

Return to Lithoprobe Canadian “Geoscience Unity”

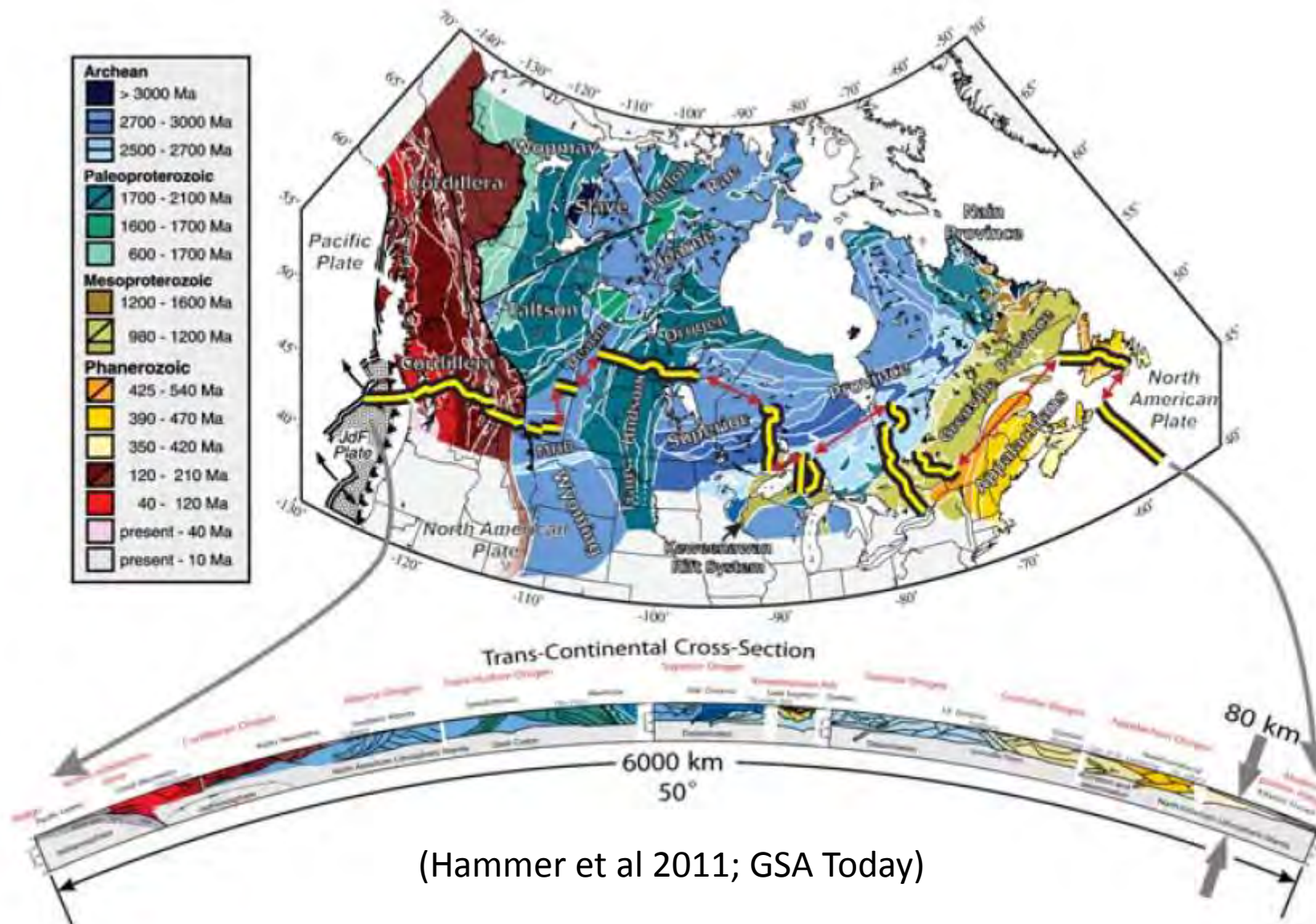
21 years!

~1500 scientific publications

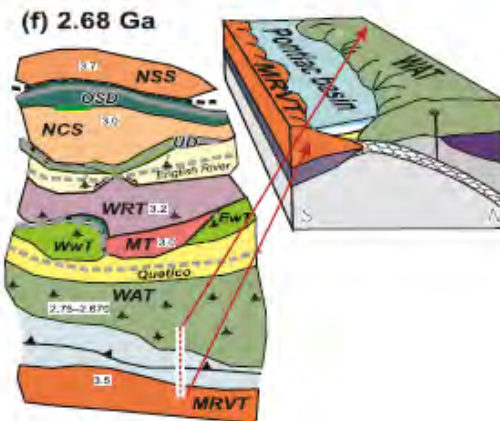
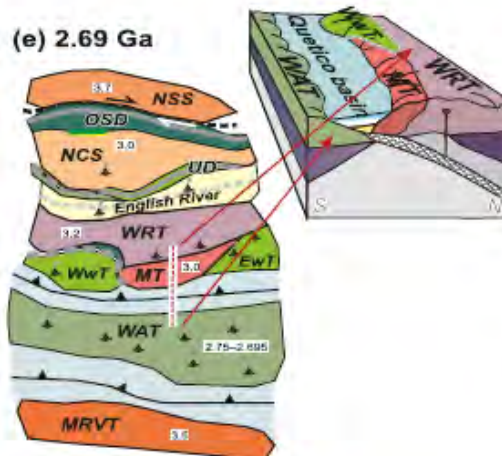
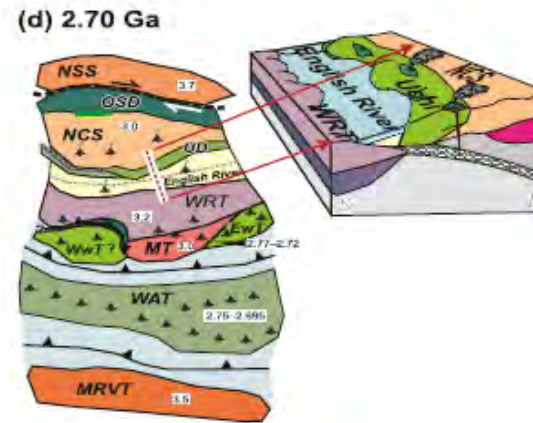
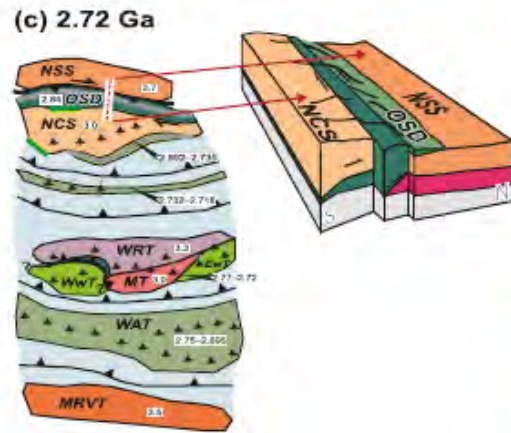
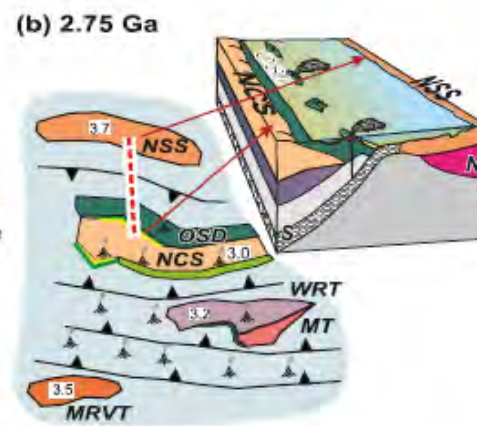
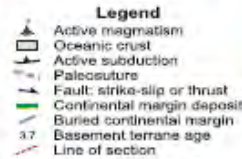
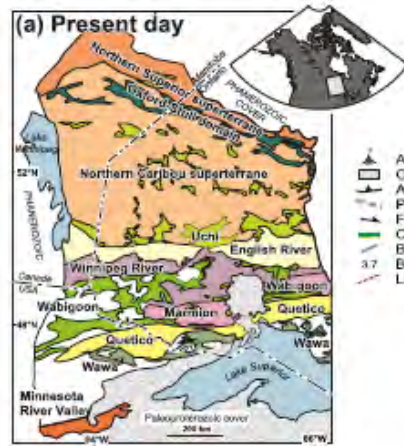
~1000 geoscientists
(~500 RAs/students)

Unity because of
multi-discipline
nature

(Clowes 2010; CJES)



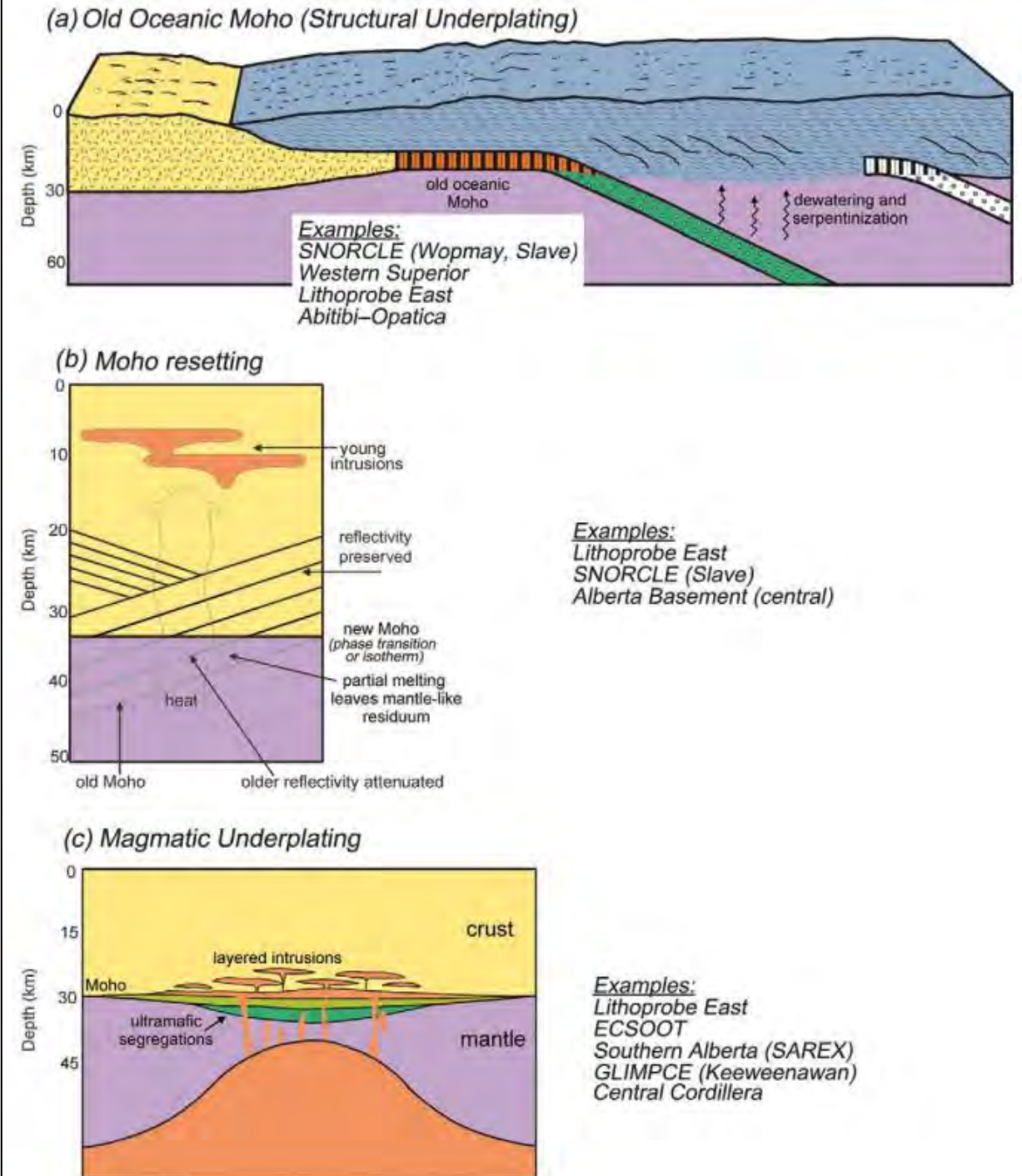
(Hammer et al 2011; GSA Today)

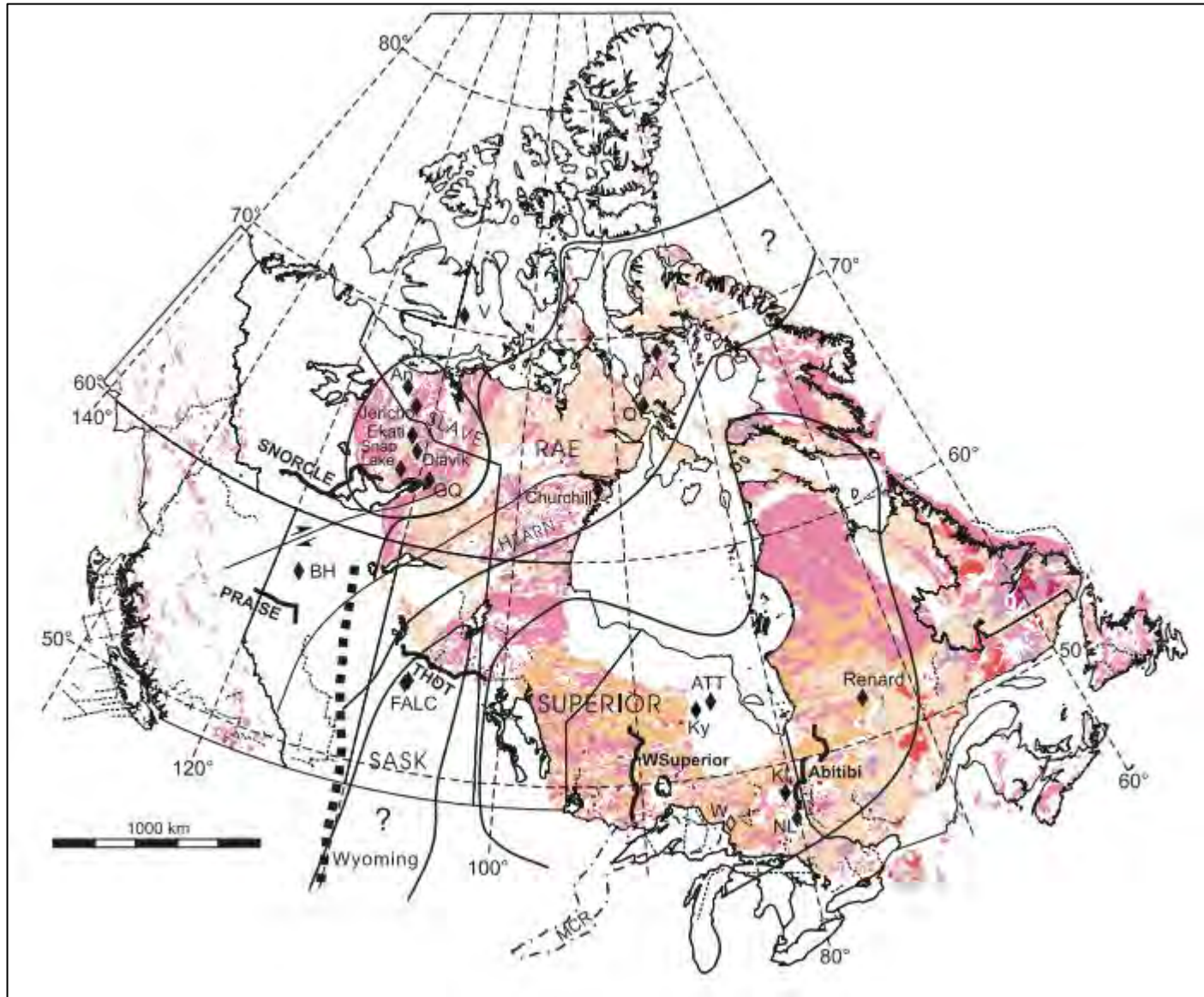


Schematic
evolutionary model
-accretionary growth
W Superior
Province
(Percival et al, 2006; CJES)

Moho configuration models

(Cook et al, 2010; CJES)





Aid to diamond exploration

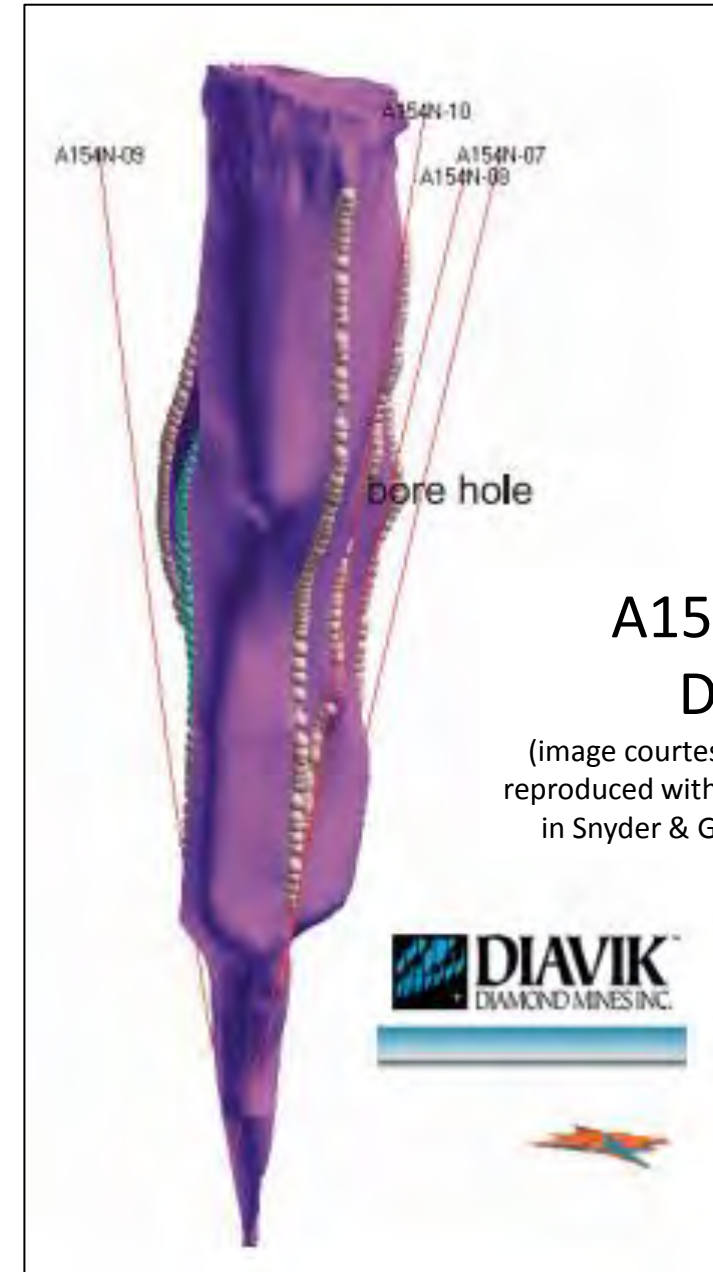
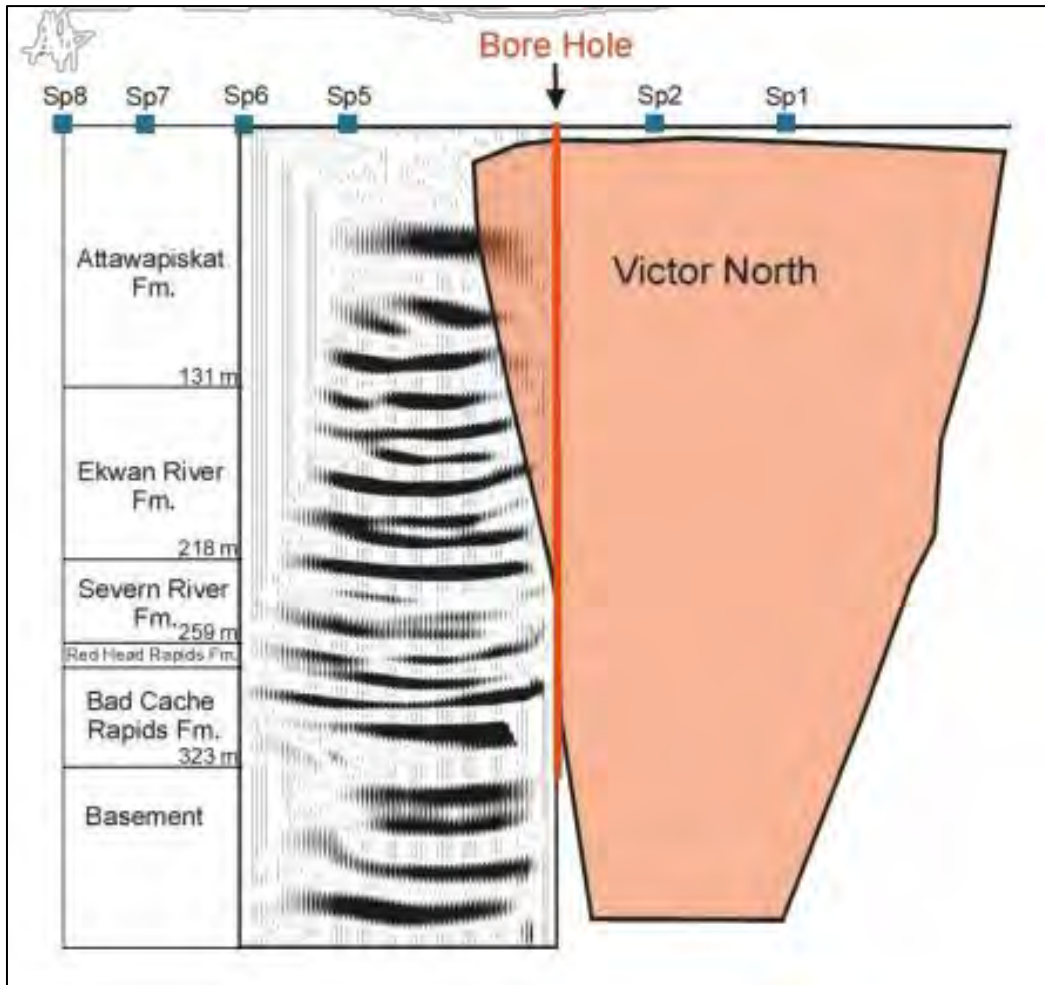
-kimberlite location
on Archean crust
and craton outlines
(Snyder & Grutter, 2010;
CJES)

Seismic imaging of kimberlite pipes

-Vertical Seismic Profiles

Victor North; Attawapaskat cluster

(Bellefleur et al 2005; GSC; Stratigraphic section Webb et al 2004; Lithos)



A154 pipe Diavik

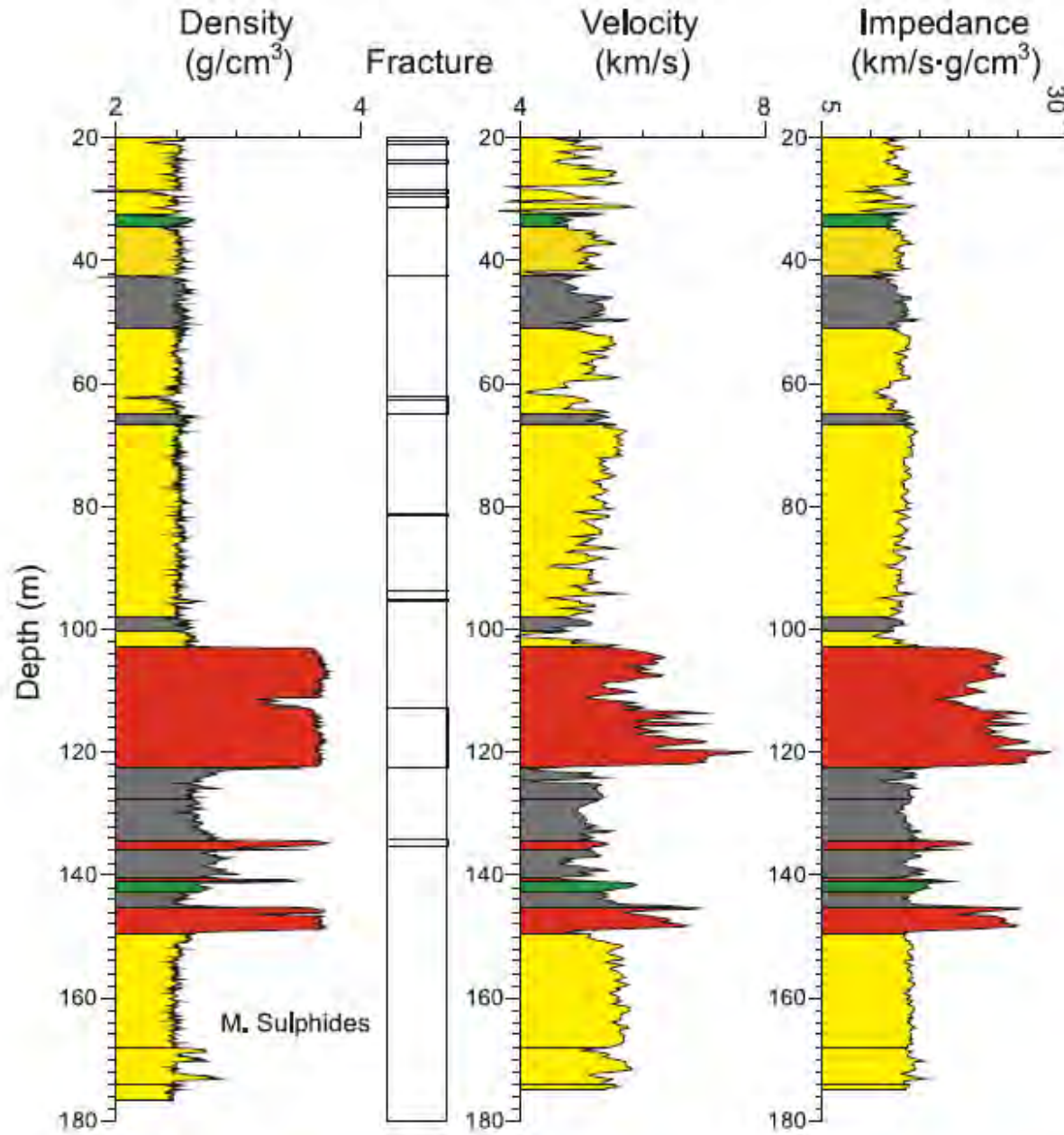
(image courtesy of D. Eichenberg,
reproduced with permission of Diavik
in Snyder & Grutter; 2010; CJES)

Enhanced base-metal exploration

(Eaton et al 2010; CJES)

Sulfides =
good
reflectors

(Schmitt et al 2003; SEG)

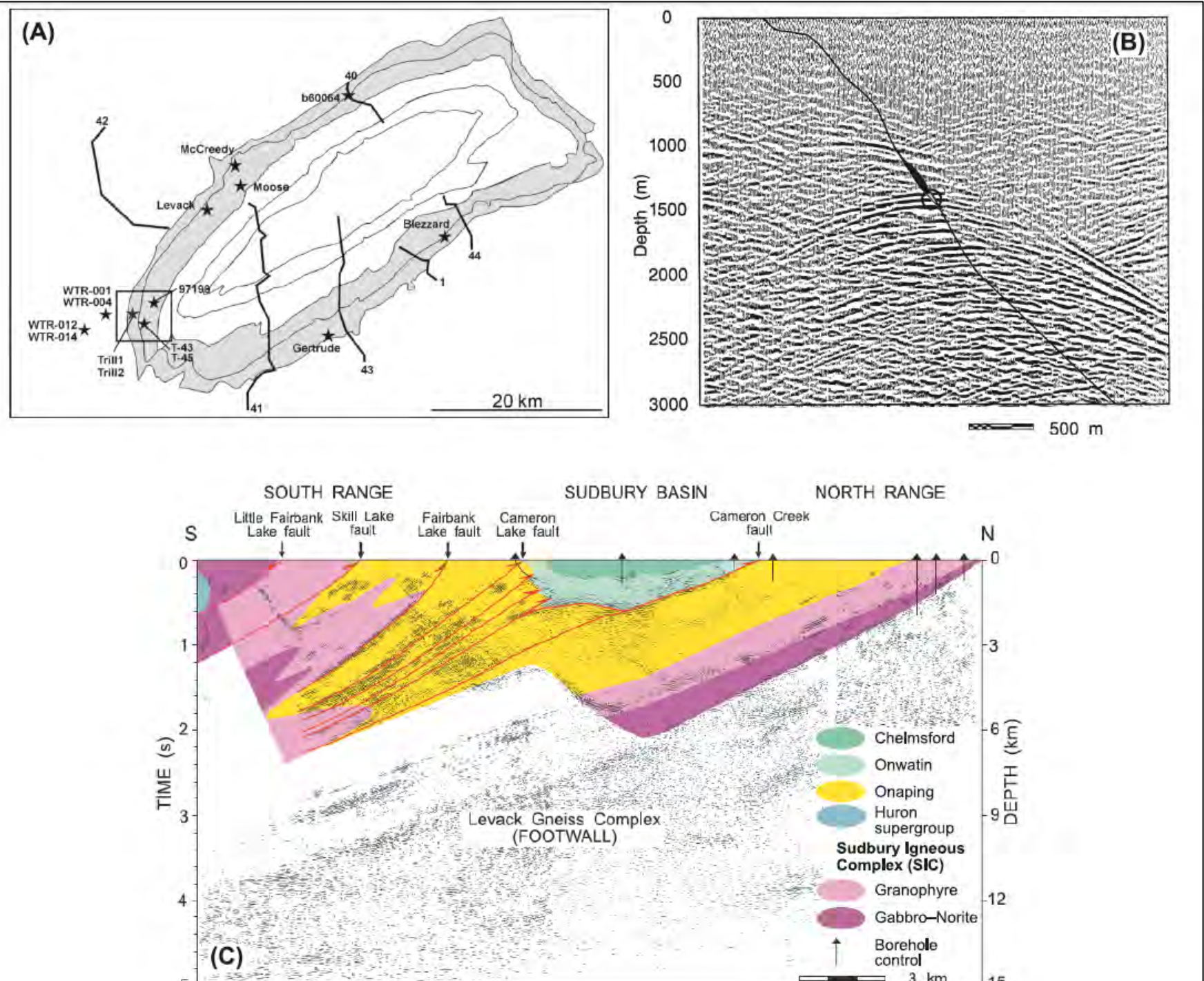


Sudbury structure

a) transects

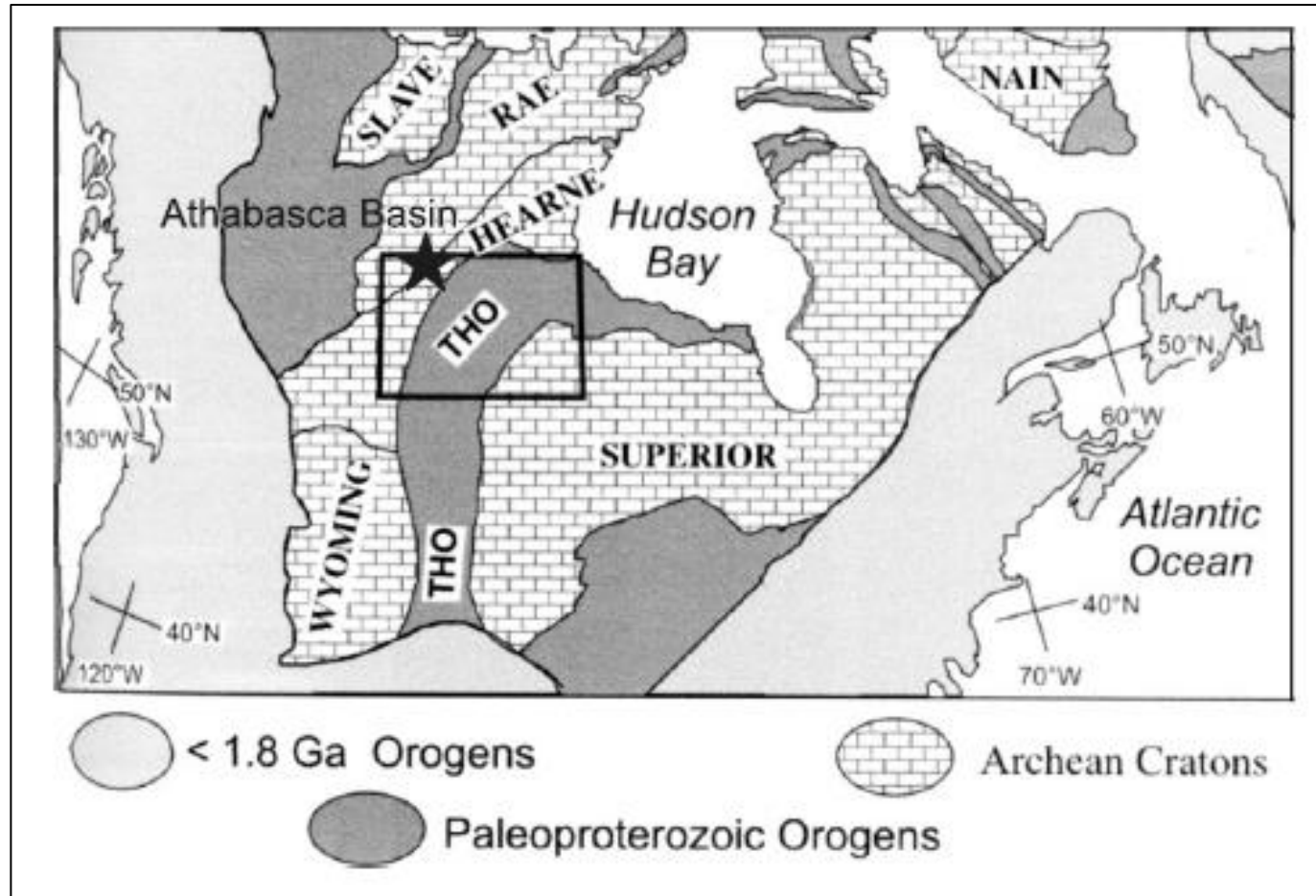
b) Unmigrated Creighton 402 orebody; black – ore; circle – mined out ore
(Eaton et al, 2010; CJES)

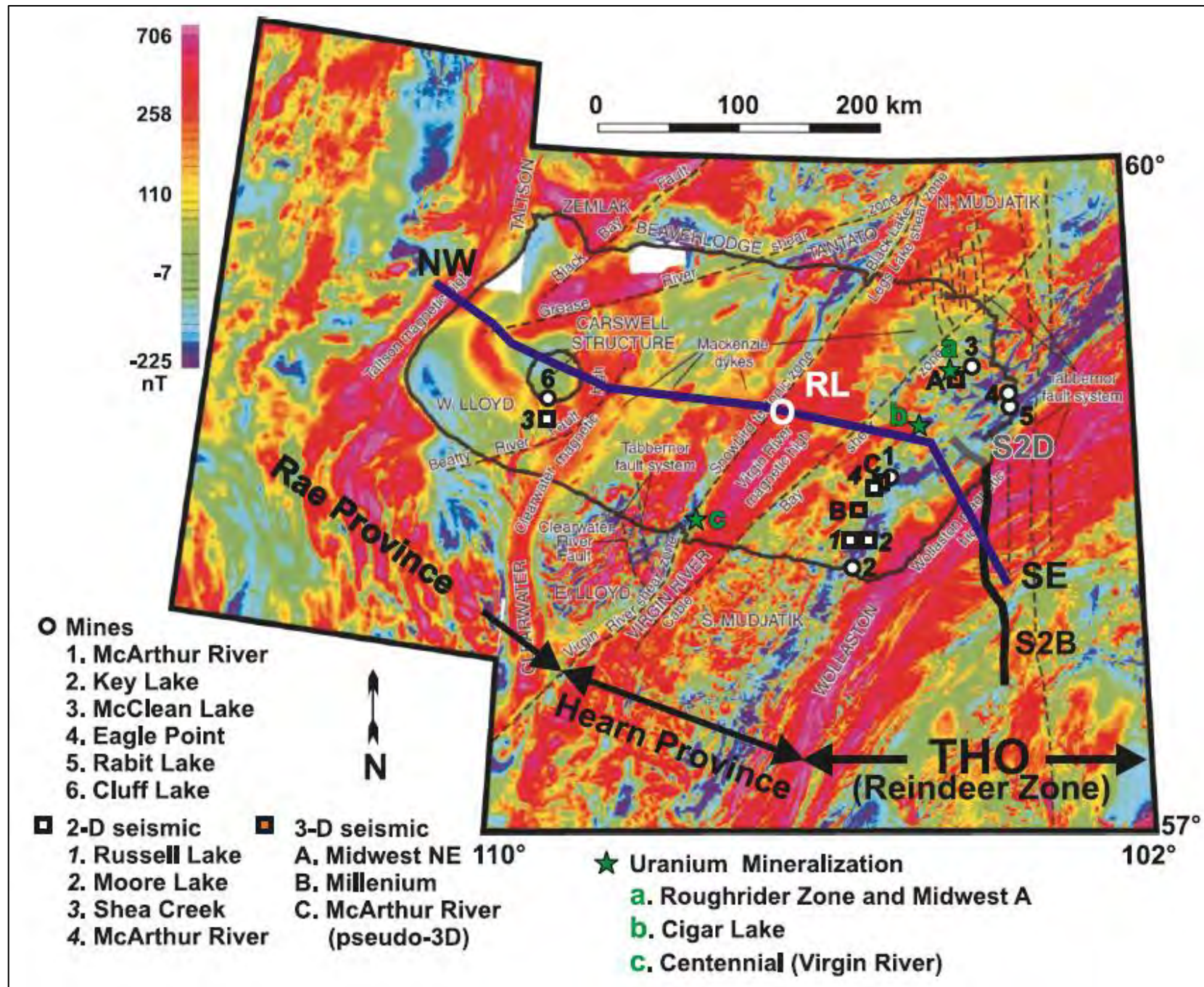
c) Interpreted seismic cross section
(Wu et al 1995; JGR)



Applications for U-exploration; Athabasca Basin

(Hajnal et al 2010; CJES)





Aeromagnetic map for Athabasca Basin

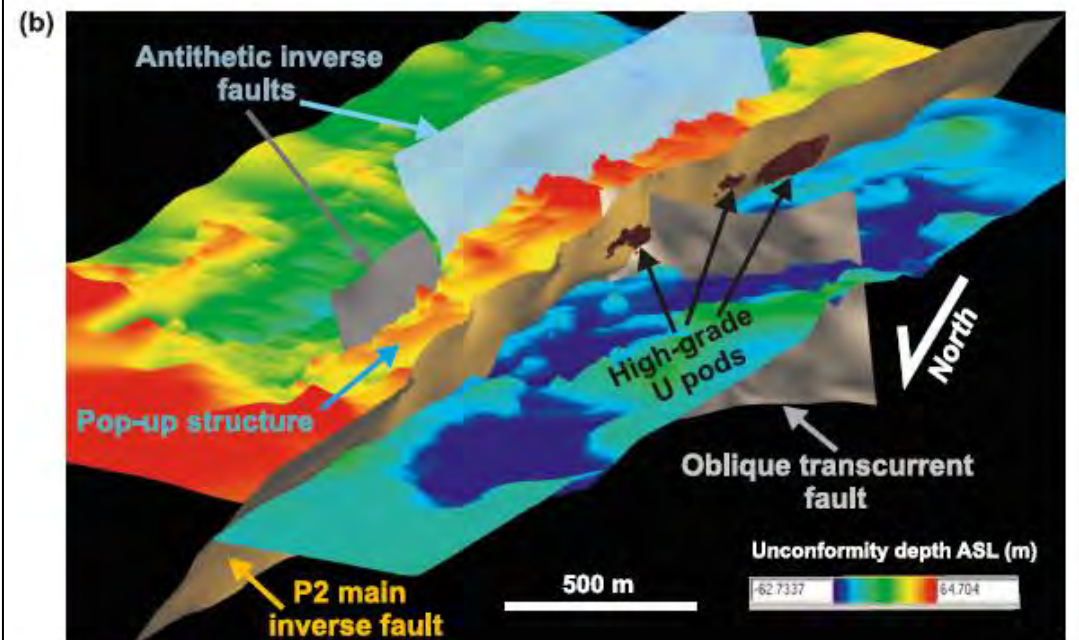
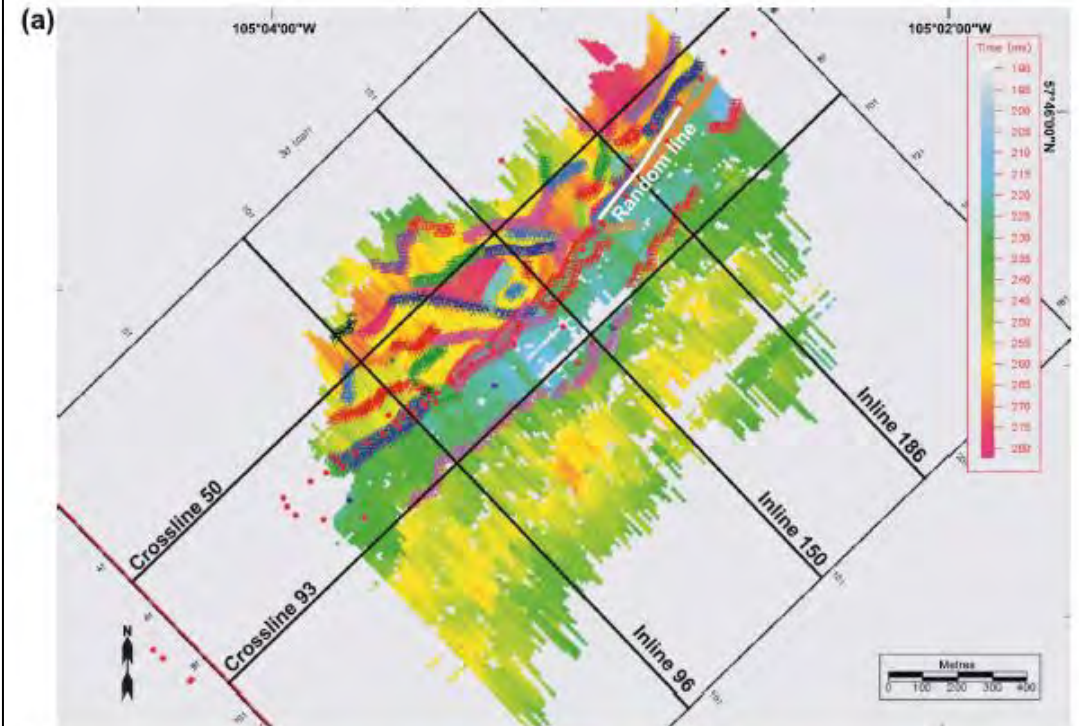
(modified from Card et al 2007, GAC 4;
in Hajnal et al 2010, CJES)

a) Time structural map of unconformity

b) 3-D GOCAD display of structural framework of McArthur river Mine Camp

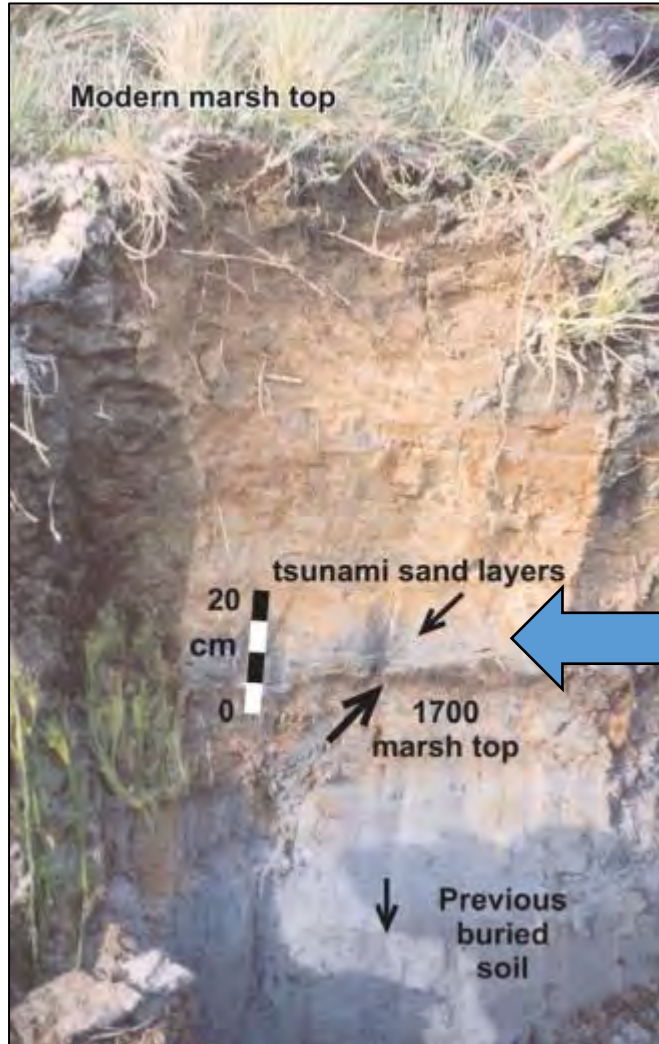
– seismic tied to borehole

(Hajnal et al 2010; CJES)



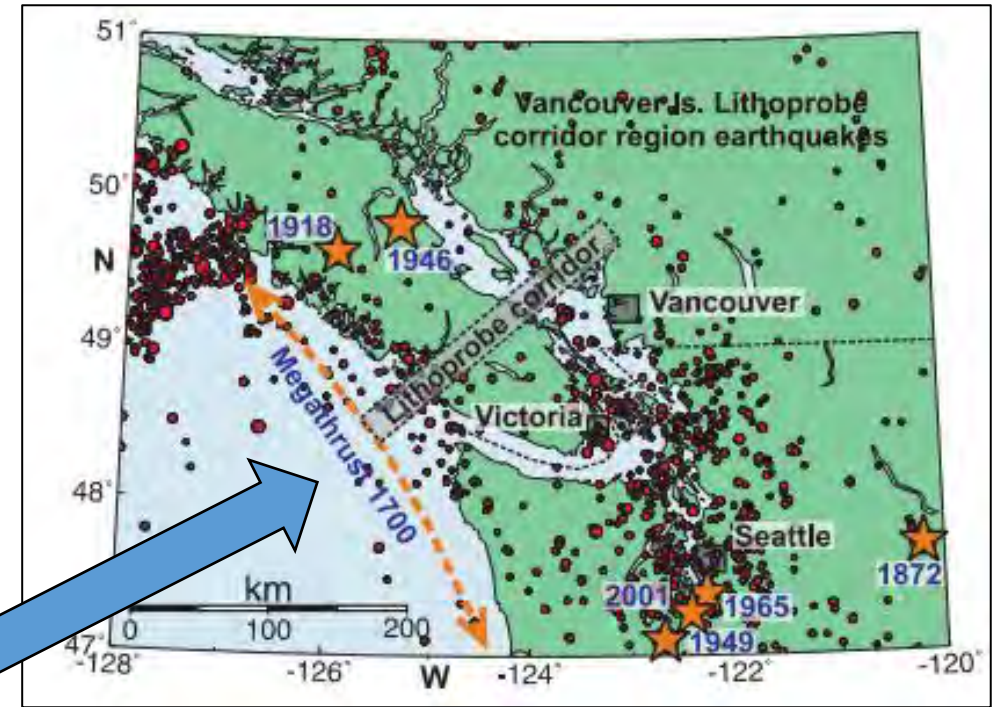
Hazard Mitigation

- earthquakes & Cascadia subduction

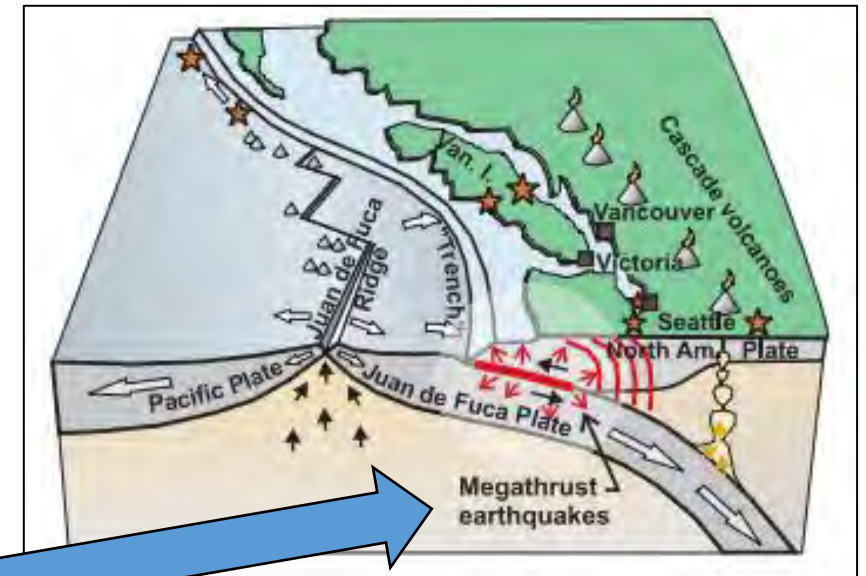


Megathrust
1700 – tsunami
sand layer

(Leonard et al 2004; GSA Bull)



(Hyndman & Rogers 2010; CJES)



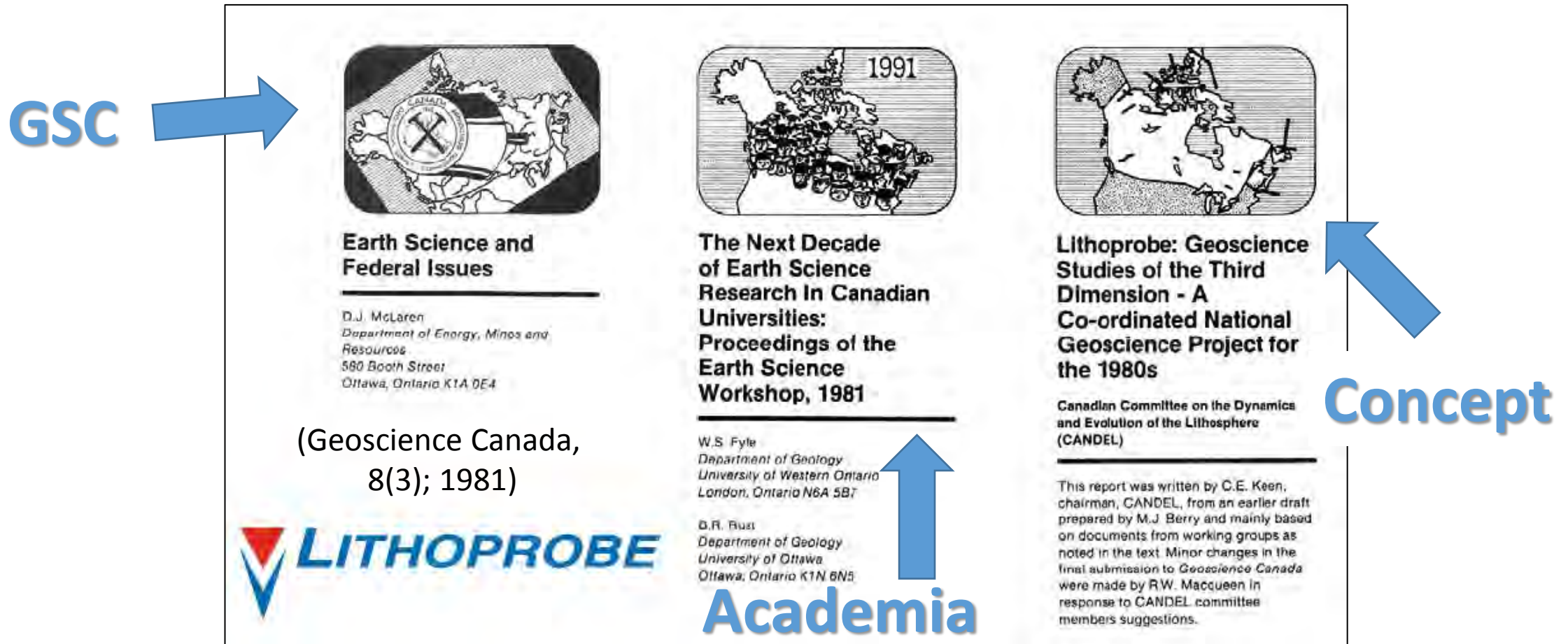
Outreach – 200 print media, 40 electronic

(Clowes 2010; CJES)



Have we returned to pre-Lithoprobe despair?

- (Fyfe & Rust 1981) “...expression of concern that if we are to improve our science on the national and international scenes, then we must coordinate efforts as far as possible and as rapidly as possible”



Do you feel?

- Geoscience “Research funding ... (is) stagnant even though the discipline is critical to the economic and social well being of the country”?

(Clowes 2010; CJES - motivation for Lithoprobe)



Scientist urges straight talk on research ahead of federal vote

IVAN SEMENIUK - SCIENCE REPORTER

The Globe and Mail

Published Friday, Oct. 09, 2015 9:09PM EDT

Last updated Friday, Oct. 09, 2015 9:10PM EDT

So, what to do?

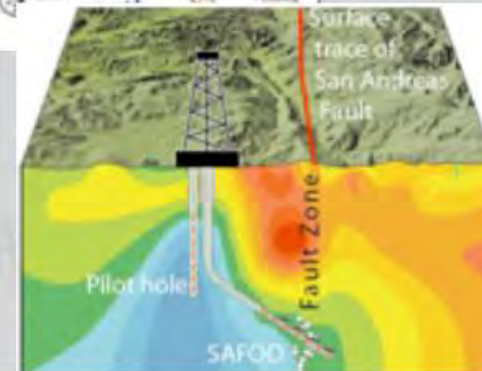
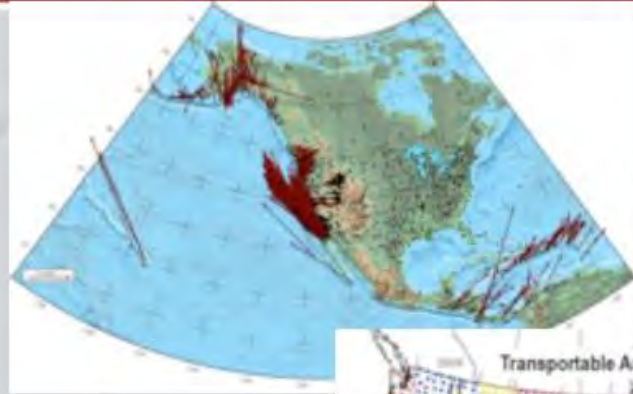
(besides voting next Monday and/or composing another “Harperman”)

Build on Lithoprobe by...

Bring Earthscope to Canada

(while maintaining lithoprobe multi-discipline unity)?

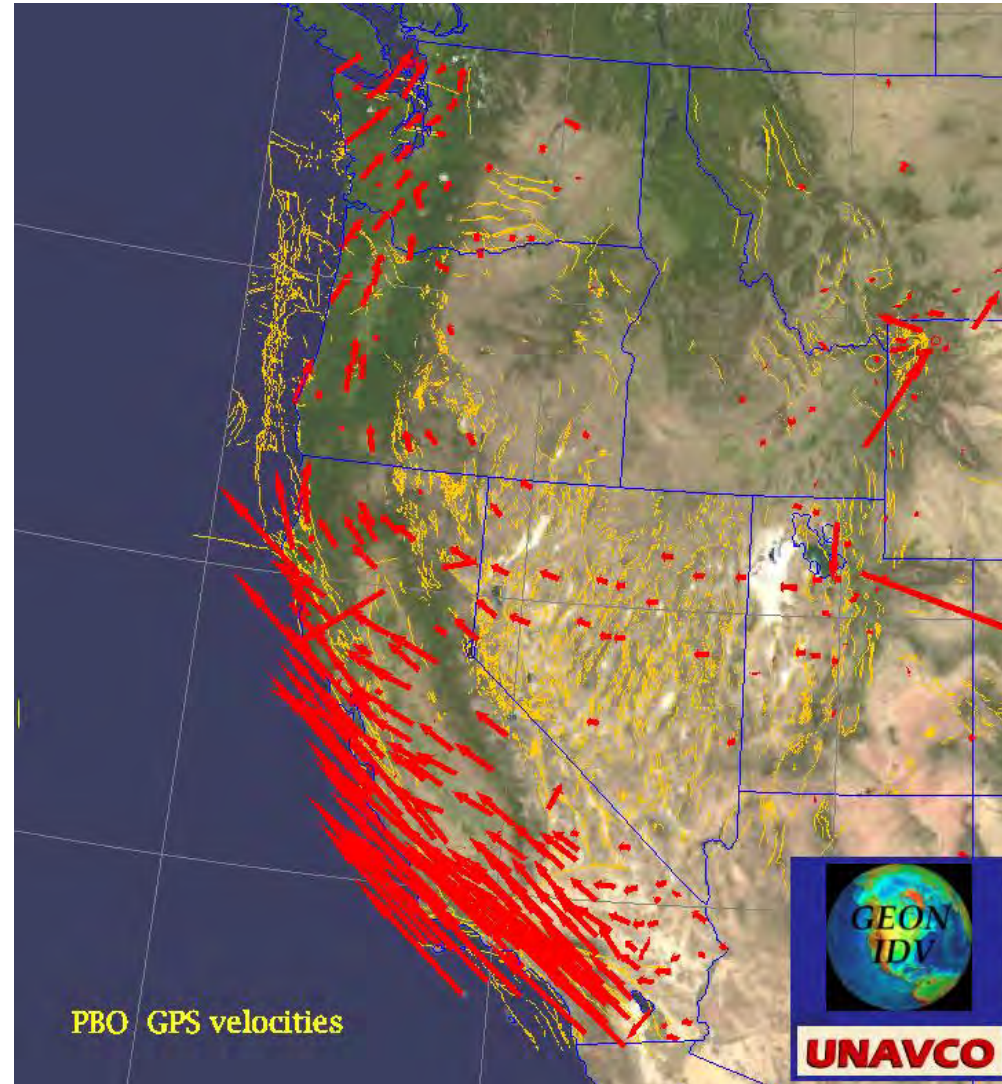
- Major research initiative
- Focus on North America
- Study earth processes
- Divide into 3 components
 1. Plate Boundary Observatory
geodetic data
 2. USArray
seismic data
 3. San Andreas Fault Observatory at Depth
borehole data



Earthscope successes:

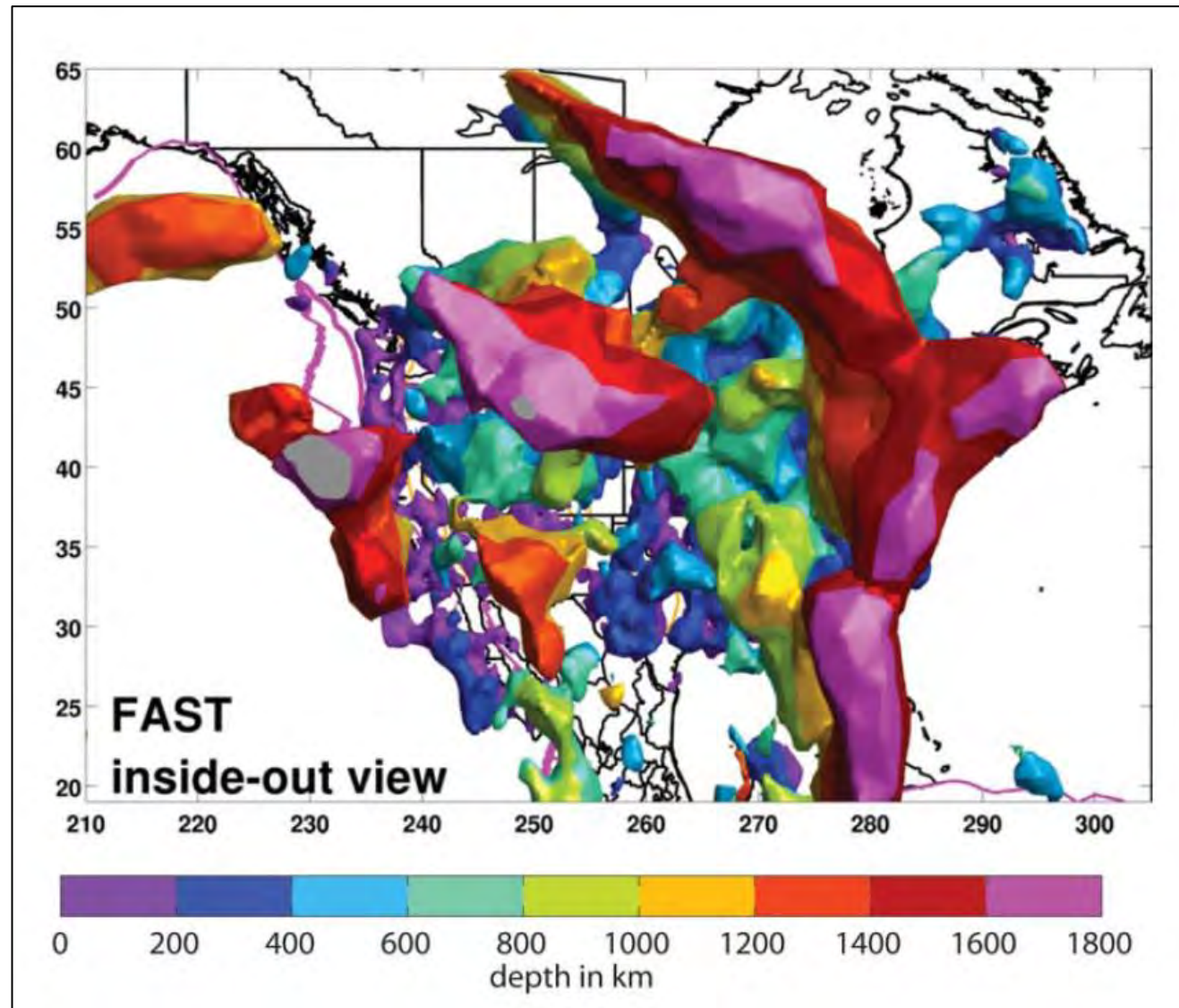
- Learn from their lessons learned:
 1. Outreach & local involvement excellent – workshops, etc
 2. GSP & seismic arrays = excellent advancements of technology & science (e.g. Farallon plate modelling, Yellowstone magma & hot spot)
 3. SAFOD – way over budget...avoid this
 4. Alaska instrumentation test for our north in future?
 5. Need multi-discipline approach of Lithoprobe to get unified buy-in

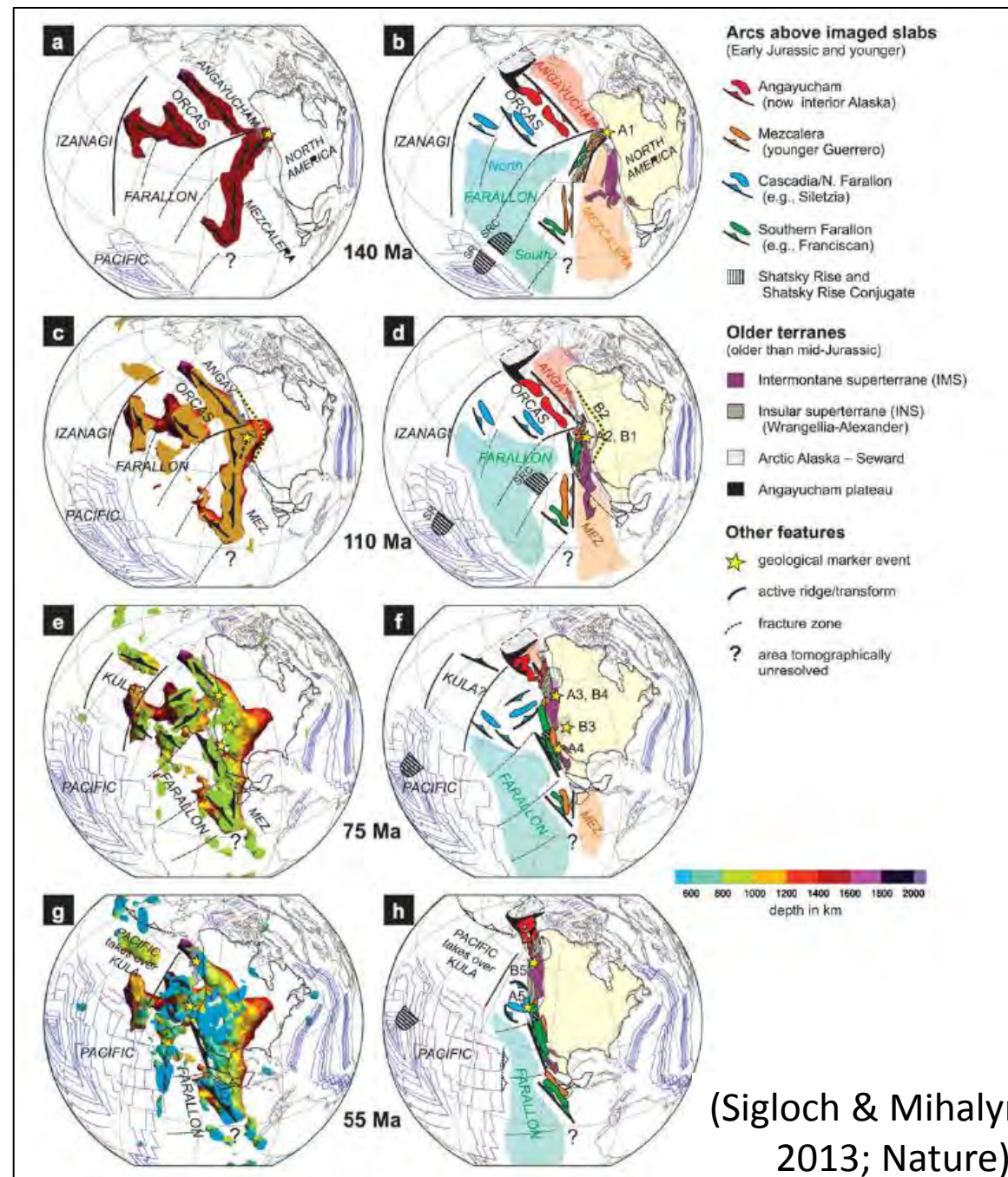
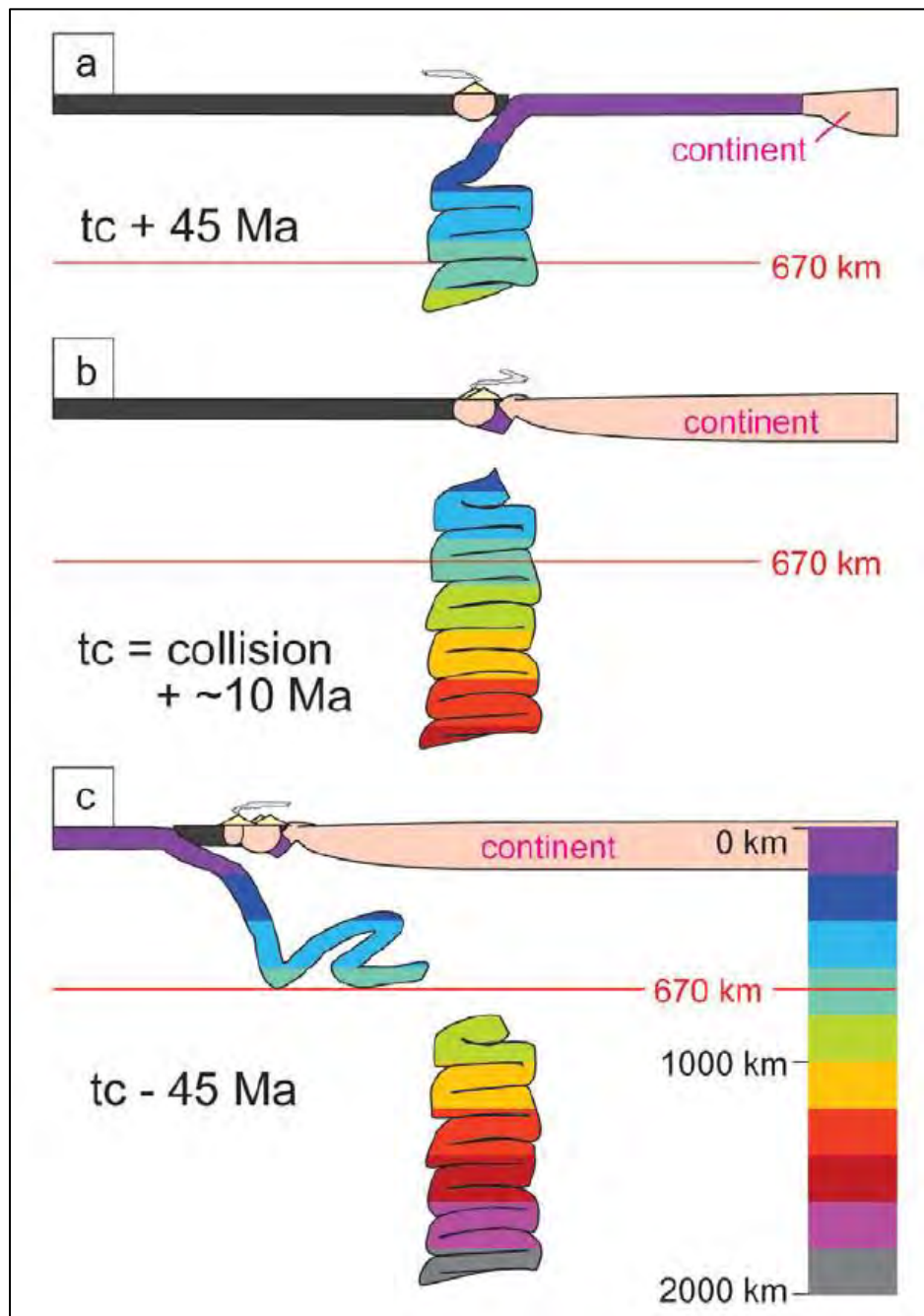
UNAVCO – GPS Array – more movement than expected!! (see poster)



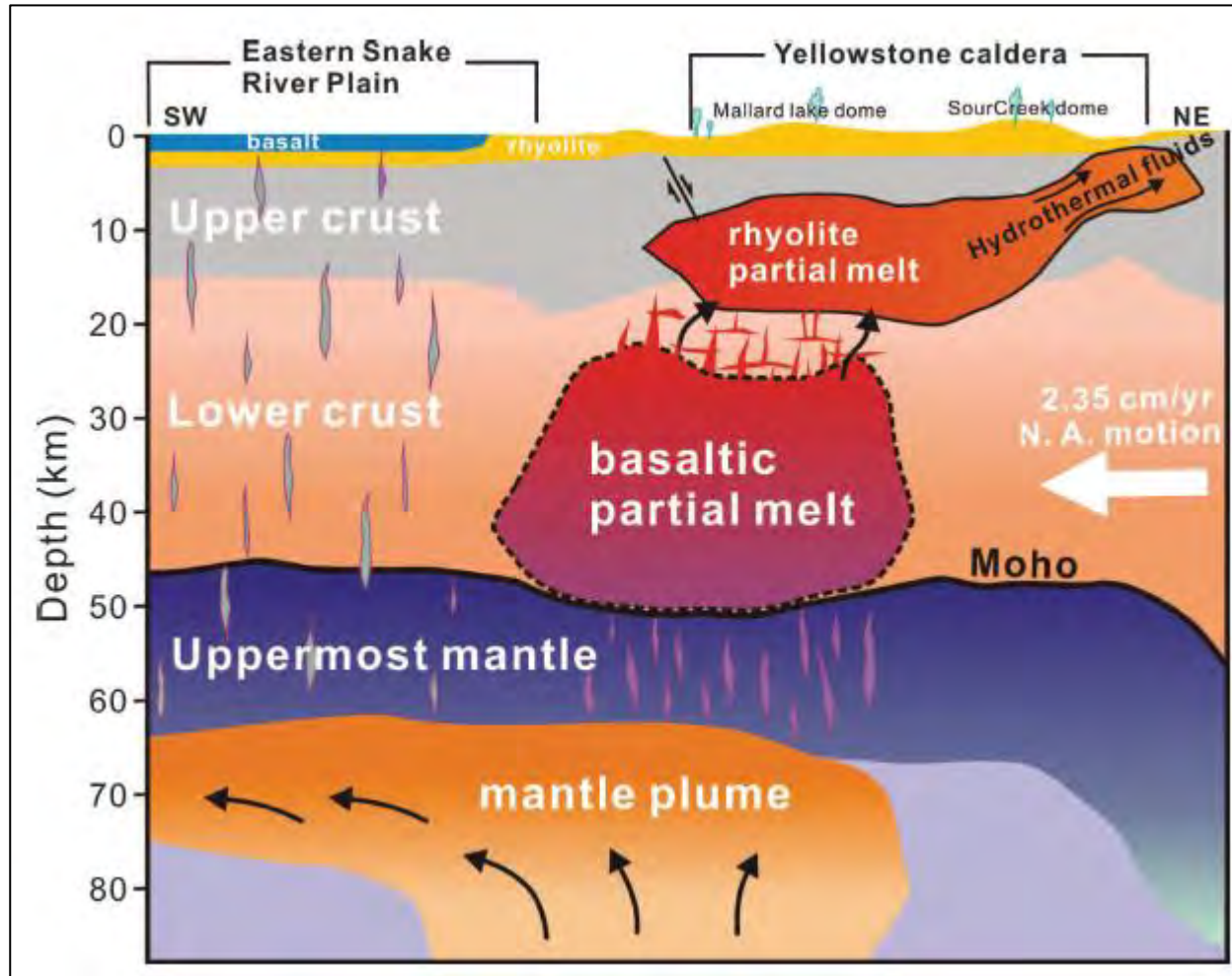
IRIS; Eq - Tomography;

(Sigloch 2011; G³)

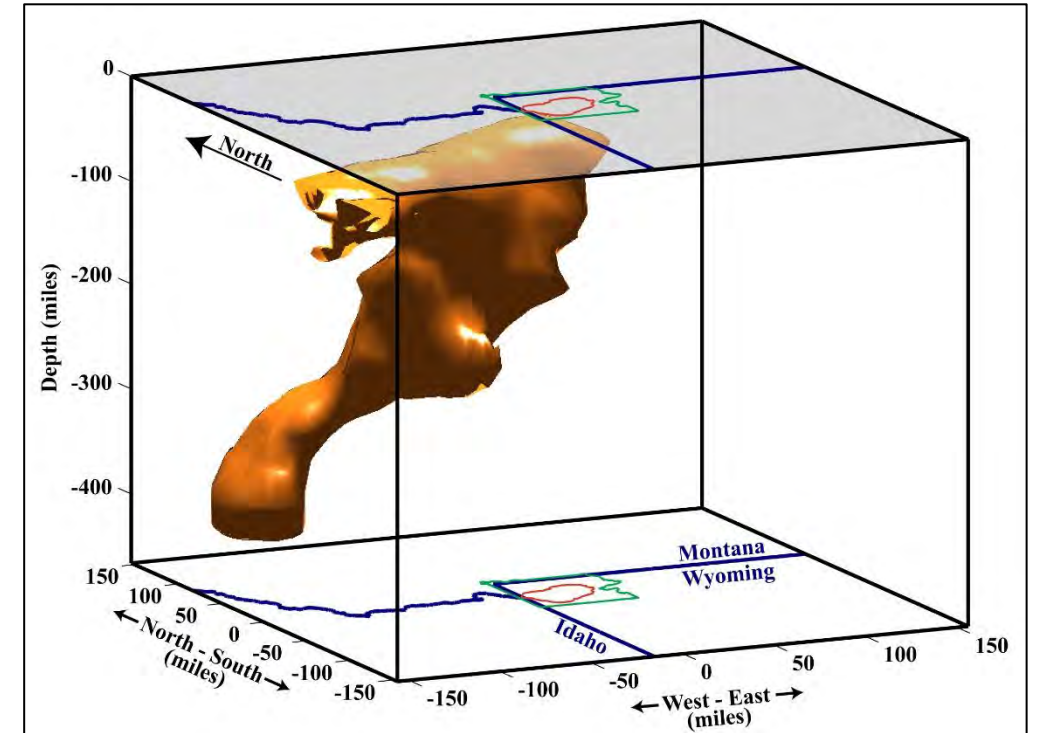




Yellowstone – Magma Plumbing System



(Huang et al 2015; Science)



(Smith et al 2009; J Volc Geo Res)

What now?

- a) Please take message home to your departments – name??
- b) Lets create buy-in across Canadian academic community
- c) Brainstorm with your departments
 - biggest gaps, remaining questions?
 - i) tectonics (build on Lithoprobe; fill in gaps – remaining questions?);
 - ii) hazard mitigation (satellite imagery for earthquake prediction?),
 - iii) climate change,
 - iv) energy & mining applications...
 - other ideas??

d) Spring 2016 – grants to start nation-wide meetings to frame pilot studies (west coast? McKenzie delta/Mtns? Others?)

e) Fund-raising for pilots for 2017

-Prepare to piggyback on Earthscope for 2018; timed to take over as the US funding expires...