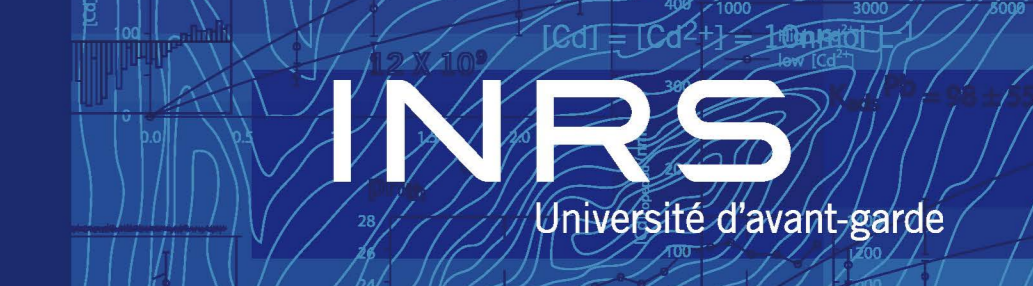


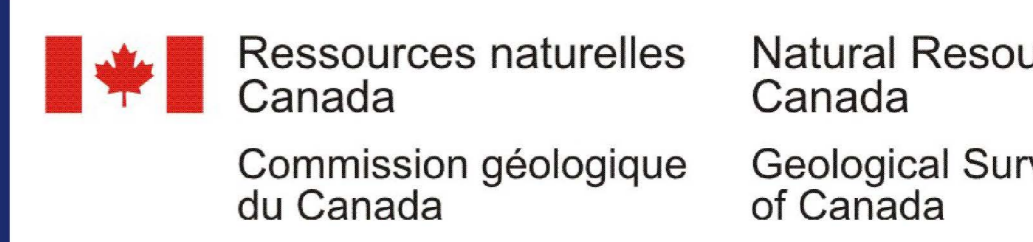
# SCLM rifting & regional shearing in the Superior Craton

– deformation & mineralization in a non-plate tectonic Archaean Earth; implications for tectonic reconstructions

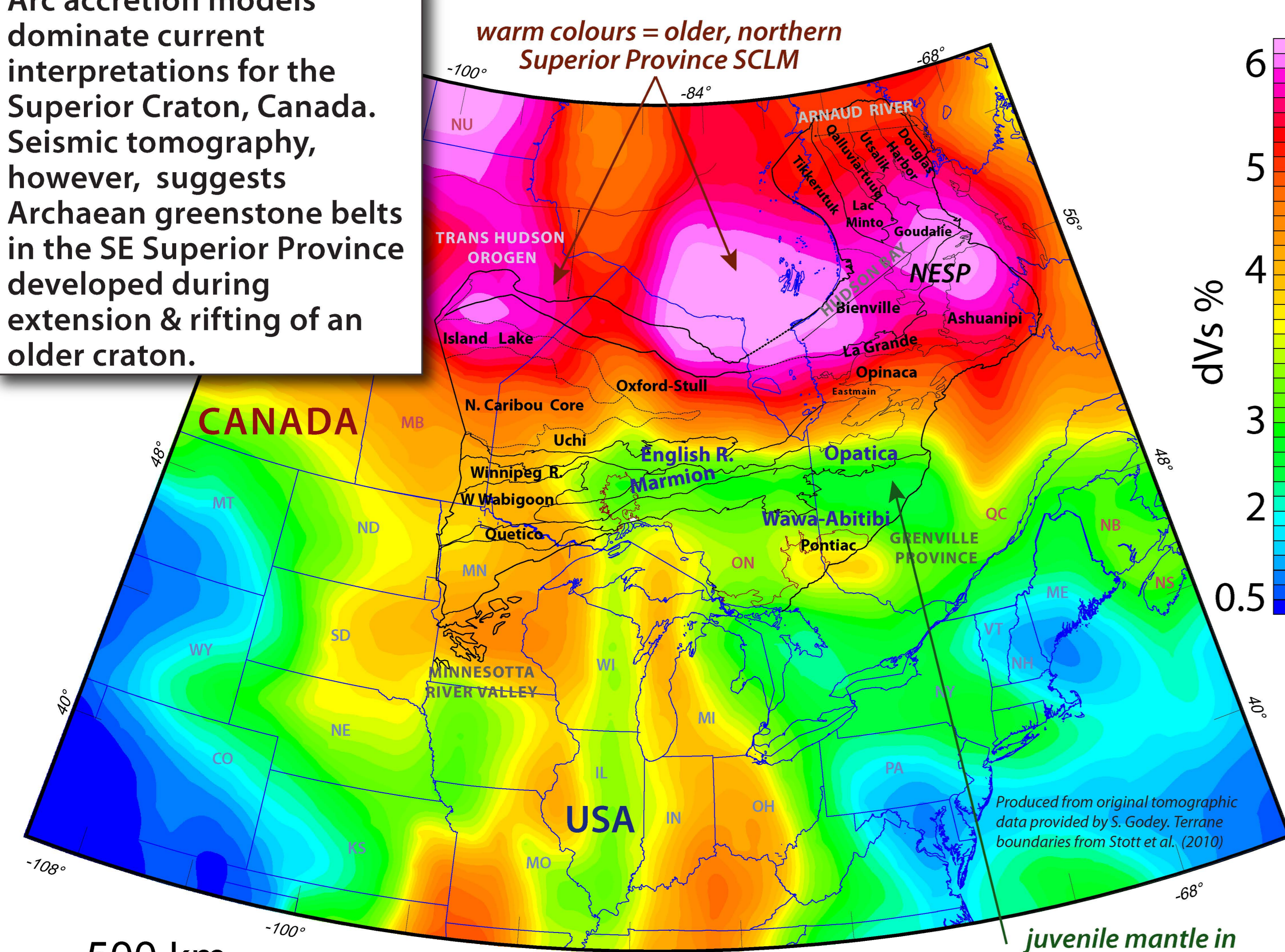
Lyal Harris  
(INRS-ETE, Québec)



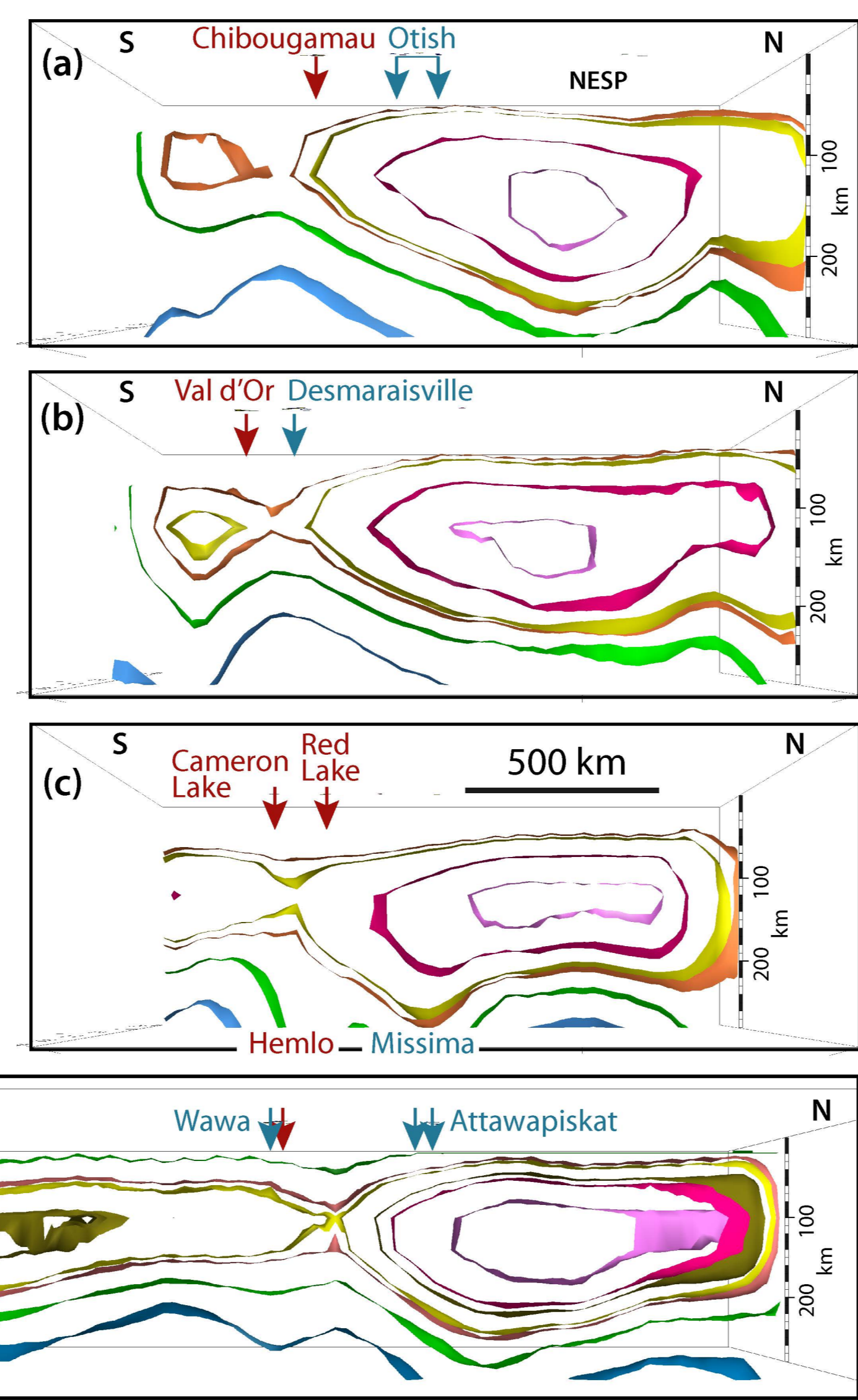
Jean Bédard  
(GSC-Québec)



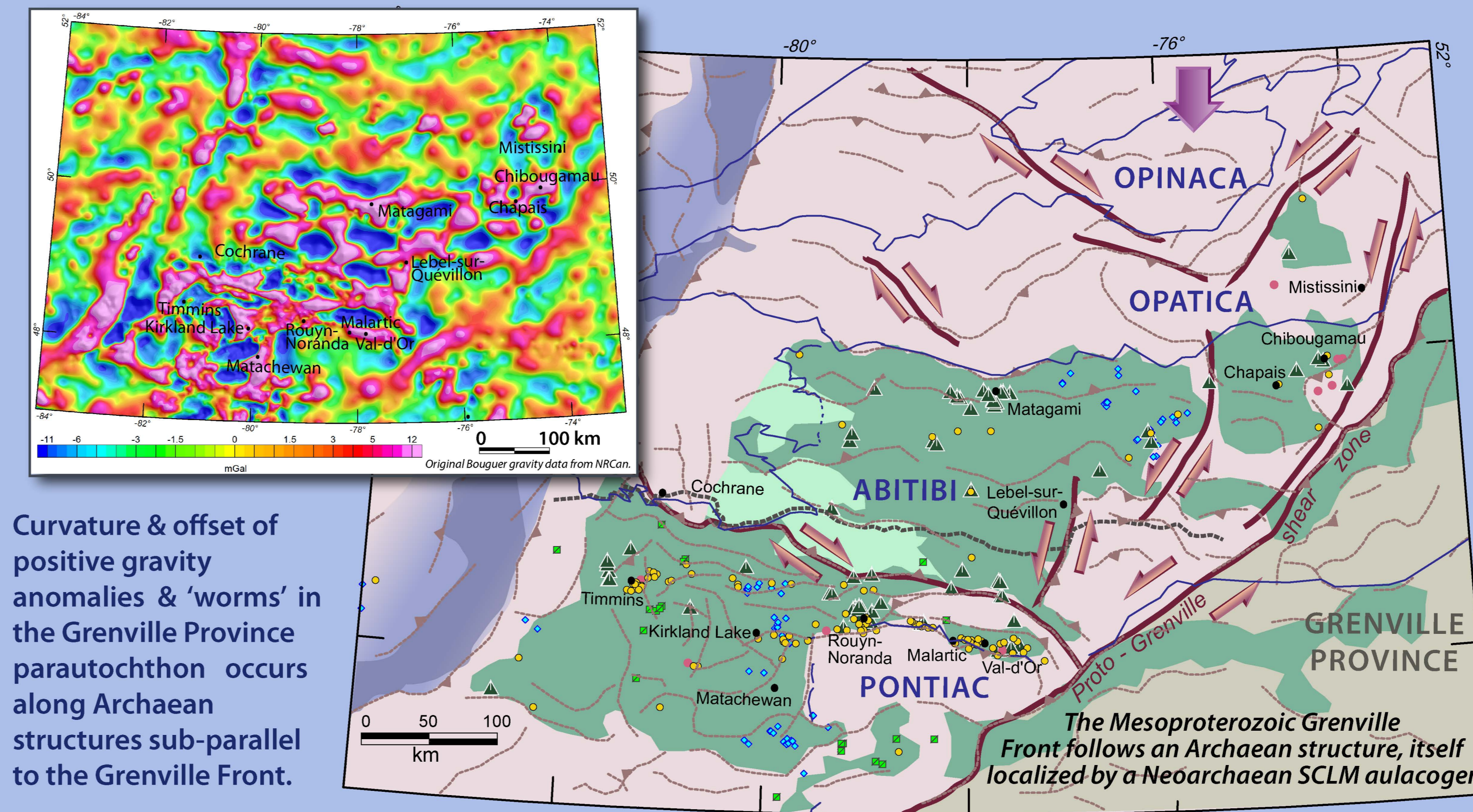
Arc accretion models dominate current interpretations for the Superior Craton, Canada. Seismic tomography, however, suggests Archaean greenstone belts in the SE Superior Province developed during extension & rifting of an older craton.



## Seismic tomographic evidence for Archaean rifting of sub-continental lithospheric mantle (SCLM) in the southern Superior Craton



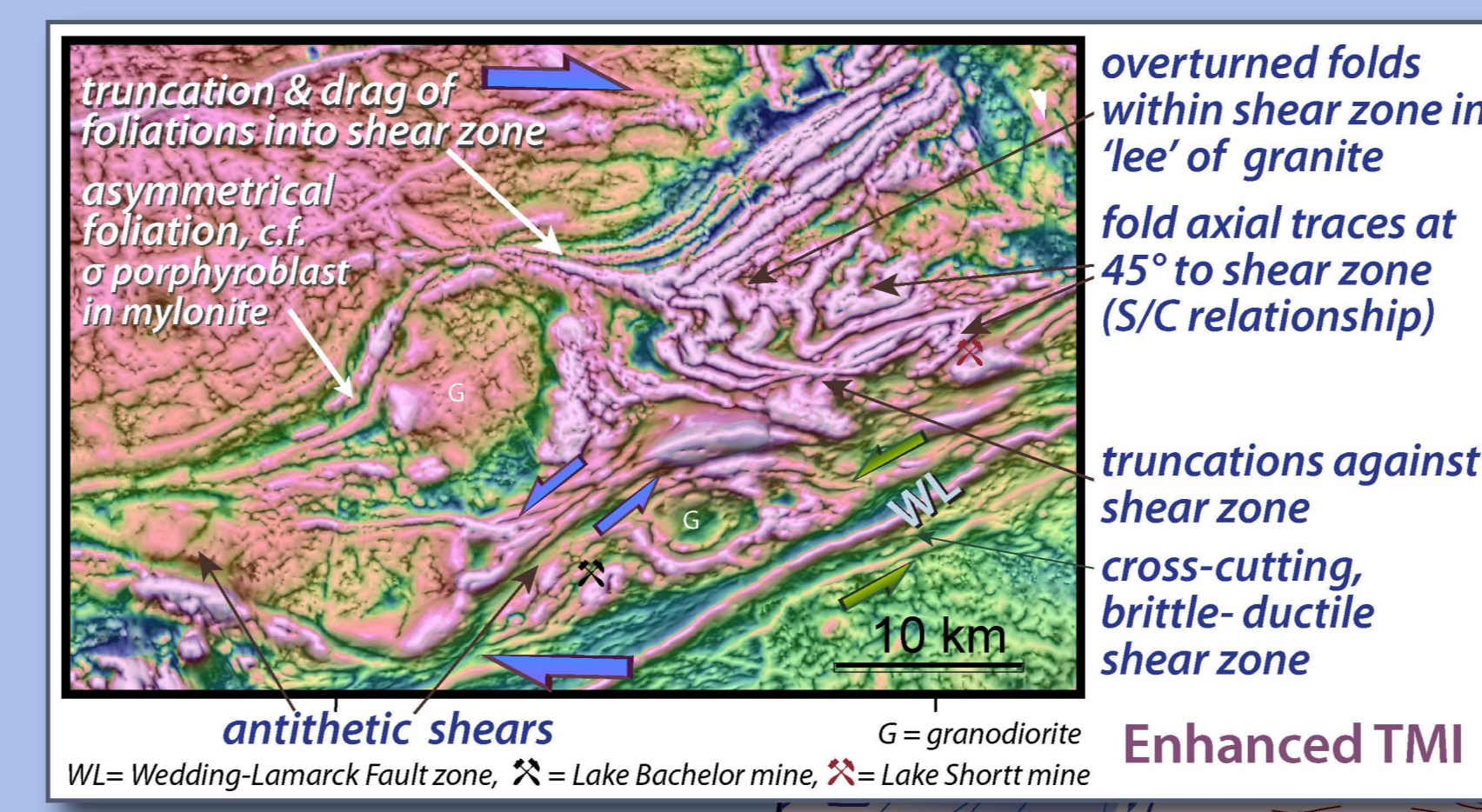
## Regional Folding & Shearing Without Plate Tectonics



Curvature & offset of positive gravity anomalies & 'worms' in the Grenville Province parautochthon occurs along Archaean structures sub-parallel to the Grenville front.

Short wavelength Bouguer gravity shows offset of denser, mafic-dominated domains along regional shear zones

- dense (mafic dominated) crust
- part of displaced block?
- Kapuskasing uplift
- Grenville
- shear zone
- gravity edges/shallow worms
- limit, N & S Abitibi
- terrane boundaries
- Au
- porphyry
- ▲ VHMS
- Ni, PGE, Cr
- kimberlite

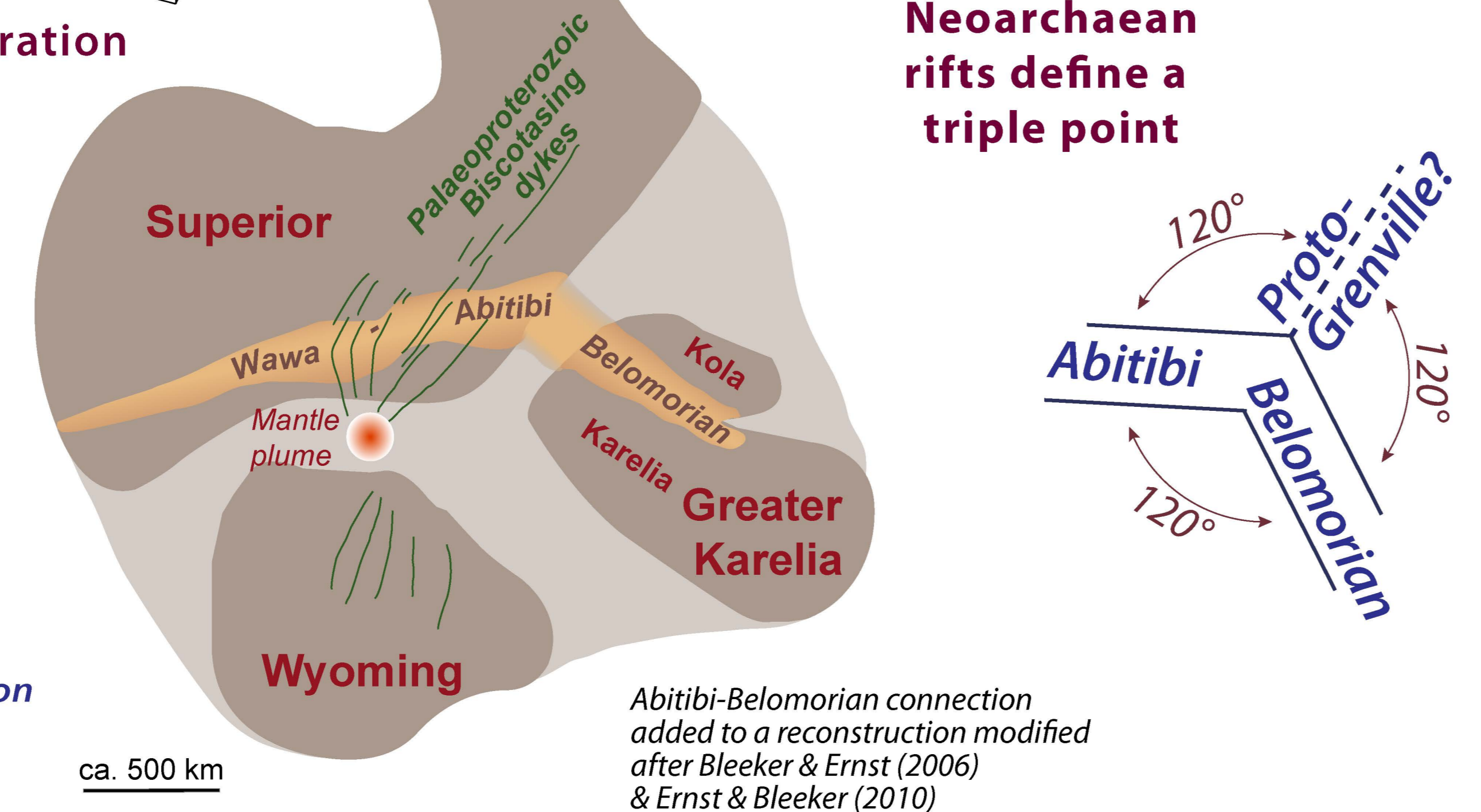
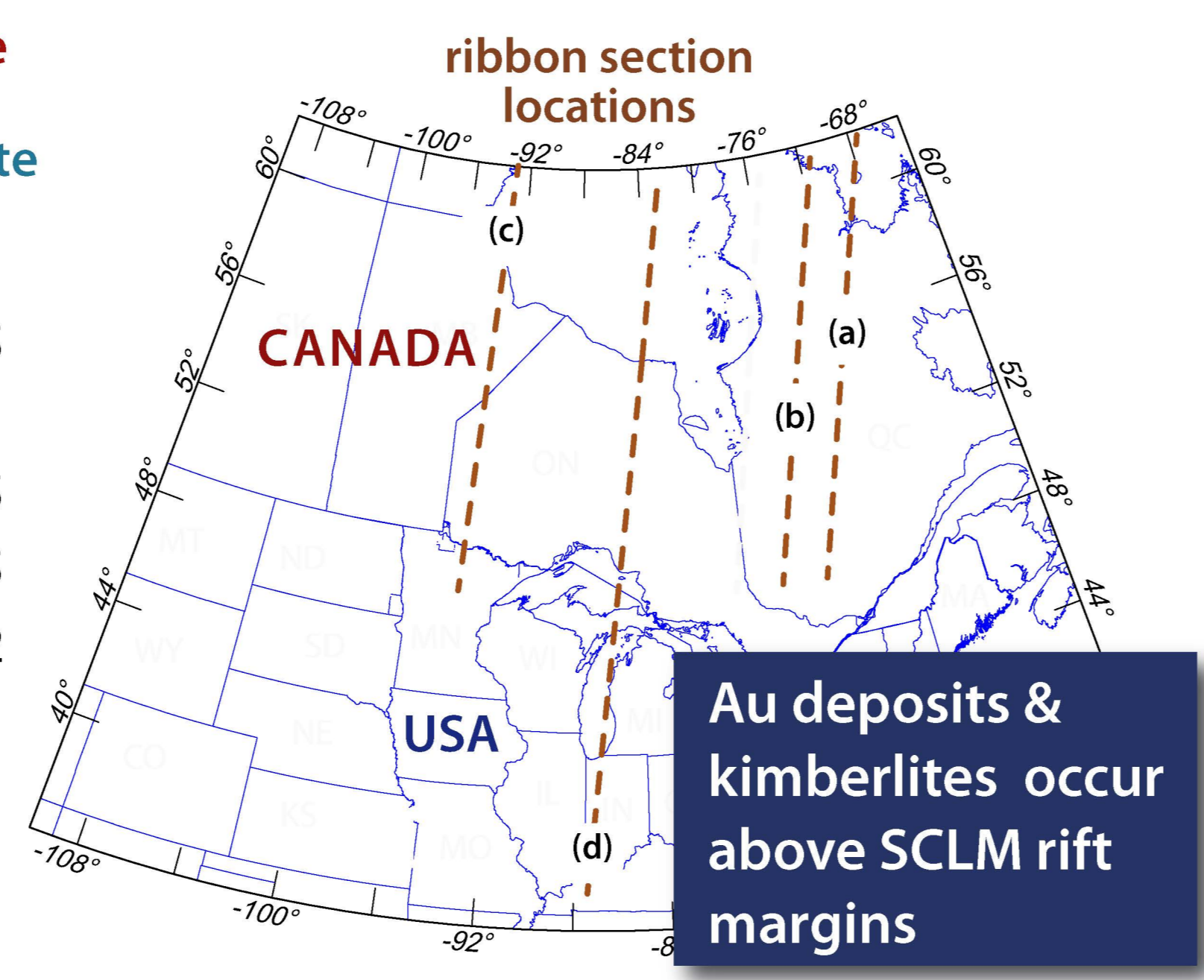
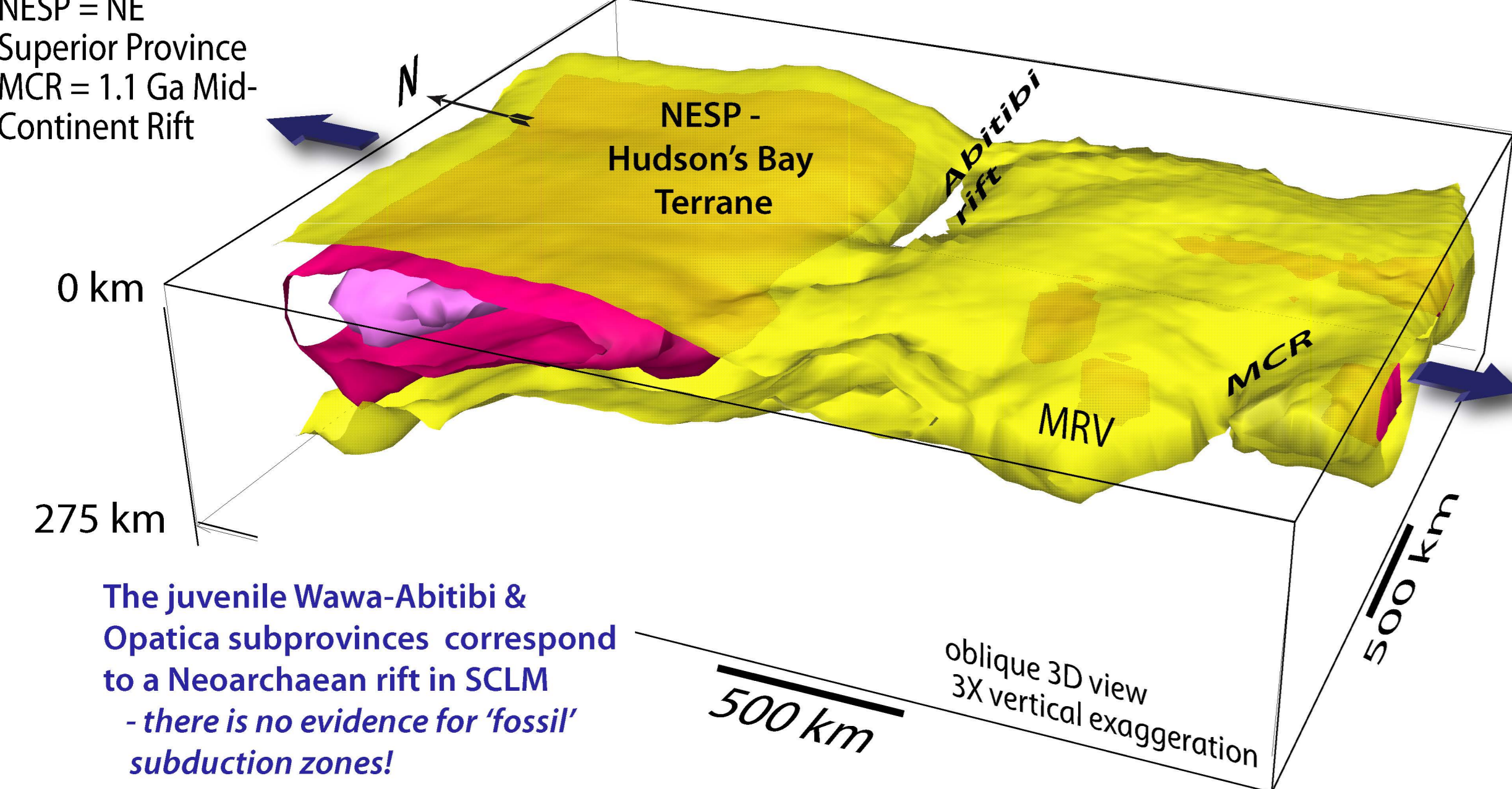
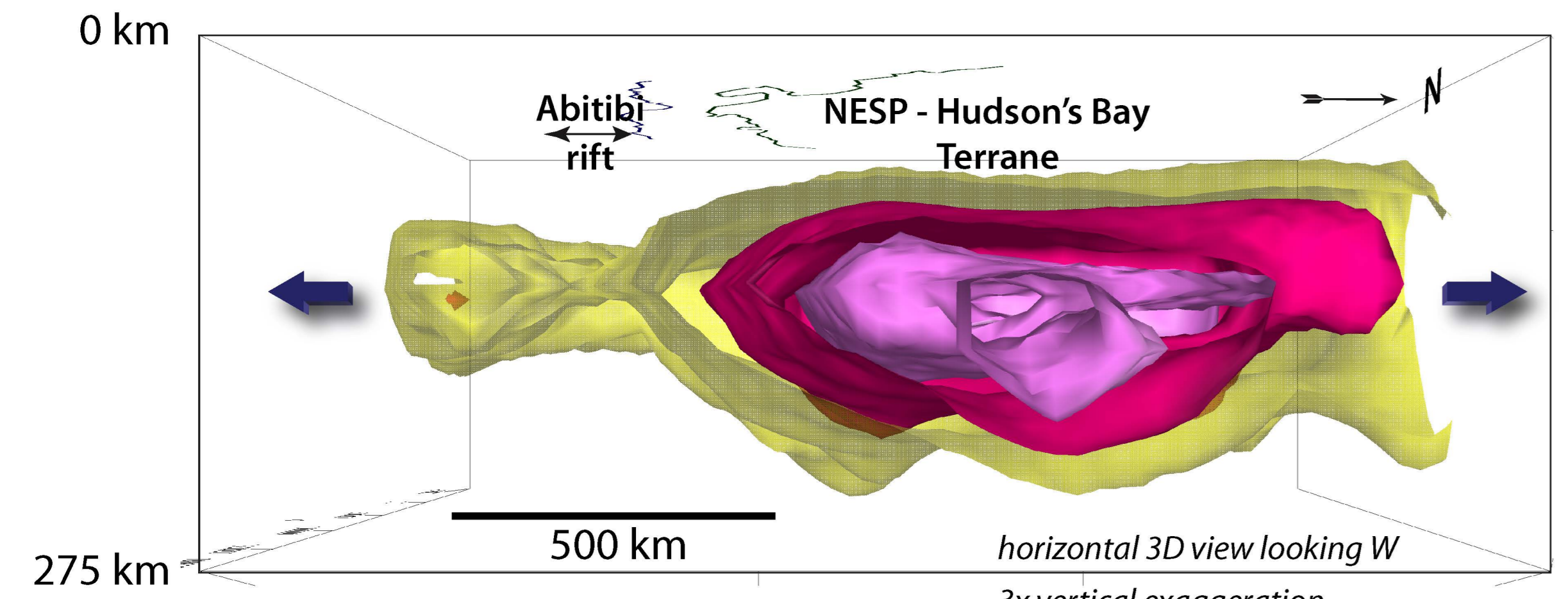


Enhanced aeromagnetic images portray early ductile shear corridors - structures at semi-regional scale resemble those in ultramylonites

Discrete shears, cutting broad dextral shear corridors, indicate c.a. N-S shortening & indentation of the N Superior proto-craton

- Superior Province
- Kapuskasing uplift
- Grenville Province
- shear zone
- fault (Kapusking Uplift)
- limit, N & S Abitibi
- terrane boundaries
- Mistassini dykes

Compiled from the Geological Map of Quebec (Theriault, 2002), Daigneault (1996), & unpublished aeromagnetic interpretation by L. Harris. Main mineral deposits from NRCAN World Mineral Deposits databases. Kimberlites are from Faure's (2010) World Kimberlites CONSOREM Database.

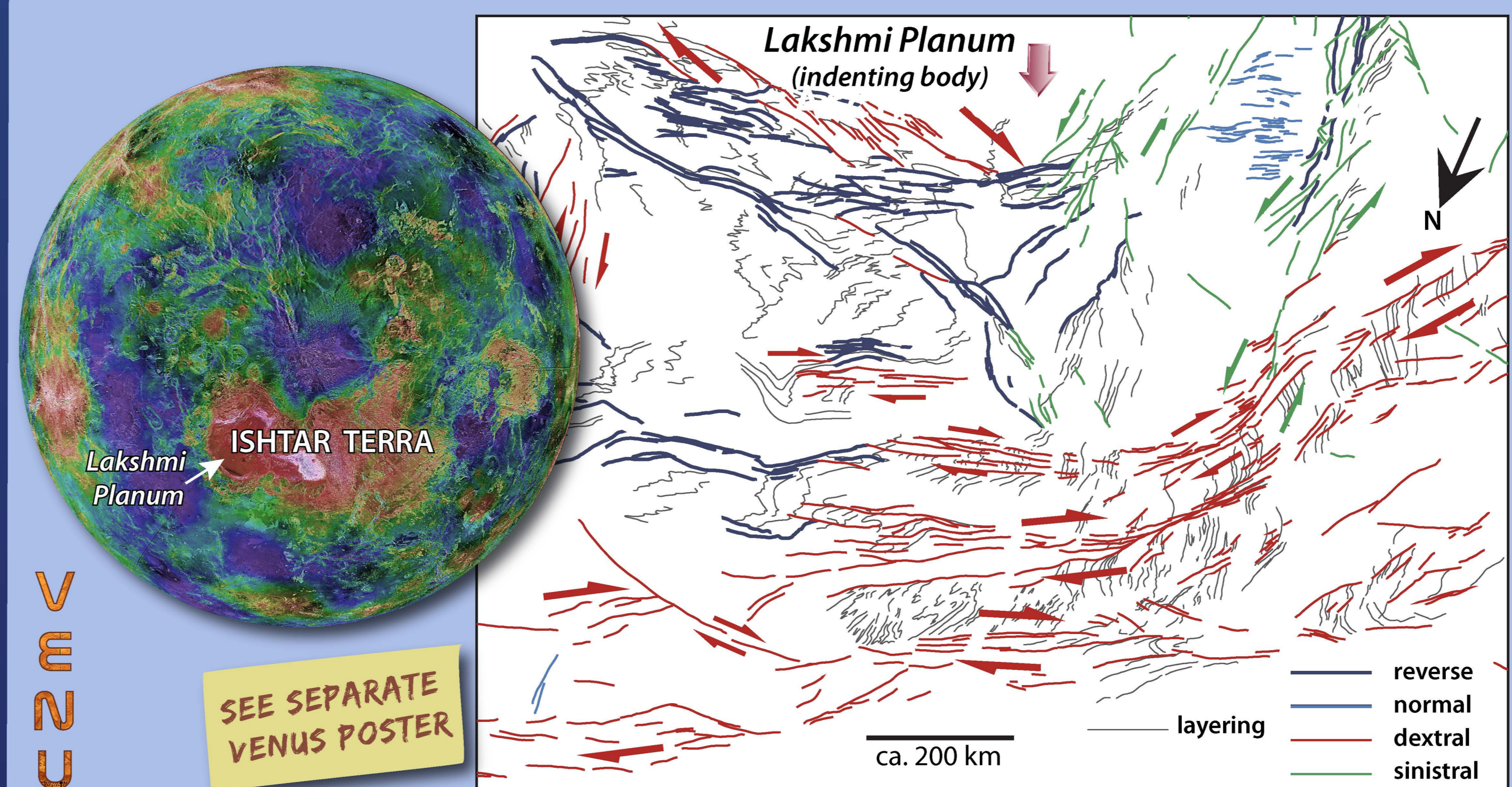


## Tectonic reconstruction

Superior, Greater Karelia (Baltica) & Wyoming cratons prior to Palaeoproterozoic breakup

The Belomorian belt (Baltica), placed against the SE Superior Province in tectonic reconstructions, likely represents a continuation of the Abitibi.

Neoproterozoic rifts define a triple point

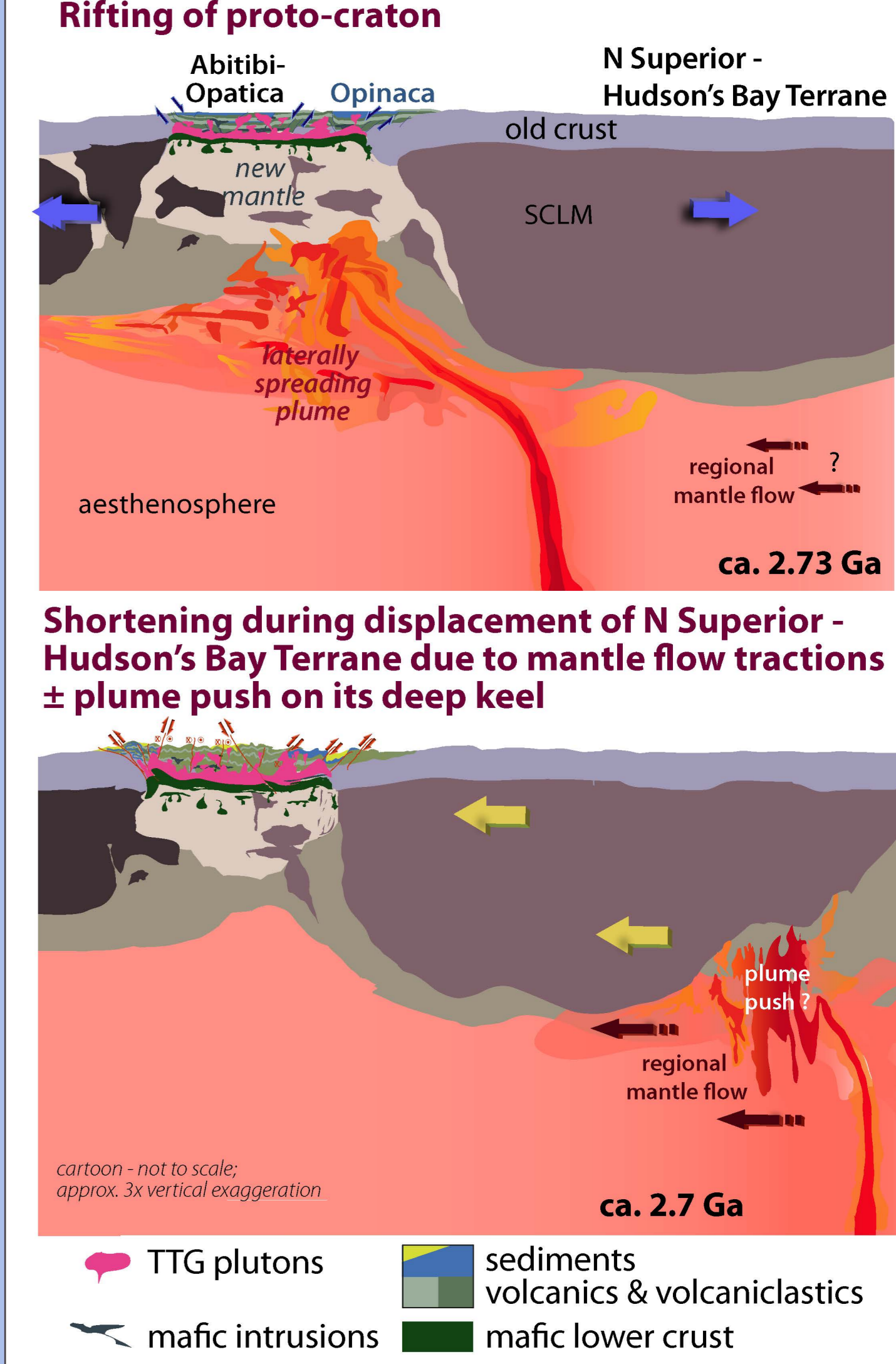


The pattern of shears in W Ishtar Terra, Venus (a planet without plate tectonics) resembles the SE Superior Province

When the shear zone interpretation of western Ishtar Terra, Venus, is rotated & flipped to match the orientation of shears in the SE Superior Province, the resemblance is striking. Shear zones on Venus formed without stresses arising from plate tectonic

processes; arc development & accretion in a modern plate tectonic régime is similarly not required for formation & deformation of Archaean granite-greenstone terrains on Earth.

## Tectonic model



- TTG plutons
- sediments
- volcanics & volcanoclastics
- mafic intrusions
- mafic lower crust