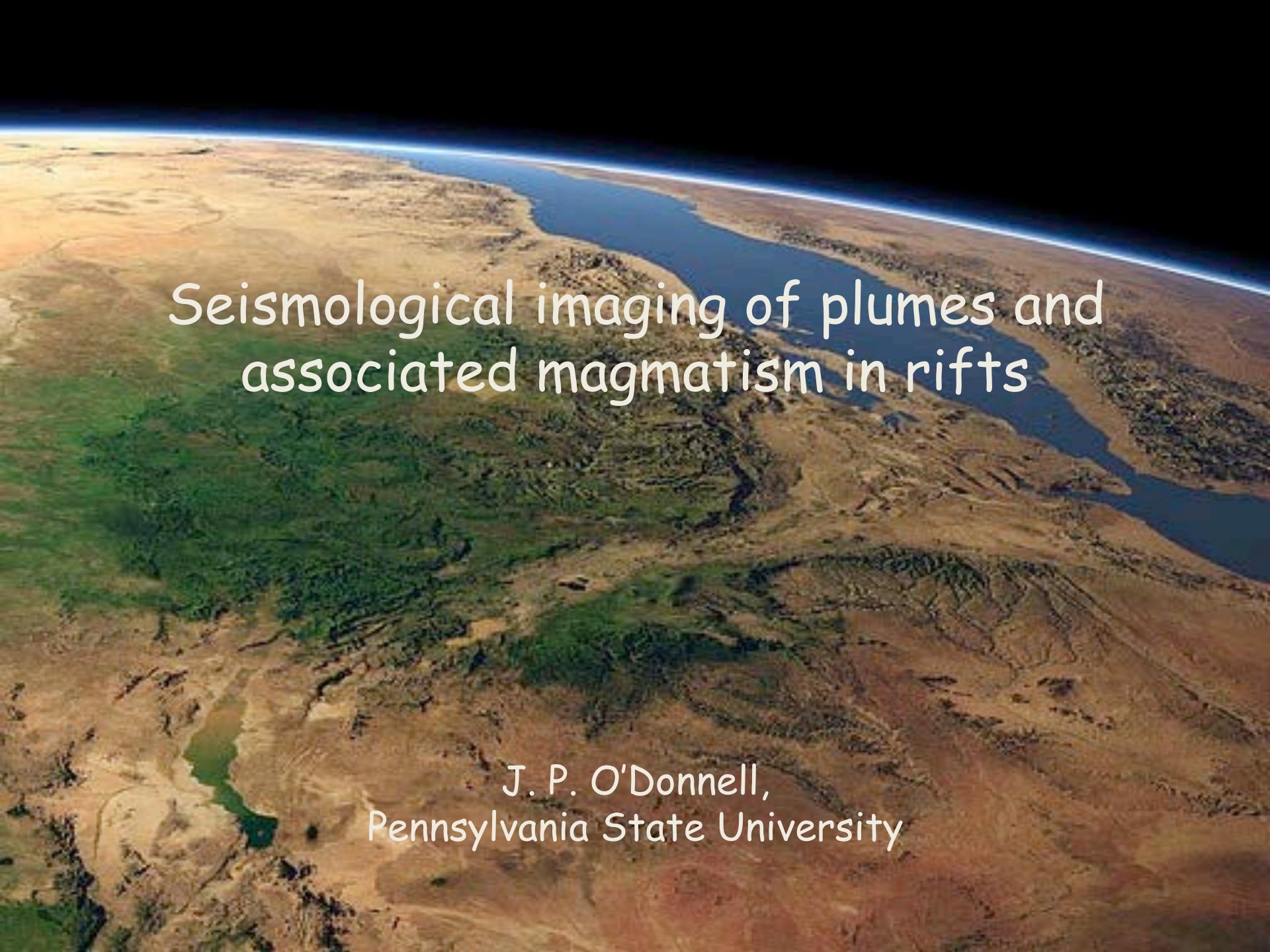
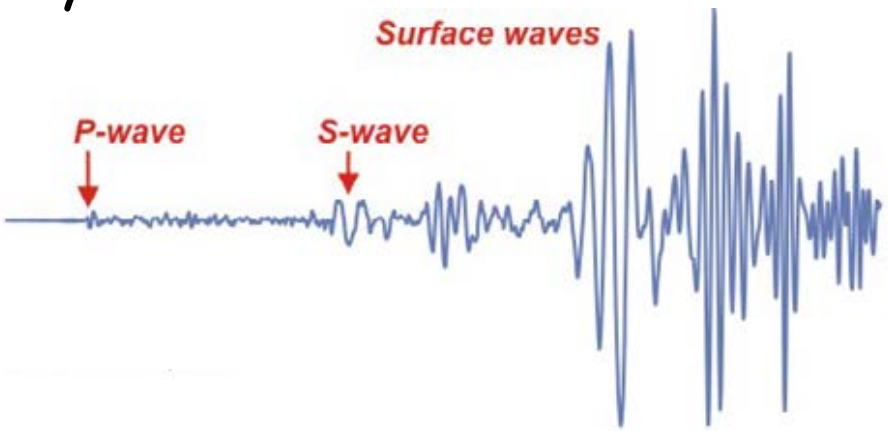


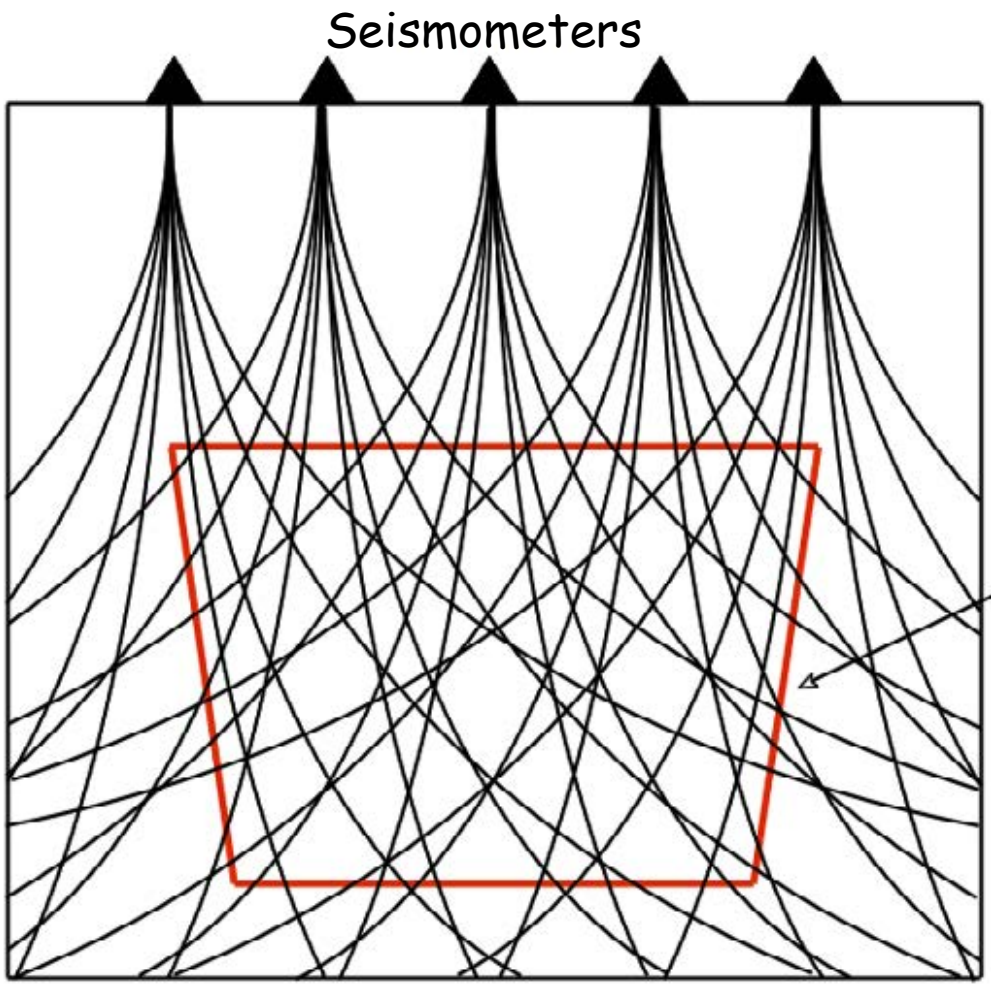
# Seismological imaging of plumes and associated magmatism in rifts

J. P. O'Donnell,
Pennsylvania State University

# Seismic tomography basics…

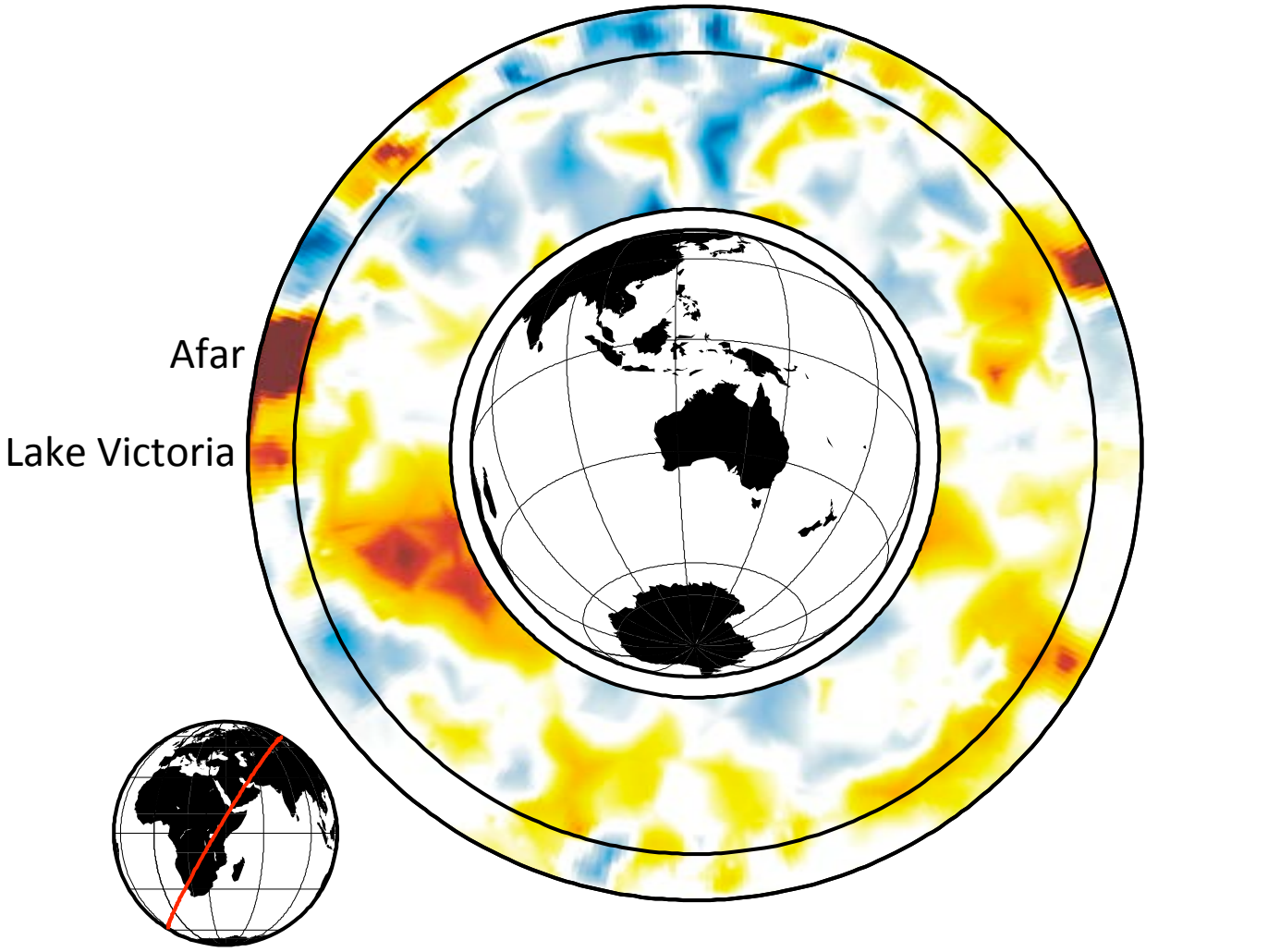
Adjust earth model such that synthetic waveform matches recorded waveform



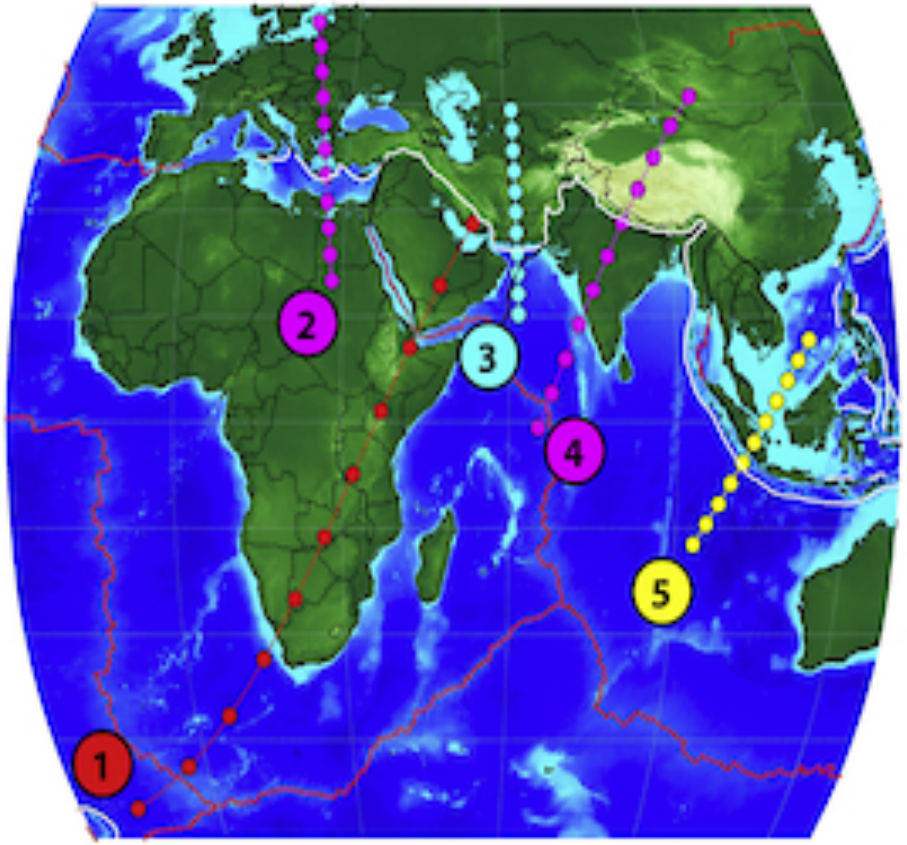



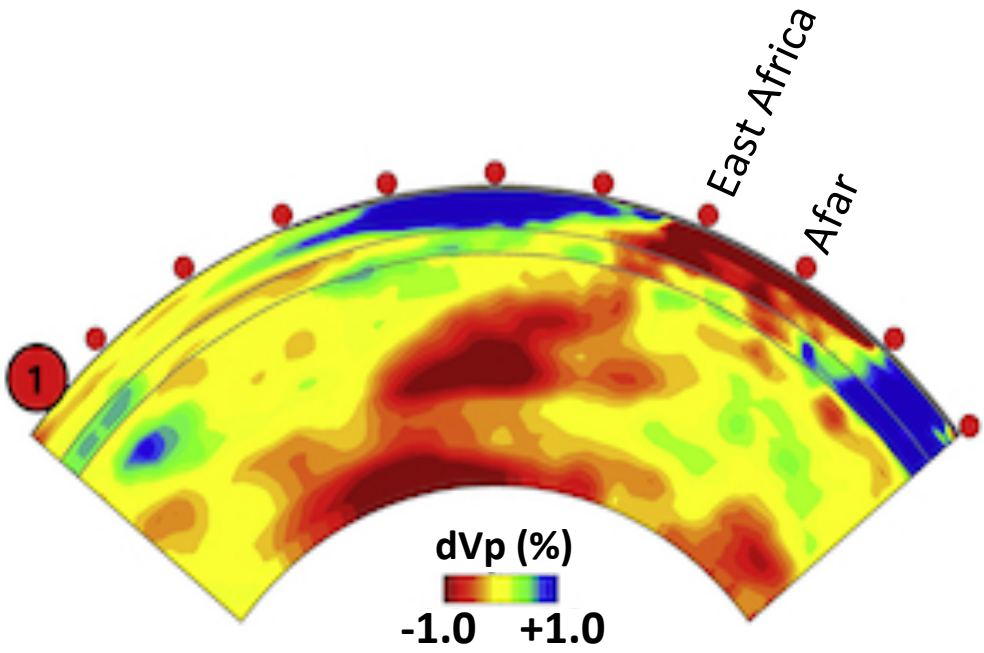

Many waveforms arriving from many azimuths means well constrained velocity structure

# Montelli et al. (2006): Global S-wave tomography…

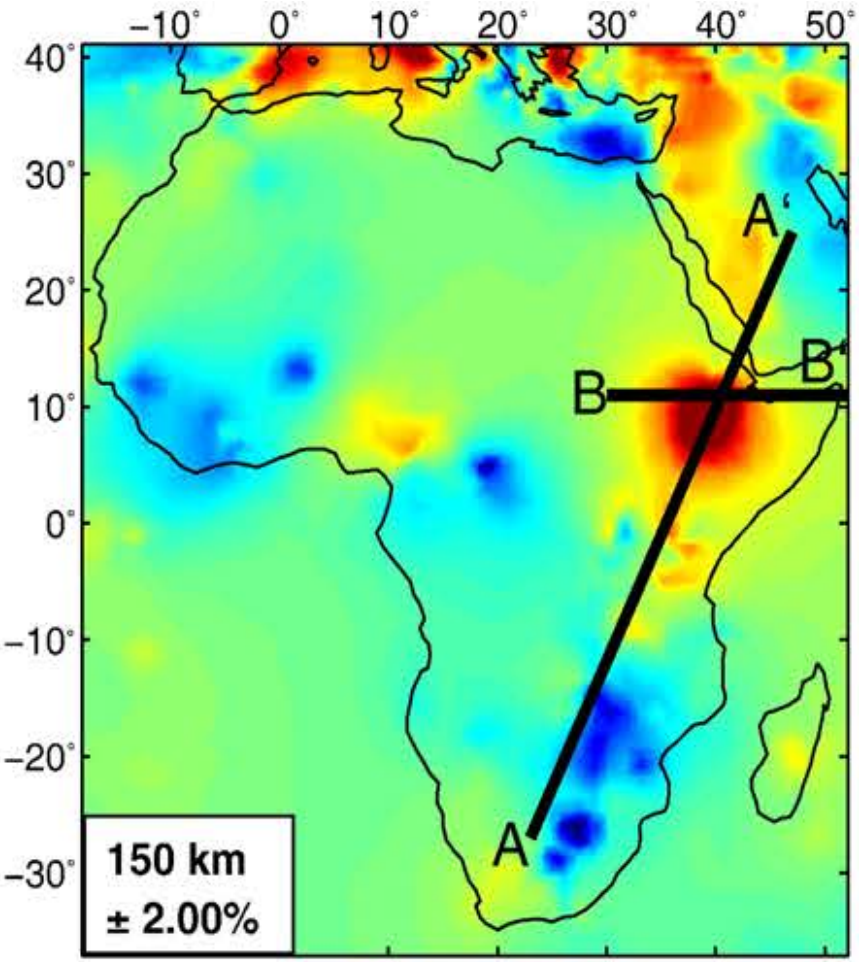


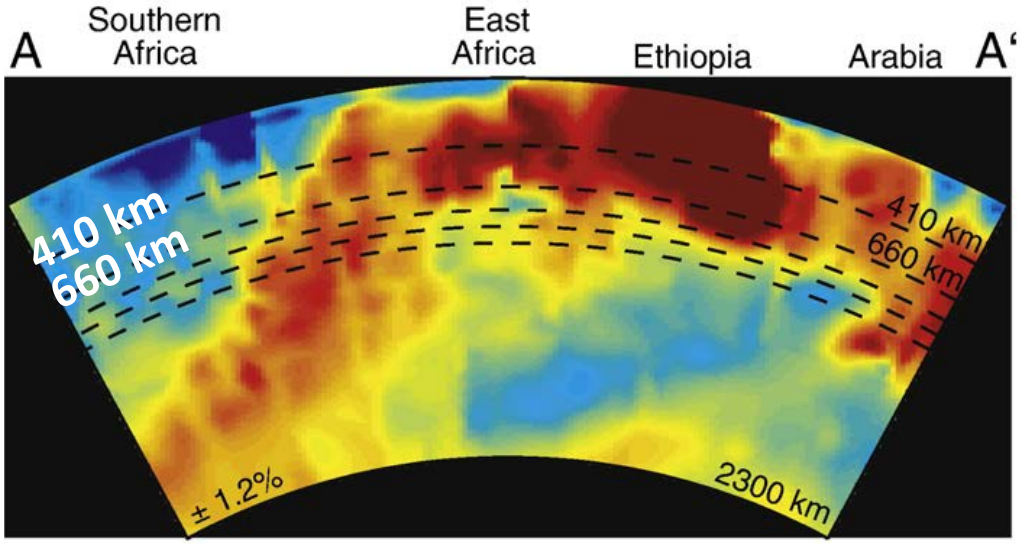
# Simmons et al. (2012): Global P-wave tomography…

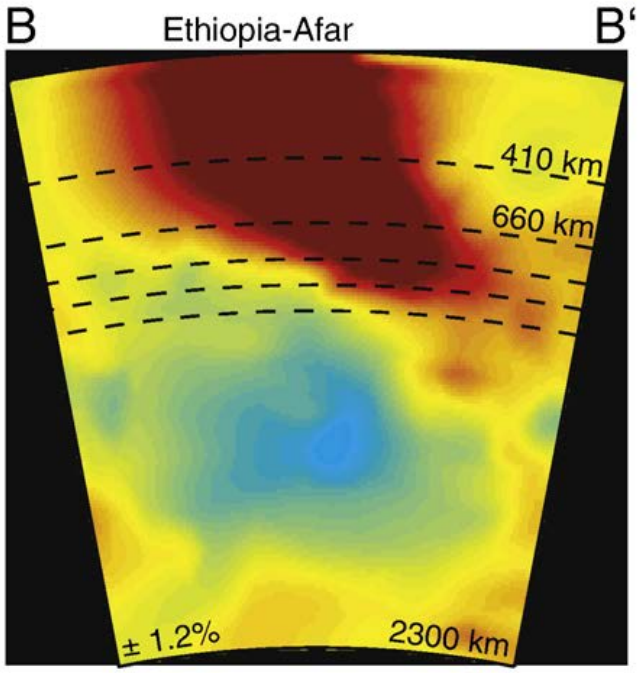


# Hansen et al. (2012): Global P-wave tomography…



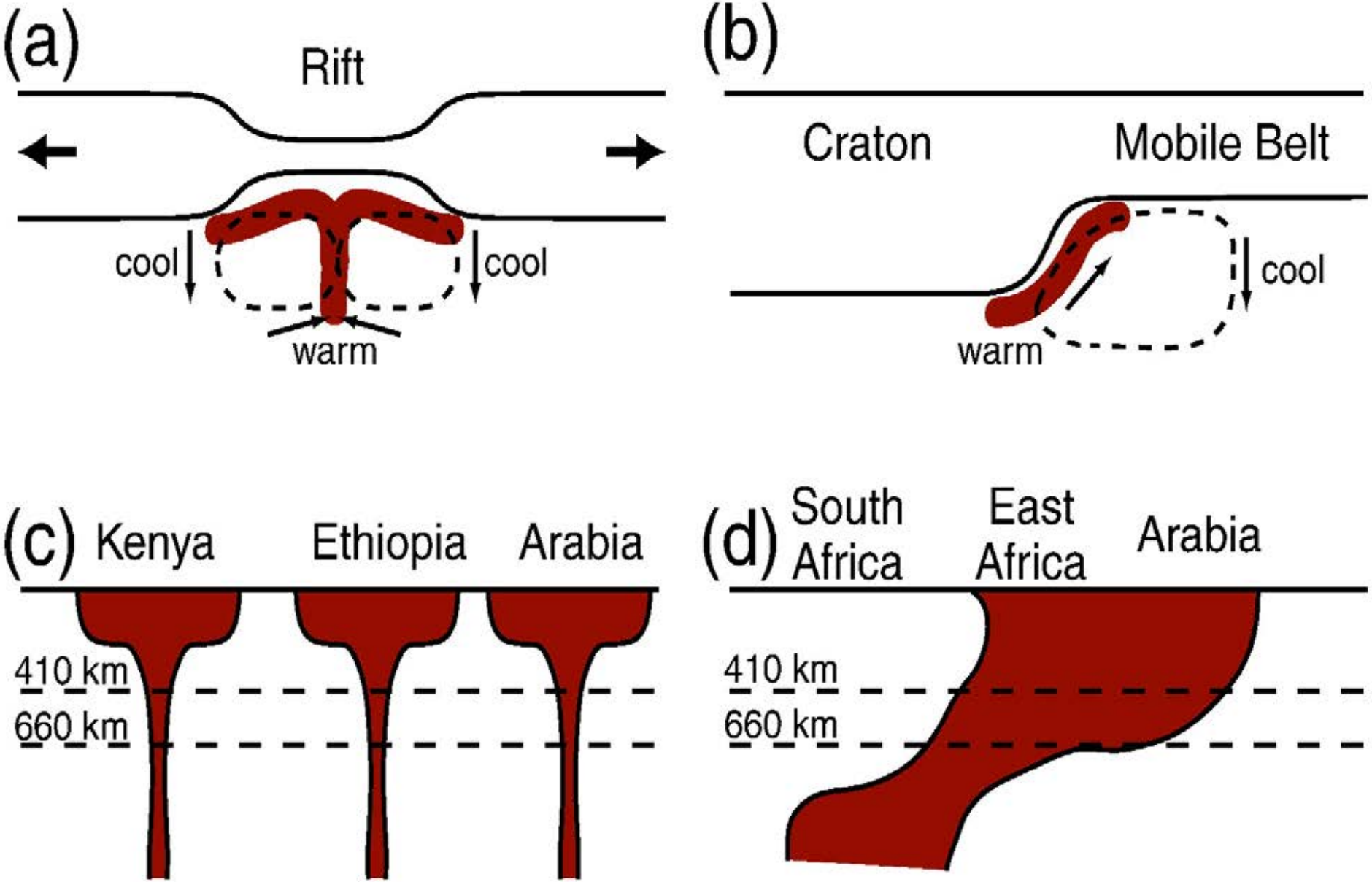



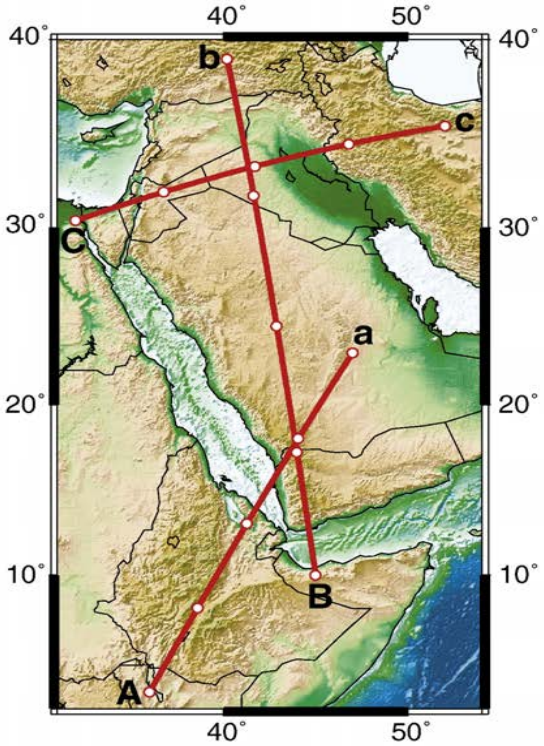

Fast (+) (-) Slow

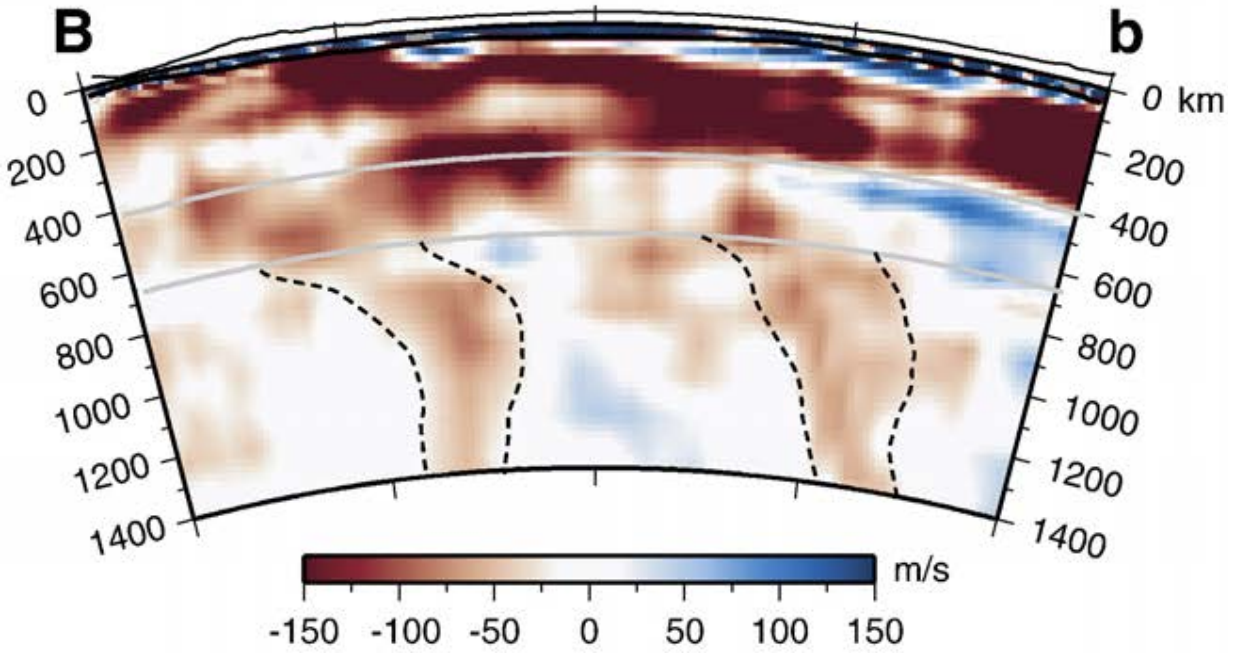
dVp

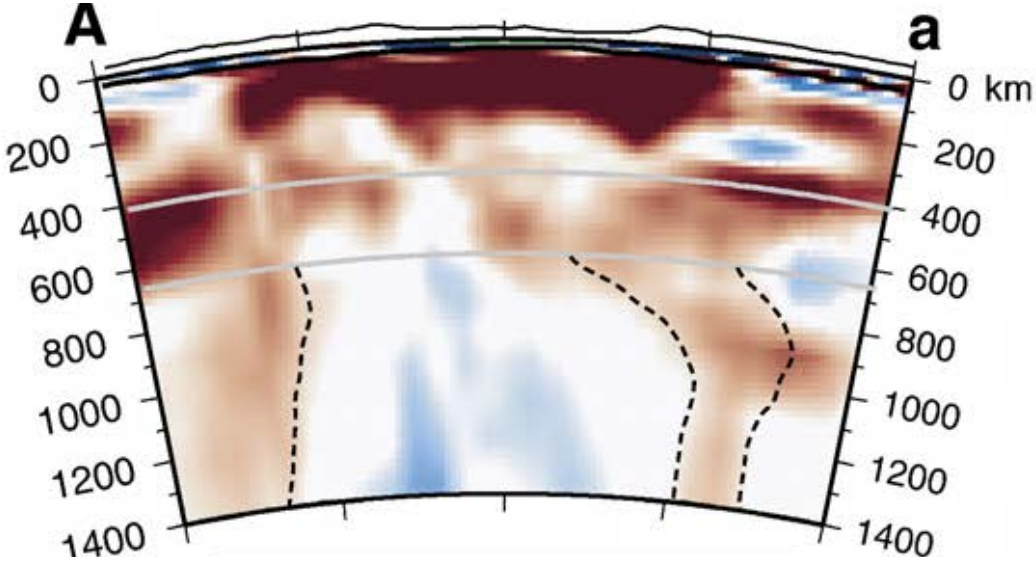
# Possibilities…?

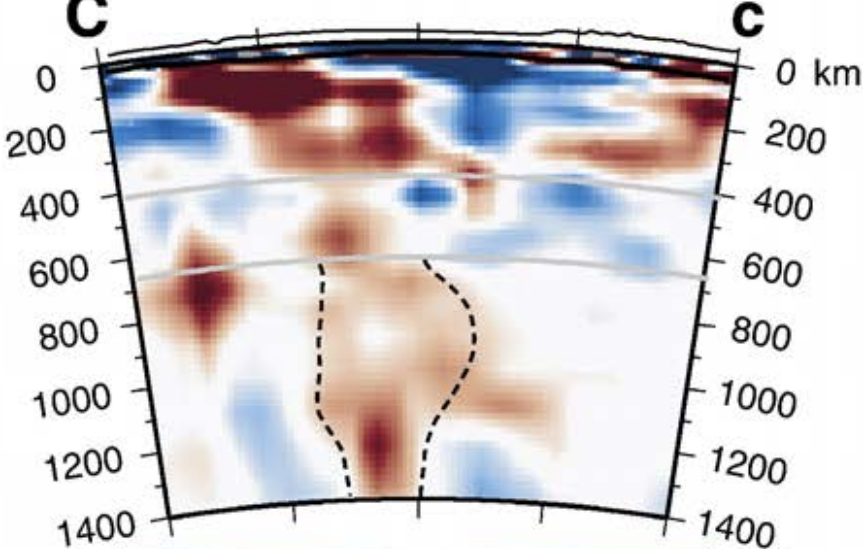


# Chang & Van der Lee (2011): Body & surface waves…

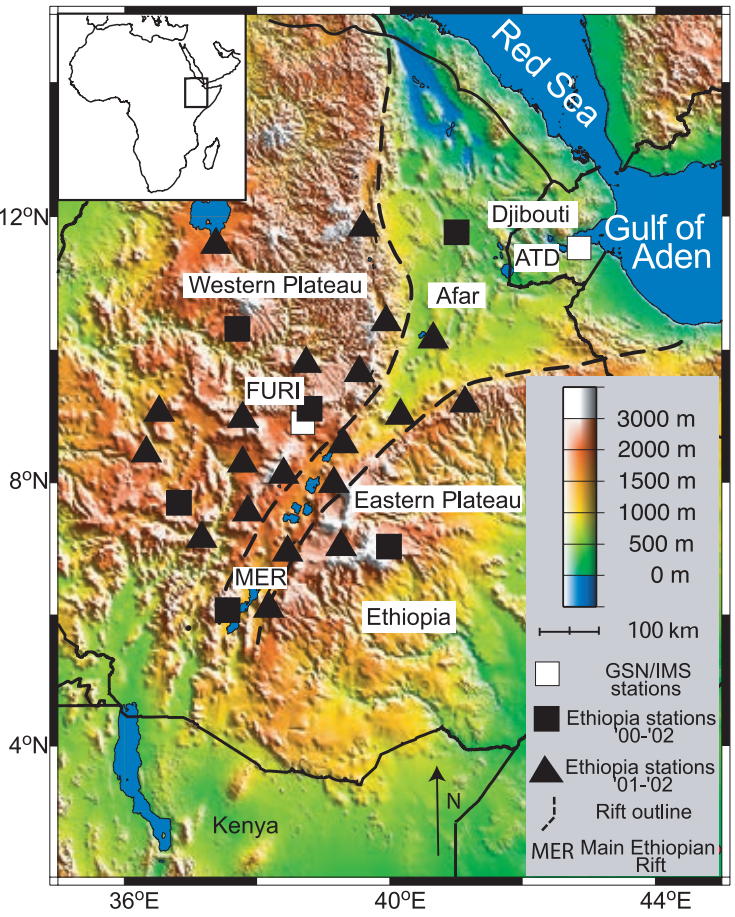


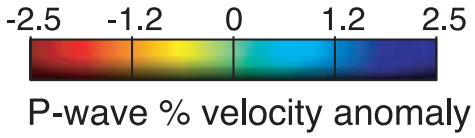



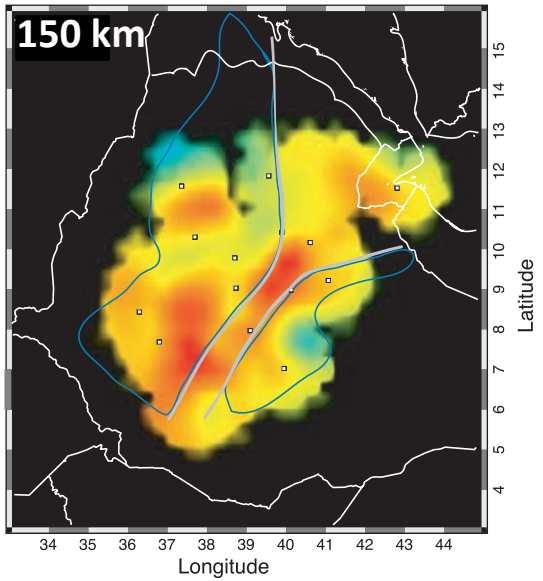



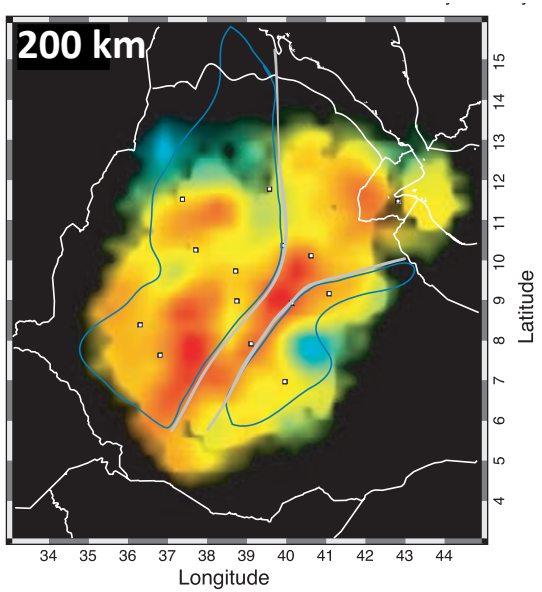



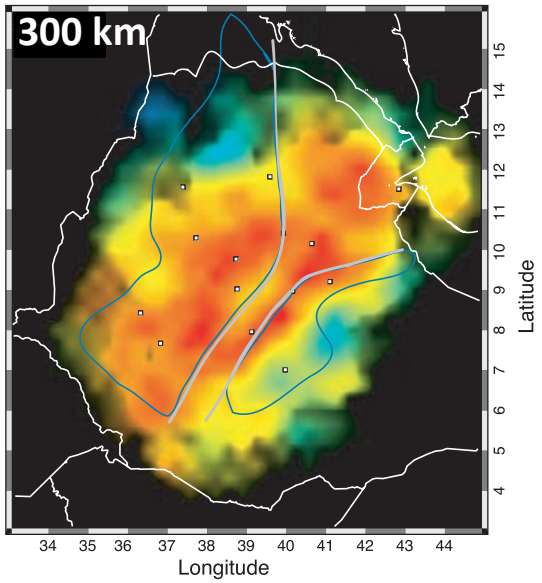
# Benoit et al. (2006): Regional S-wave tomography… Ethiopia Broadband Seismic Experiment (2000-02)

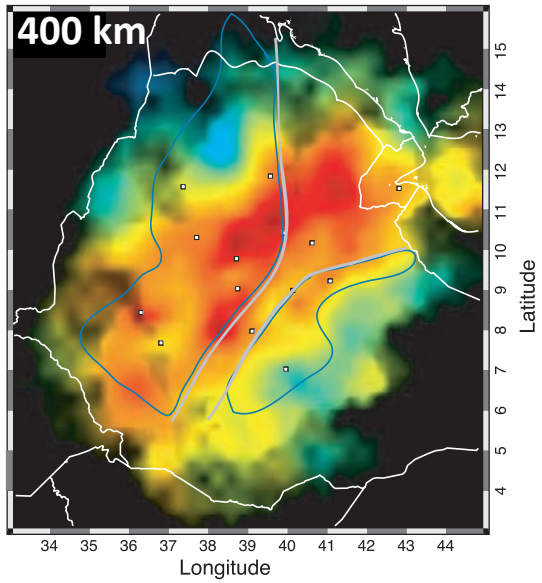


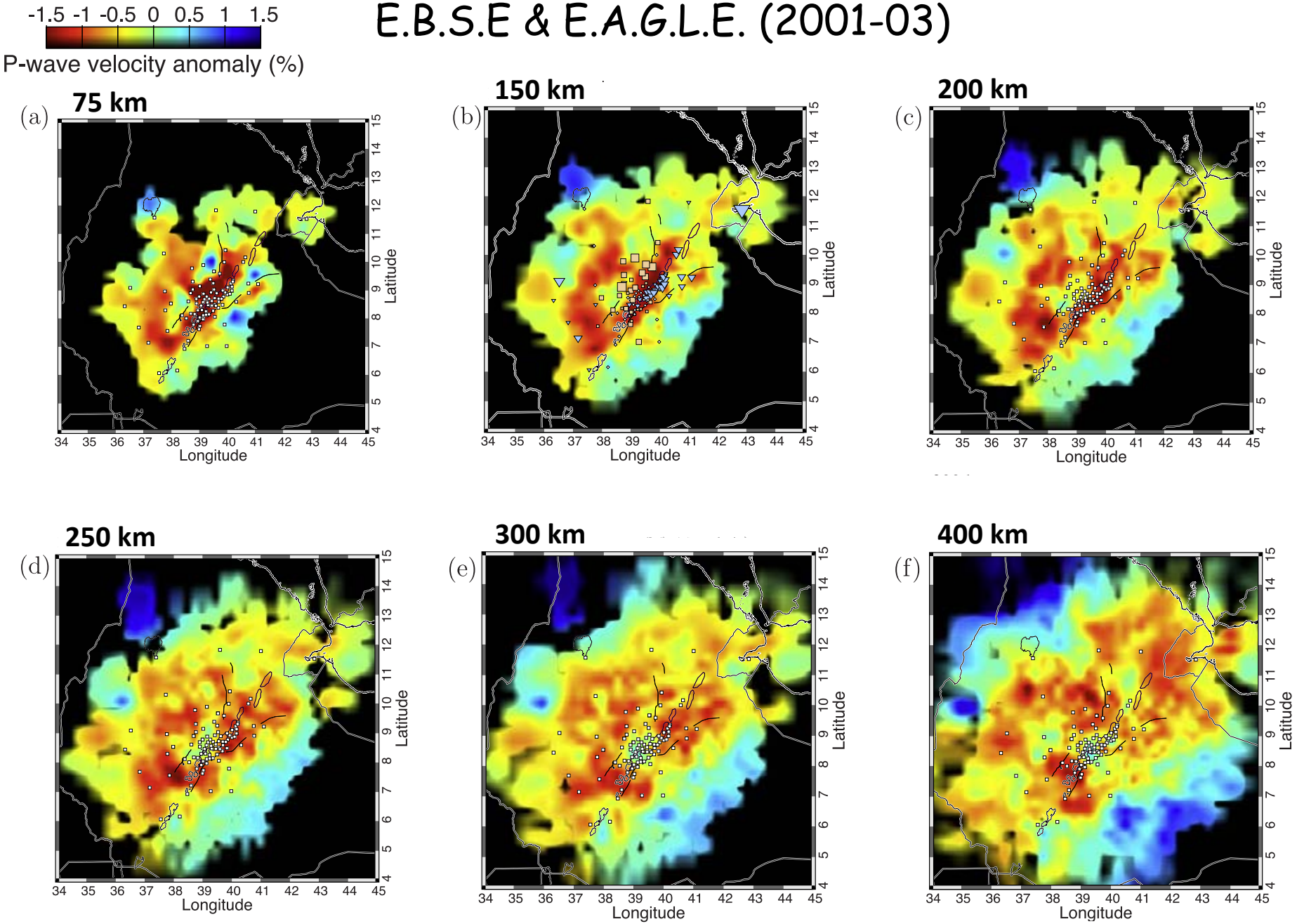



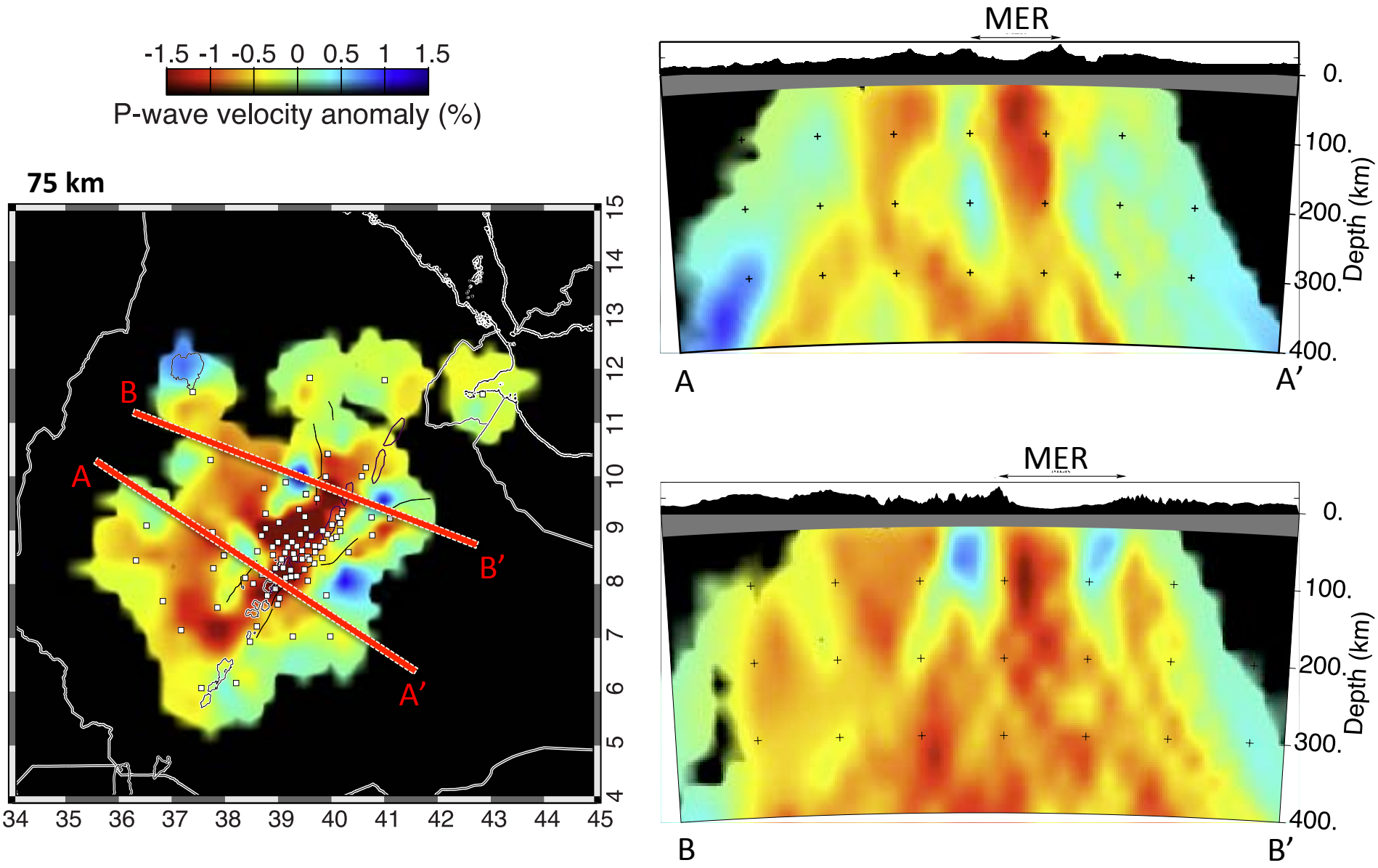



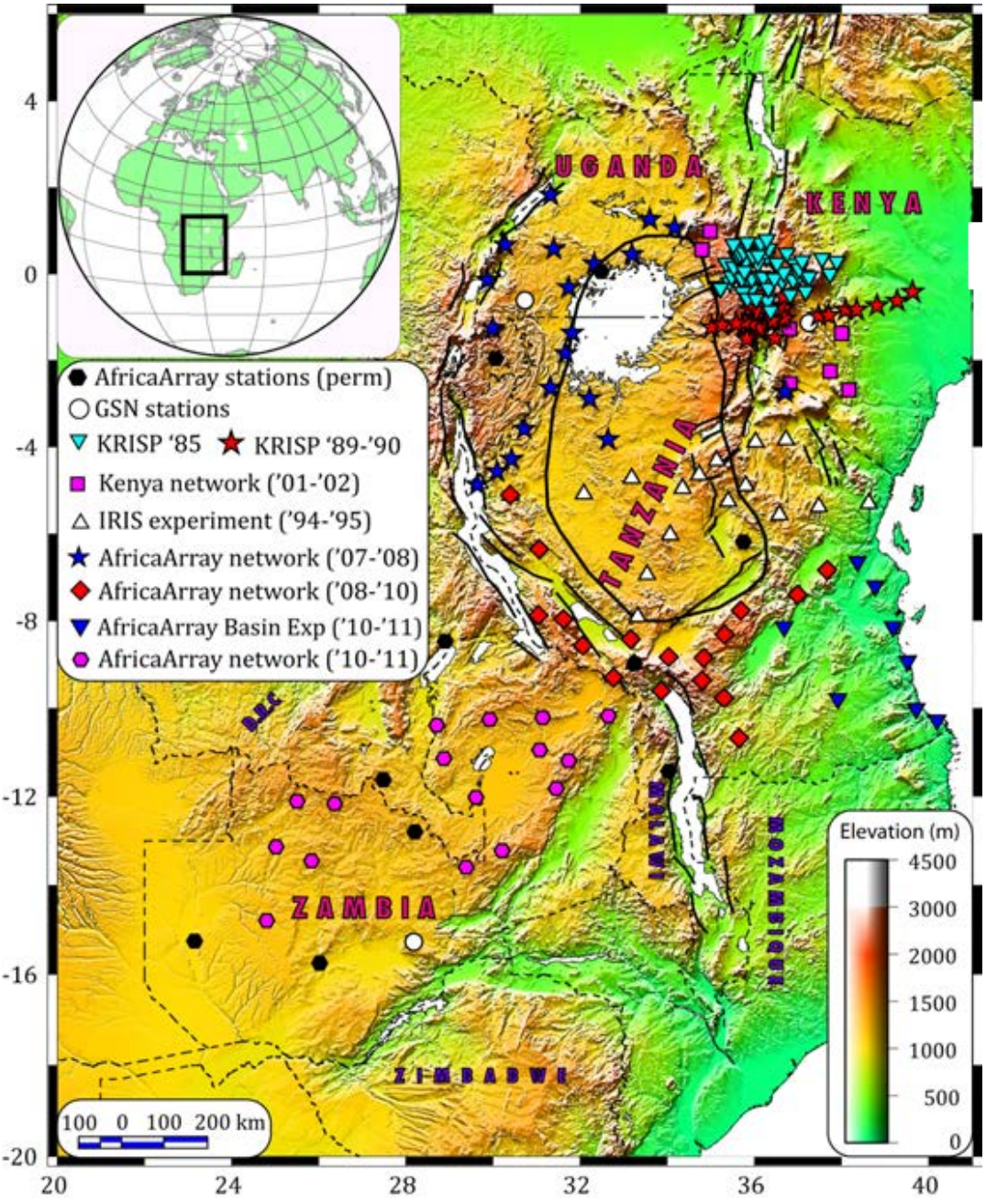
# Bastow et al. (2008): Regional P-wave tomography… E.B.S.E & E.A.G.L.E. (2001-03)

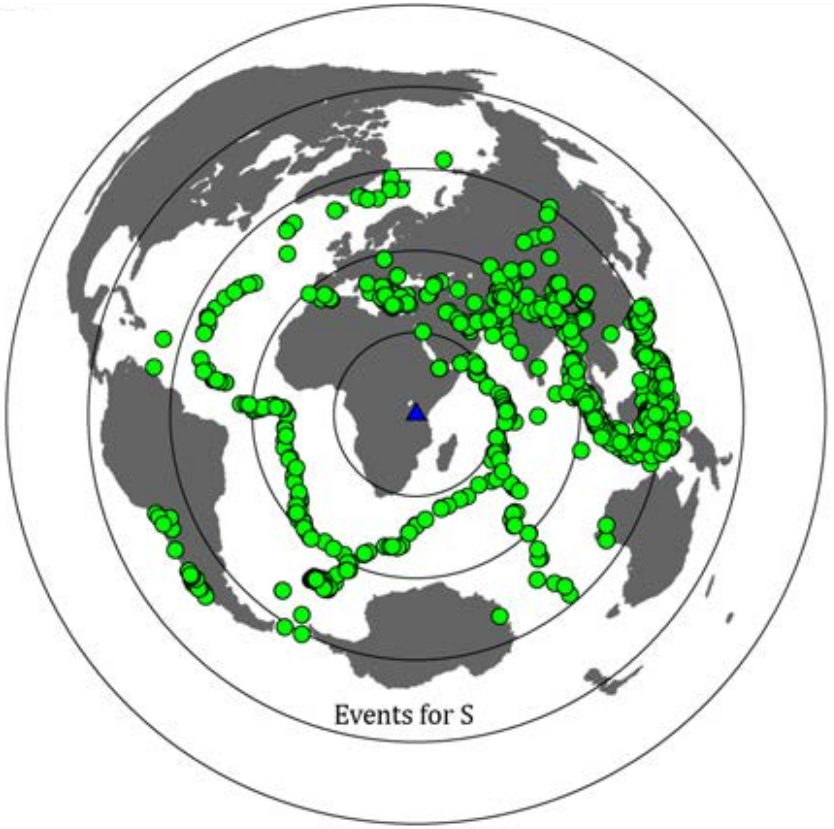


# Bastow et al. (2008)…

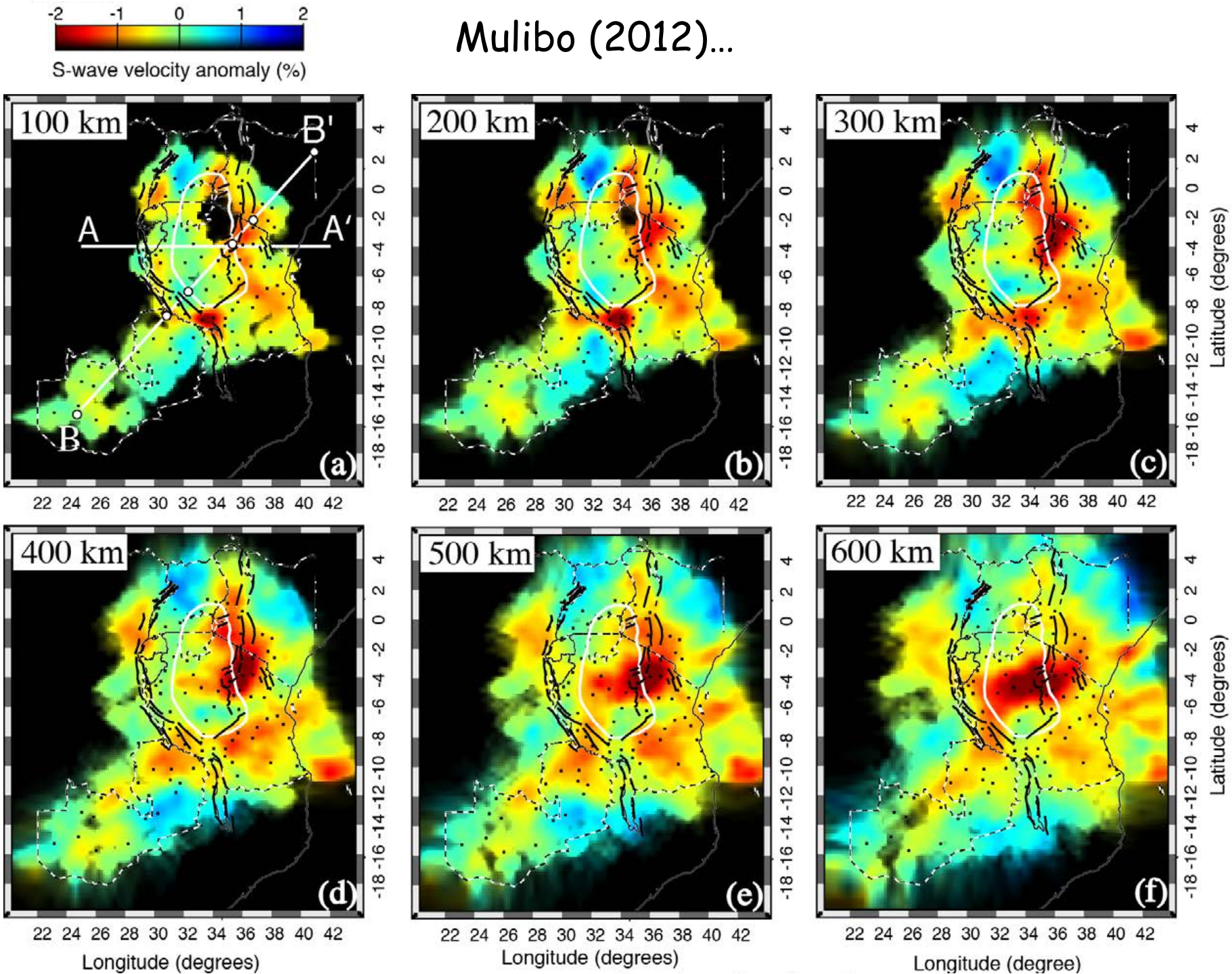


# Mulibo (2012): Regional body-wave tomography…

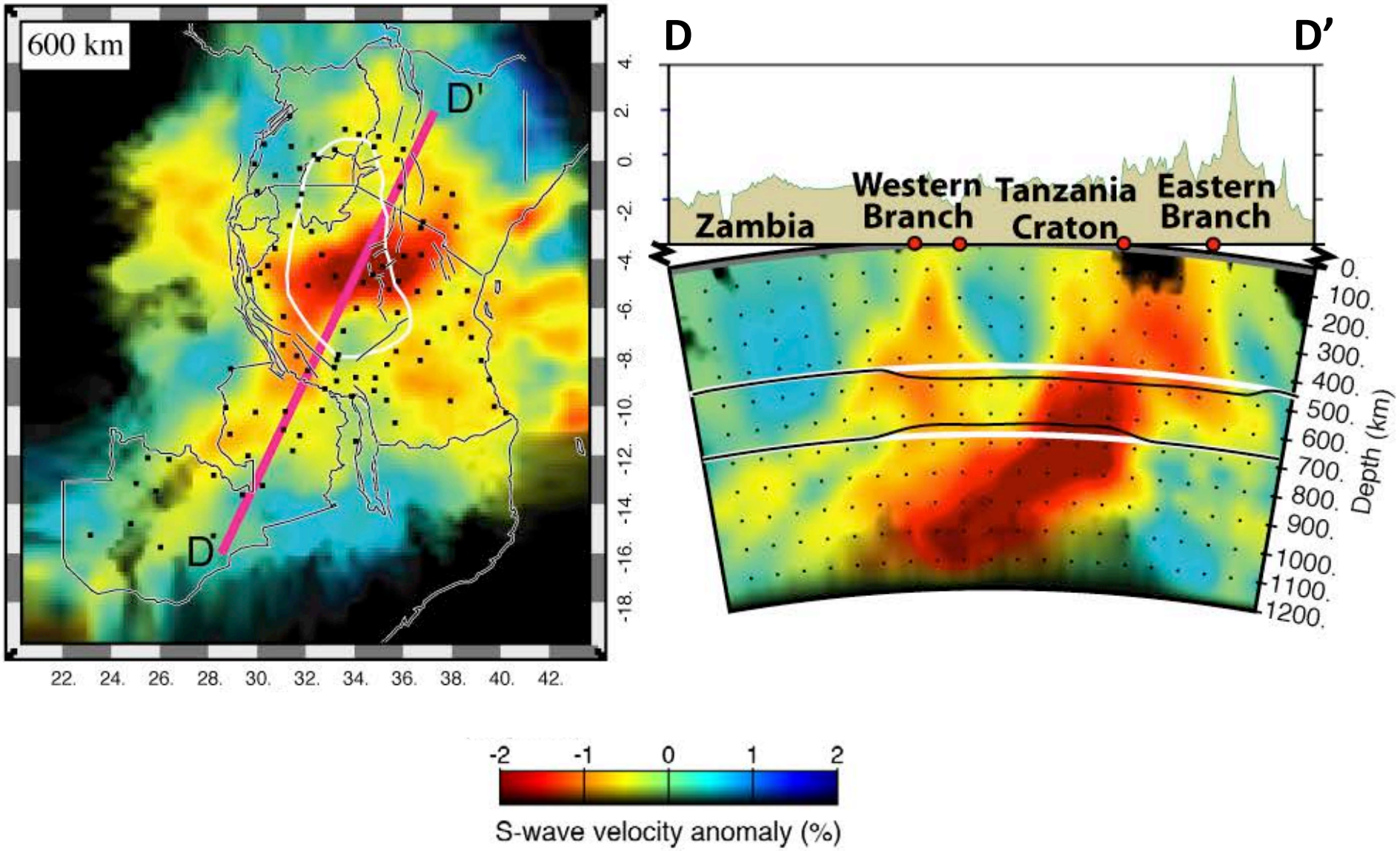


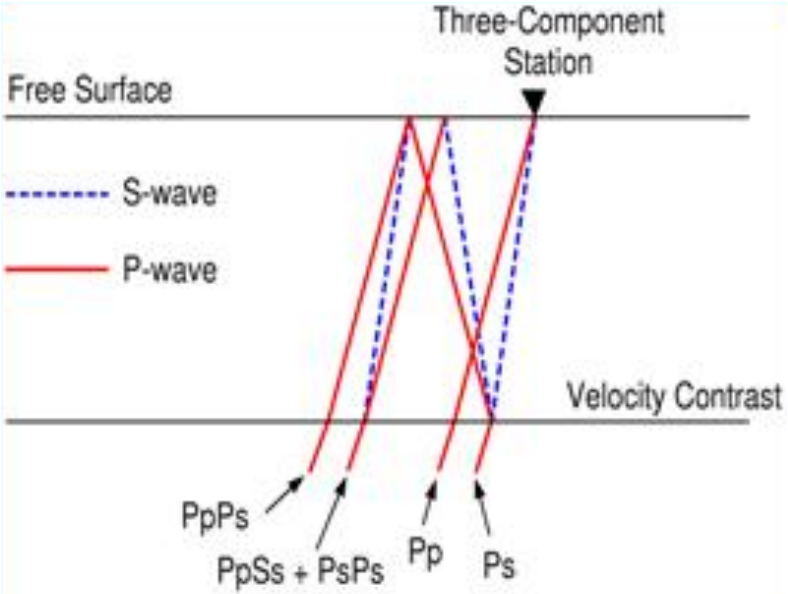
# Mulibo (2012)…

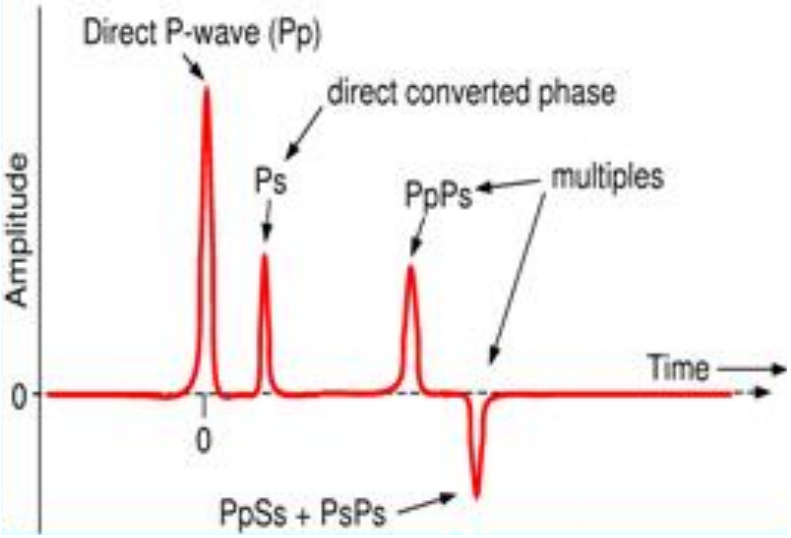

-2 -1 0 1 2
S-wave velocity anomaly (%)
100 km
200 km
300 km
400 km
500 km
600 km
A
A'
B
B'
(a)
(b)
(c)
(d)
(e)
(f)
22 24 26 28 30 32 34 36 38 40 42
Longitude (degrees)
Longitude (degree)
-18 -16 -14 -12 -10 -8 -6 -4 -2 0 2 4
Latitude (degrees)

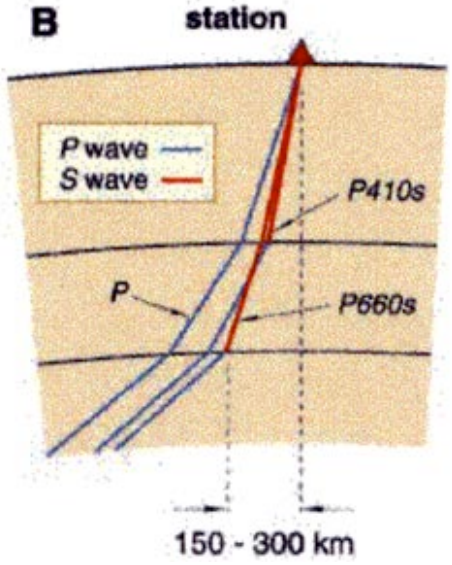
# Mulibo (2012)…

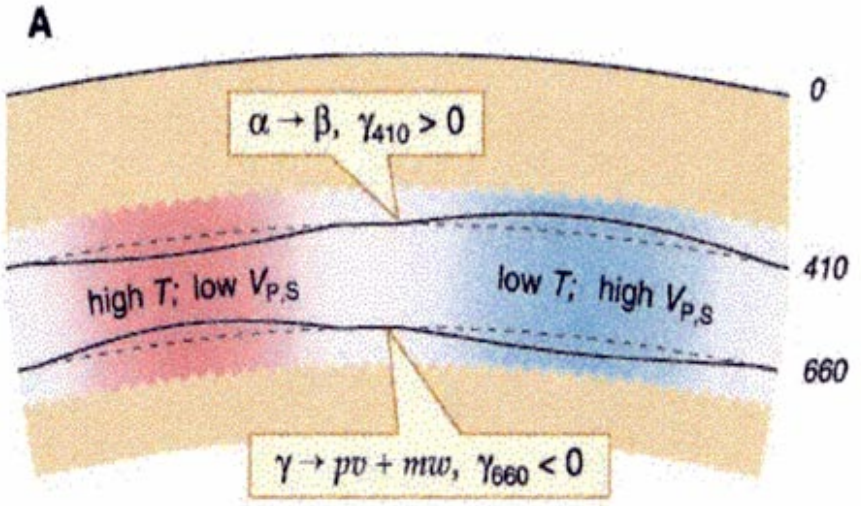

600 km
D'
D'
D
D'
Zambia
Western Branch
Tanzania Craton
Eastern Branch
Depth (km)
0.
100.
200.
300.
400.
500.
600.
700.
800.
900.
1000.
1100.
1200.
4.
2.
0.
-2.
-4.
-6.
-8.
-10.
-12.
-14.
-16.
-18.
22.
24.
26.
28.
30.
32.
34.
36.
38.
40.
42.
-2
-1
0
1
2
S-wave velocity anomaly (%)

# Receiver functions sensitive to seismic discontinuities…



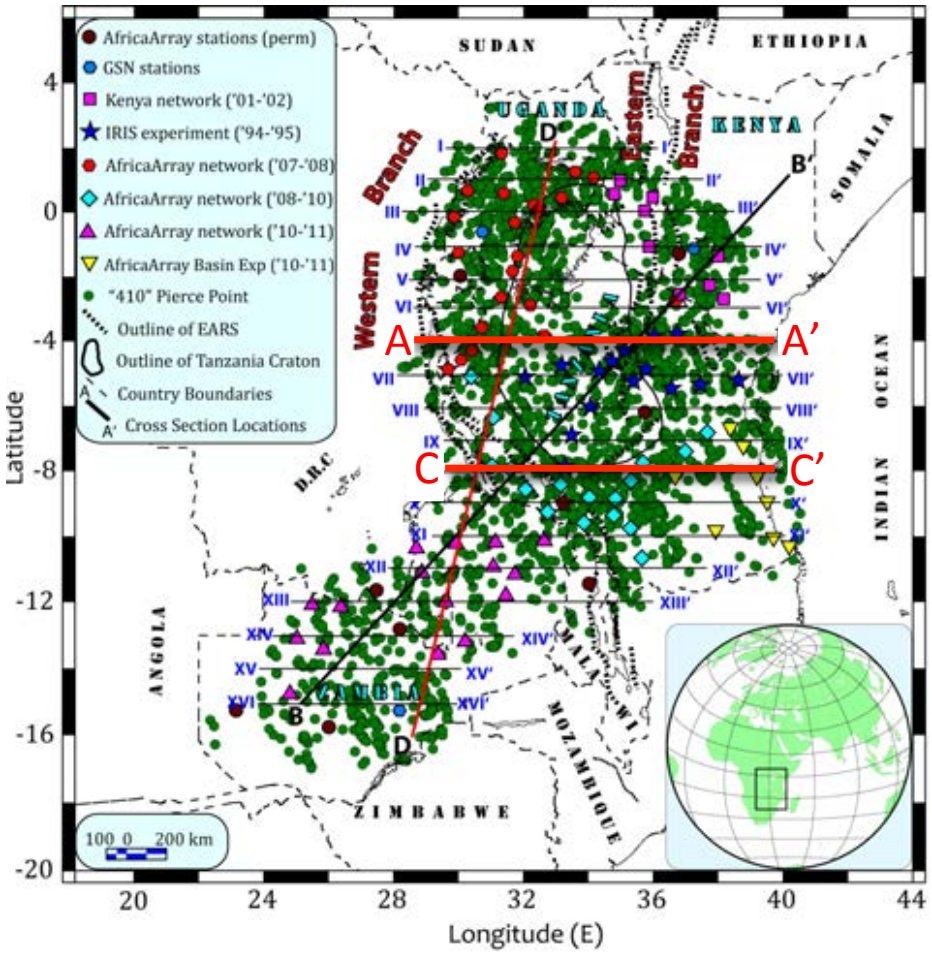



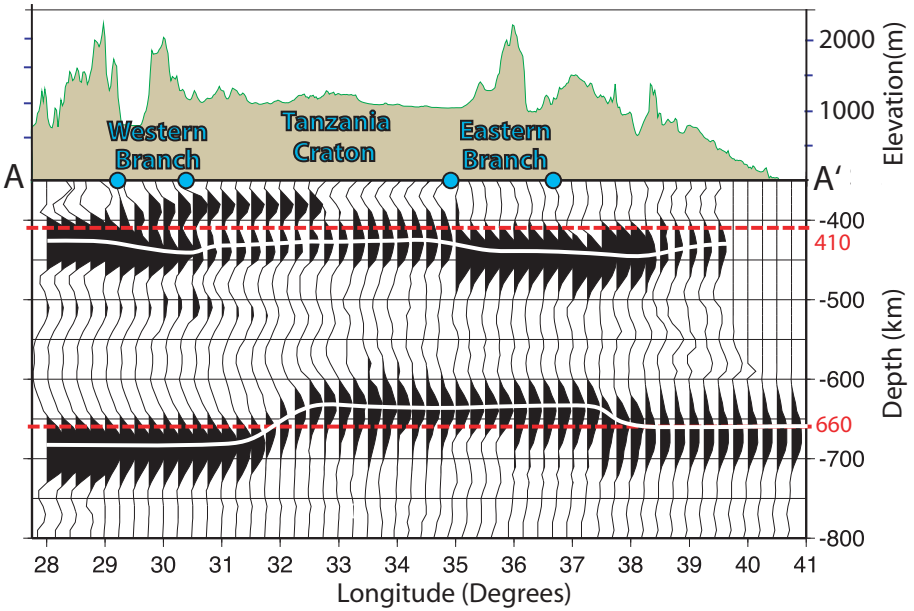



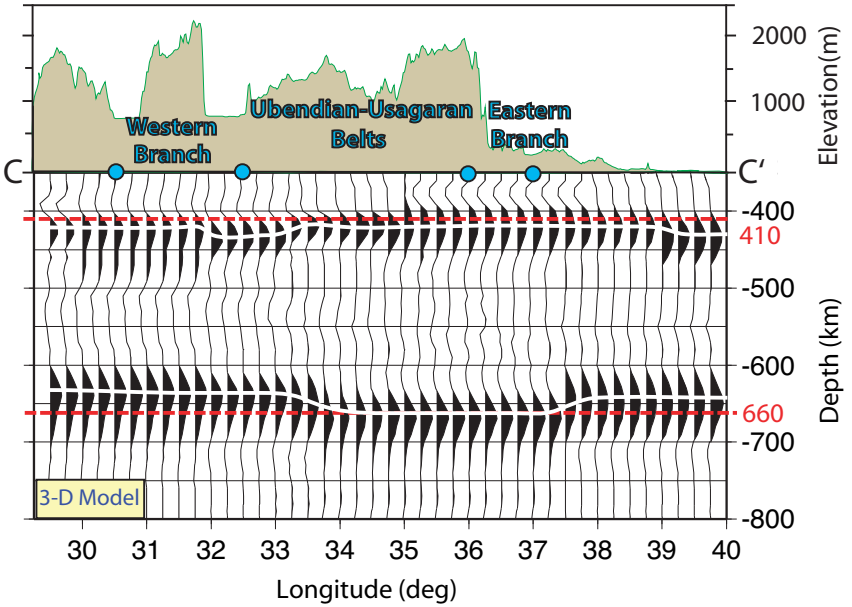



# Mulibo (2012): Receiver functions…

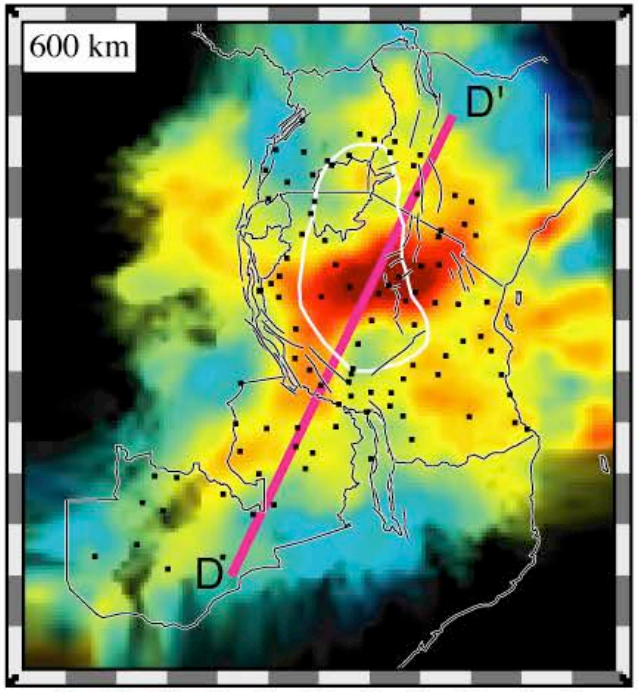
Ps points for 410 km discontinuity

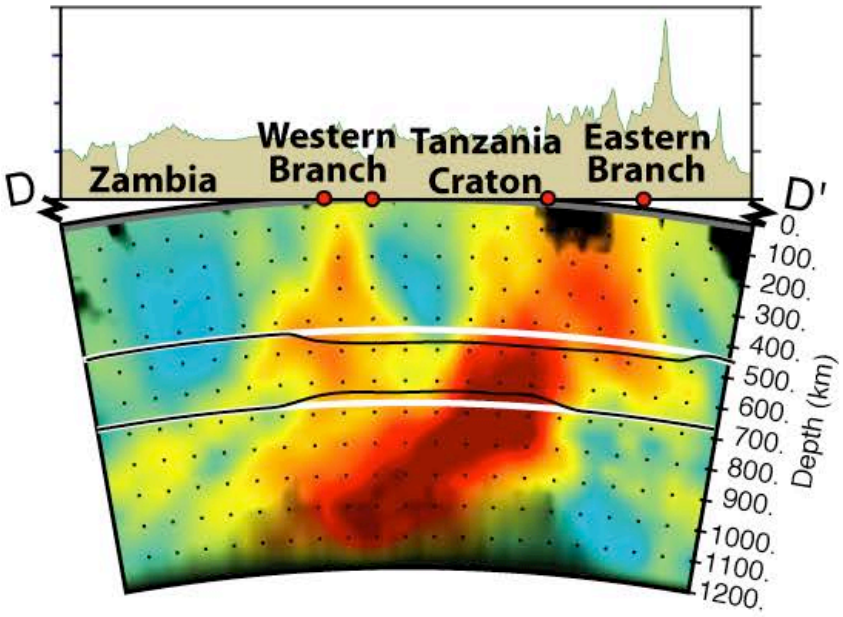


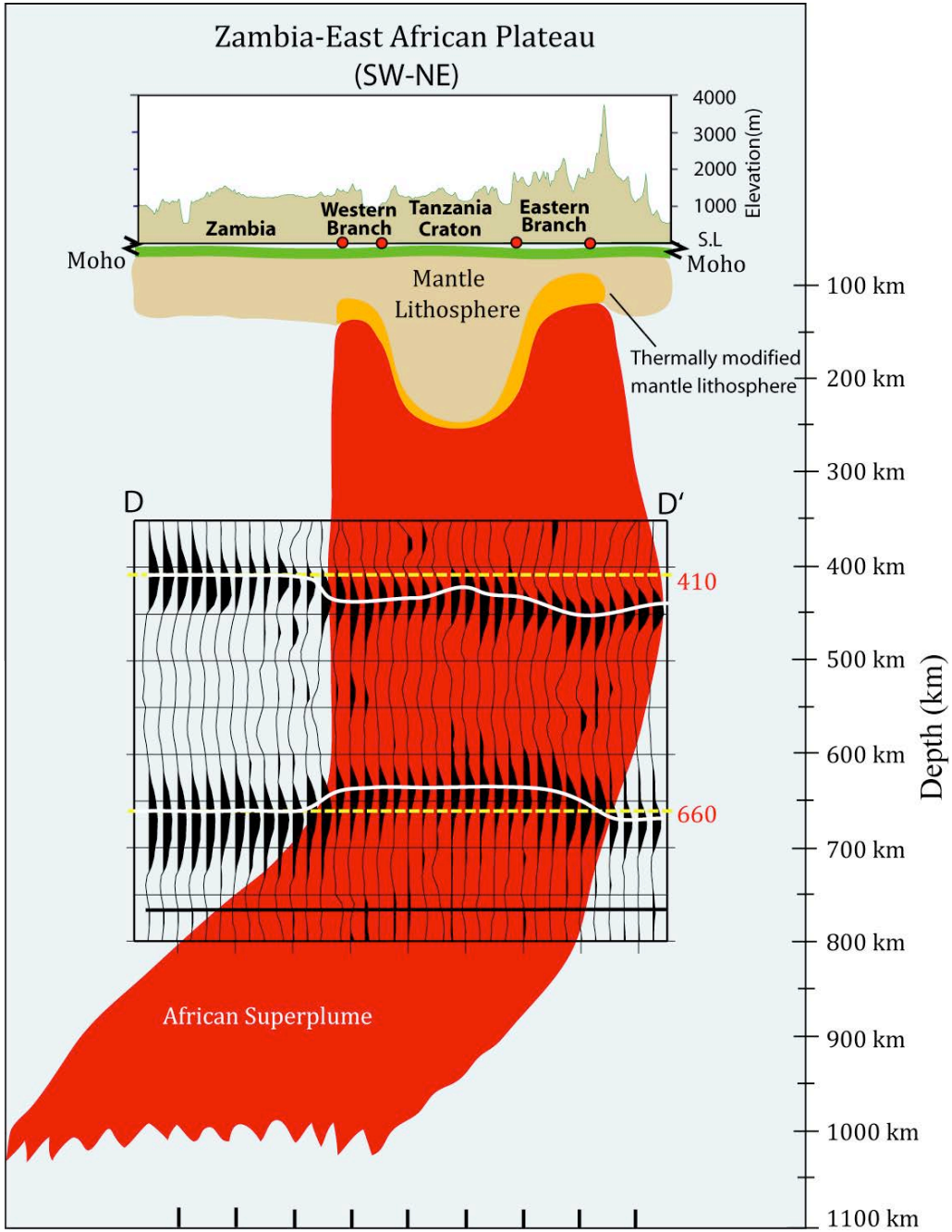



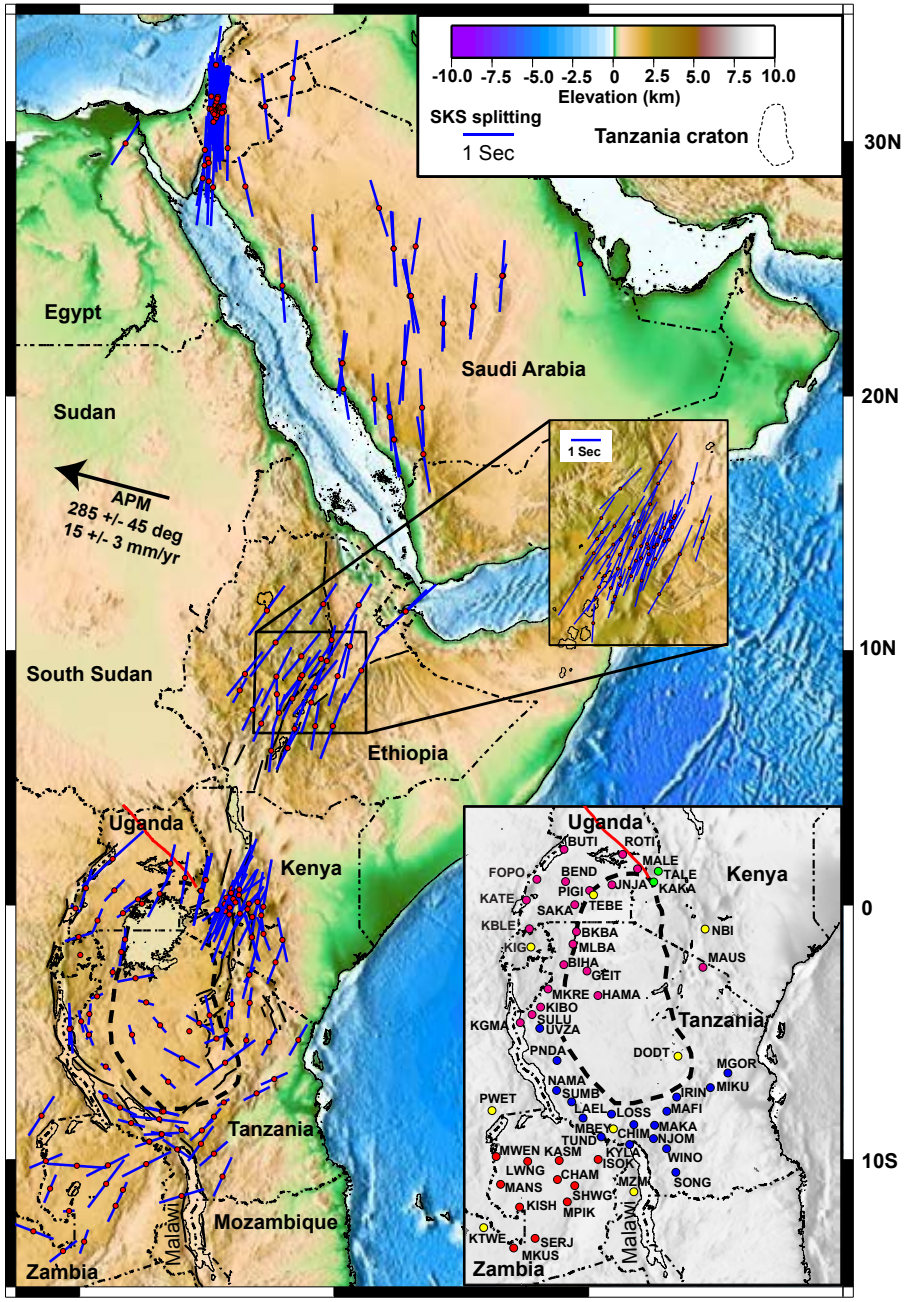
# Mulibo (2012): Conclusion…

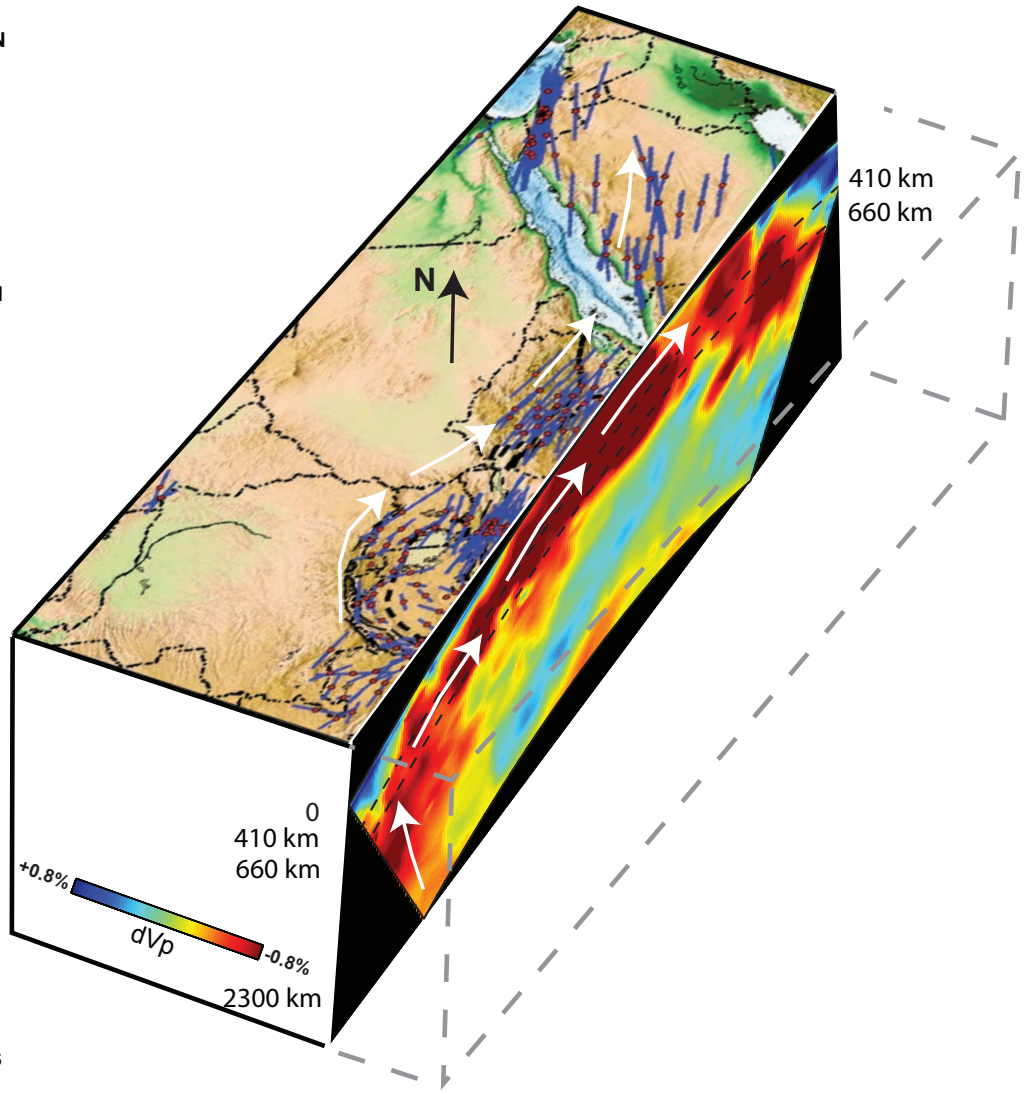


# Bagley & Nyblade (submitted): Shear-wave splitting…



# O'Donnell et al. (in prep): Surface-wave tomography…