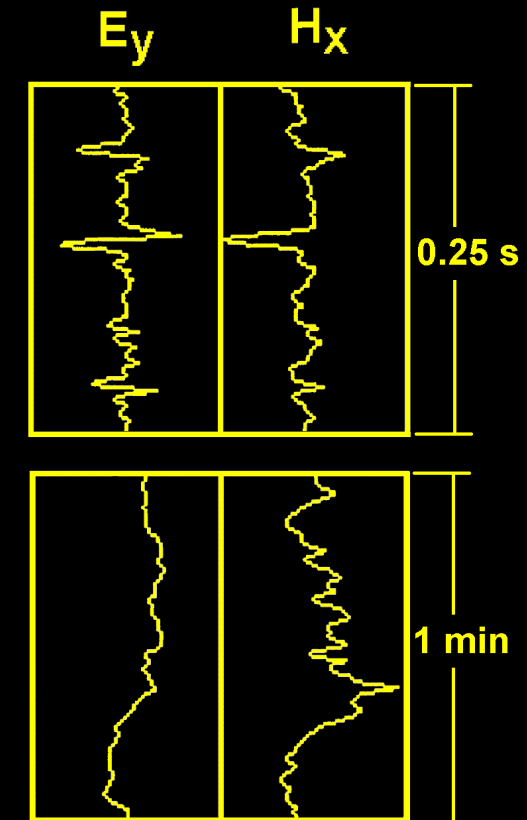
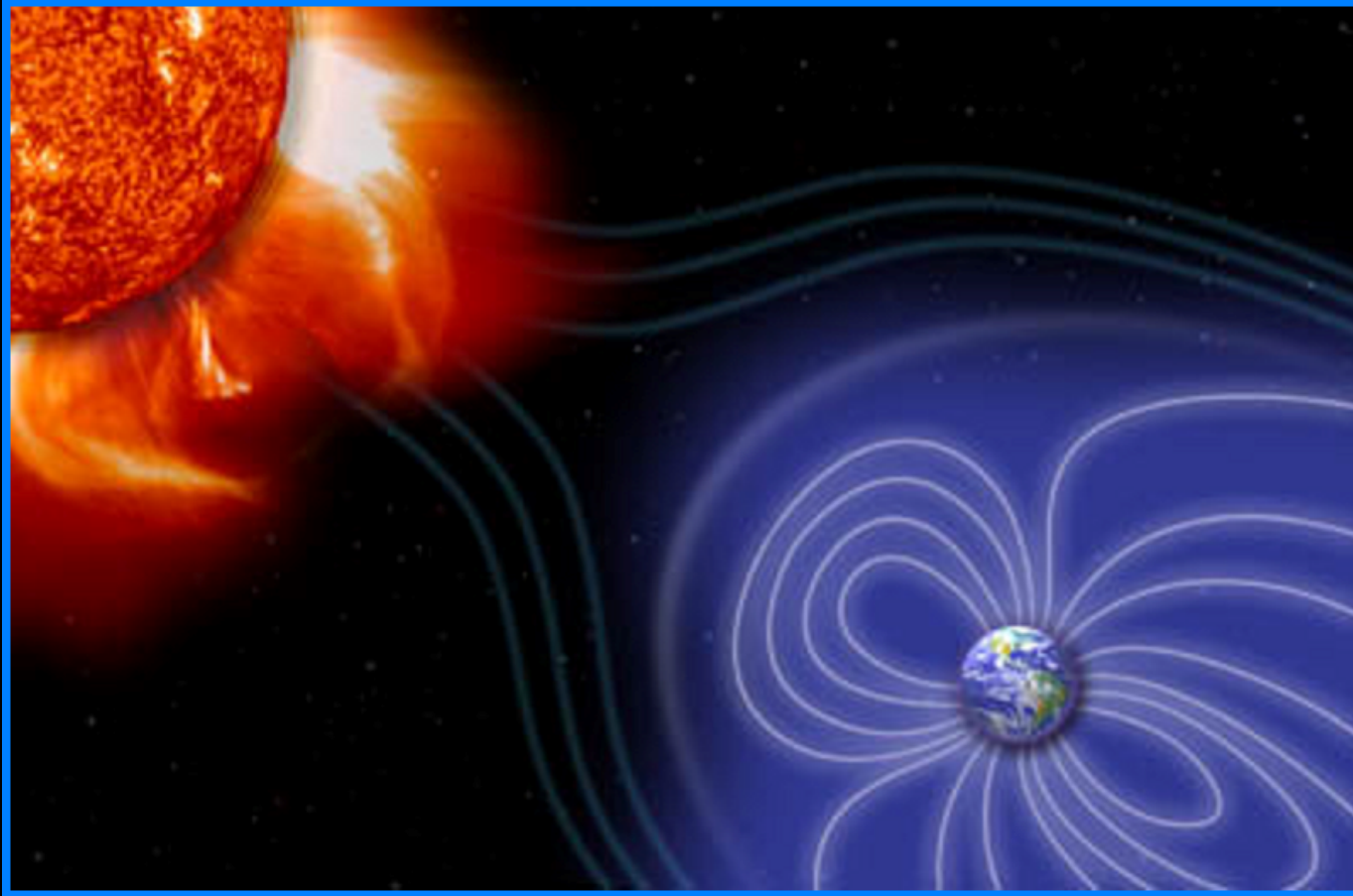




Thermal Regime, Legacy Structures, Upper Mantle Hydration and Magmatic Processes of the Antarctic Interior From Regional Scale Electrical Properties

Phil Wannamaker, John Stodt, Graham Hill, Virginie Maris, Michal Kordy
University of Utah, Czech Academy of Sciences, Univ. of Canterbury

Source Fields for the Magnetotelluric Method



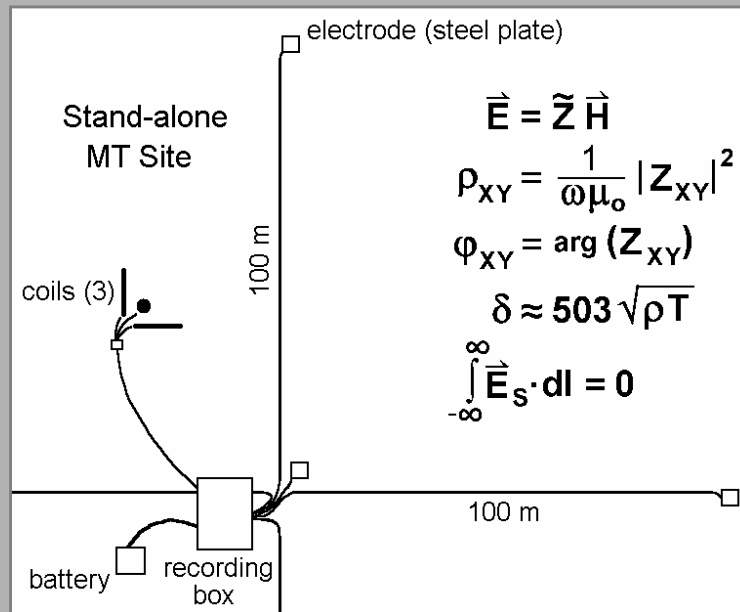
Regional and Global Lightning Activity for $f > 1$ Hz
Solar Wind-Magnetospheric Interactions for $f < 1$ Hz



Induction Coil
(Solenoid)



Ti Electrode w/
High-Z Preamp

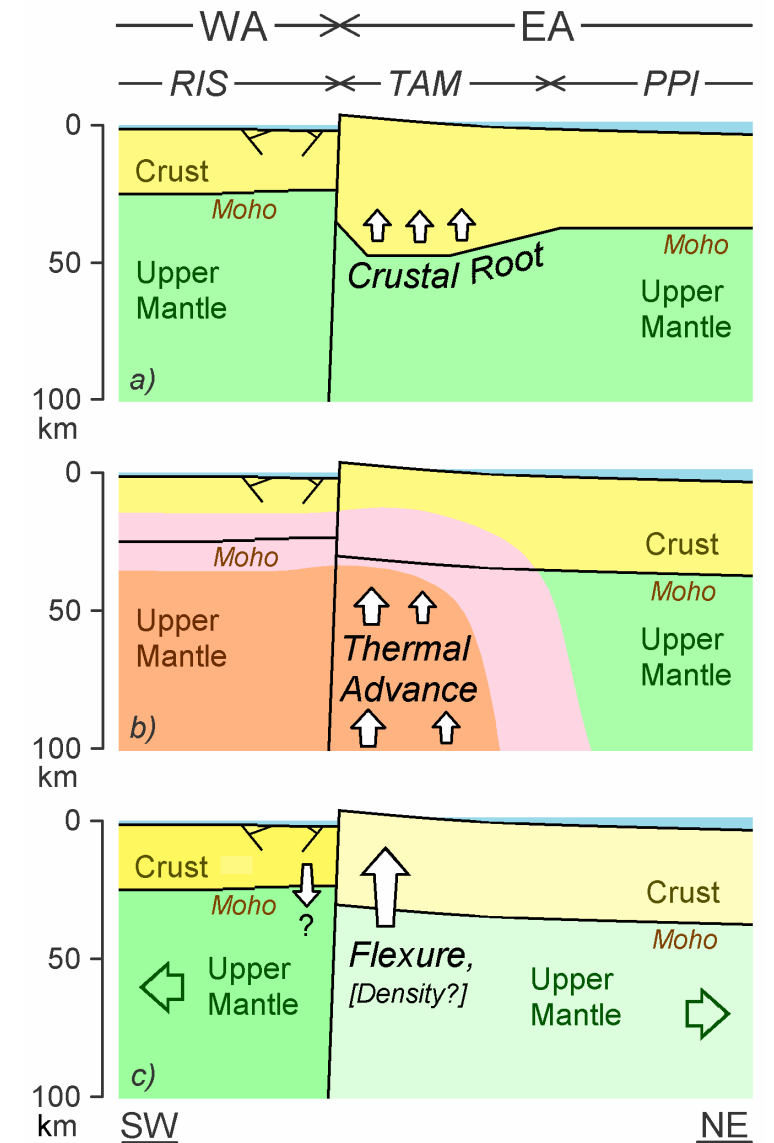
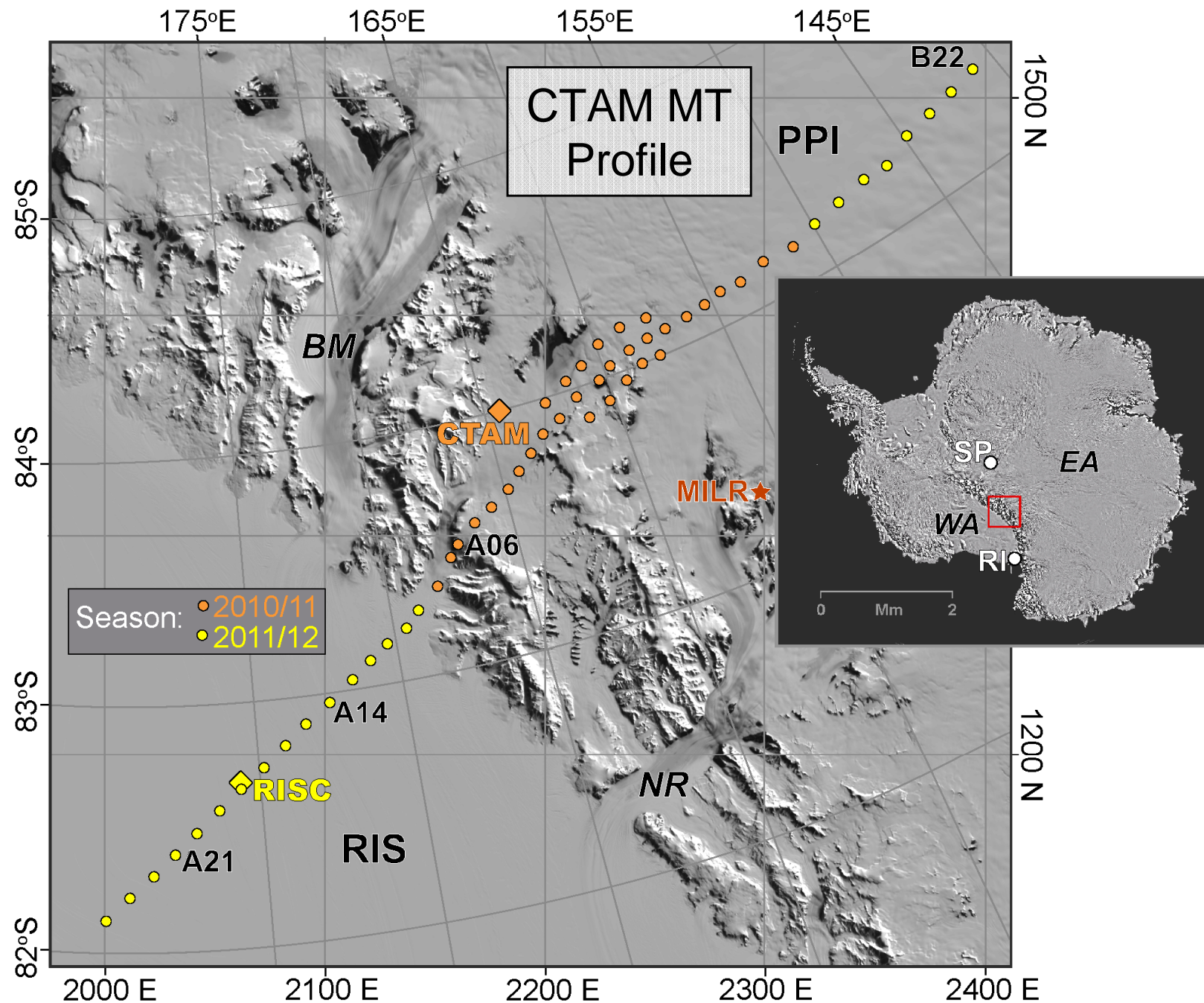


MT Recording Components For Polar Deployment

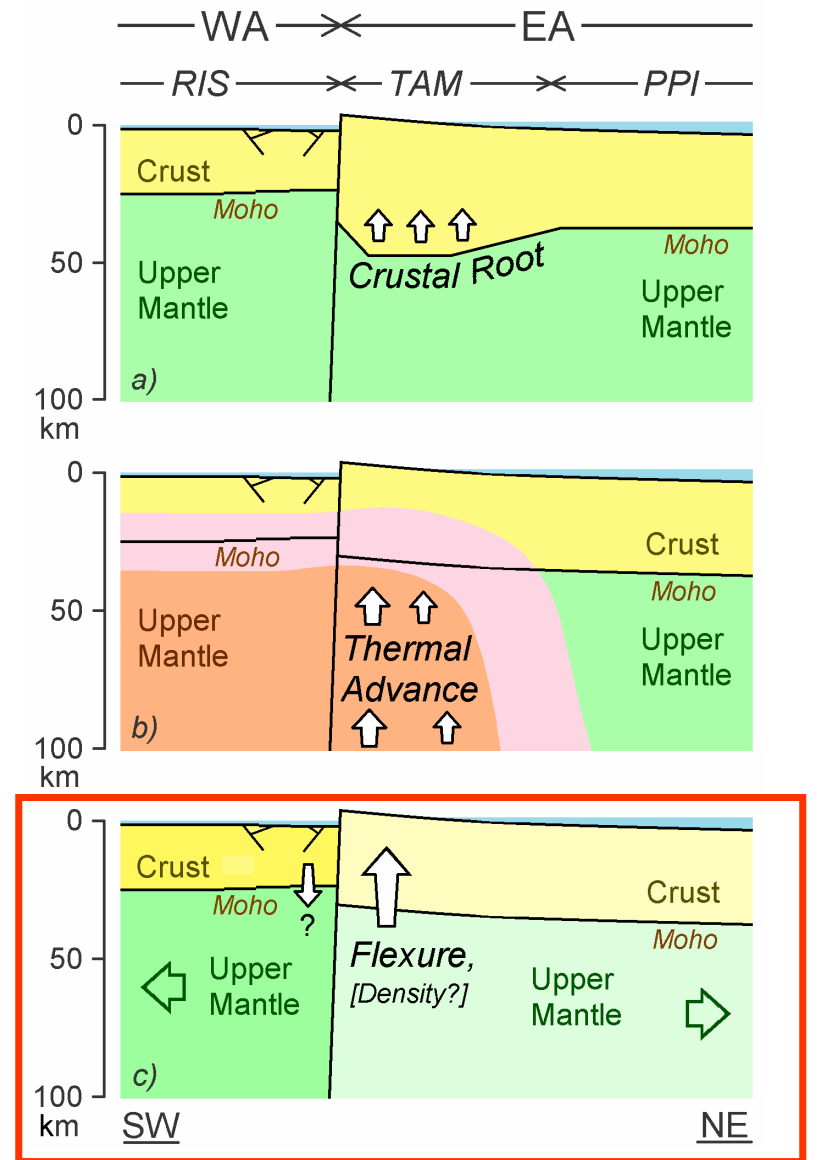
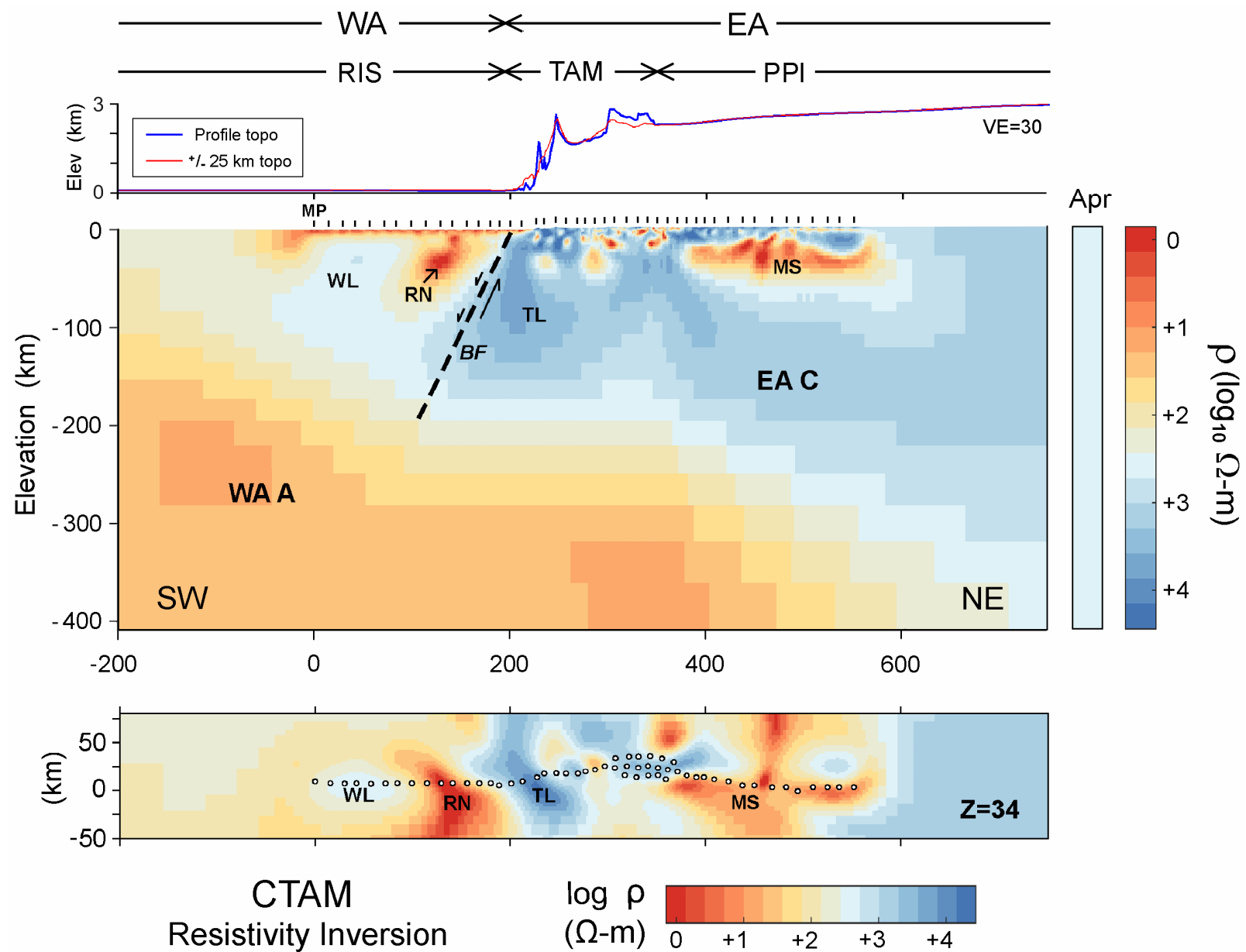


Sync'd MT recorders



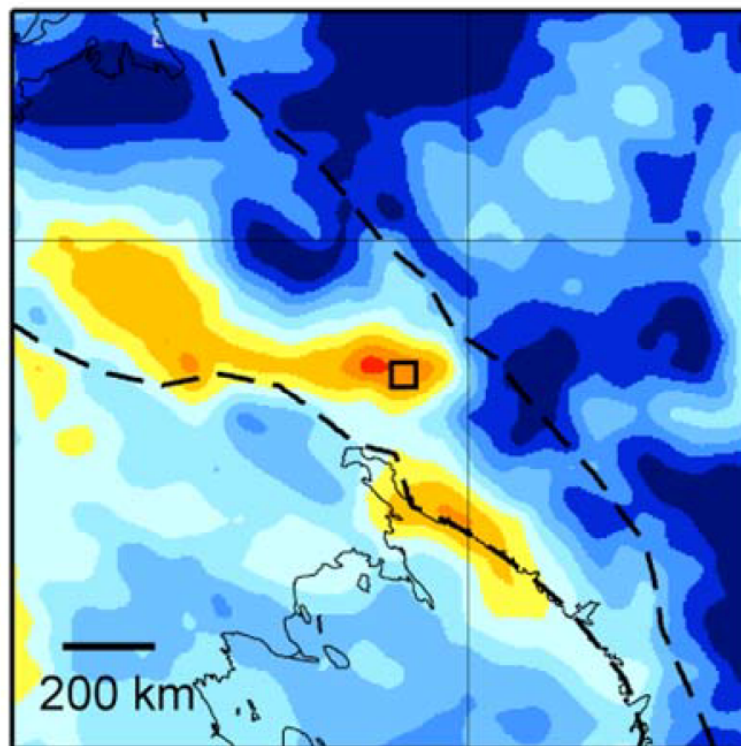


Hypotheses for TAM Uplift
 (Wannamaker et al., 2017, Nat Comms)

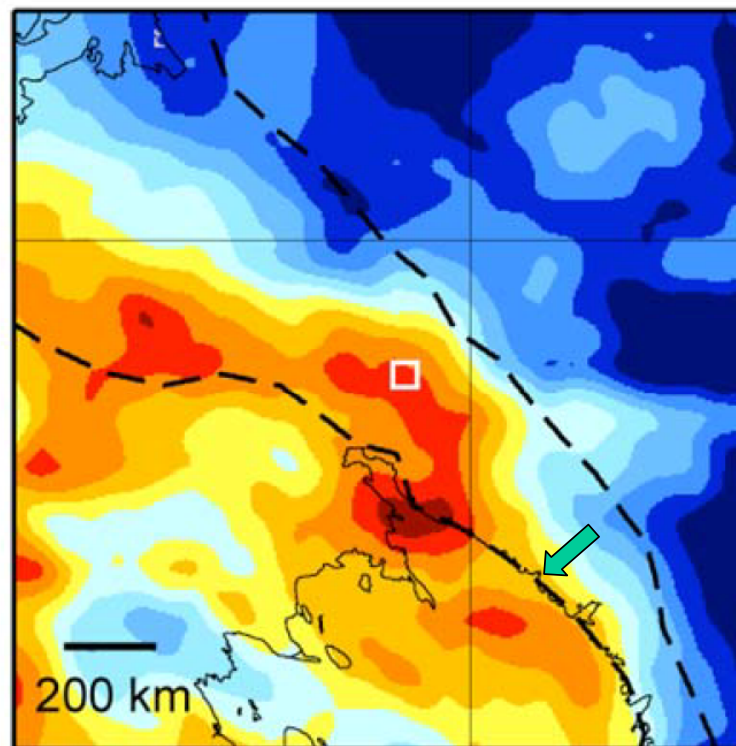


Hypotheses for TAM Uplift
(Wannamaker et al., 2017, Nat Comms)

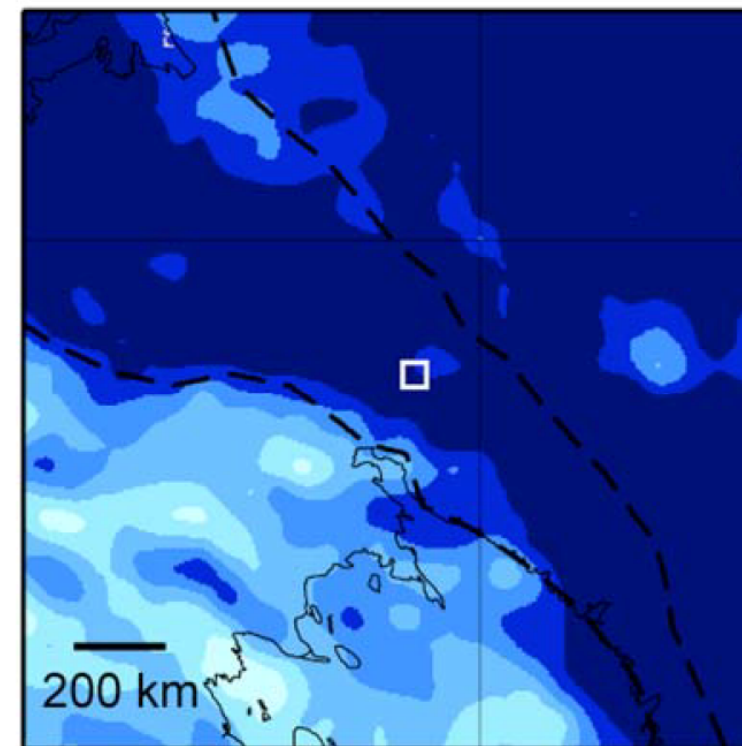
(a) 60 km



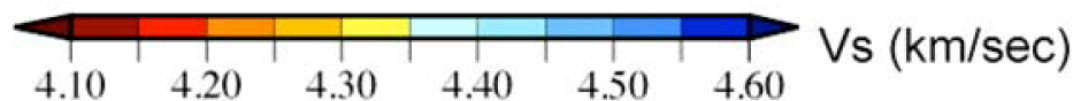
(b) 80 km



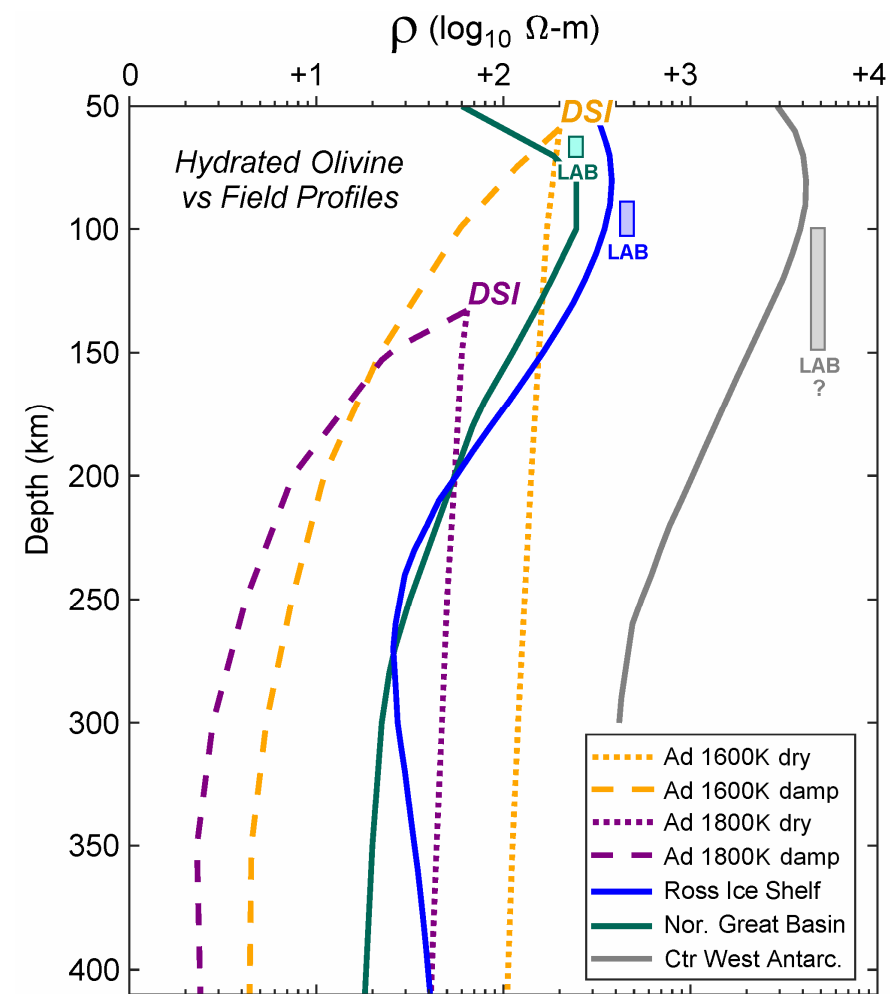
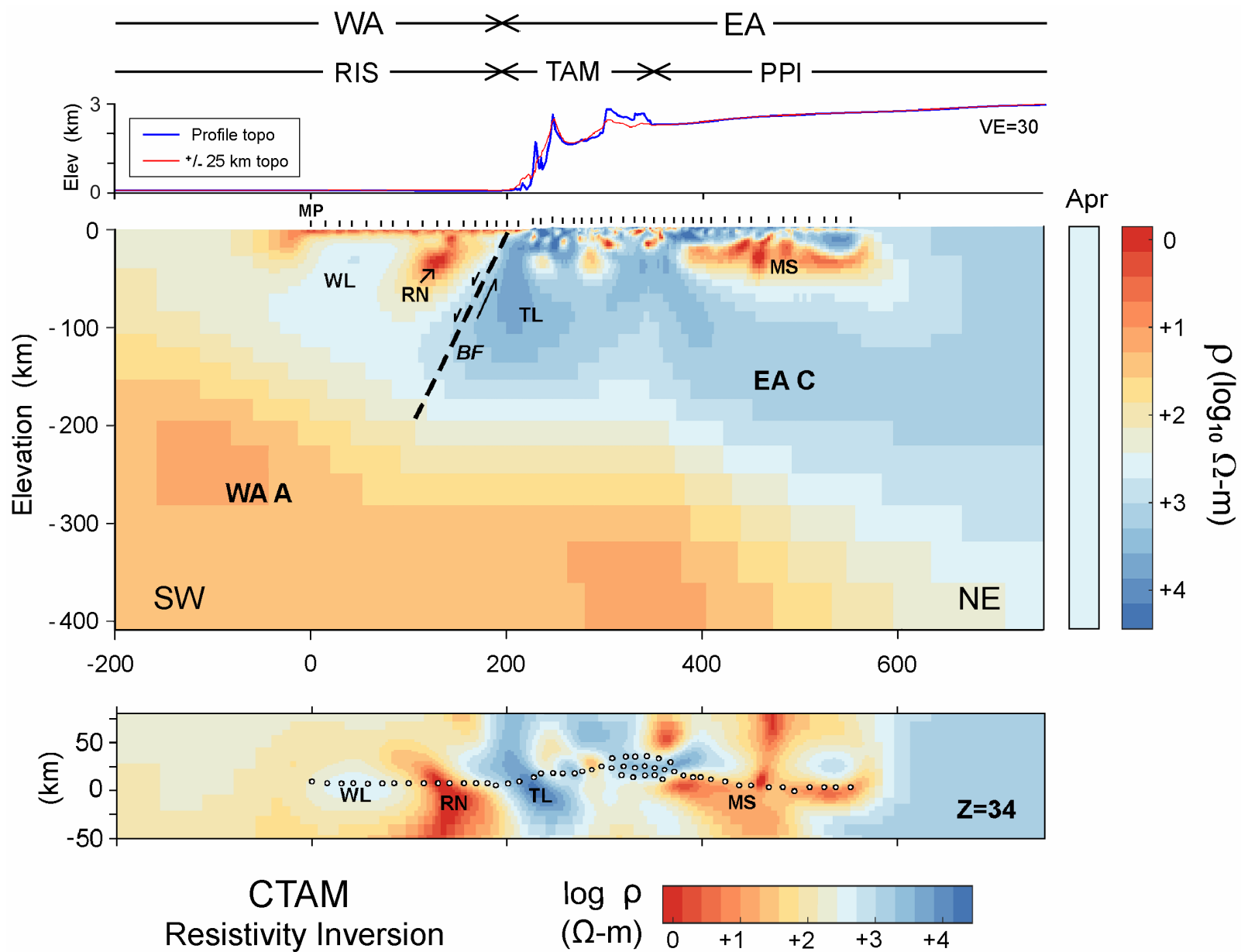
(c) 200 km



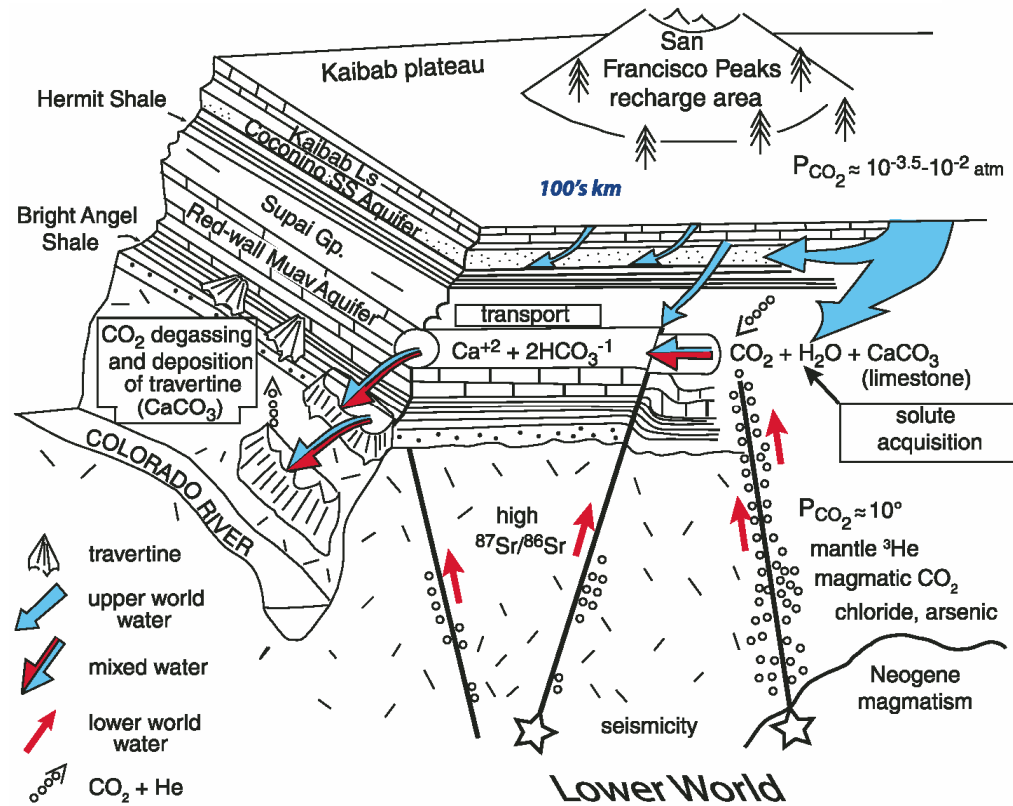
□ Mount Early –
Sheridan Bluff



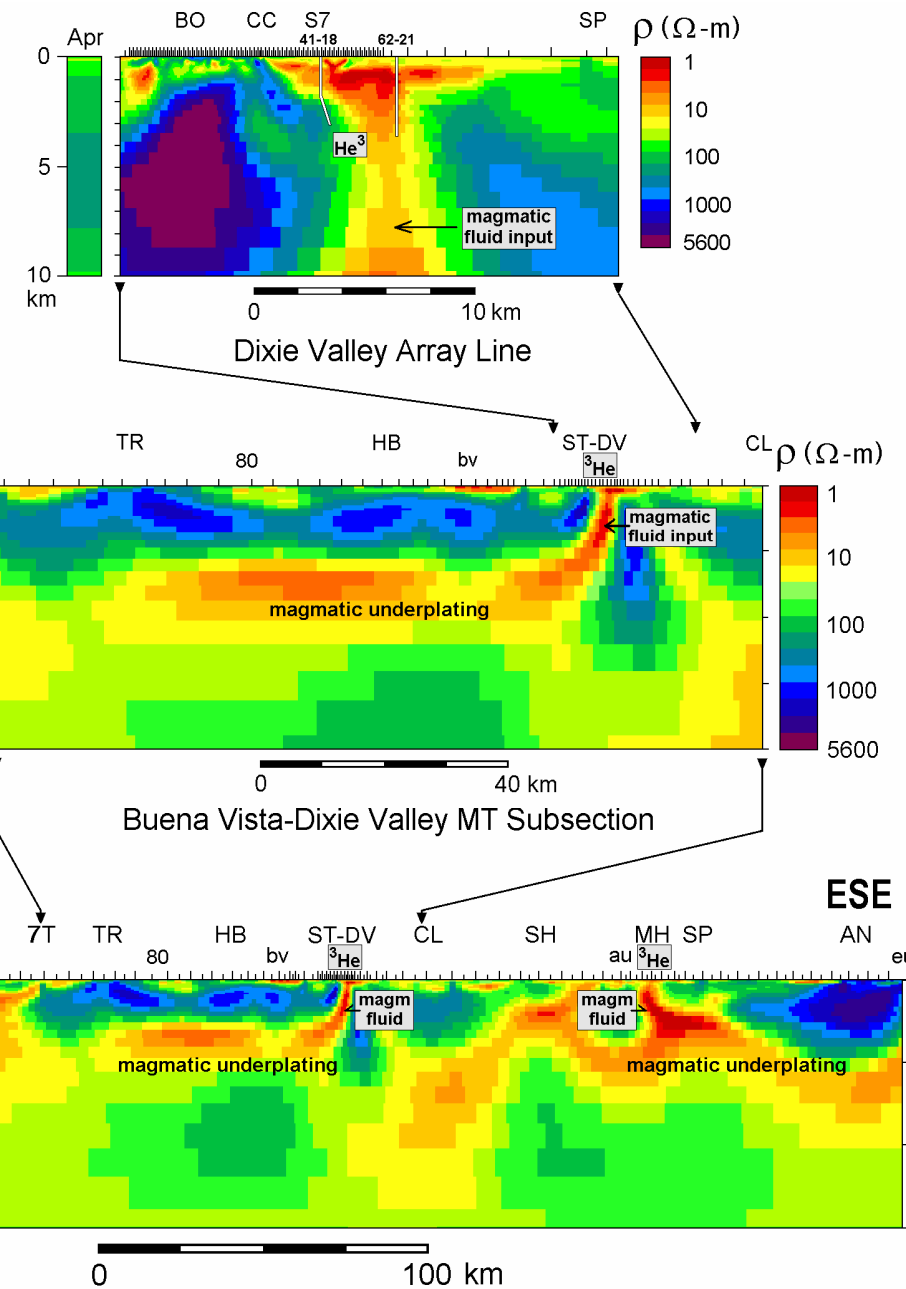
Absolute Shear Wave Speeds
Southern Transantarctic Mountains
(Shen et al., 2017)



Upper Mantle NAMs Hydration
(West Antarctica, Great Basin)
(Wannamaker et al., 2020, GSL Mem.)

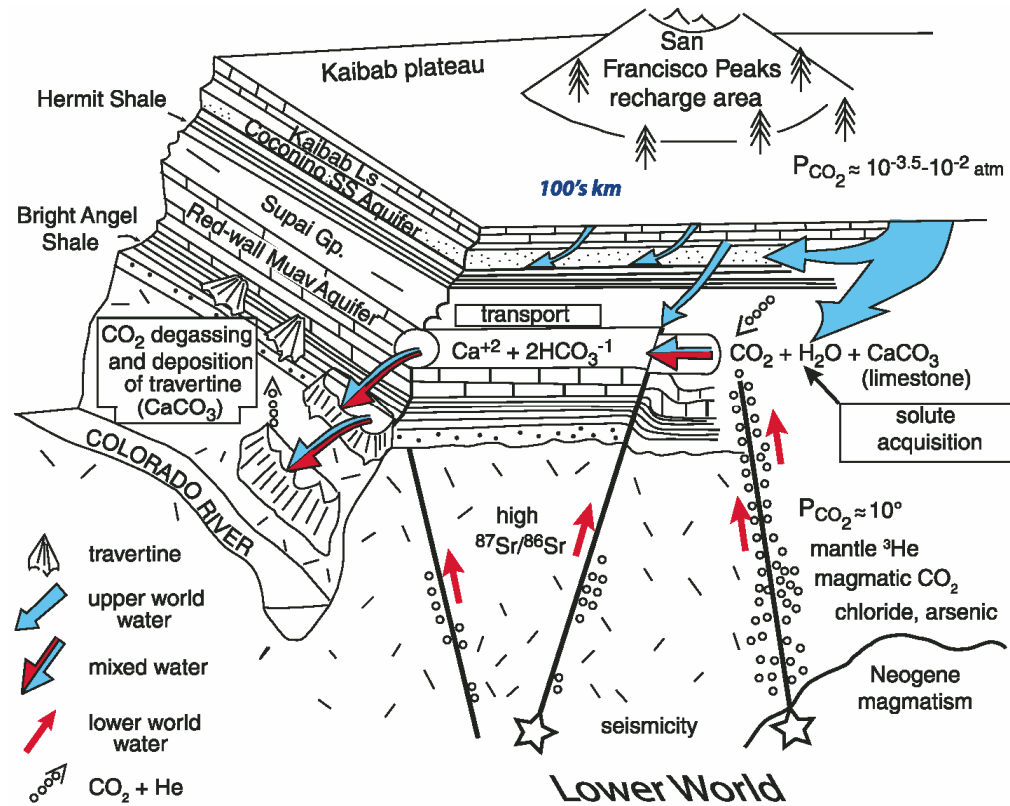


**Multiscale Magmatic/
Hydrothermal Connections**
Grand Canyon Hydrol. Model
(Crossey and Karlstrom, 2012)



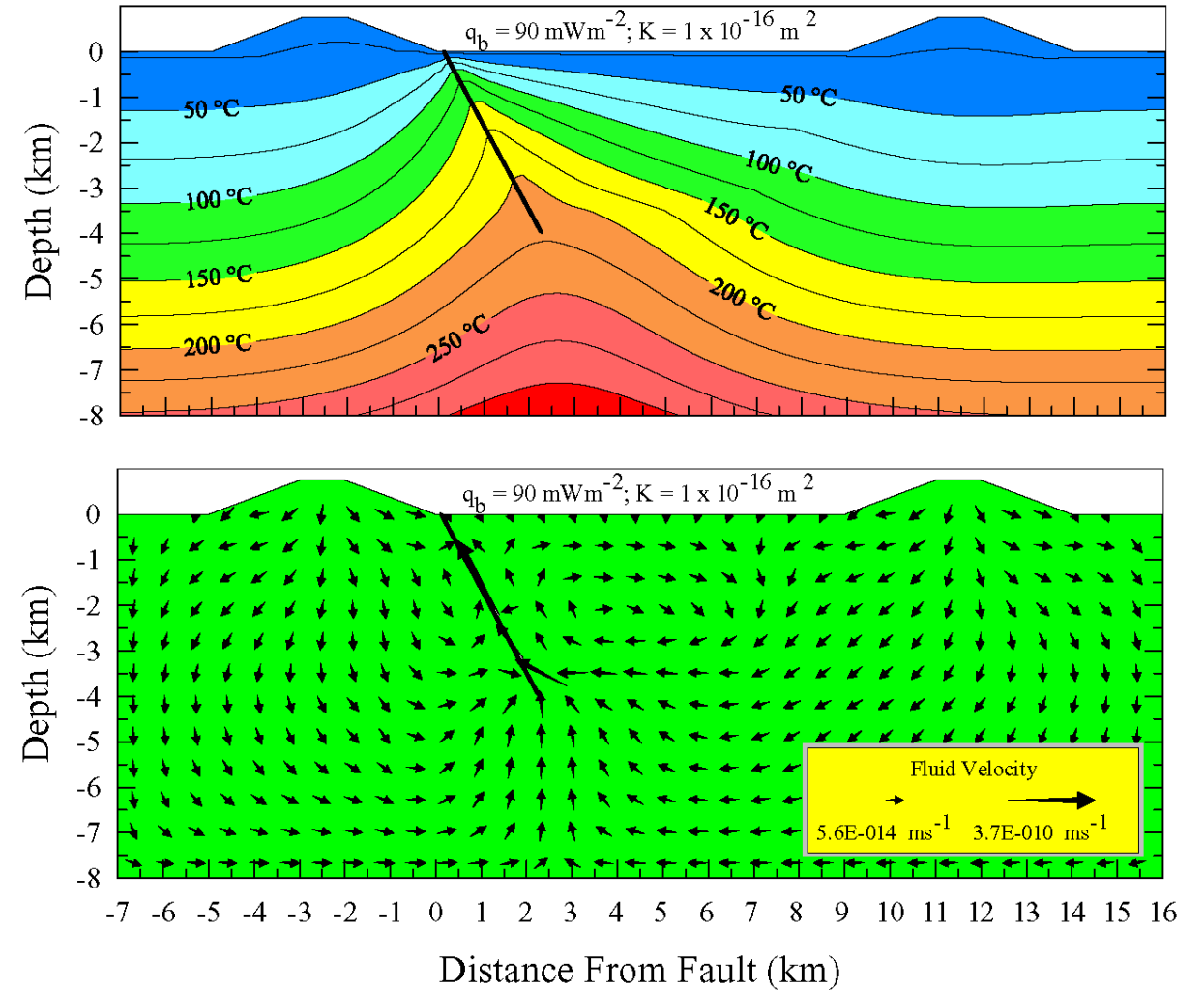
**Wannamaker et al, 2007,
2008, 2011; Siler et al., 2014**

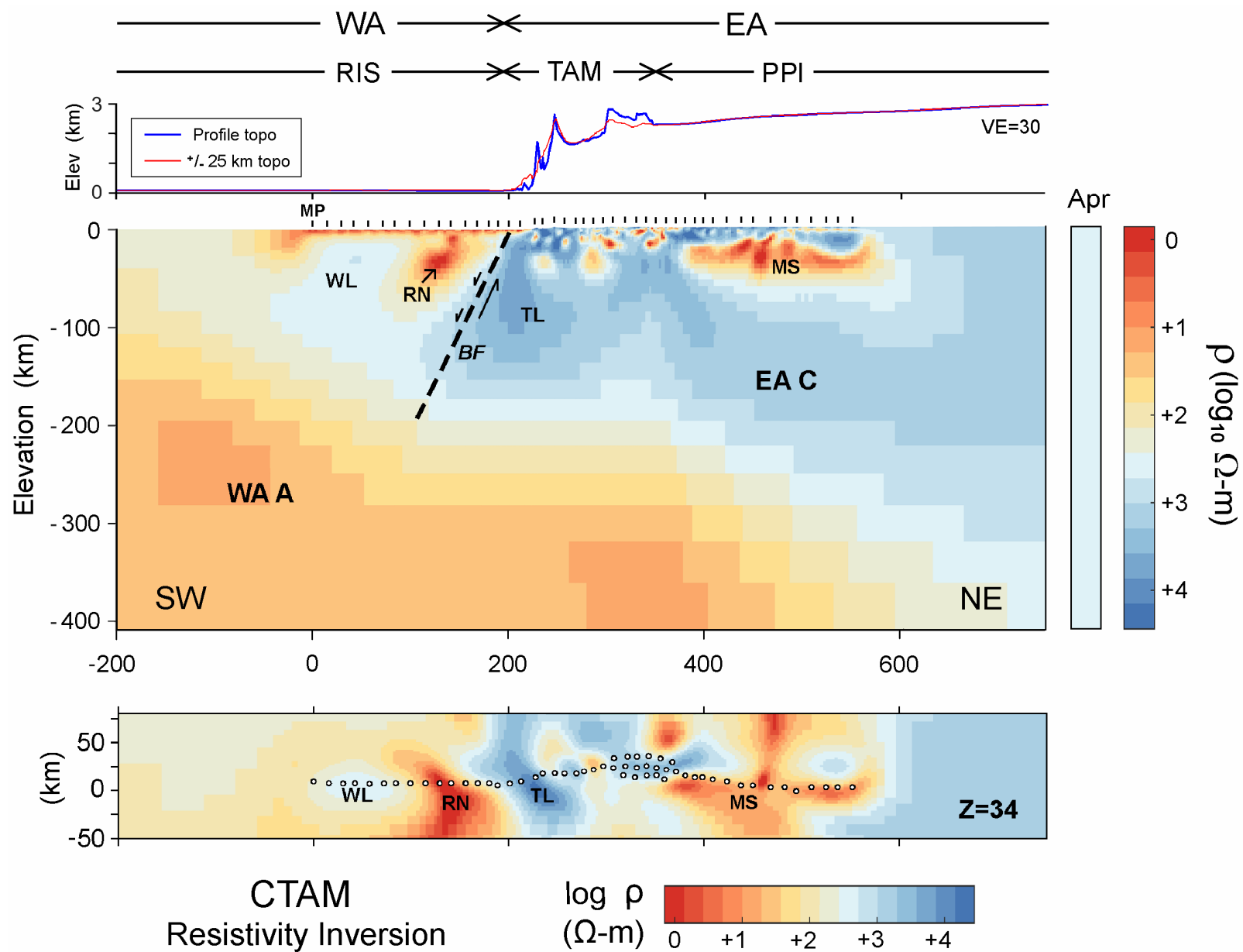
NW Great Basin MT Transect



Multiscale Magmatic/
Hydrothermal Connections
Grand Canyon Hydrol. Model
(Crossey and Karlstrom, 2012)

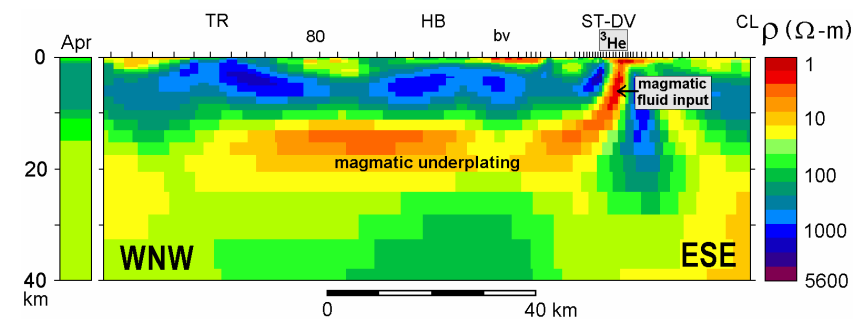
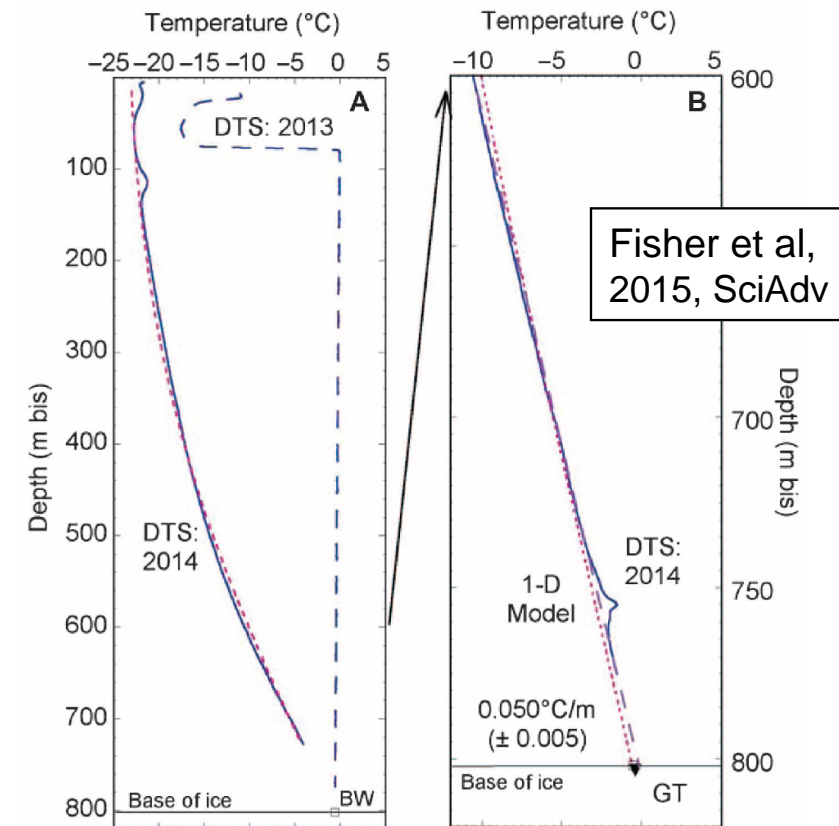
Dixie Valley NV Convective Thermal Model (McKenna and Blackwell, 2004)



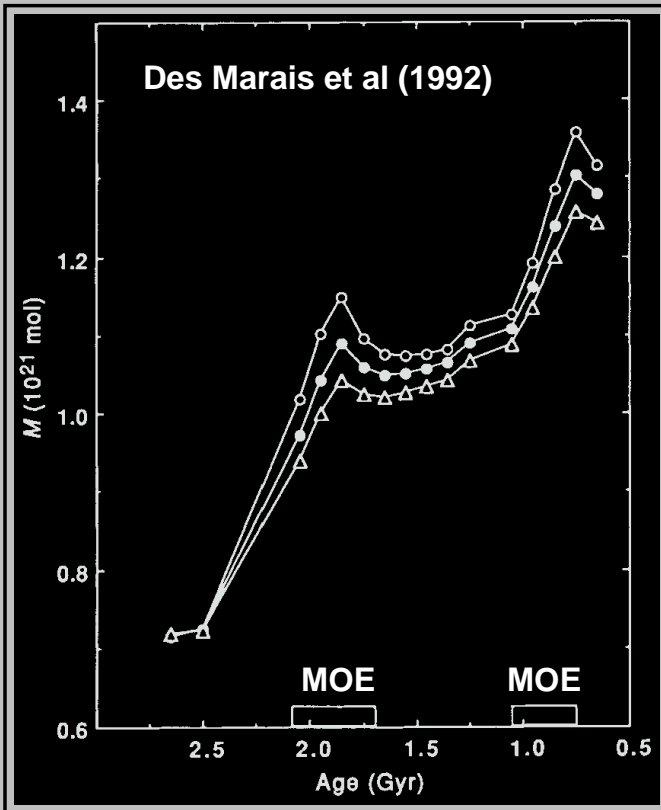


Subglacial Lake Whillans

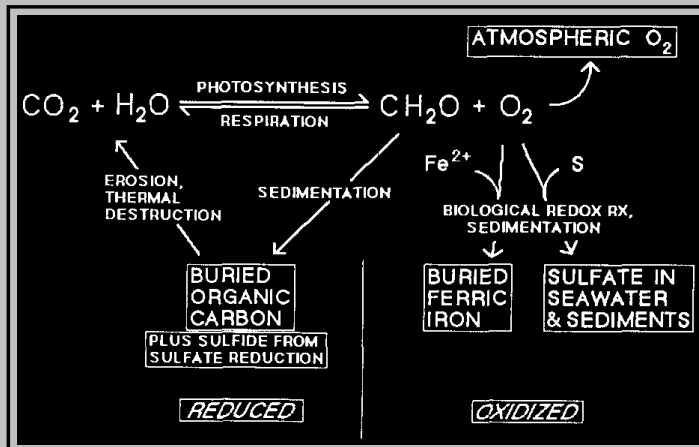
heat flux $285 \pm 80 \text{ mW/m}^2$



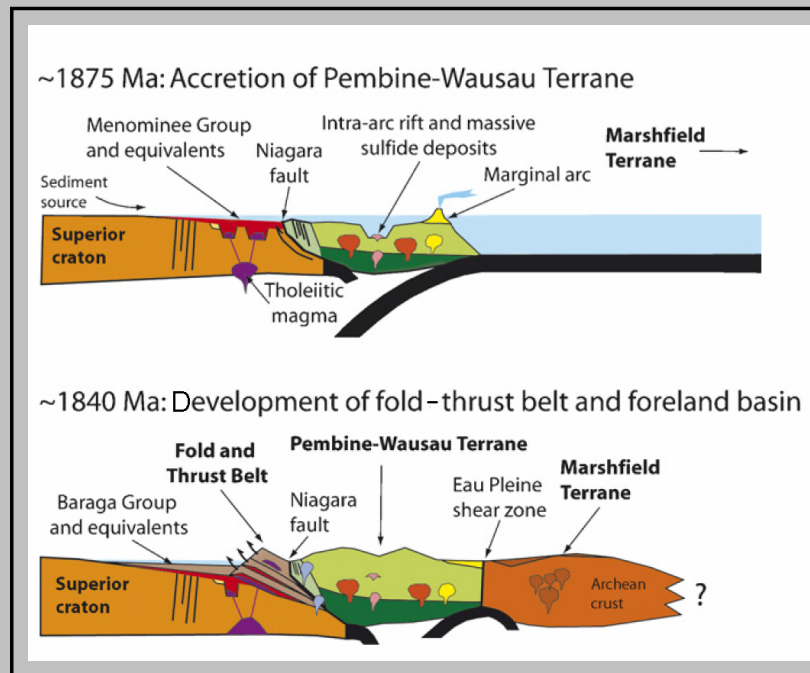
Wannamaker et al (2007) – Western NV
 Rift Necking and Thermal Focus



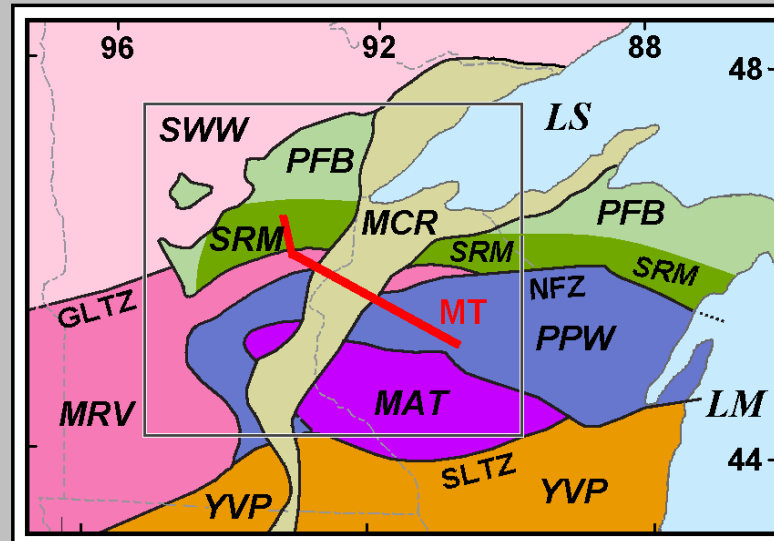
oC-Sd global primary production



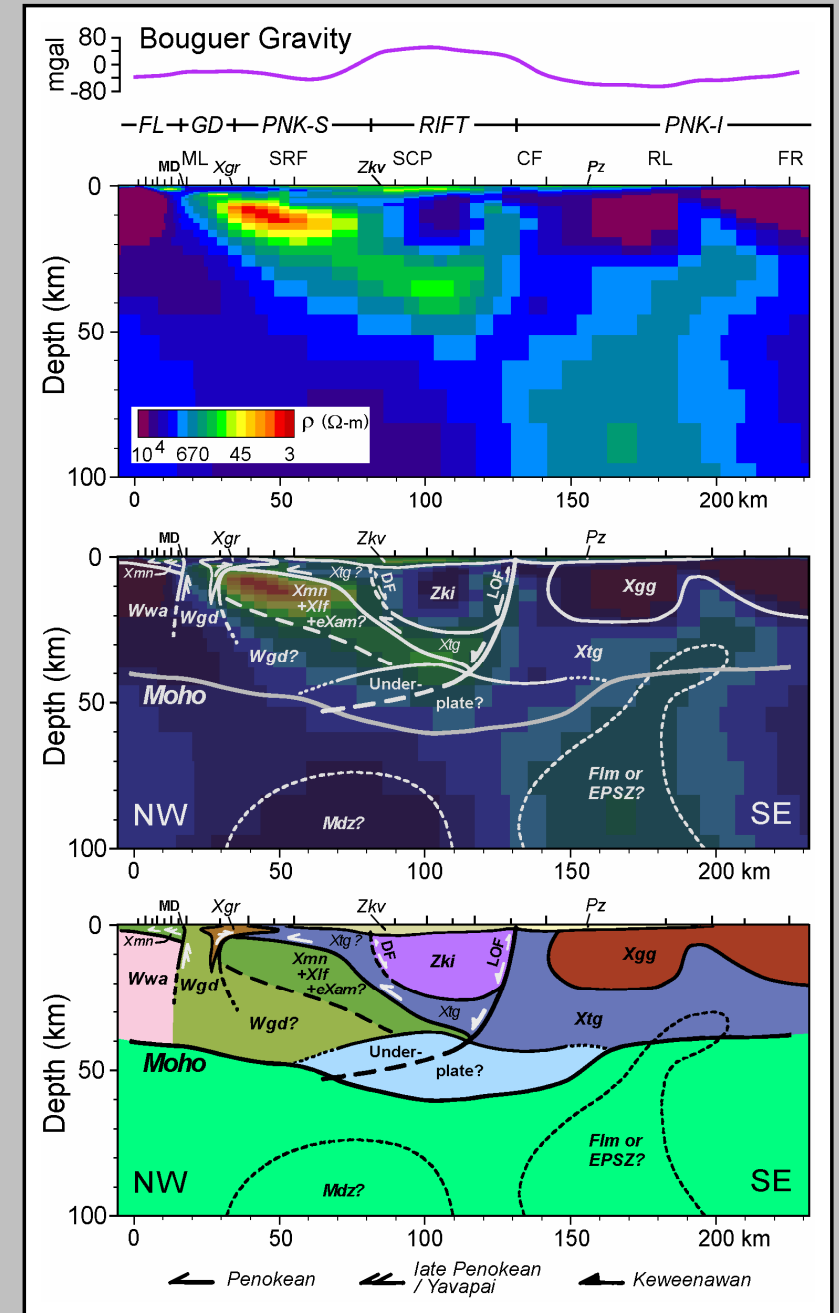
Cyanobacterial oC-Sd sequ.



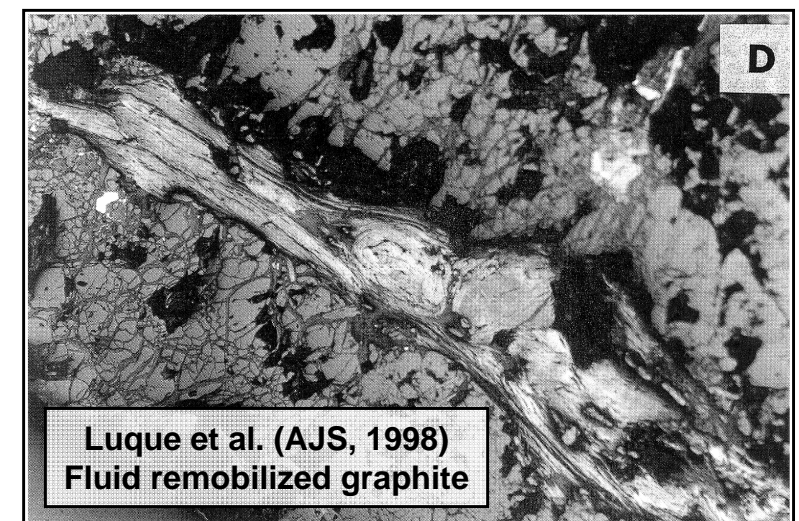
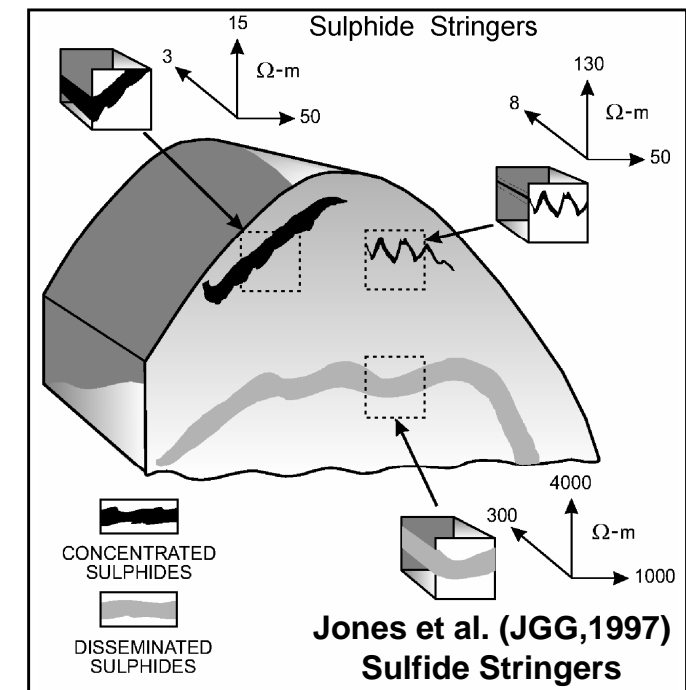
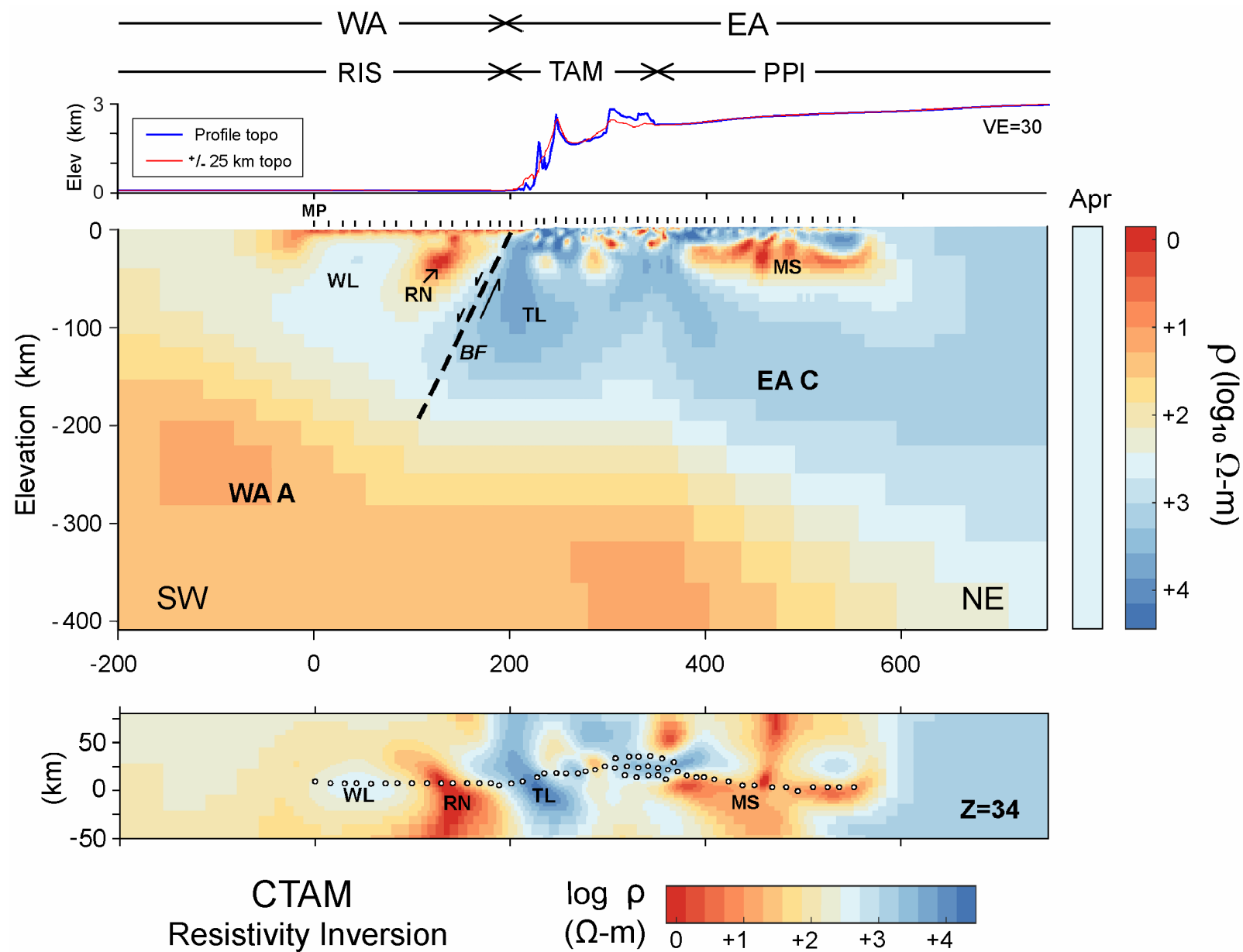
Mod from Schulz and Cannon (2007)



Mod from Southwick (2014)

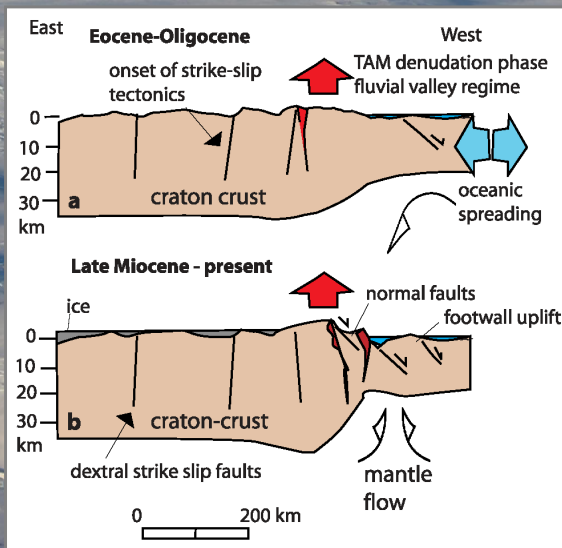


Wunderman et al. (2018)

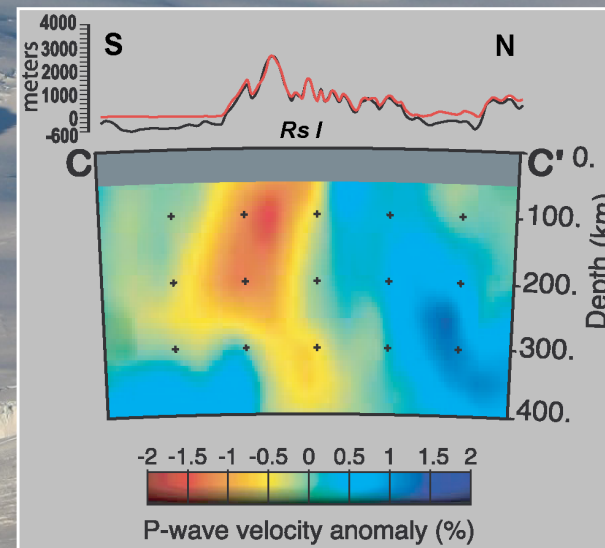
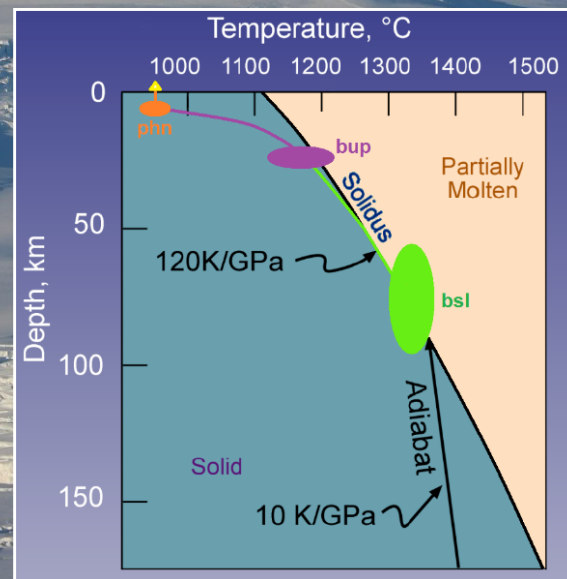


Graphite-sulfide textures in crustal-scale conductors

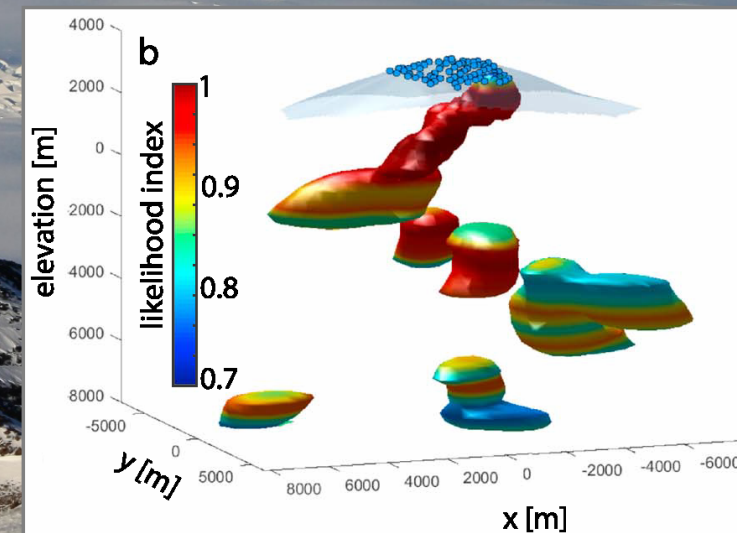
Mount Erebus, Ross Island Active Phonolite Volcano



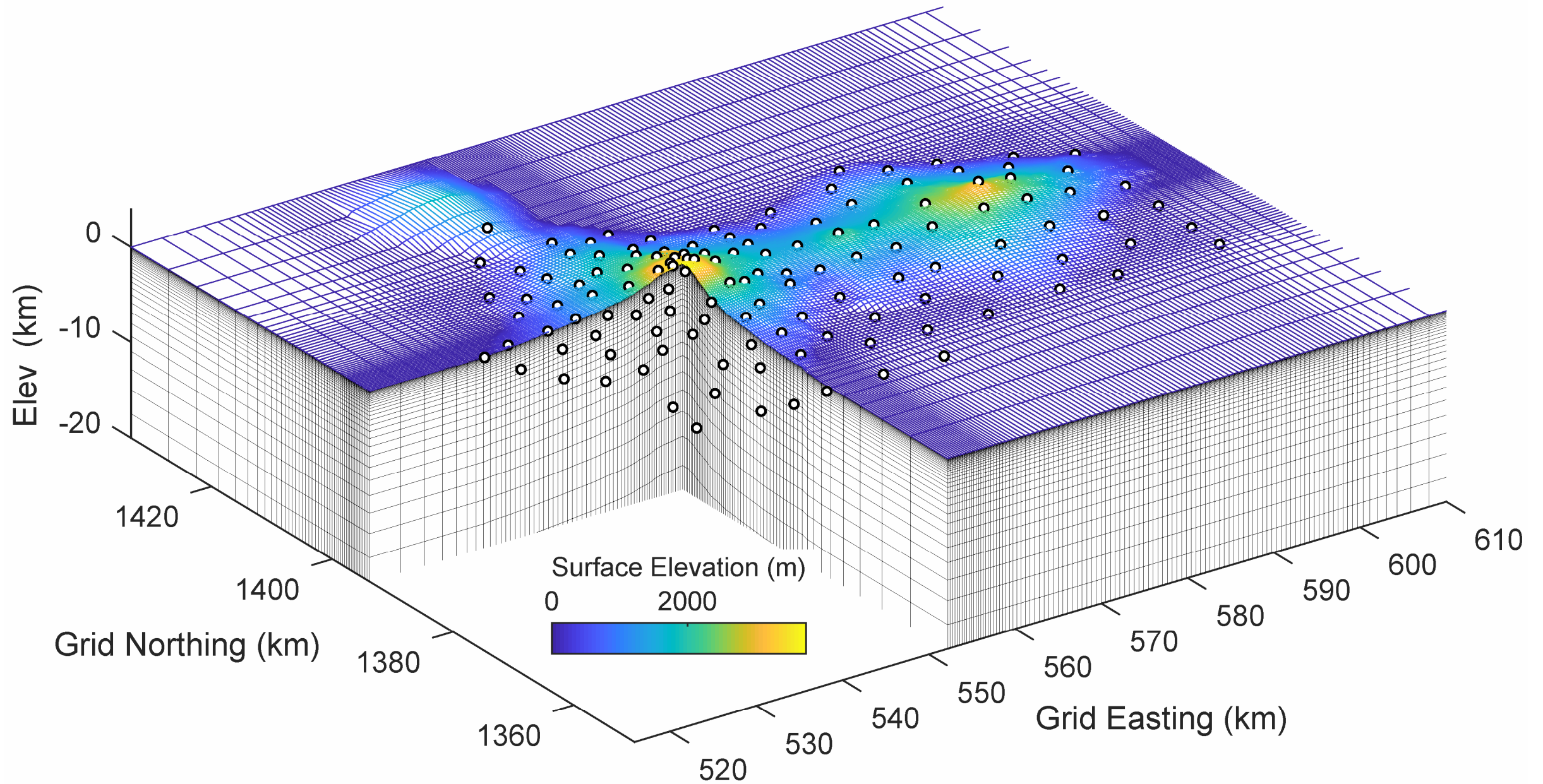
Faccenna et al., 2008



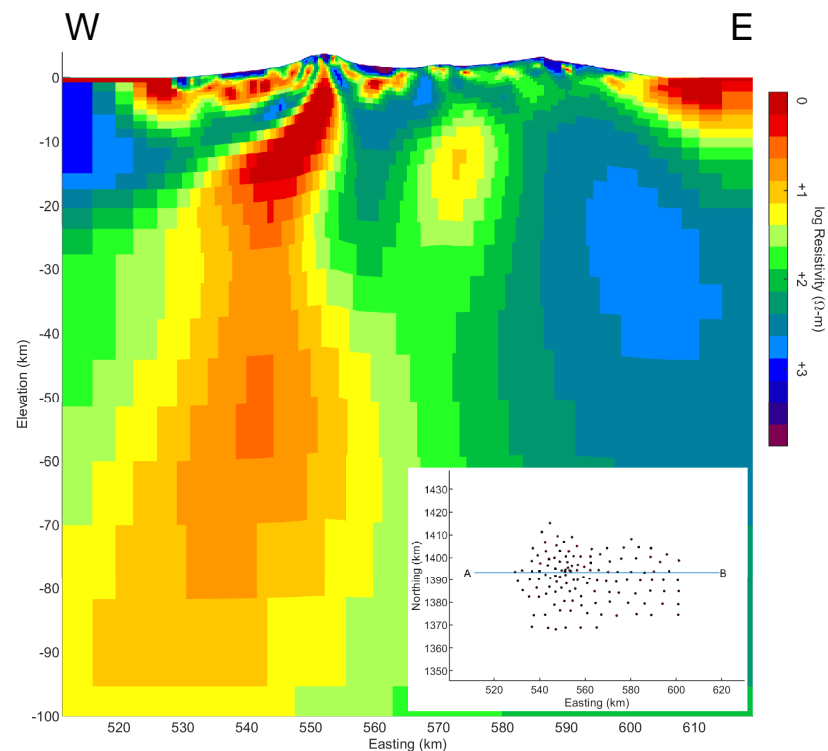
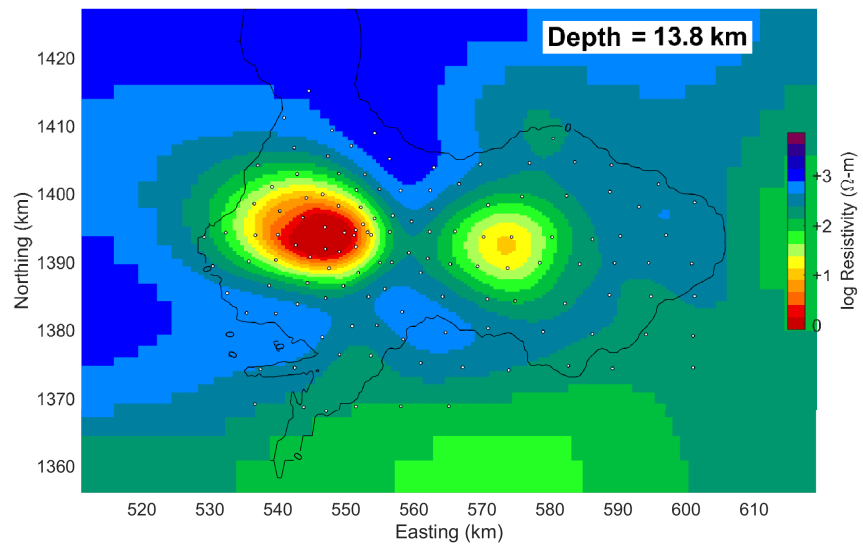
Watson et al (2006)



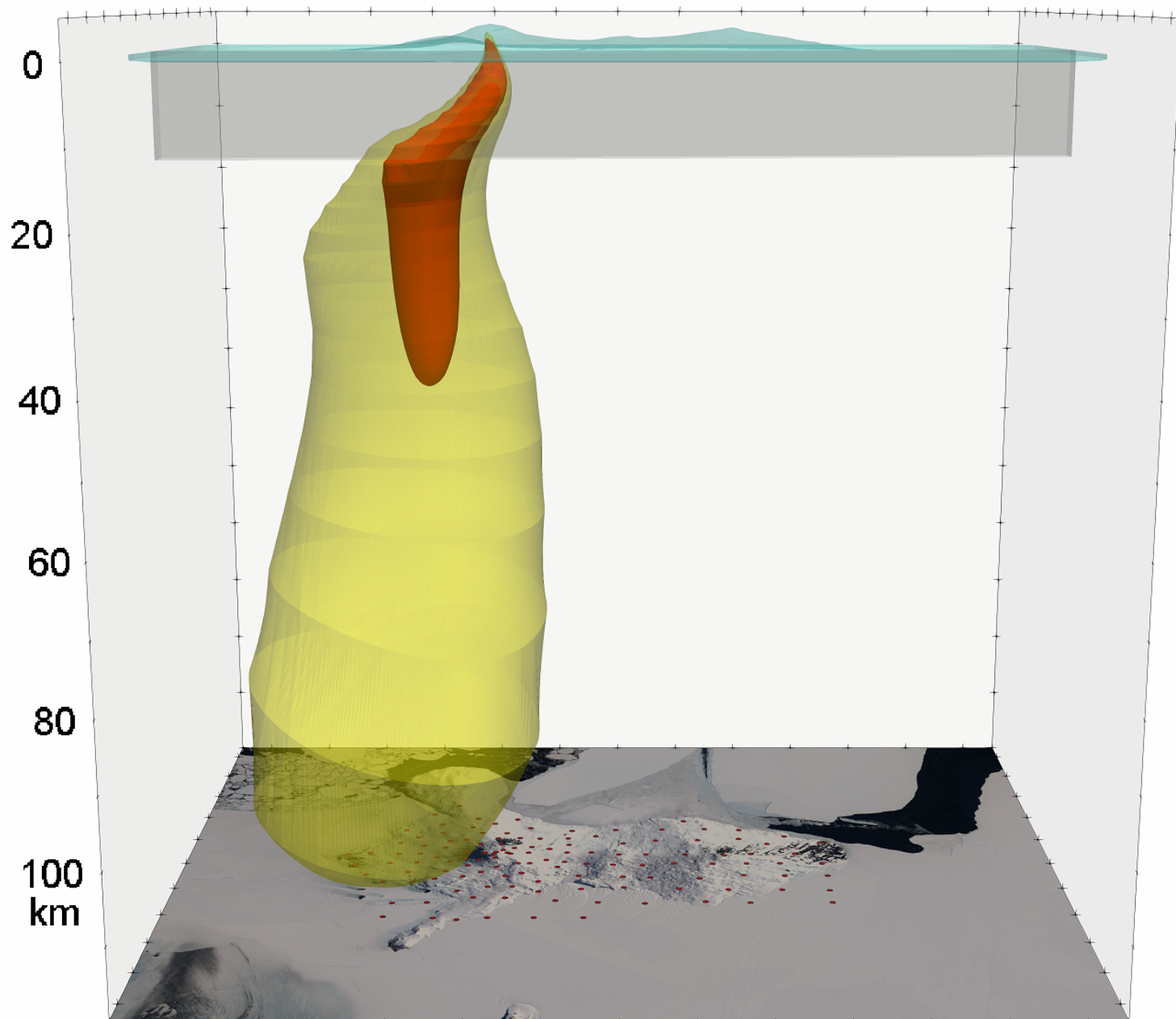
Blondel et al (2018)



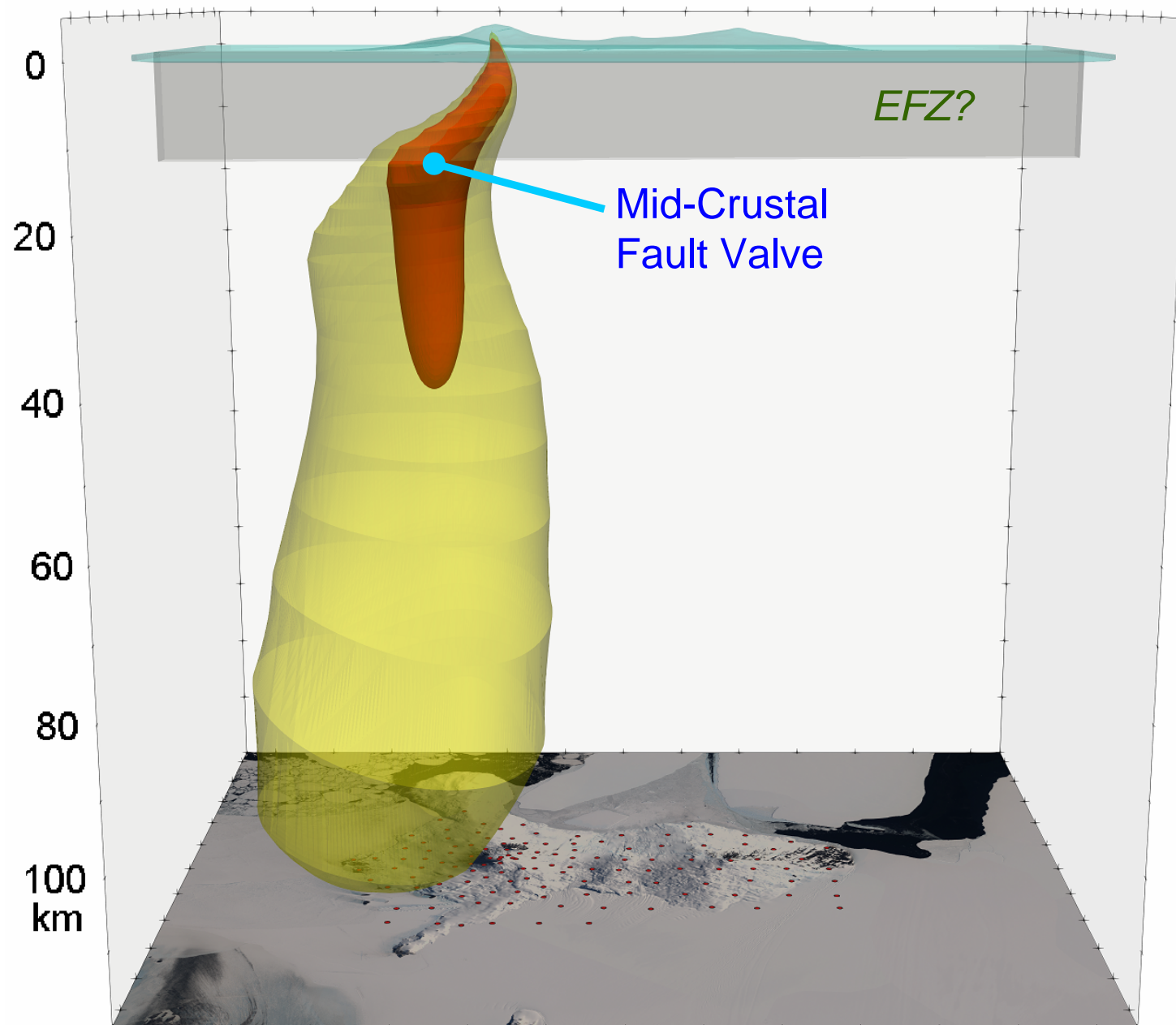
Mt Erebus/Ross Is Finite Element Mesh for 3D Non-Linear MT Inversion
(Kordy, Wannamaker et al, 2016a,b)



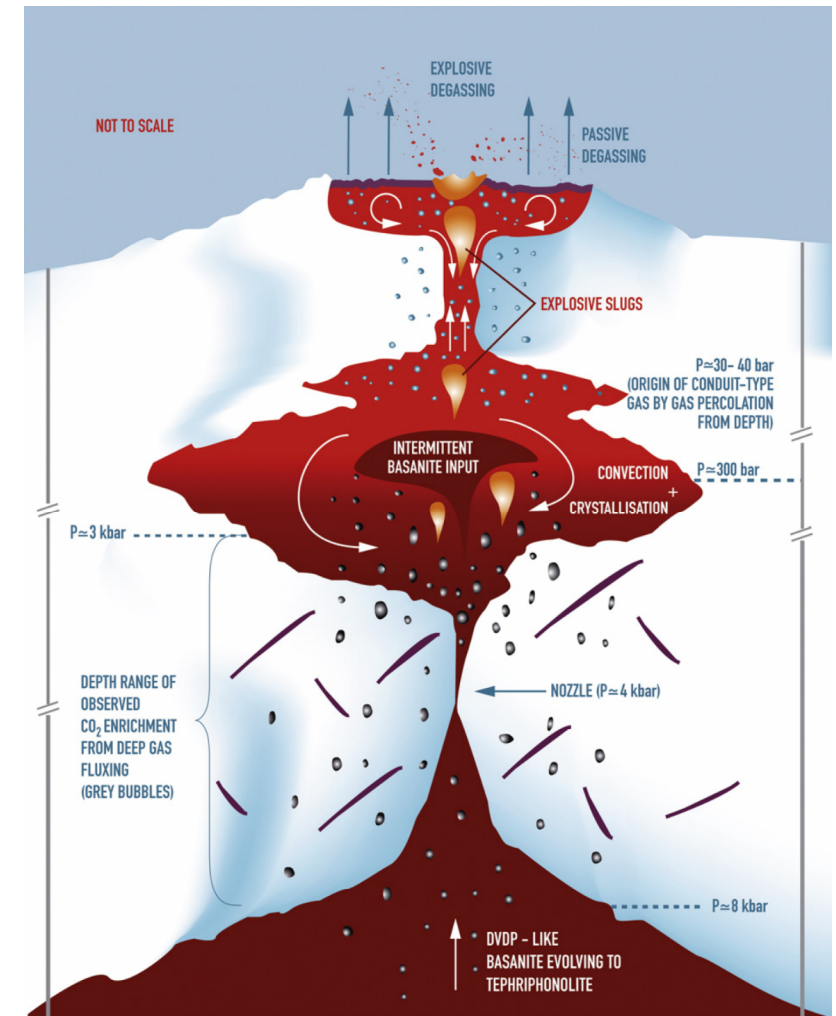
Mount Erebus MT Sections



Mount Erebus Paraview
(5, 20 ohm-m)



Mount Erebus Paraview
(5, 20 ohm-m)



Schematic Mount Erebus magmatic plumbing (Oppenheimer et al., 2011).
"Nozzle" interpreted at ~4 kbar for periodic basanite replenishment.

The End!



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