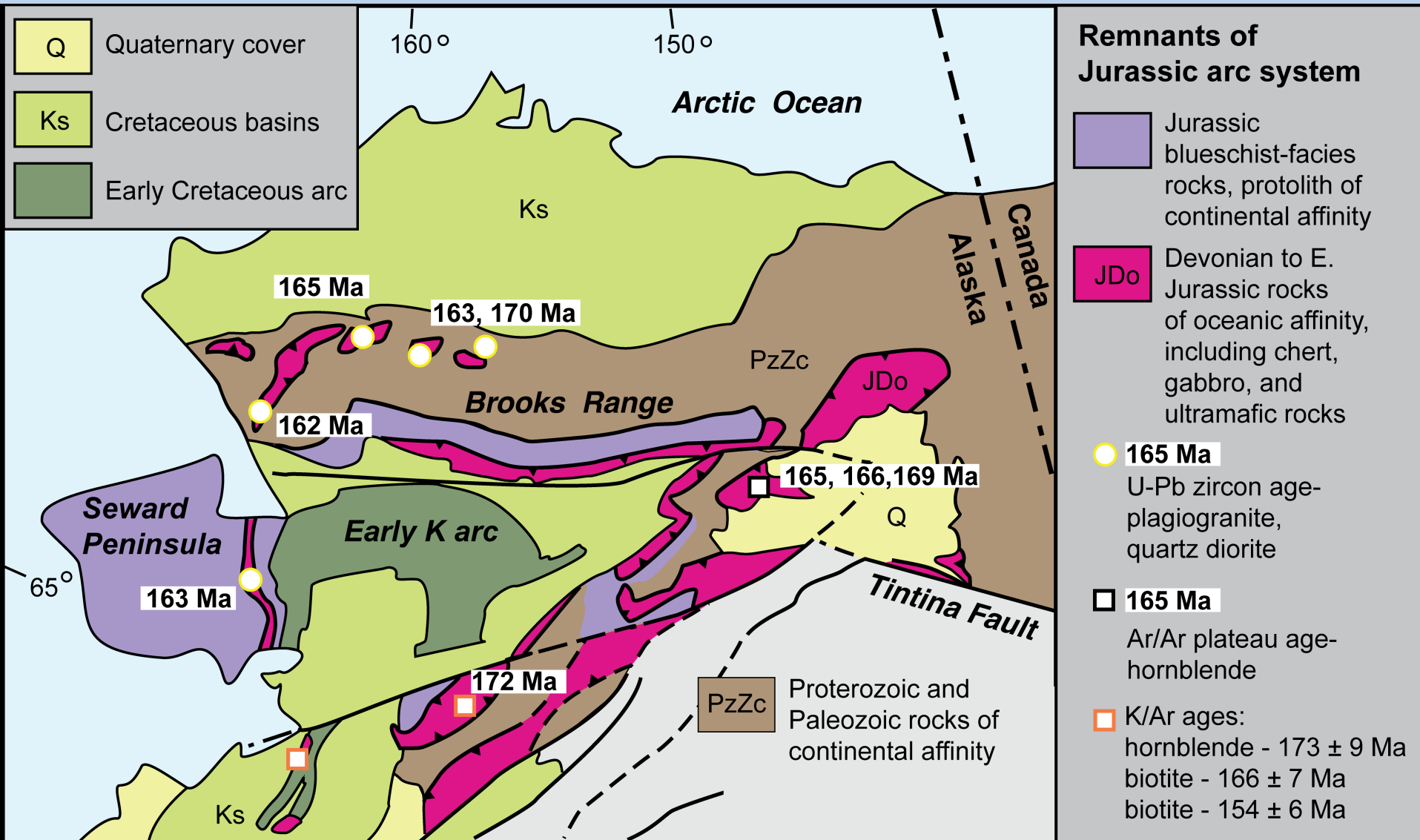


Terranes of N. Cordillera dominated by continental margins and basement, as old as 2.0 Ga

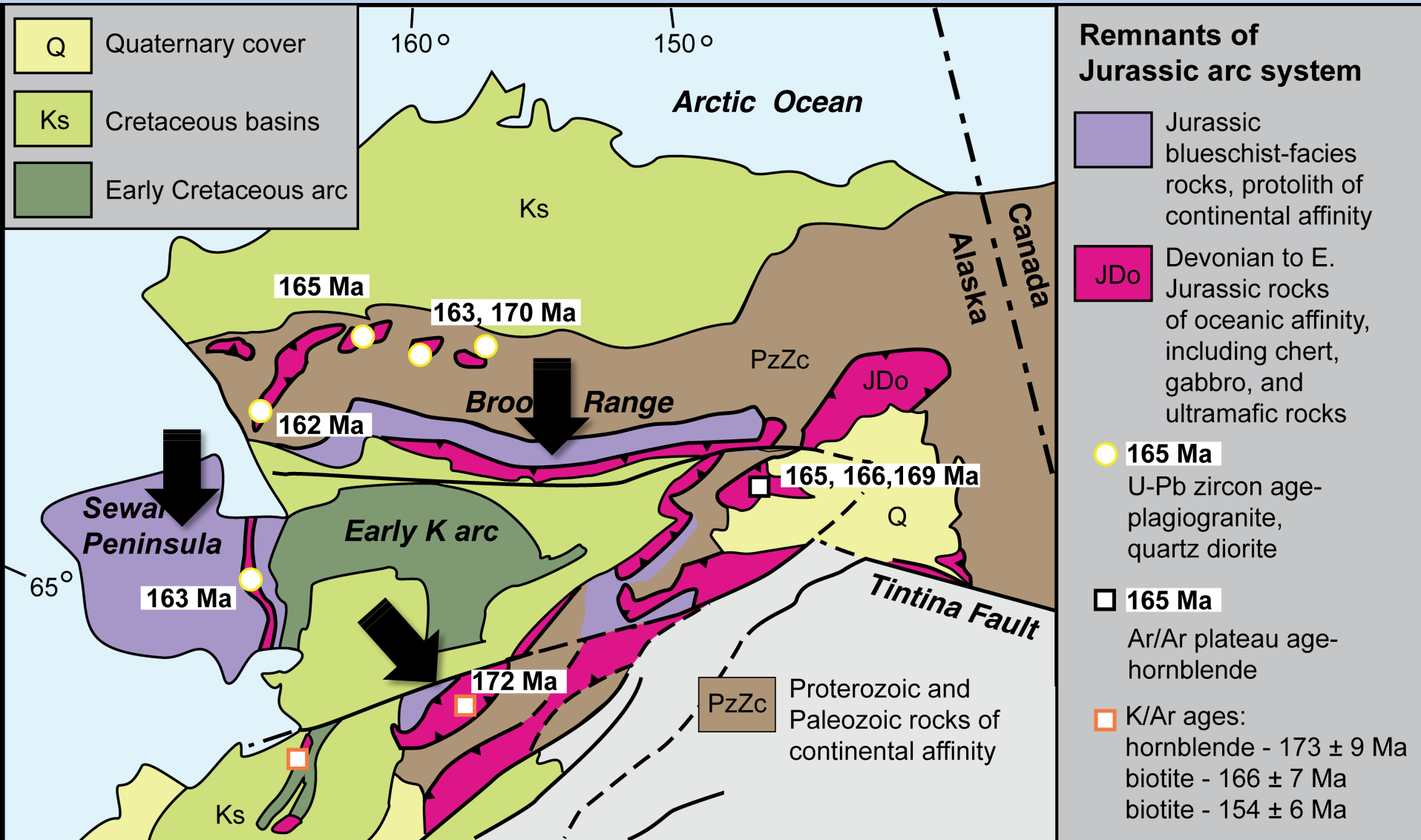
Colpron and Nelson 2011



Shared tectonic history of Seward – southern Brooks Range – Ruby from ~180 – 145 Ma



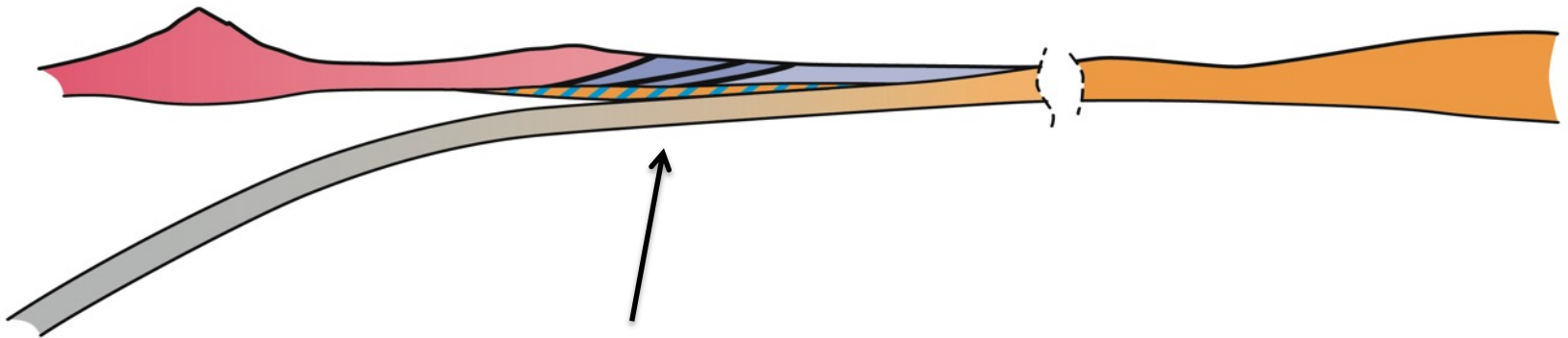
Shared tectonic history of Seward – southern Brooks Range – Ruby from ~180 – 145 Ma



Initial phase of continental margin – subduction zone interaction

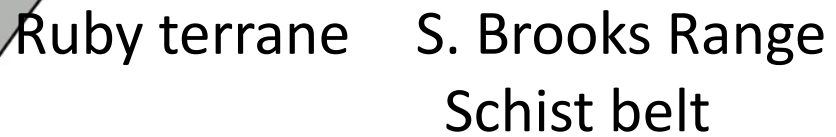
~155 Ma

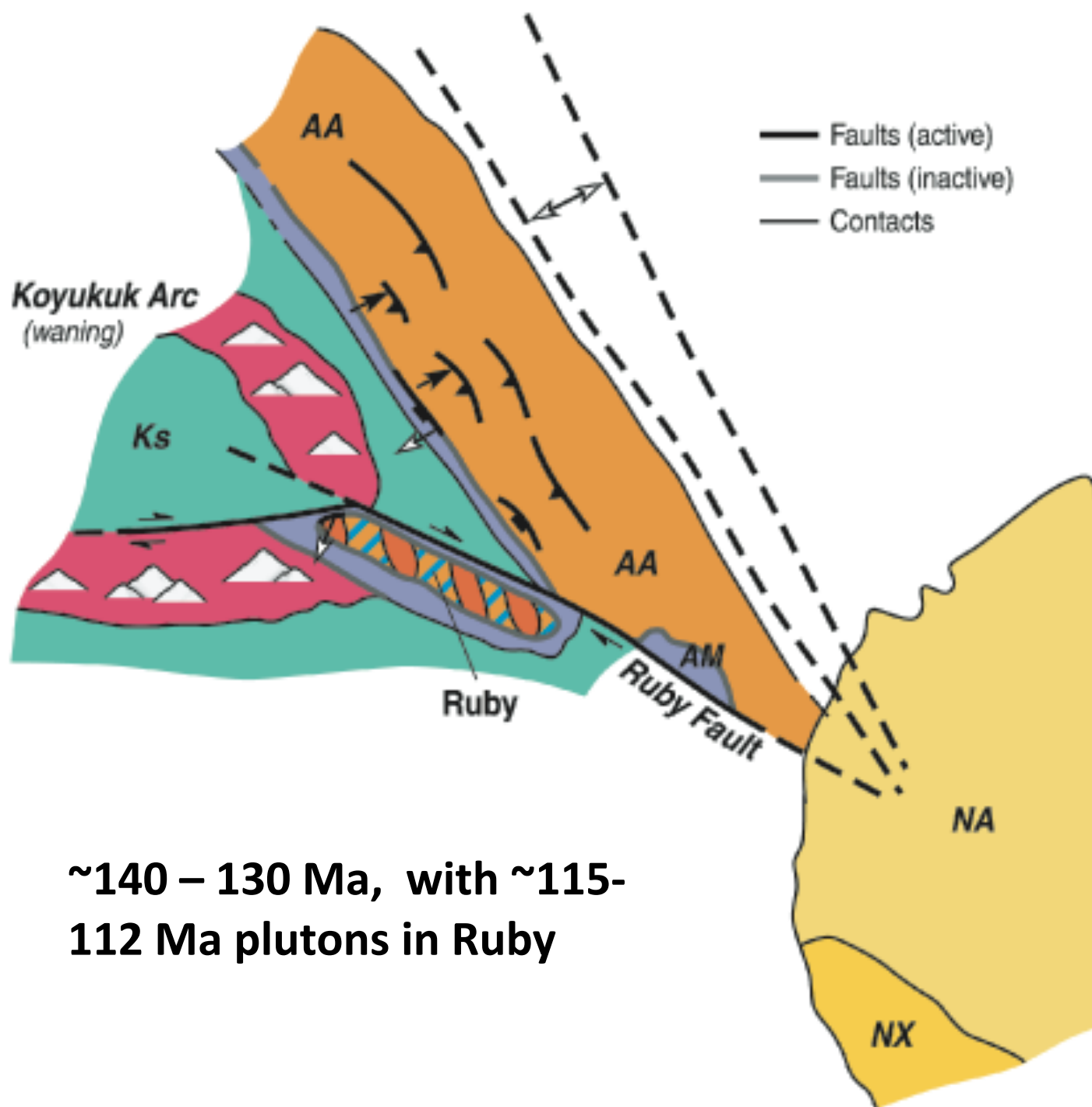
Koyukuk Arc



Thinned continental margin of AAC subducted,
underplated beneath forearc/accretionary complex

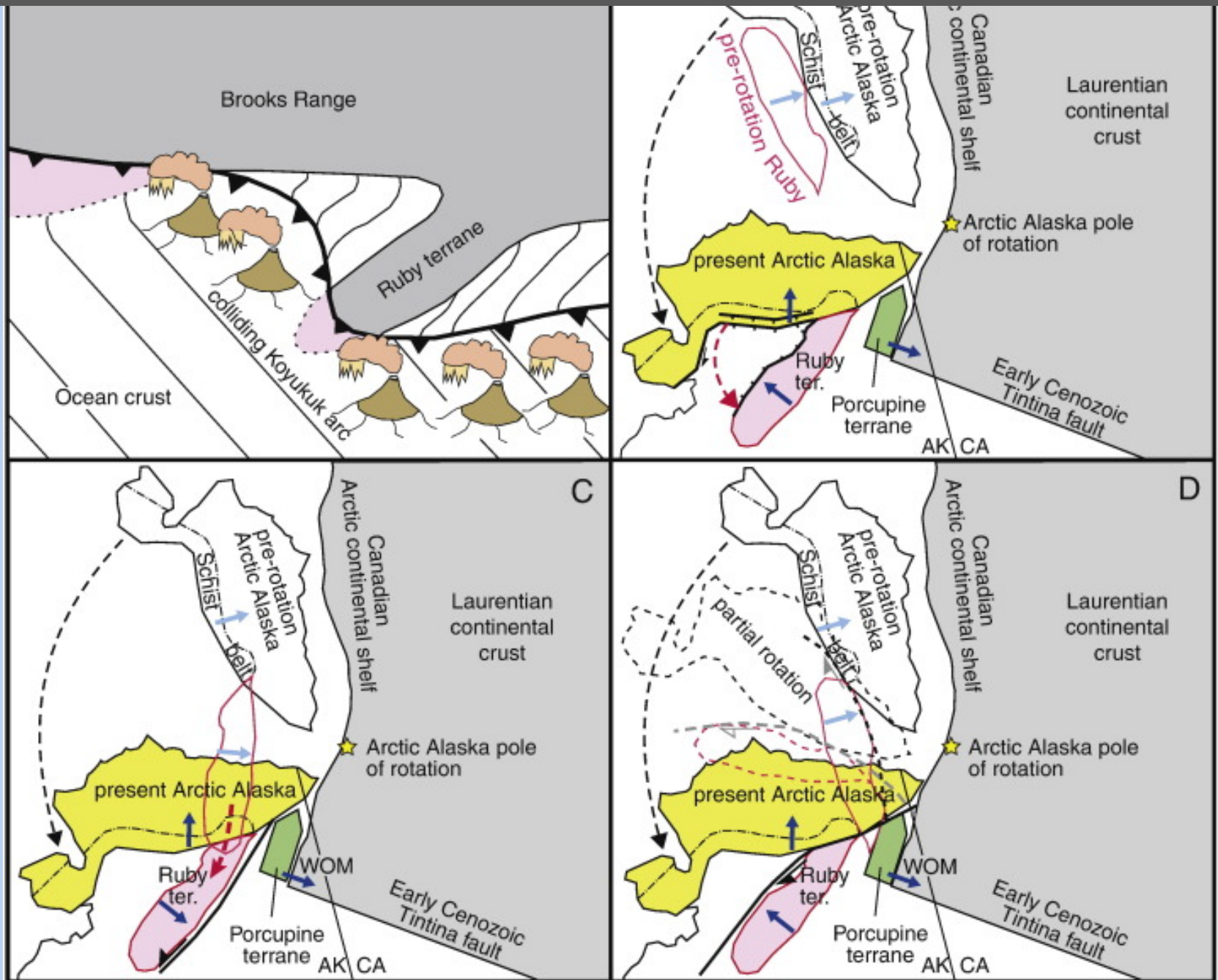
~140-130 Ma





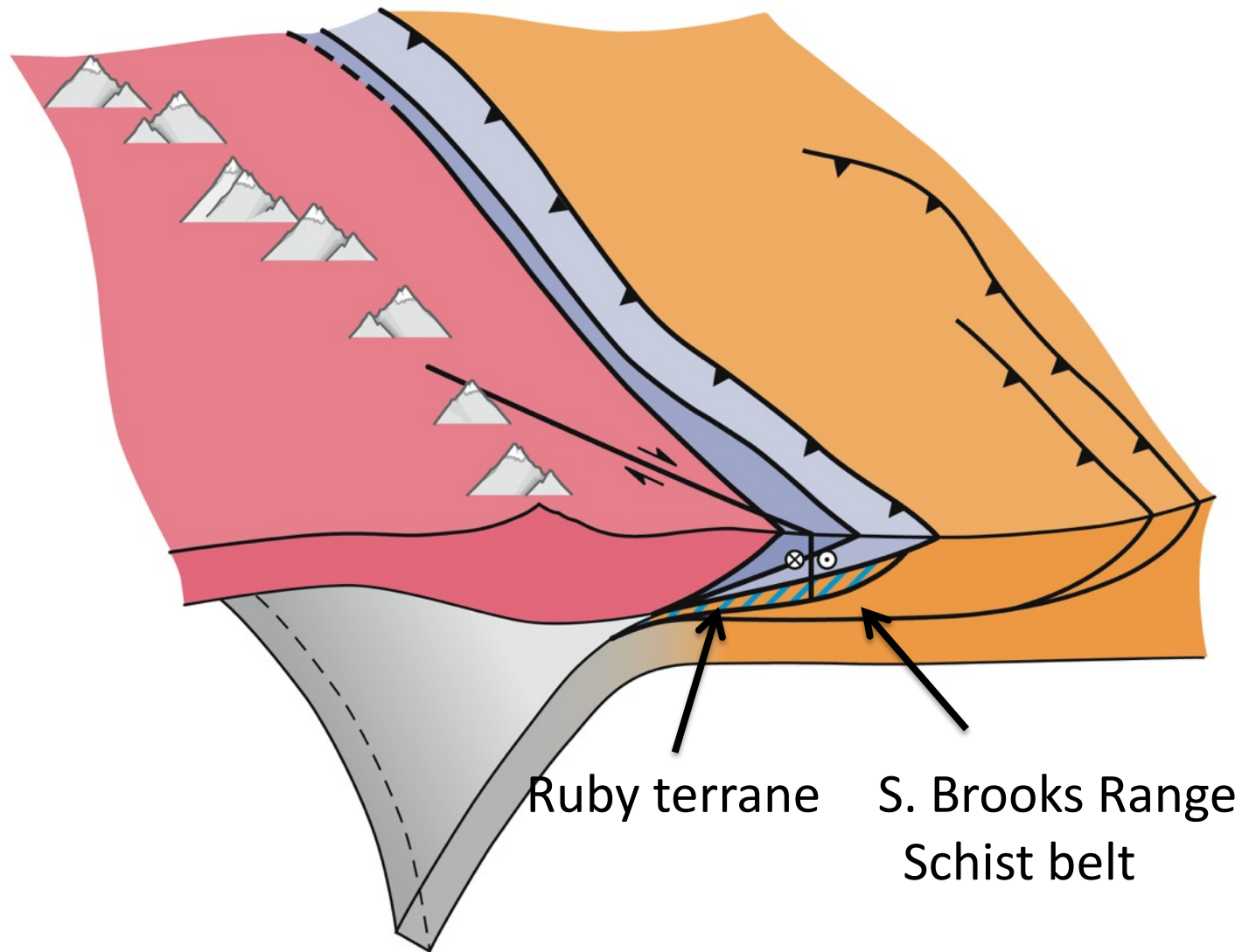
~140 – 130 Ma, with ~115-112 Ma plutons in Ruby

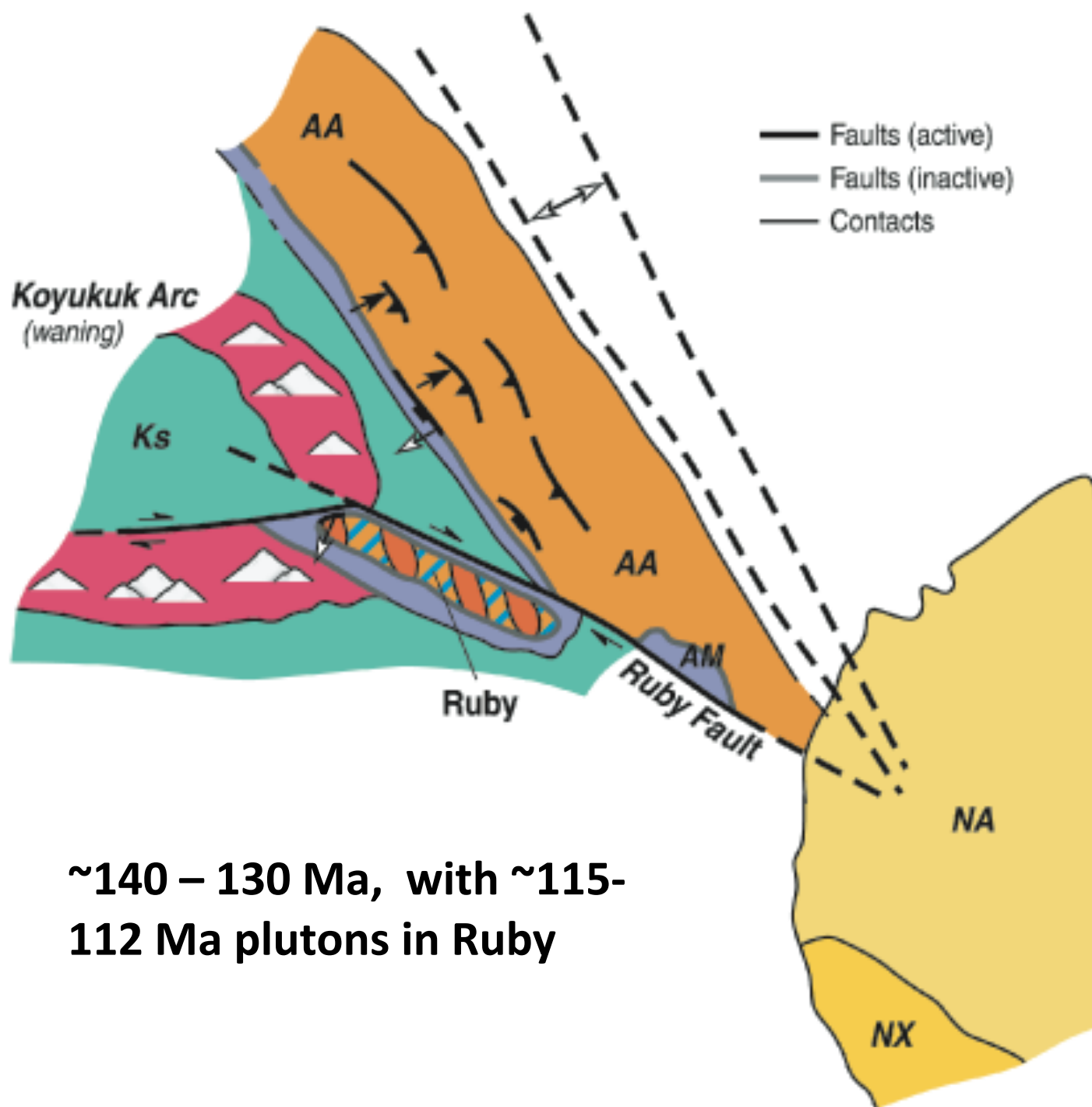
Role of Ruby Terrane in Opening of Canada Basin (Moore & Box 2016)



Subduction to Collision stage of orogen

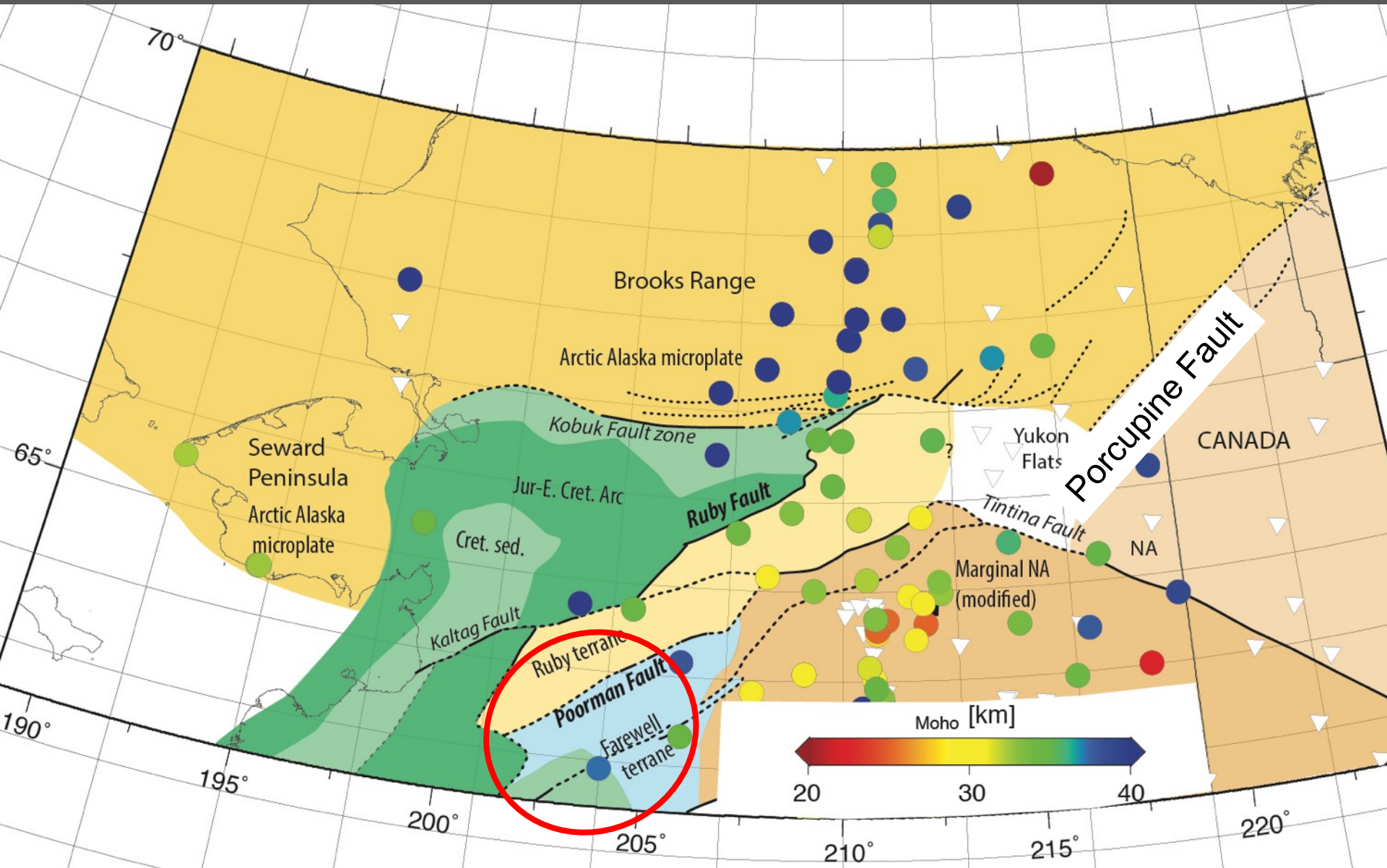
~140-130 Ma





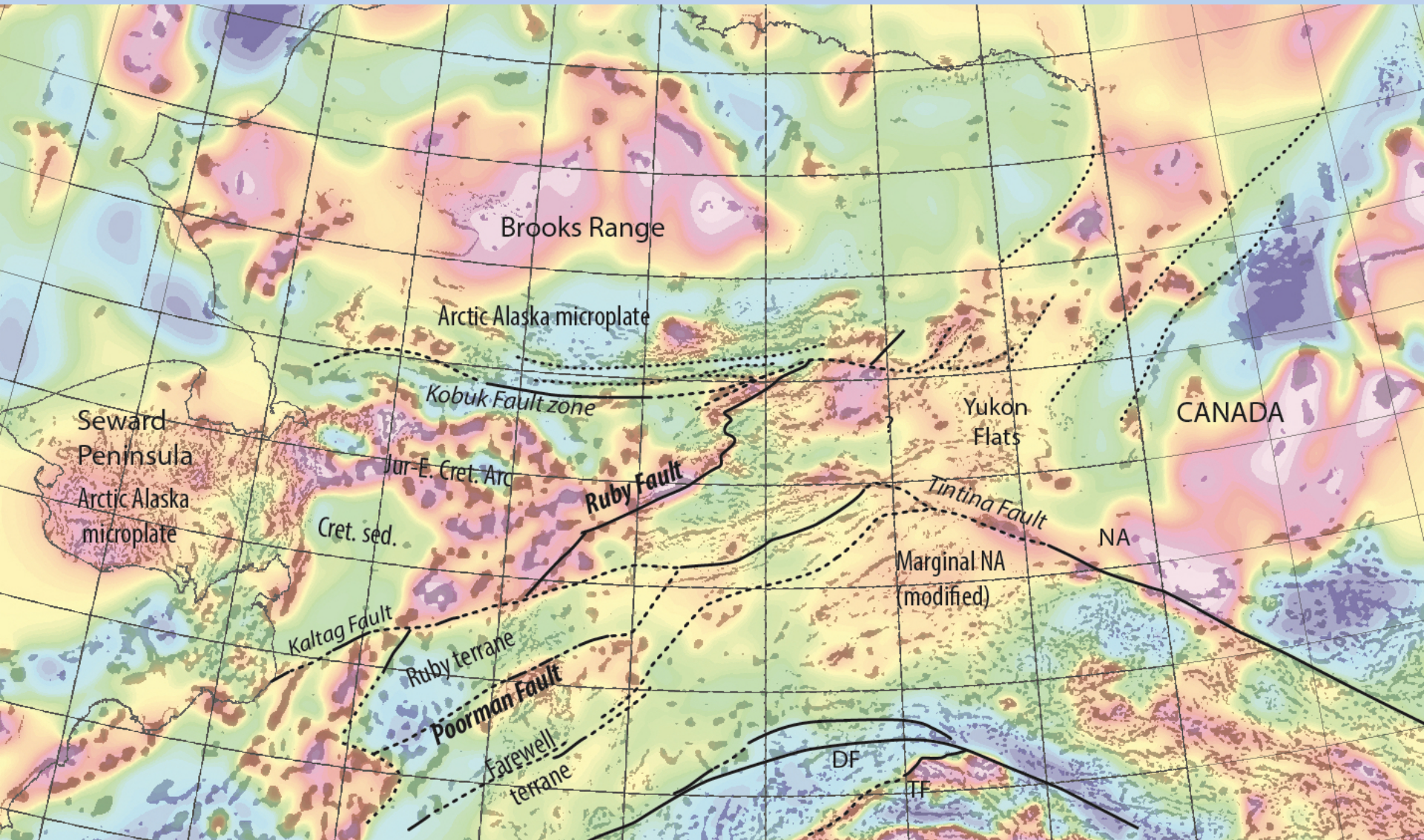
**~140 – 130 Ma, with ~115-
112 Ma plutons in Ruby**

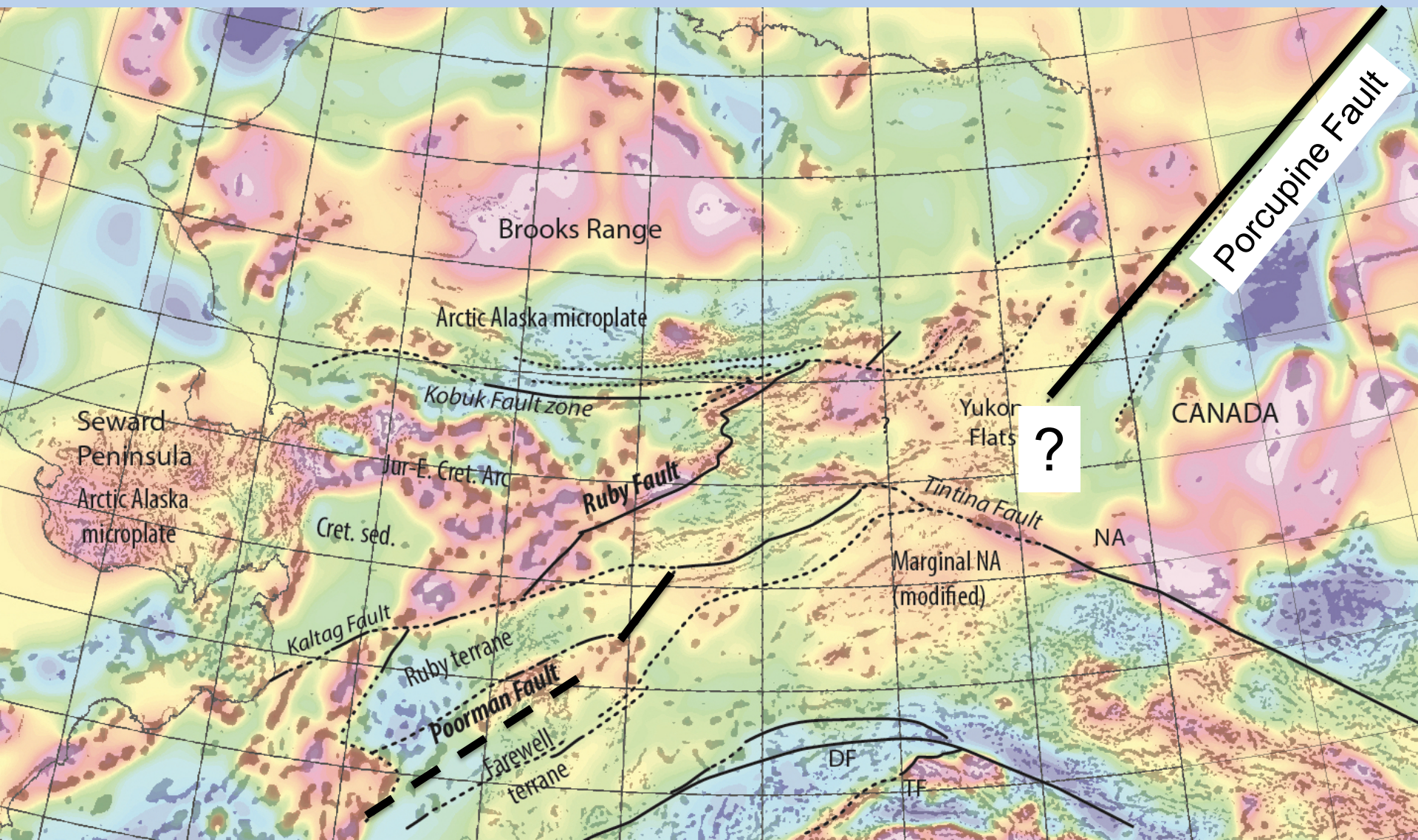
Faults between Arctic Alaska Microplate (Mesozoic) and other Continental Crust



Aeromagnetic Anomalies map provided by Rick Saltus

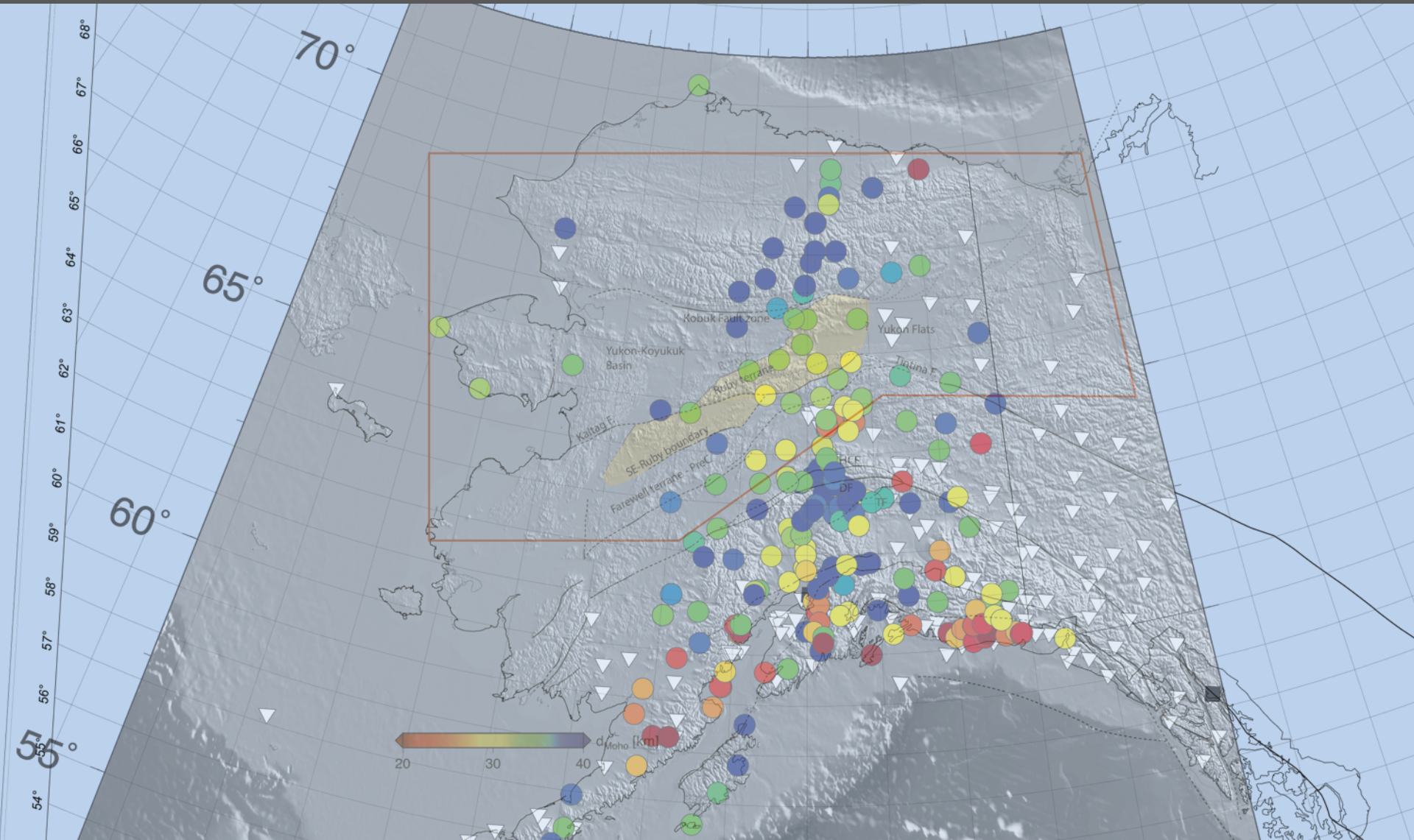
Filtered up 10 Km

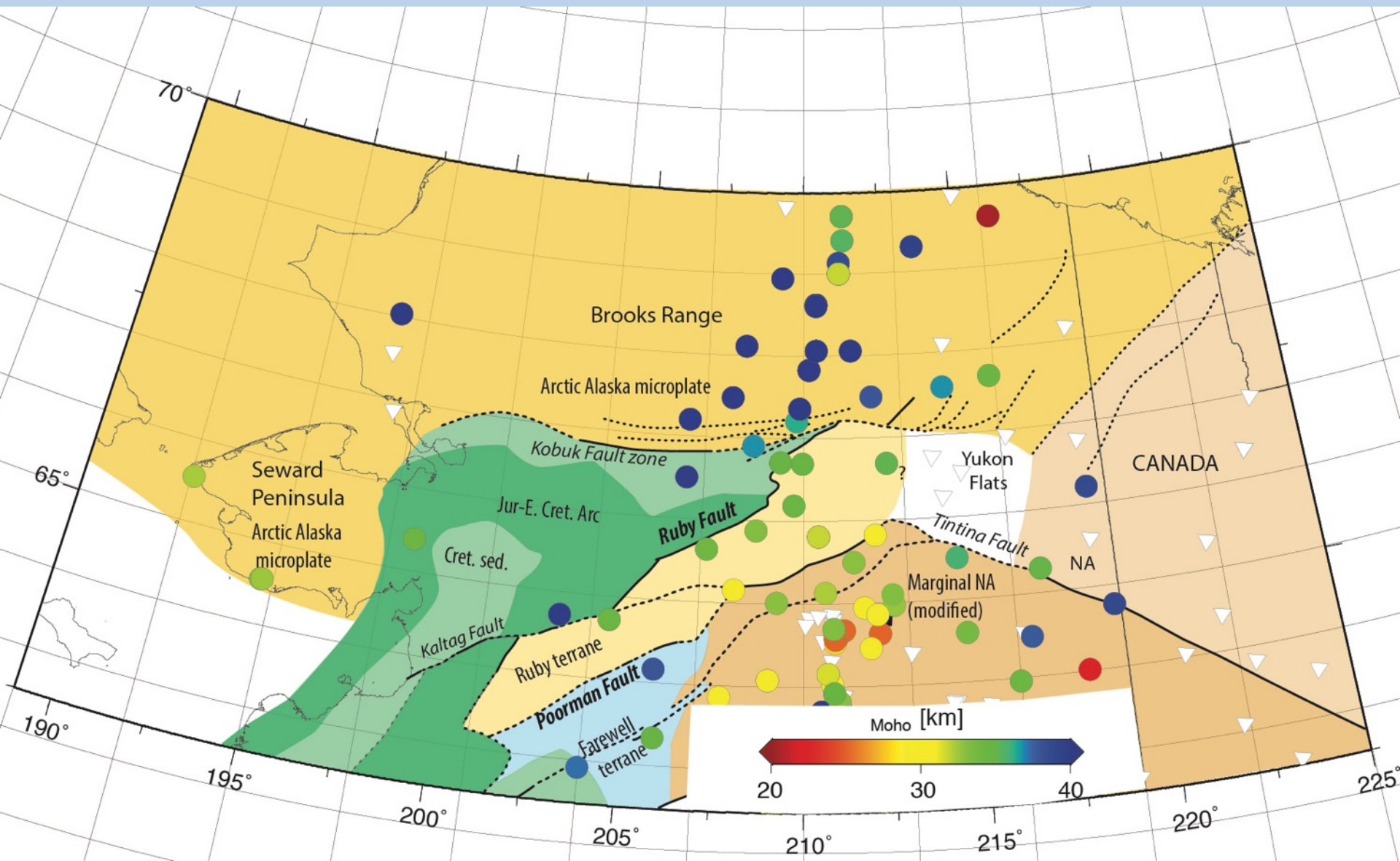




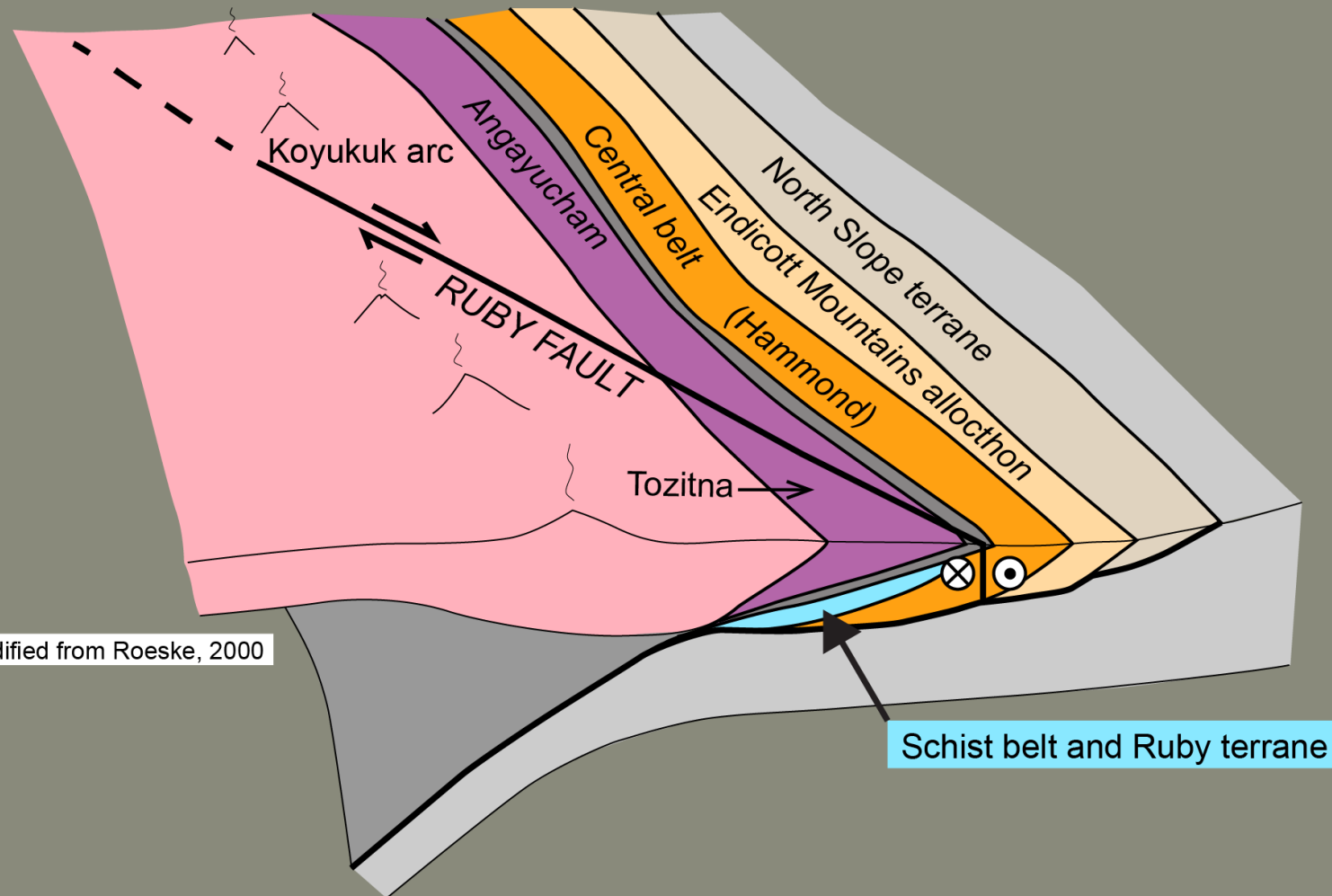
Earthscope AK – Amazing Progress Already

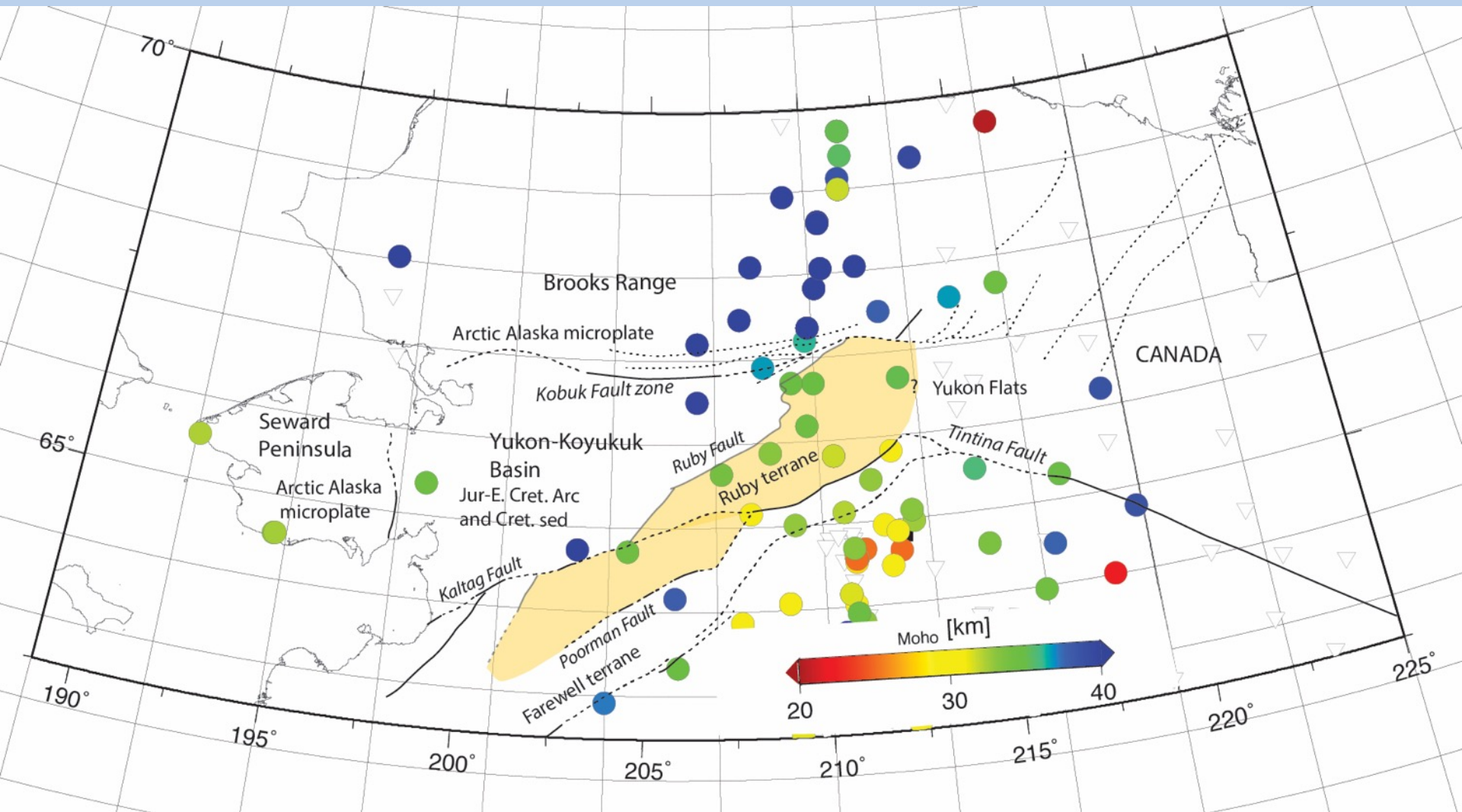
Tectonicists Eagerly Await New Stations and Crustal Scale Interpretations





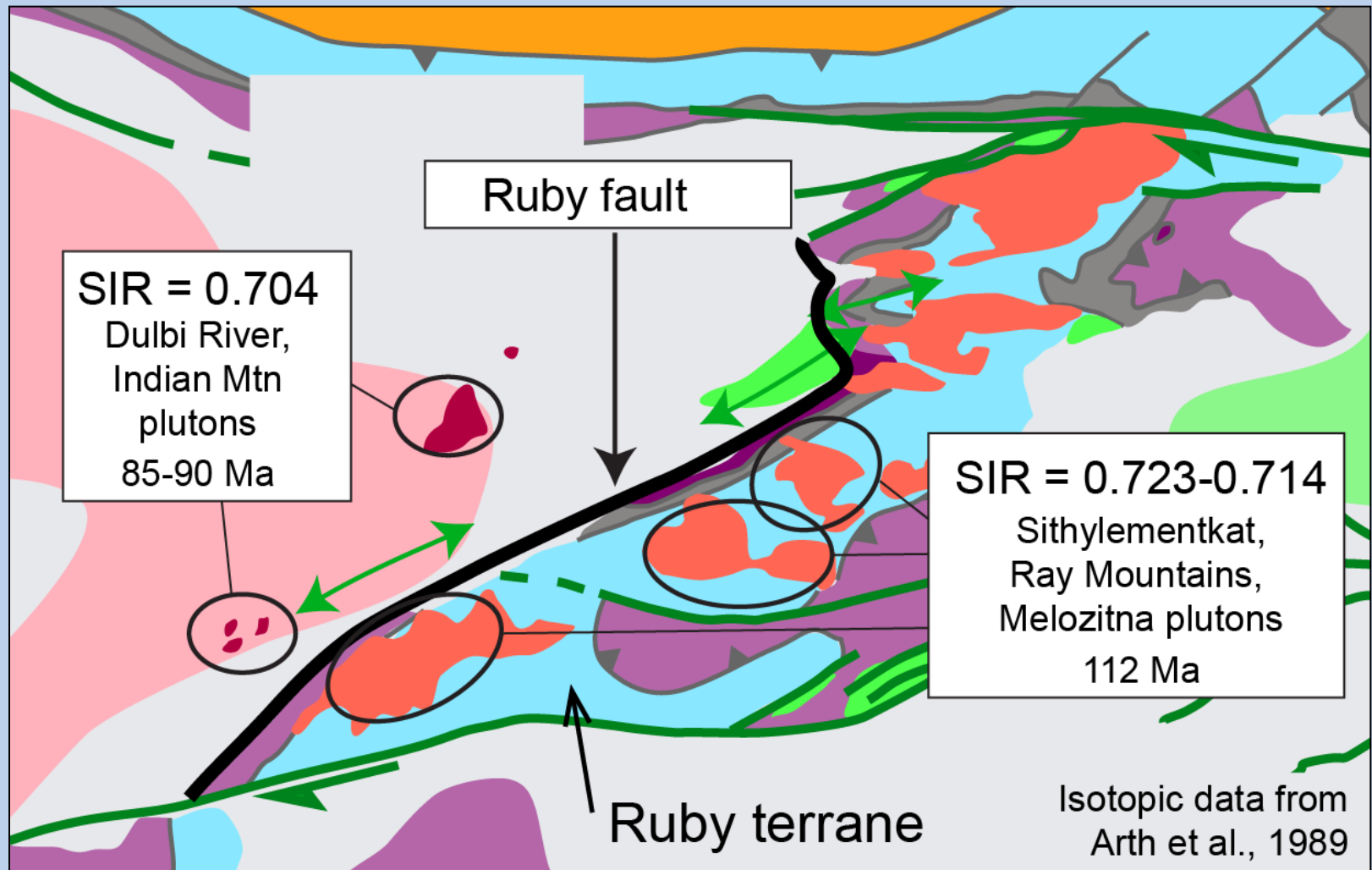
The tectonic context of the Ruby fault:





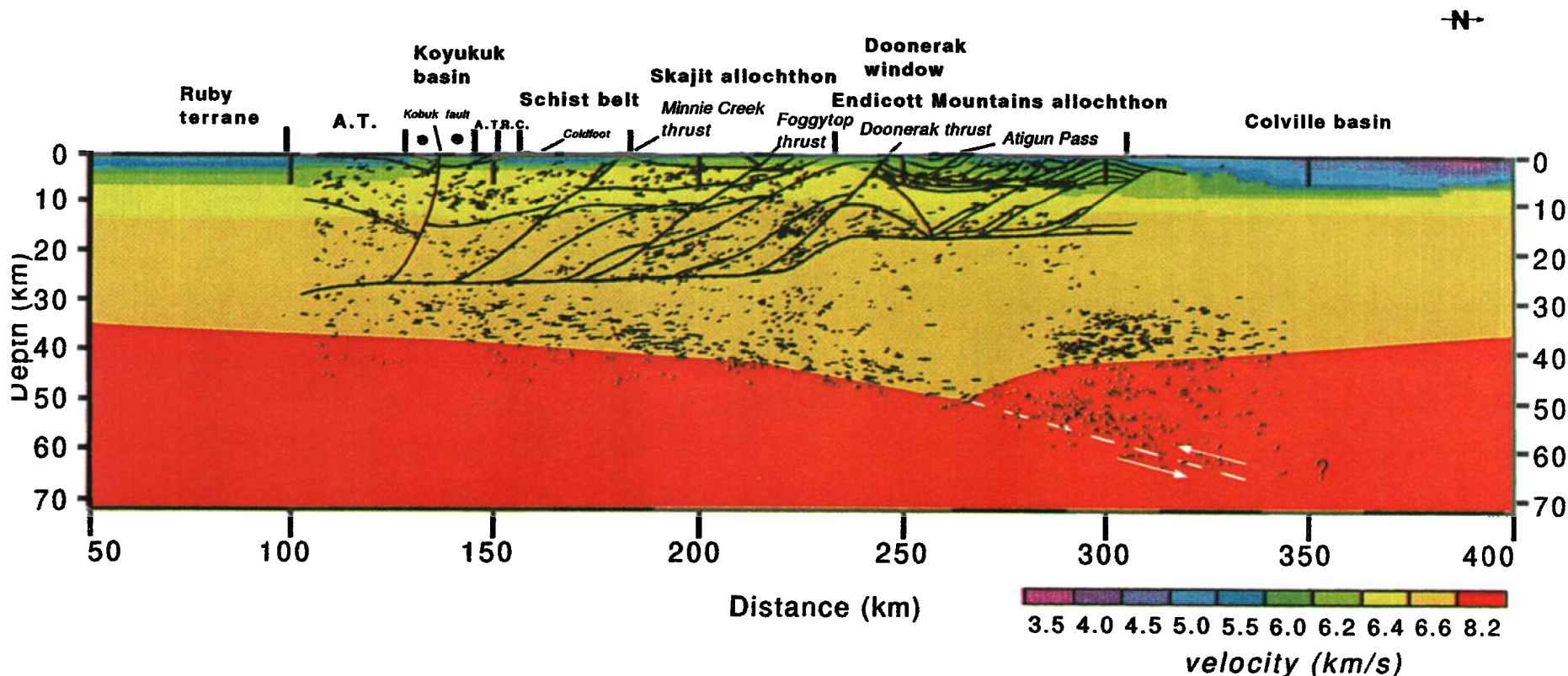
The Ruby fault traces a sharp transition in crustal composition, reflected in Sr isotope ratios

Dominant slip on Ruby Fault waning or done by time of Ruby Batholith
New U-Pb Age constraints Ruby Batholith $113.6 - 111.4 \pm 1$ Ma



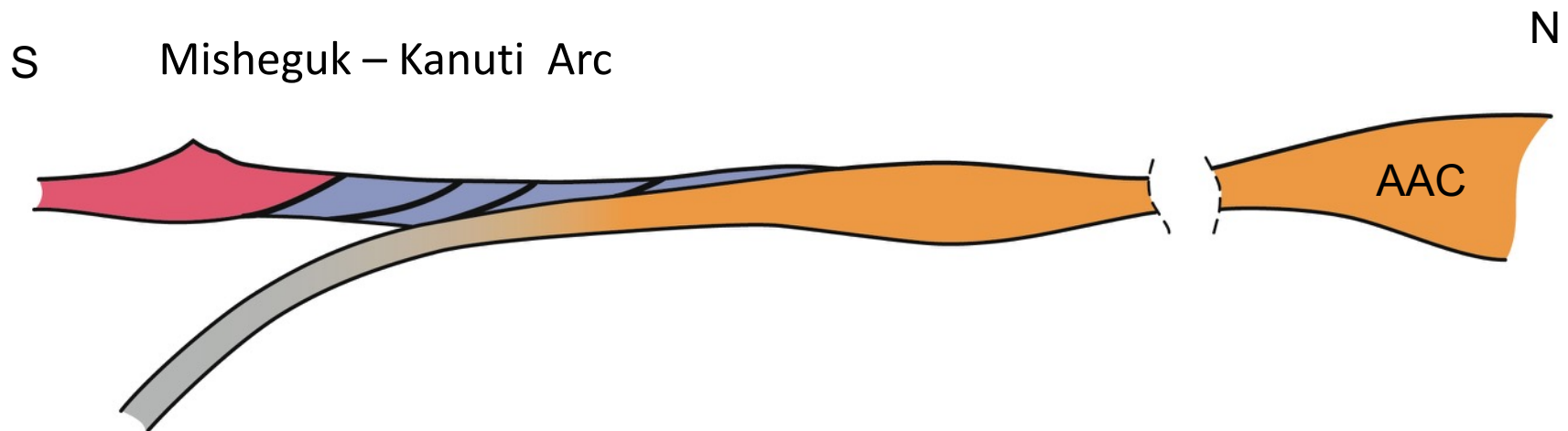
Crustal-Scale Duplex in Brooks Range TACT transect line interpretation

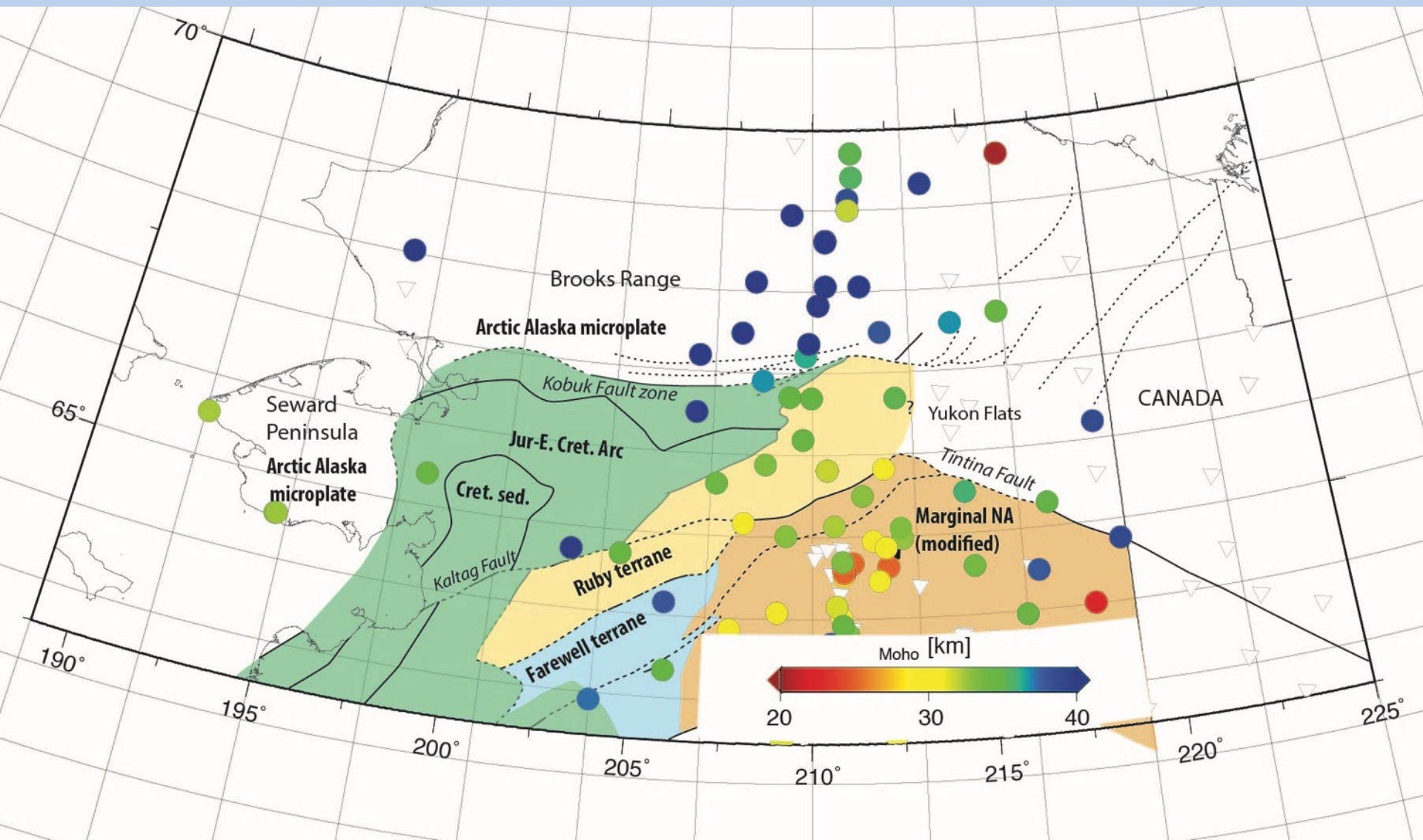
Wissinger et al., JGR 1997



Latest Cretaceous to Cenozoic shortening based on cooling ages in Doonerak Window

~ 170-175 Ma Angayucham ocean closing by subduction beneath
Misheguk – Kanuti ocean island arc



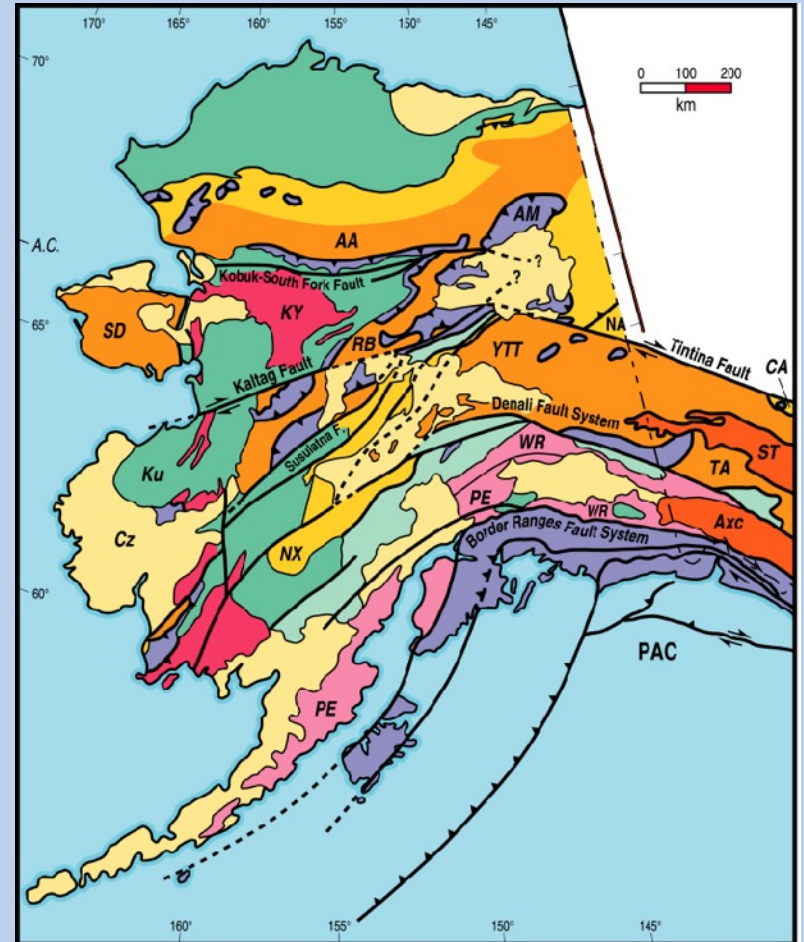
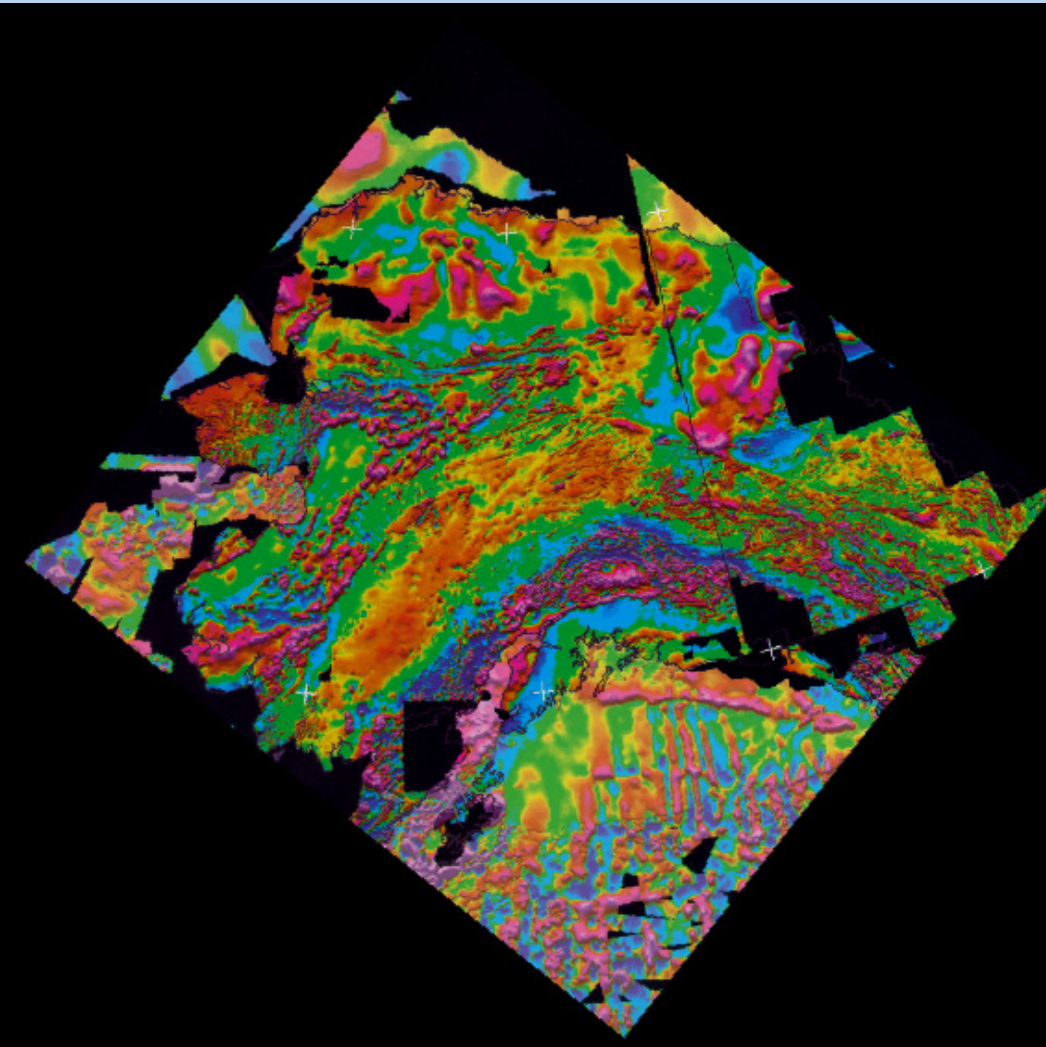


Alaska-centric view of northern Cordillera

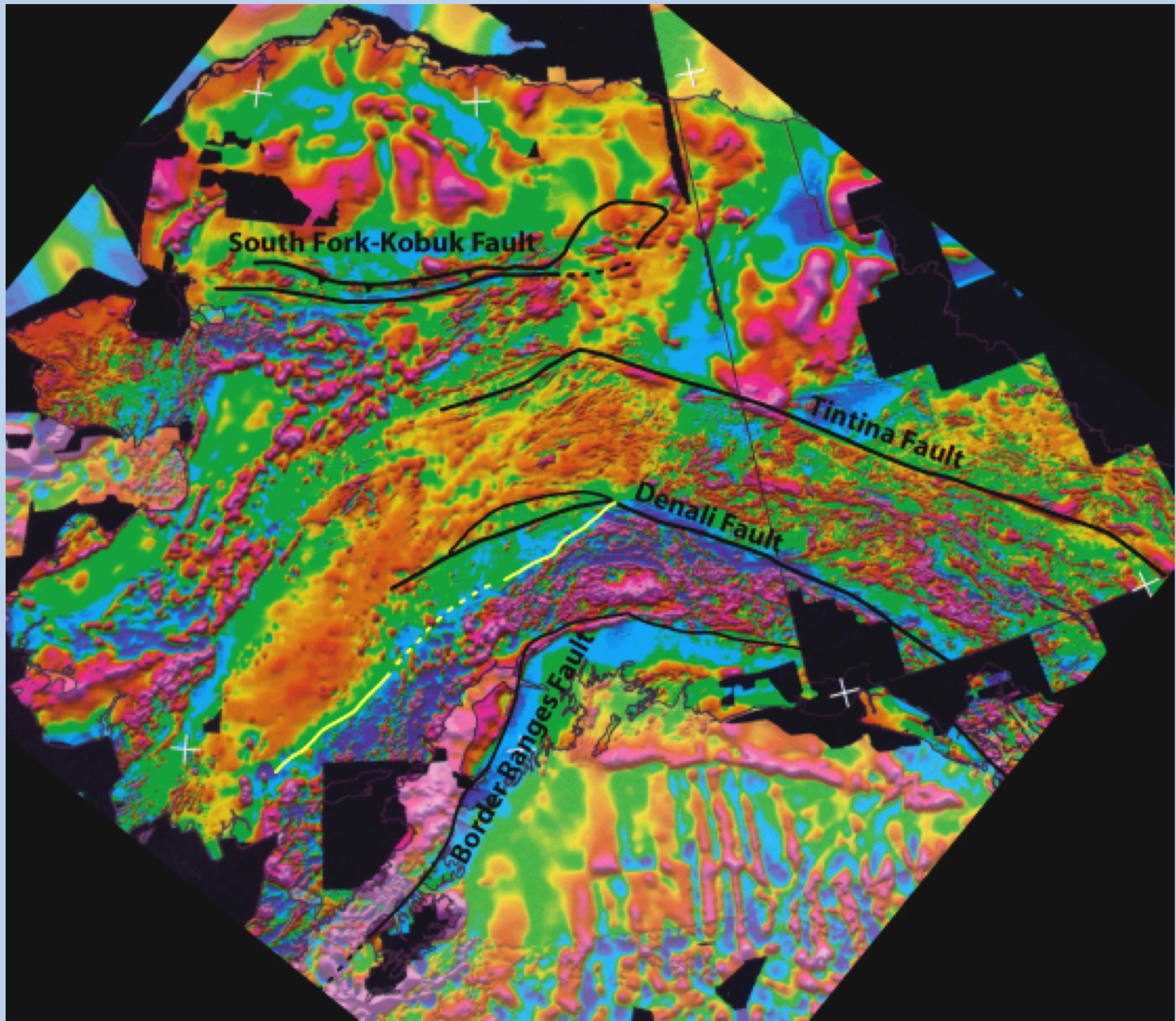


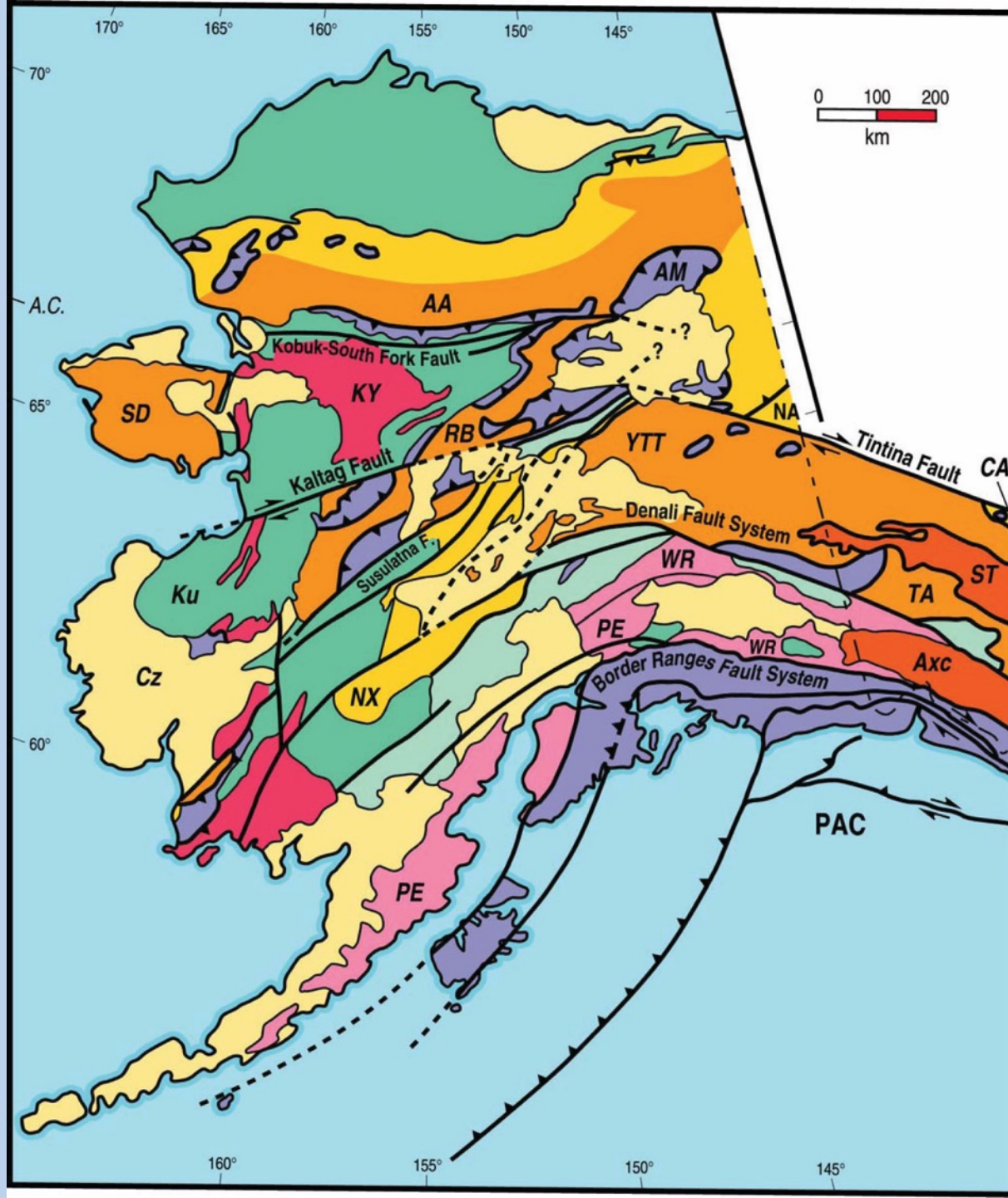
Part of a broad continental margin that extends from North America to Siberia

COMPARISON OF MAGNETIC ANOMALY MAP AND CRUSTAL BLOCKS OF ALASKA



Major strike-slip faults reactivating former subduction or suture zones





GENERALIZED GEOLOGY

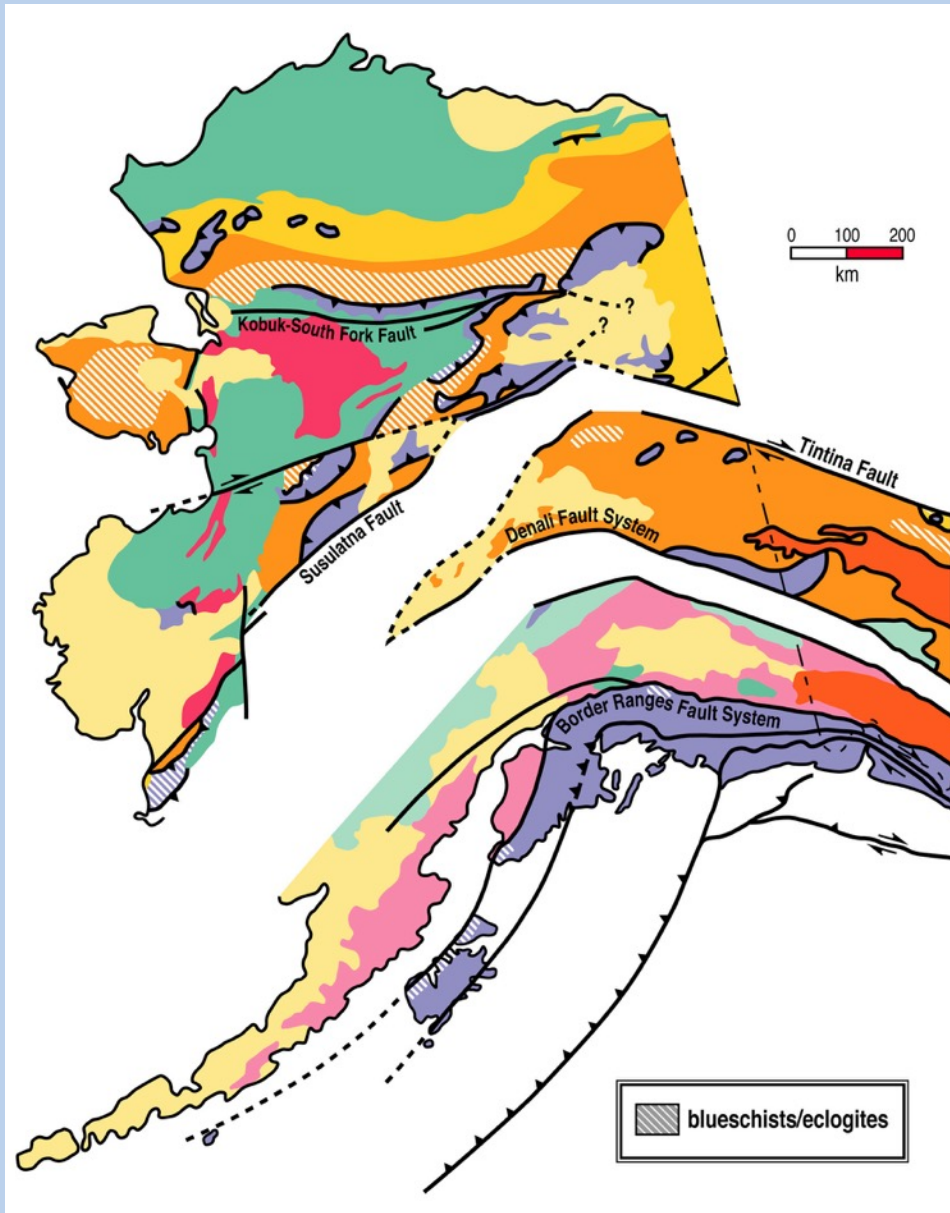
Overlap sequences

- Cenozoic
- Cretaceous
- late Jurassic-E. Cret.
- Marine basins

Terranes

- Continental - low grade
- Continental - high grade
- Cont. arc (Pz basement)
- Island arc etc.
- Oceanic

ALASKA CAN BE DIVIDED INTO THREE PARTS – EACH REGION RECORDS ELEMENTS OF CONVERGENT MARGIN



Northern AK - Arc-Continent collision, subduction/accretion partially preserved

Central AK - Continental block
Continent collision in north,
Arc-plateau collision with continent in south.
Subduction record gone.

Southern Alaska - Intermittent subduction since mid-Mesozoic
Subduction - Accretion well-preserved.

