

Petrologic and Geophysical Synthesis of the Magmatic System at Akutan Volcano

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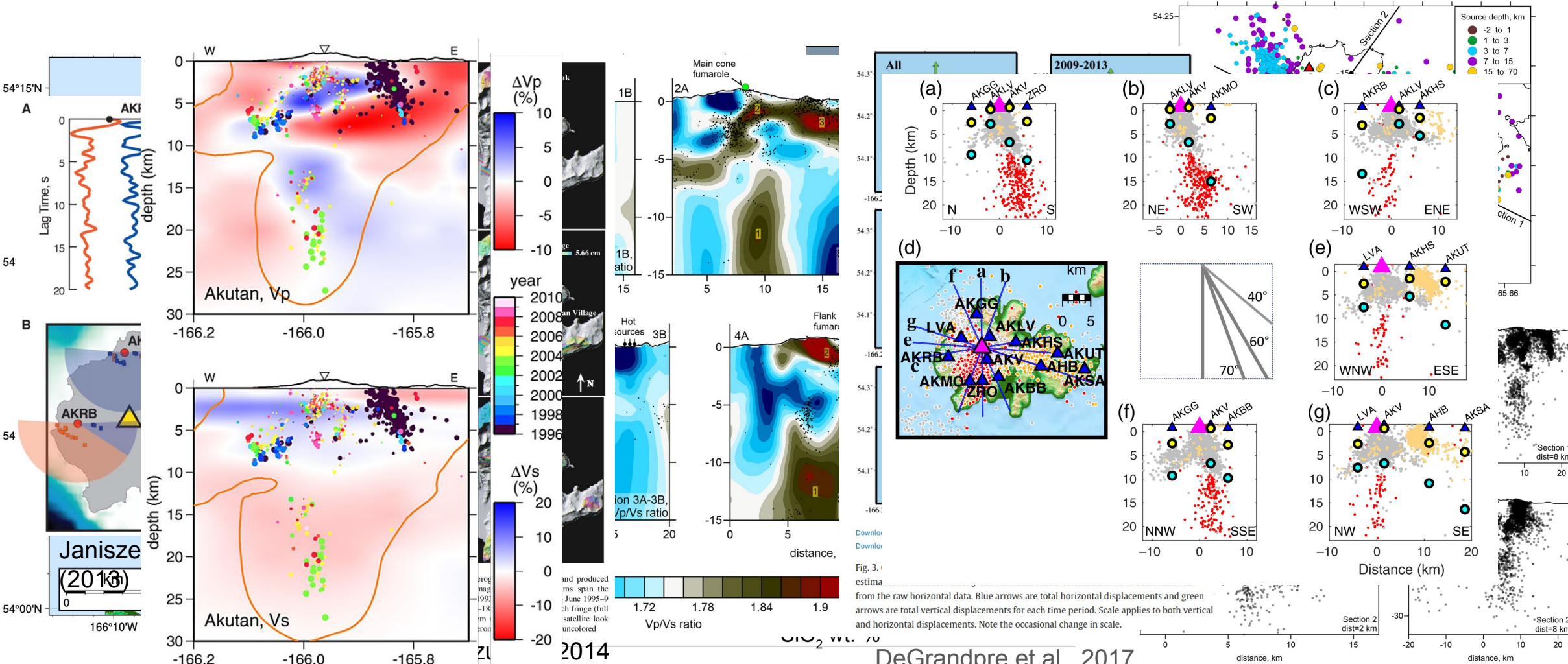
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The Grand Challenge

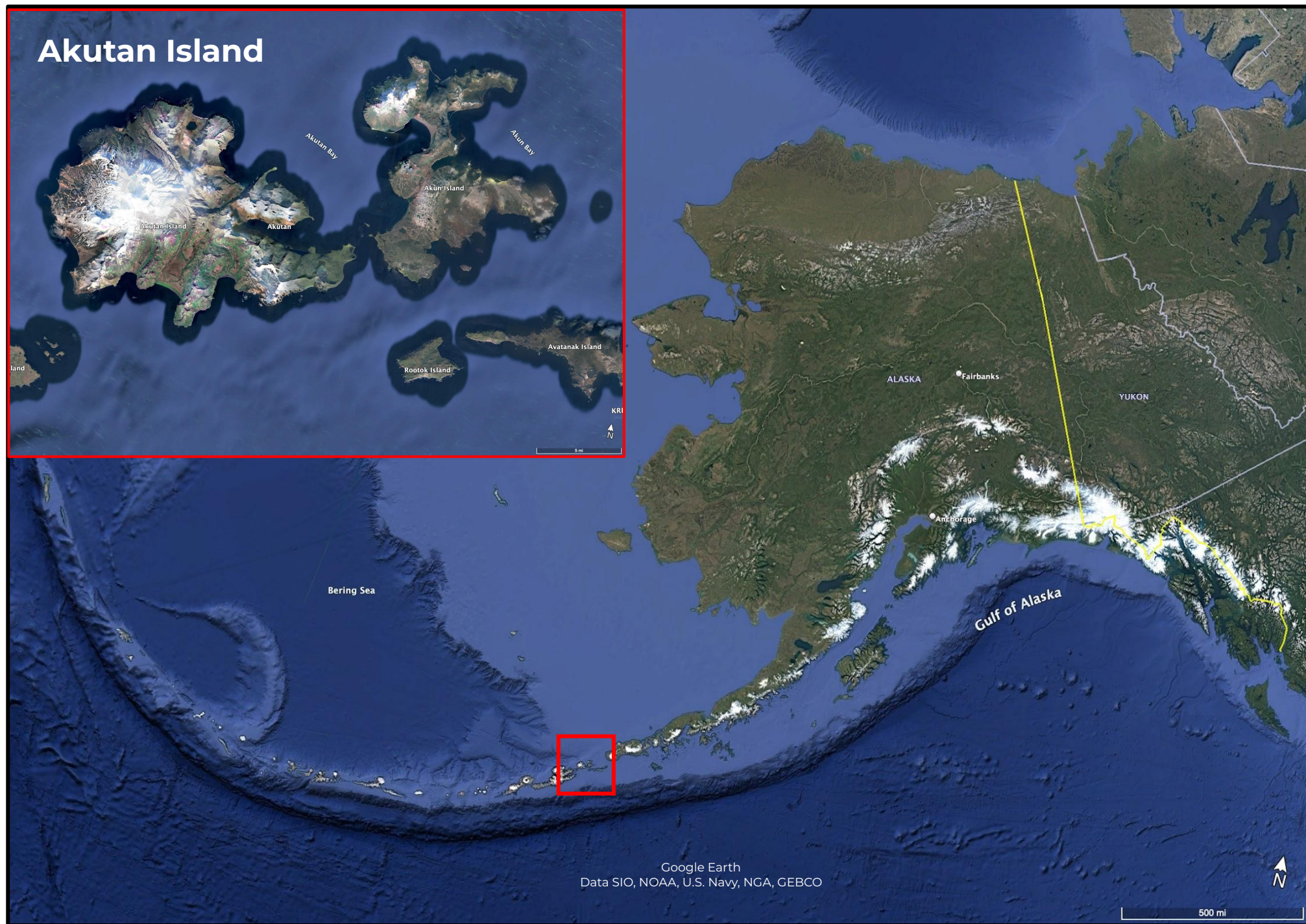


Syracuse et al. (2015)

Koulakov et al. (2021)

DeGrandpre et al., 2017

Koulakov et al. (2021)



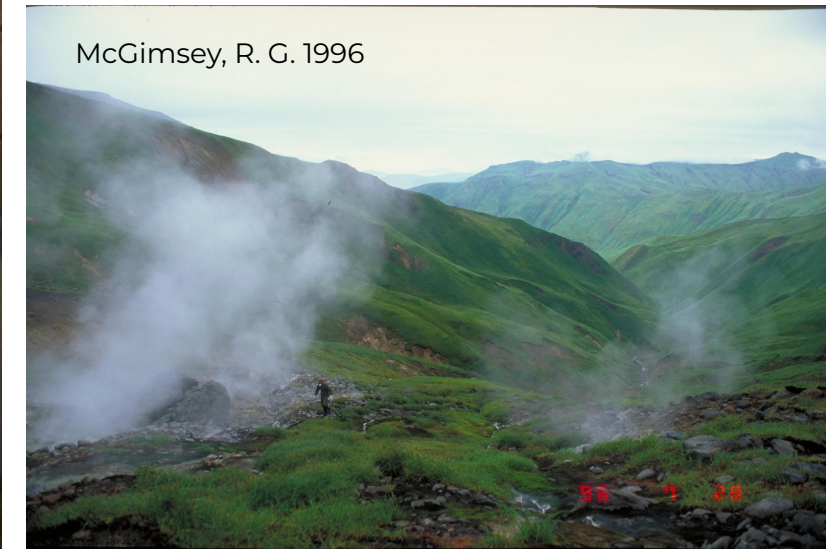
Nye, C. J. 1994



McGimsey, R. G. 1996



McGimsey, R. G. 1996





GEOLOGY OF AKUTAN ISLAND, ALASKA

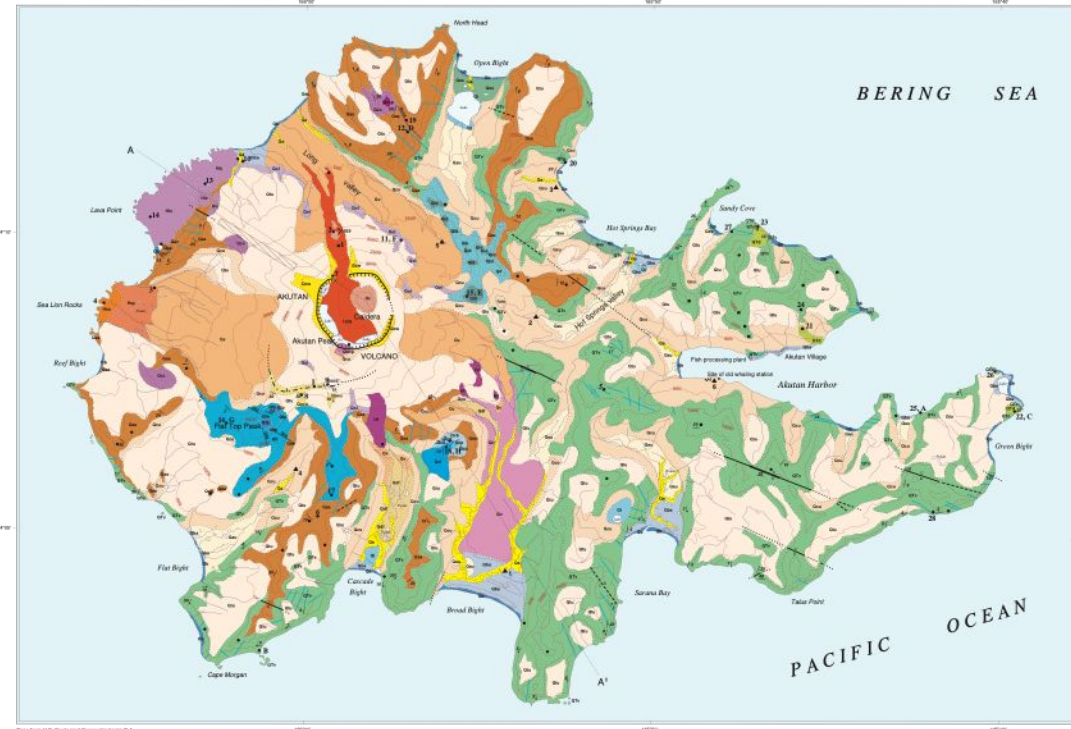
By

Donald H. Richter, Christopher F. Waythomas, Robert G. McGinsey, and Peter L. Stelling
Alaska Volcano Observatory

1998



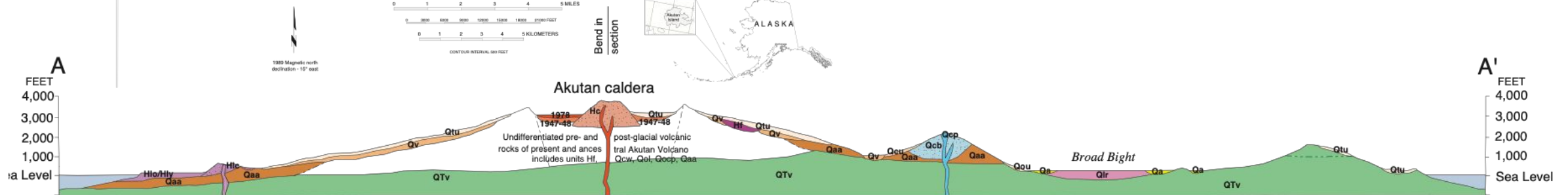
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY



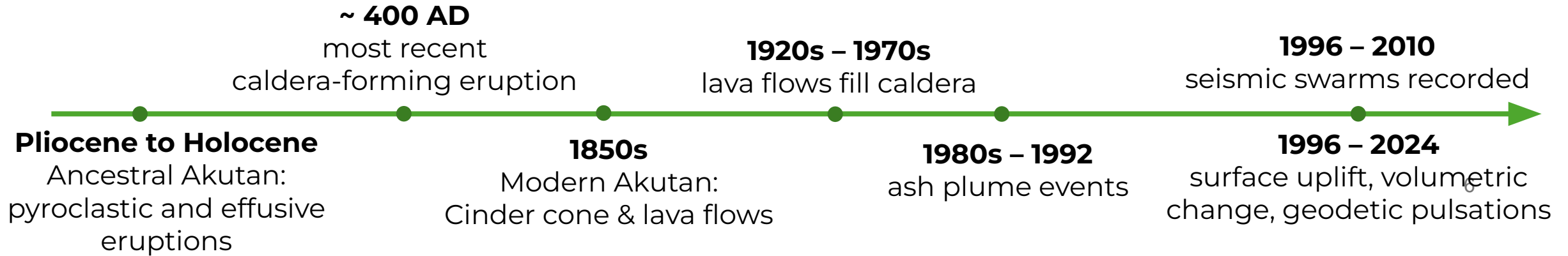
Base from U.S. Geological Survey (Shastka et al., 1989; A-1 and A-2, 1989; 1:50,000, 1989)

Map by D.H. Richter, C.F. Waythomas, R.G. McGinsey, and P.L. Stelling, 1998

Description of Map Units (See accompanying pamphlet for more detailed descriptions of map units)	
SURFICIAL DEPOSITS	
Qa Alluvium in active stream channels	Qes Eolian deposits
Qau Alluvium, undifferentiated	Qsb Modern beach deposits
Qcu Colluvium, undifferentiated	Qba Abandoned beach deposits
Ql Lacustrine deposits	
DEPOSITS OF AKUTAN AND ANCESTRAL AKUTAN VOLCANO	
1978 1978 lava flow	Qtp Tephra
1947-48 1949-48 lava flow (shown in cross section only)	Qcw Present caldera wall rocks
1929 1929 lava flow	Qocp Older caldera (?) plug
Hc Modern cinder cone	Qood Older caldera (?) dome
Hay Younger Sea Lion Rocks lava flow	Qocw Older caldera wall rocks, undifferentiated
Hes Older Sea Lion Rocks lava flow	Qol Pre-glacial lava flows
Hf Holocene lava flows	Qsa Ancestral Akutan volcanic rocks, undifferentiated
Qv Volcaniclastic deposits	Qsc Ancestral Akutan cinder cone
Qlr Lahar runout deposits	Qap Ancestral Akutan plug
Qdf Reworked lahar deposits	
SATELLITE ERUPTIVE CENTERS	
Hfy Younger Lava Point lava flow	Qcd Cascade Bight dikes
Hlo Older Lava Point lava flow	Qcb Cascade Bight vent breccia
Hlc Lava Point cinder cone	Qcp Cascade Bight plugs
Qlt Long valley lava flow	Qcl Cascade Bight lava flow
Qld Long valley dome (?) complex	Qcc Cinder cone
Qlb Long valley breccia	Qpl Plug
Qfd Flat Top dikes	Qcd Dike
Qfb Flat Top vent breccia	
Qfp Flat Top plugs	
Qfl Flat Top lava flows	
AKUTAN ISLAND VOLCANIC AND INTRUSIVE ROCKS	
Qta Gabbro	Qtv Volcanic rocks, undifferentiated
Qtd Domes	Qtd Dikes, undifferentiated
Qtc Cinder cones	

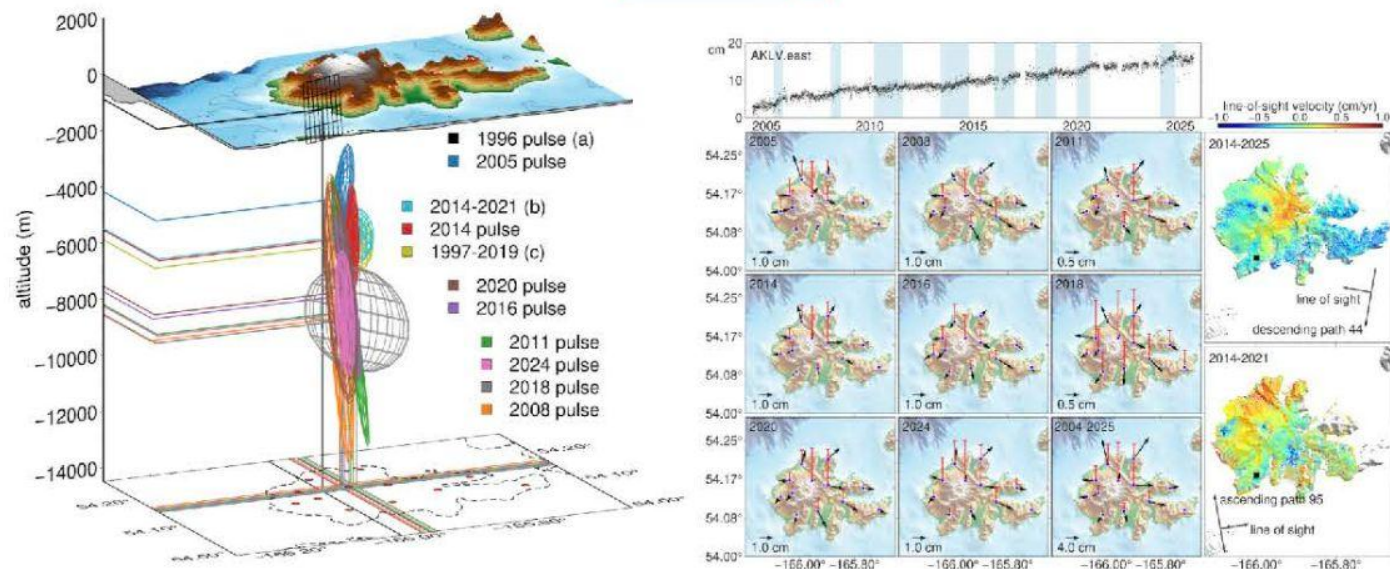


Eruptive History & Activity



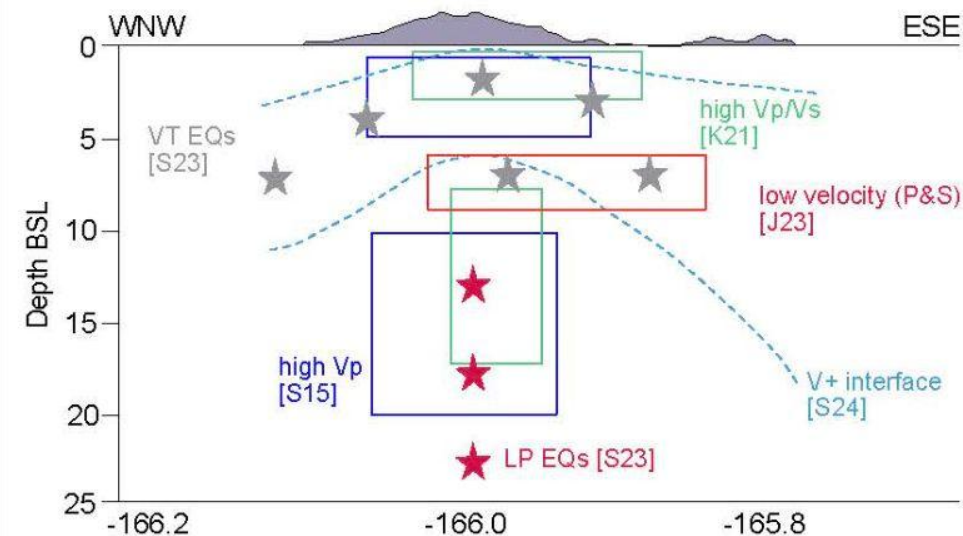
A.

Geodesy



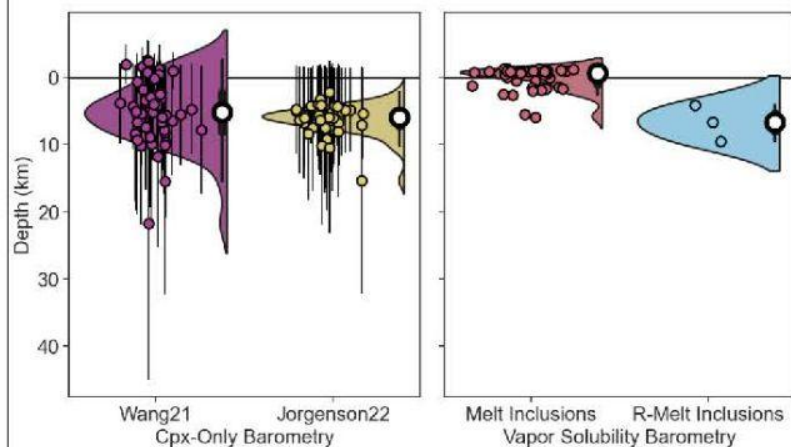
B.

Geophysics



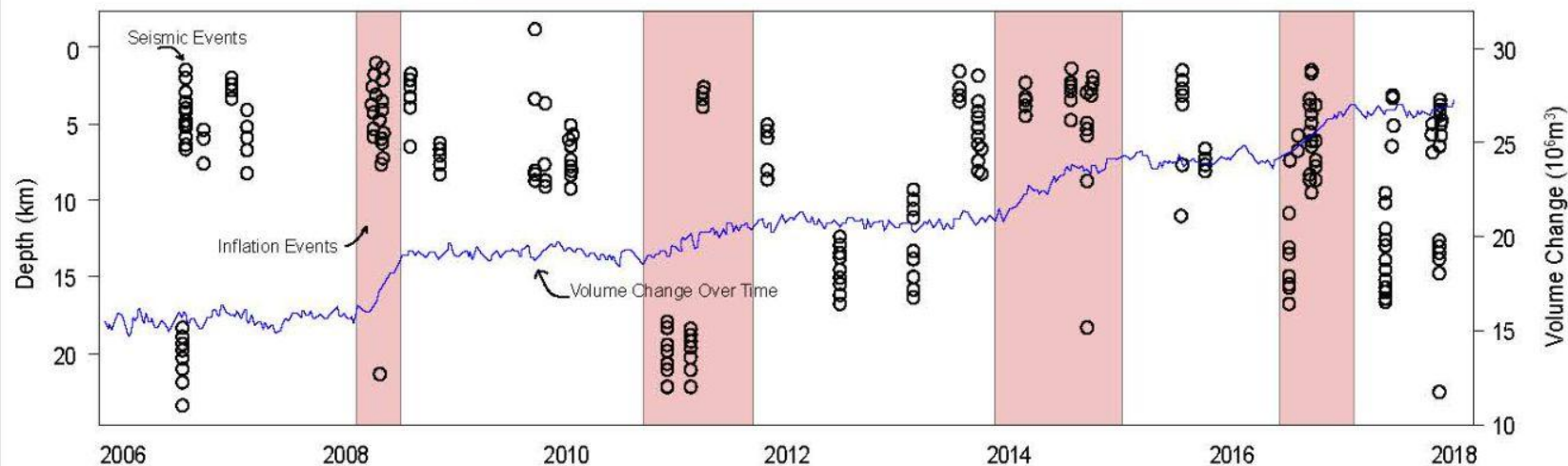
C.

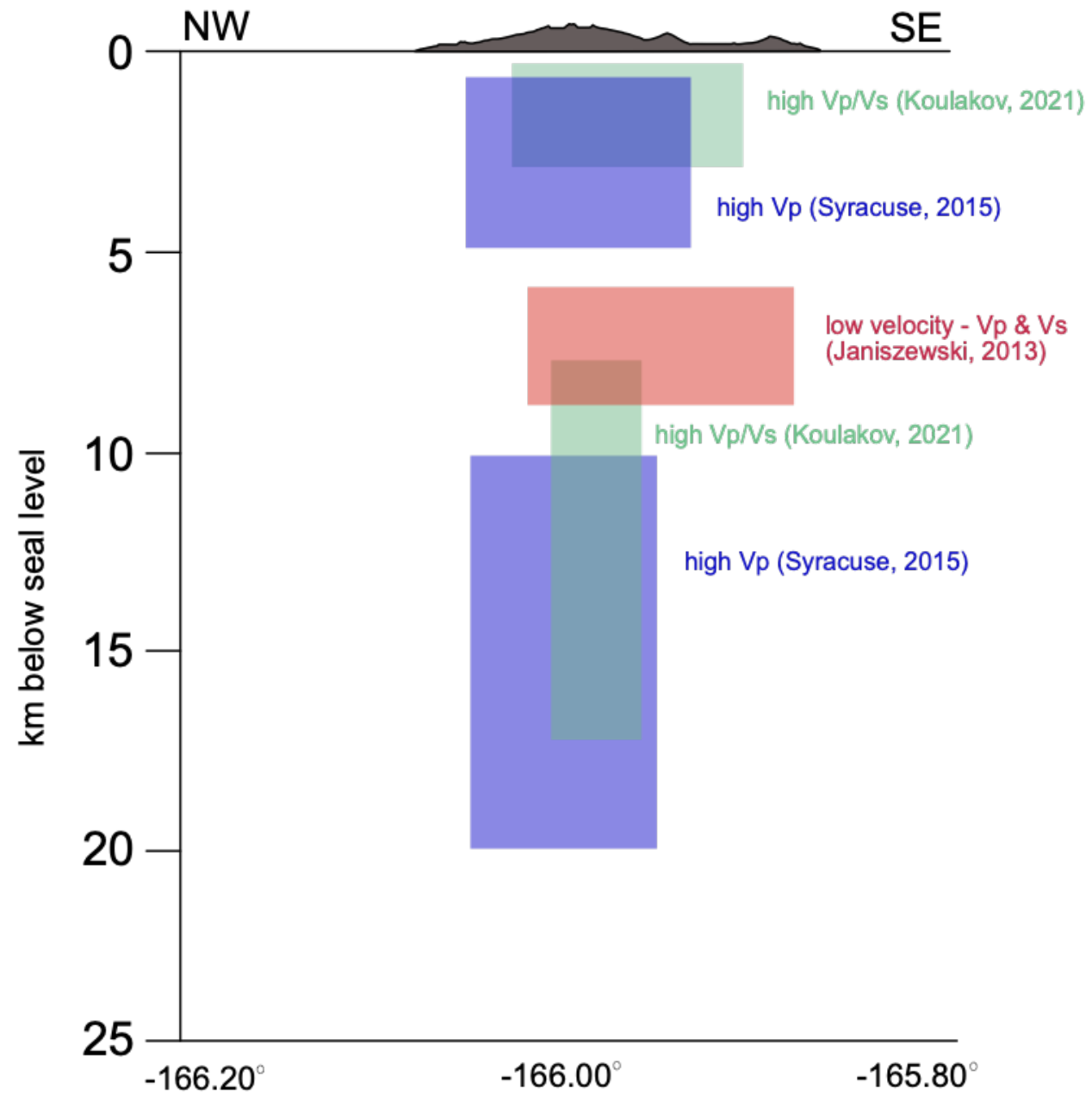
Mineral (cpx) & MI barometry

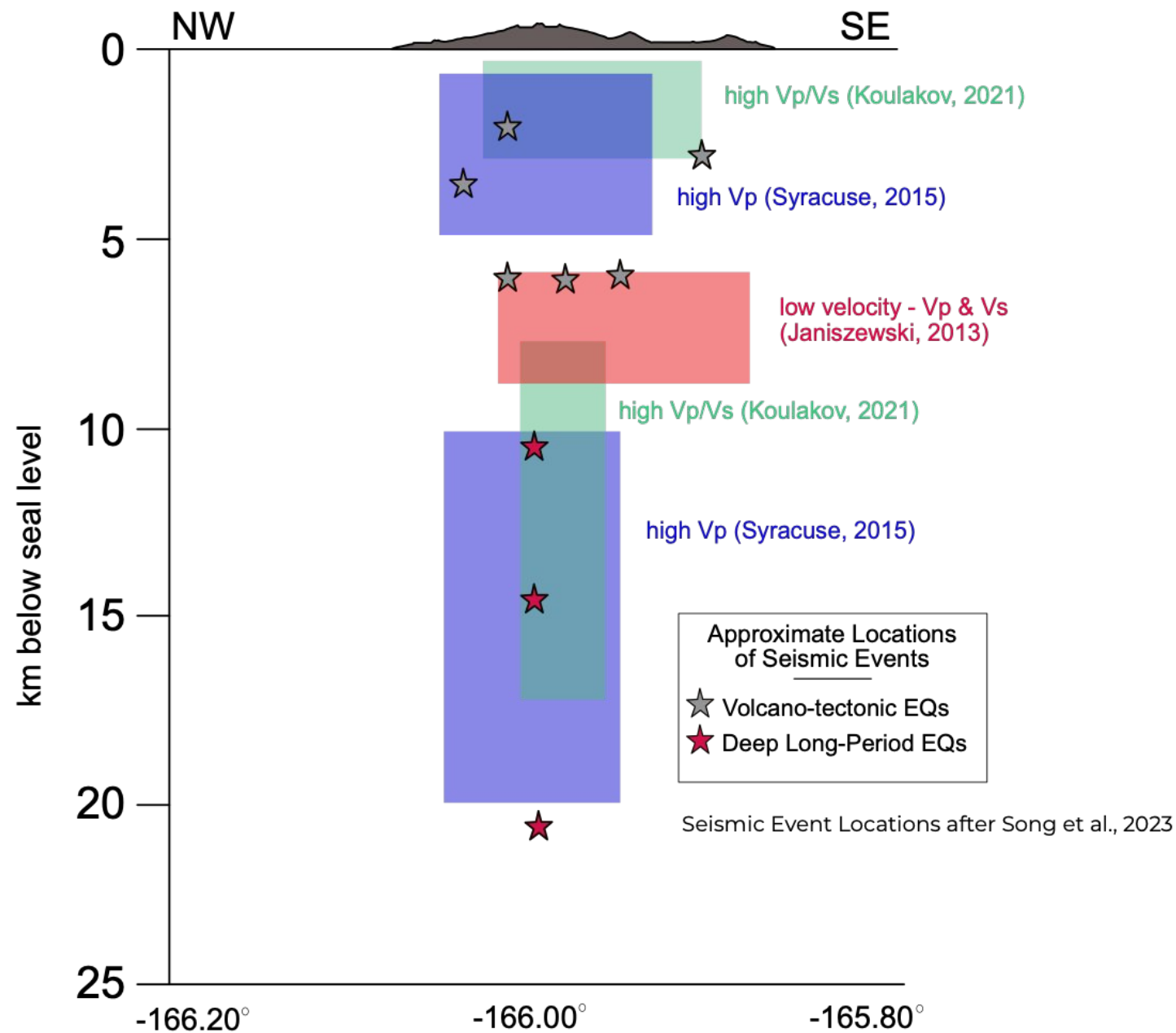


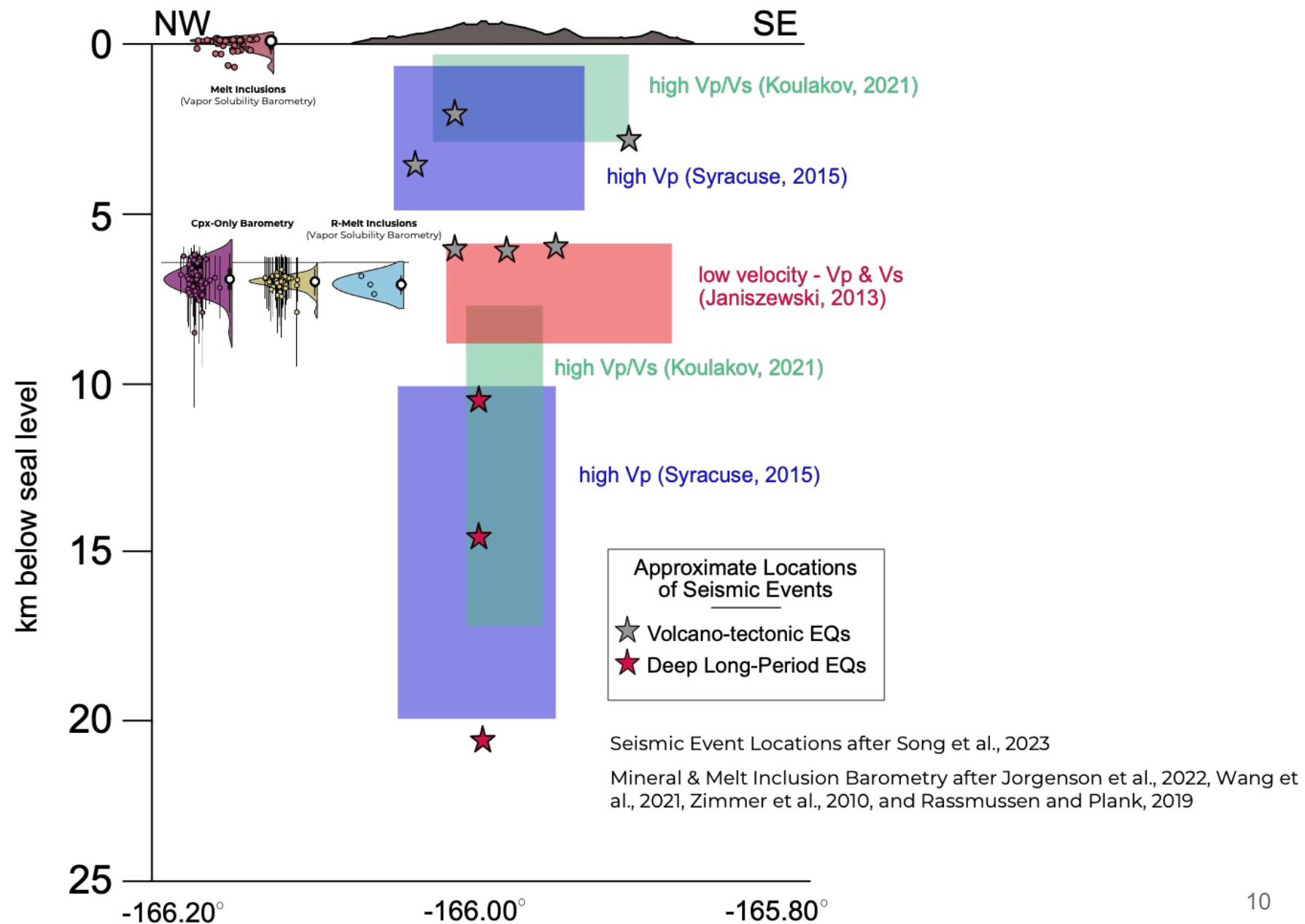
D.

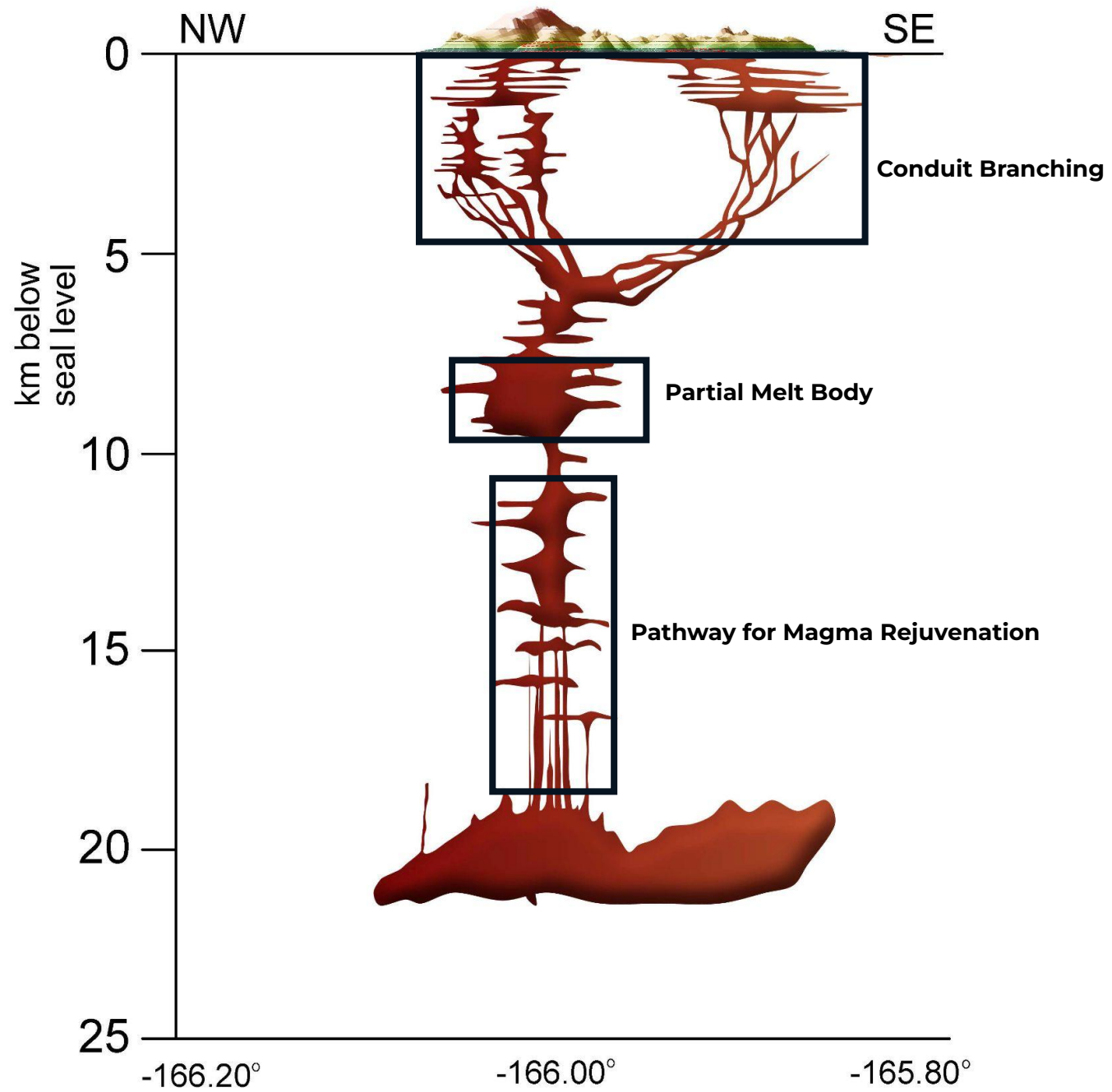
Seismicity & Ground Inflation Over Time











Deep Crust Magmatic Input

Geophysics

Syracuse et al., 2015

Koulakov et al., 2021

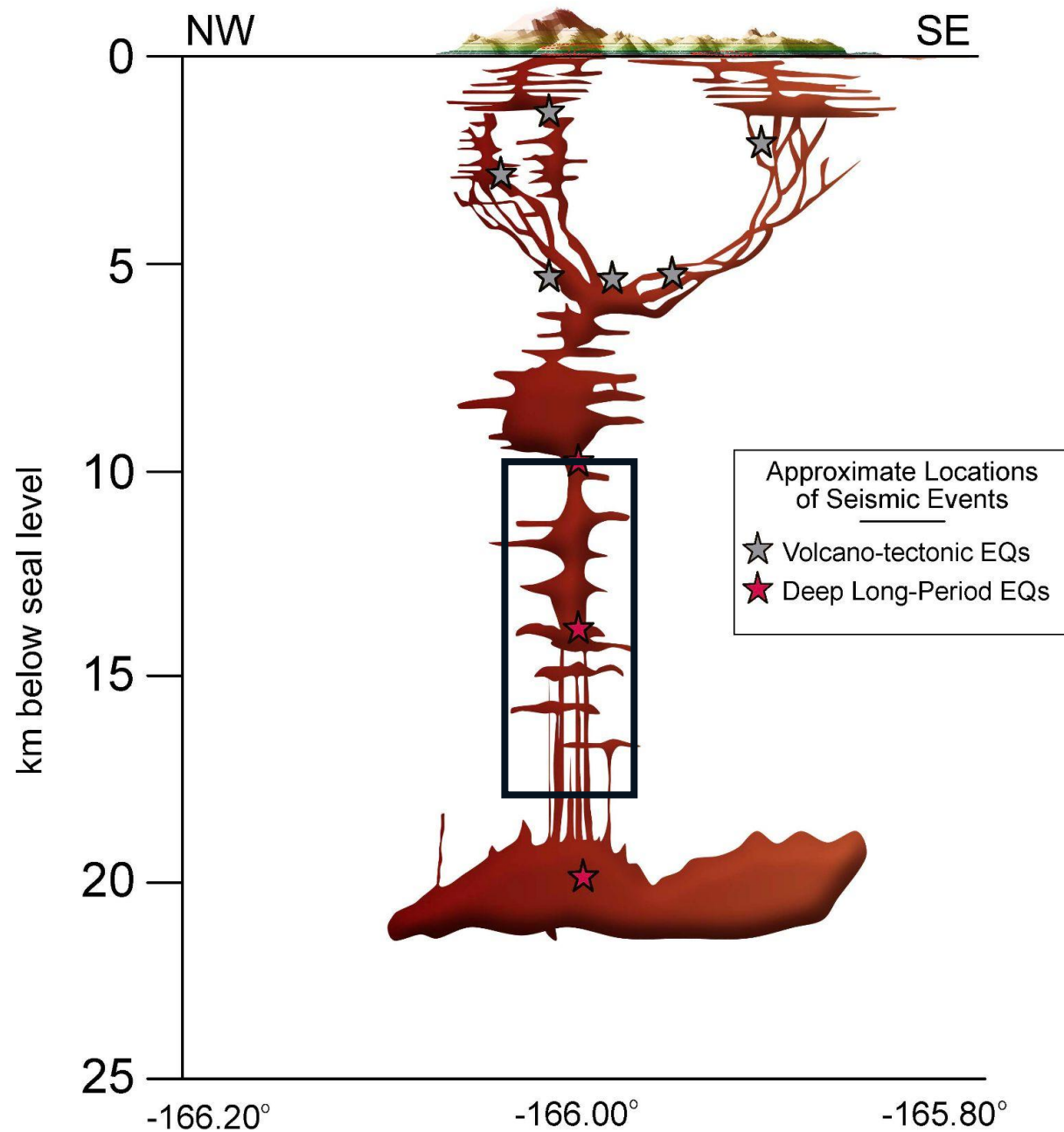
Song et al., 2023

Geodesy

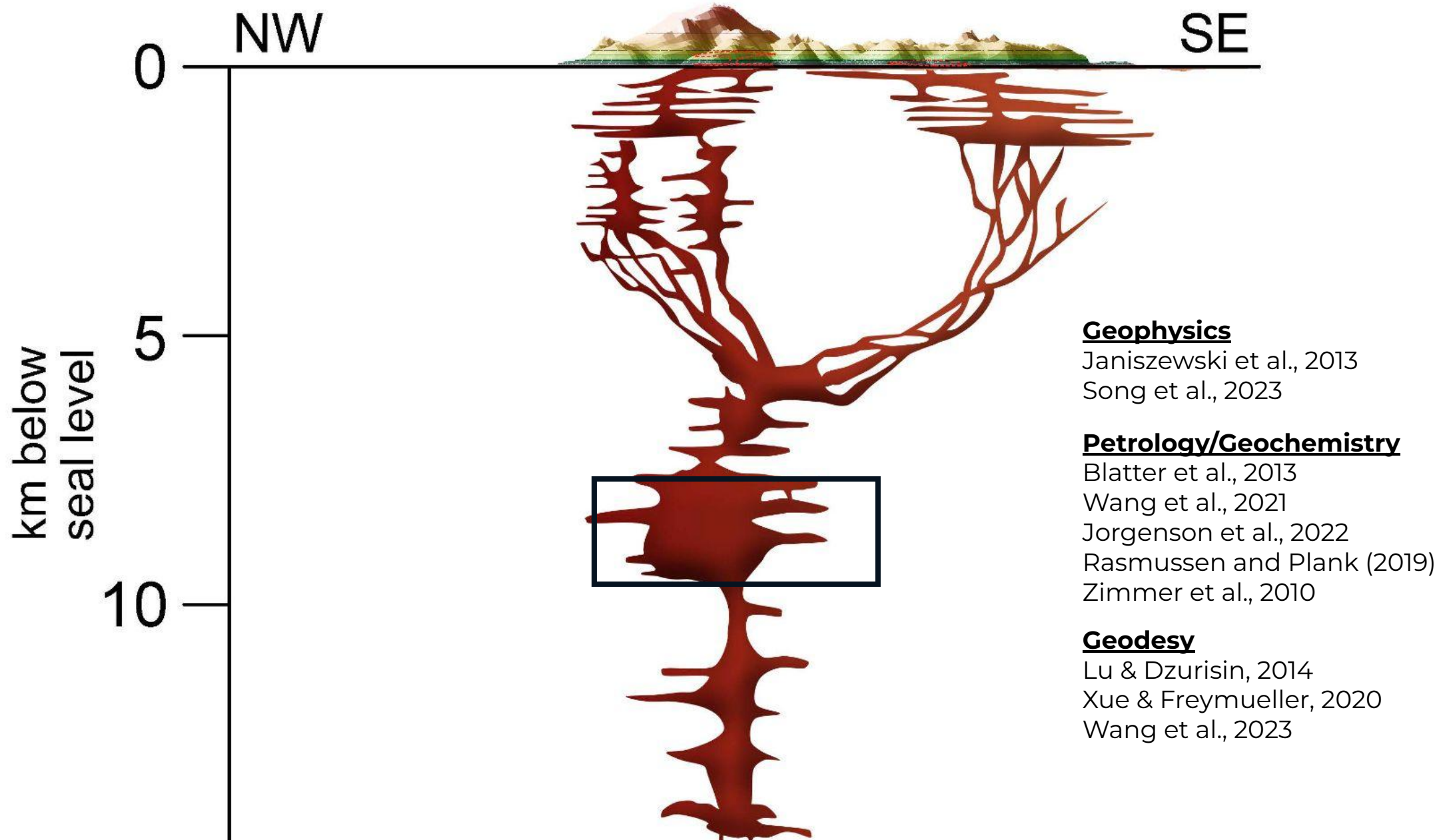
Lu & Dzurisin, 2014

Xue & Freymueller, 2020

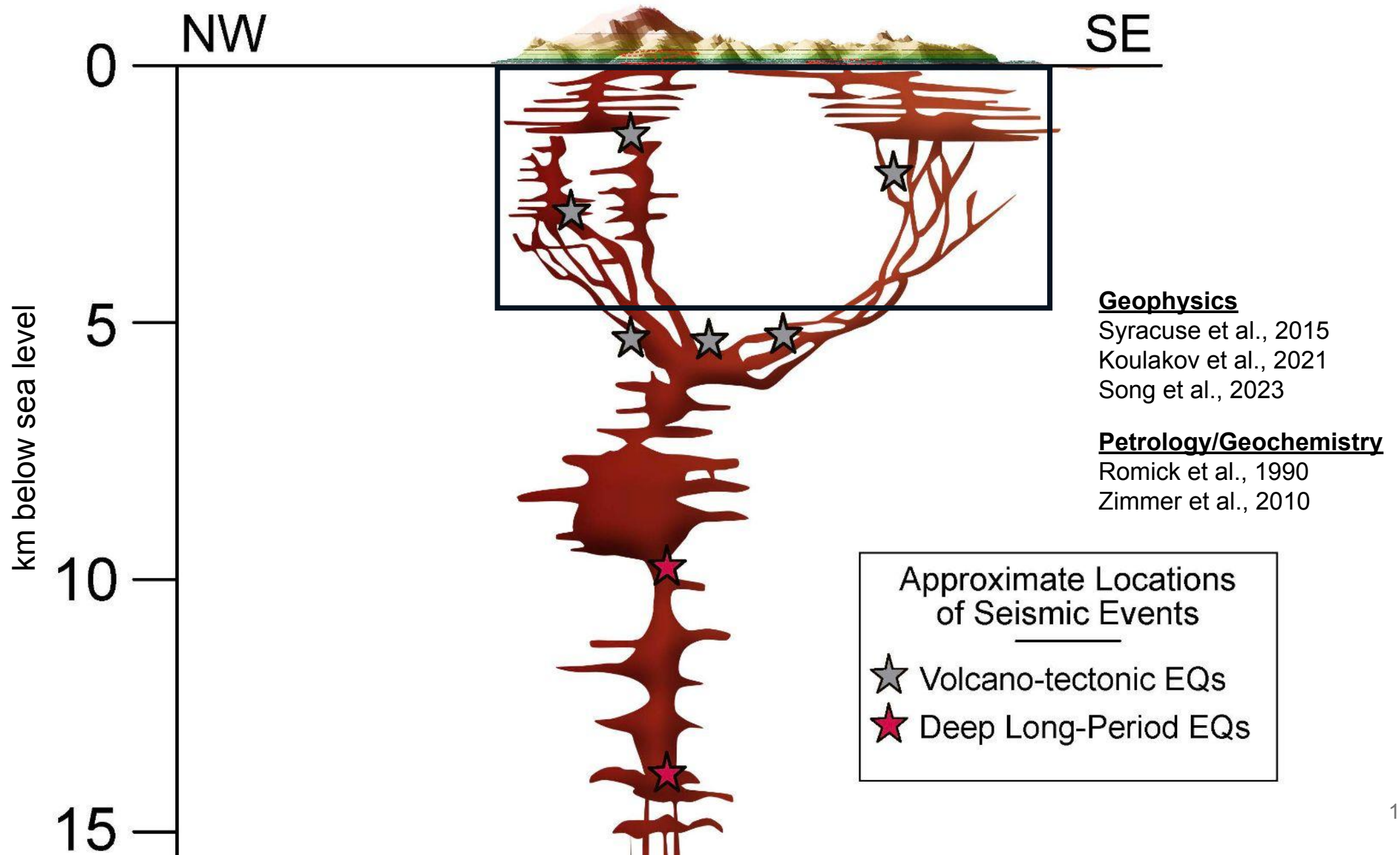
Wang et al., 2023



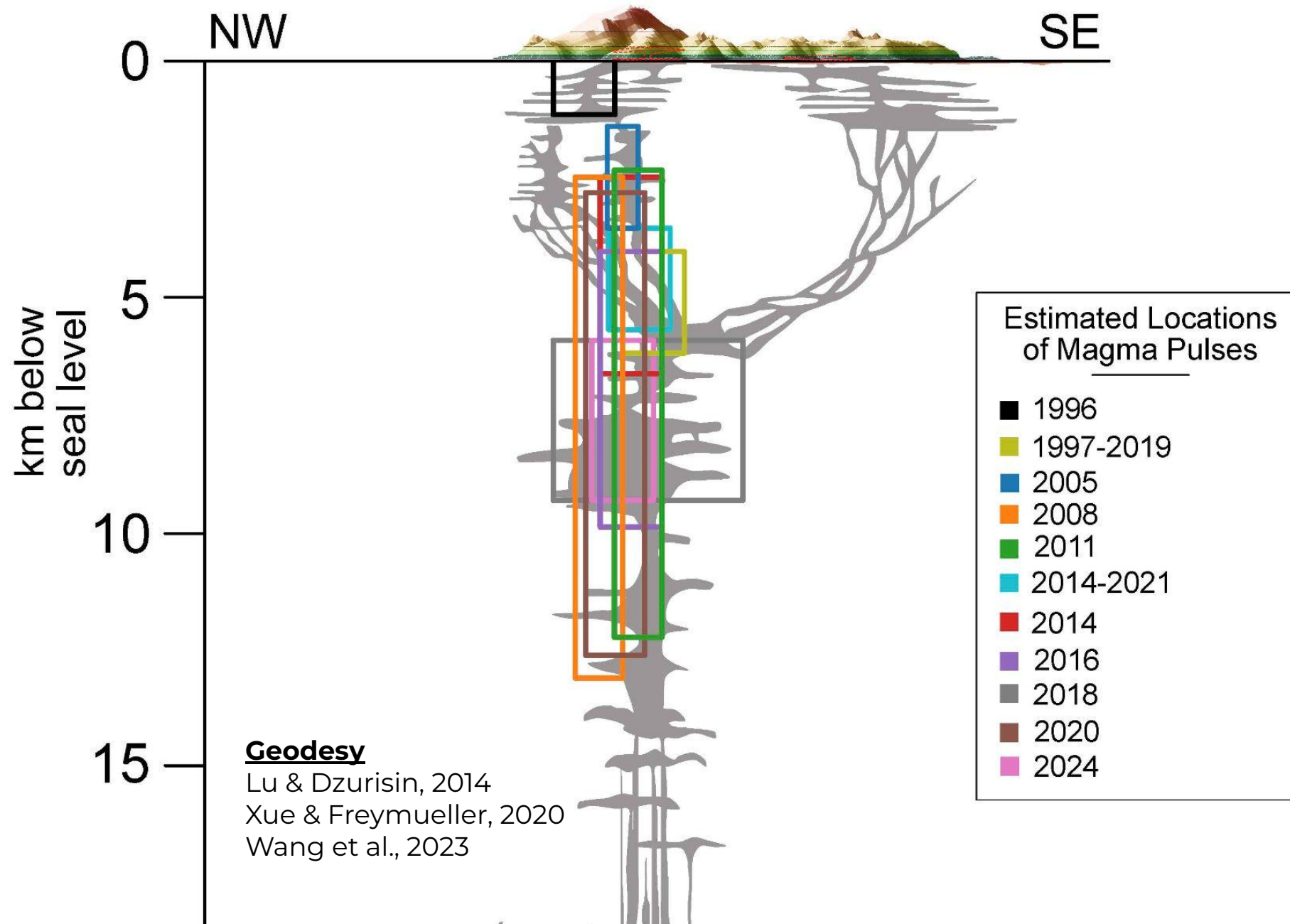
Mid-Crustal Partial Melt Body



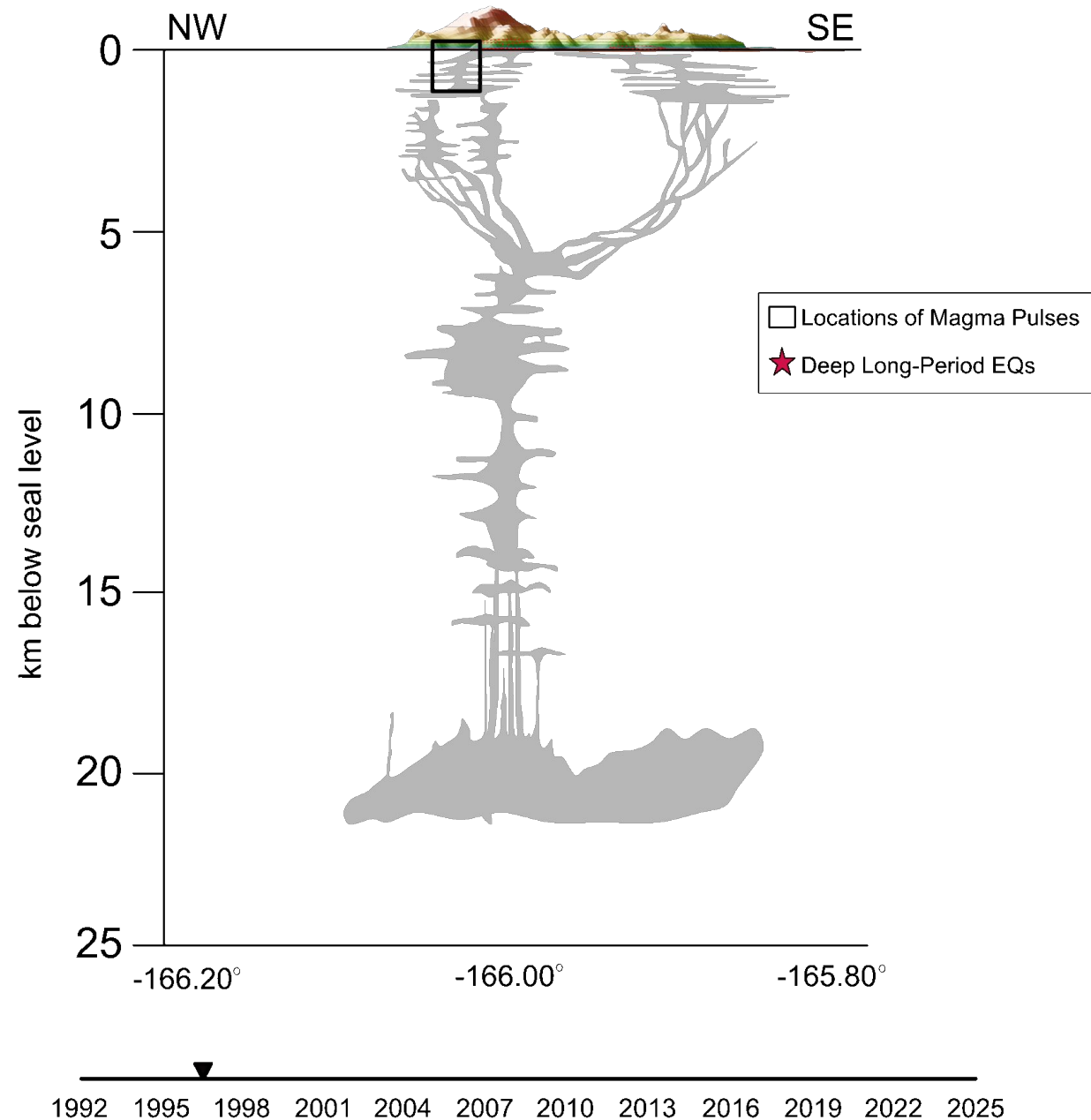
Shallow Crust Conduit Branching



Magma Pulses Based on Geodetic Models



Magma Pulses (1996-2024)



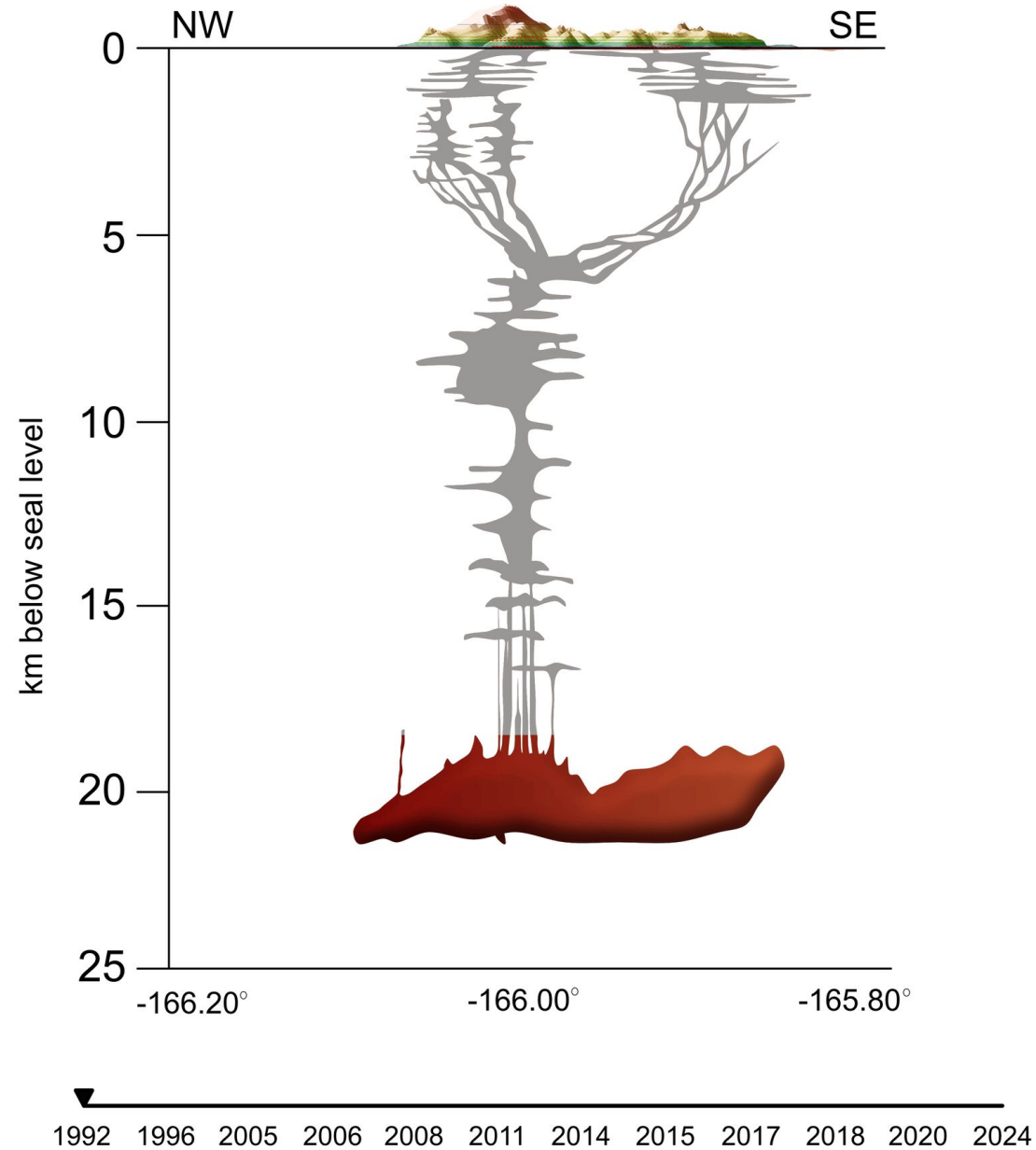
Geodesy

Lu & Dzurisin, 2014

Xue & Freymueller, 2020

Wang et al., 2023

Magmatic Dynamism (1992-2024)



Thank you.



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