Supplementary material for

Supercontinent-paced magmatic destabilisation and recratonisation of the Yilgarn Craton.

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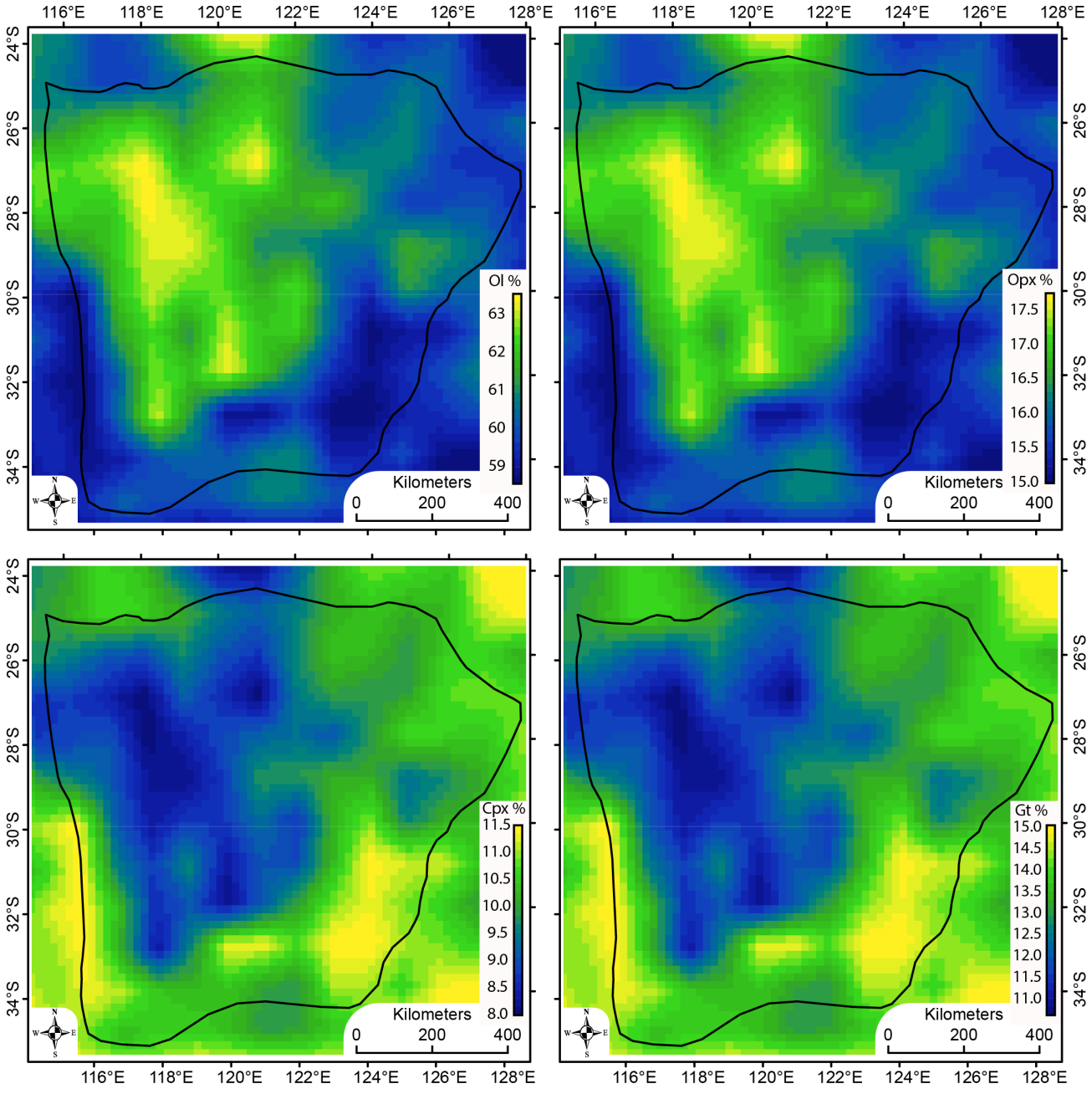

Figure S1: Inferred modal percentage of a) olivine, b) orthopyroxene, c) clinopyroxene, d) garnet compatible with compositional density component of the model of Tesauro et al. (2020). The model used is based on a linear interpolation between two end-member compositions, representing a 'fertile' and an Archean upper mantle, more depleted in heavy constituents (Tesauro et al., 2014).

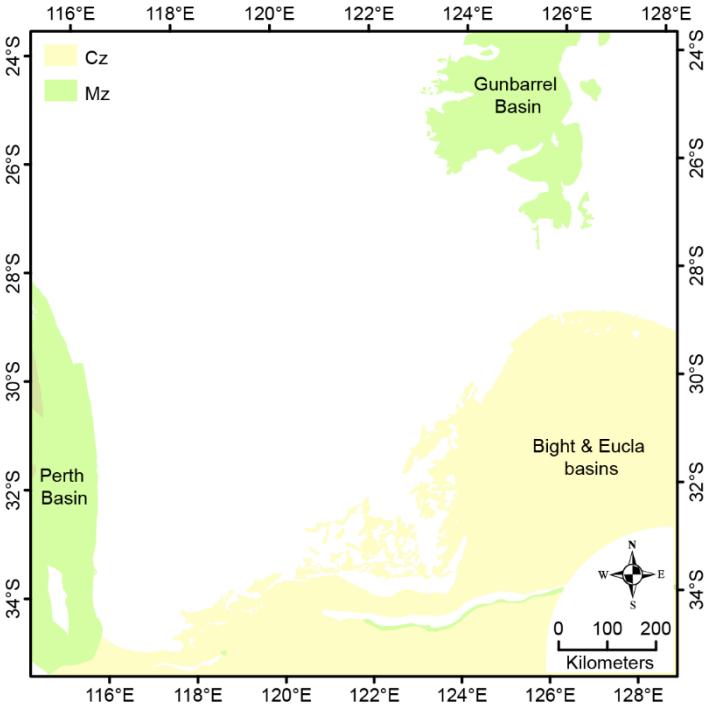

Figure S2: Mesozoic and Cenozoic sedimentary basins. See also slower Vs associated with Gondwana breakup (Fig 4, Fig S3)

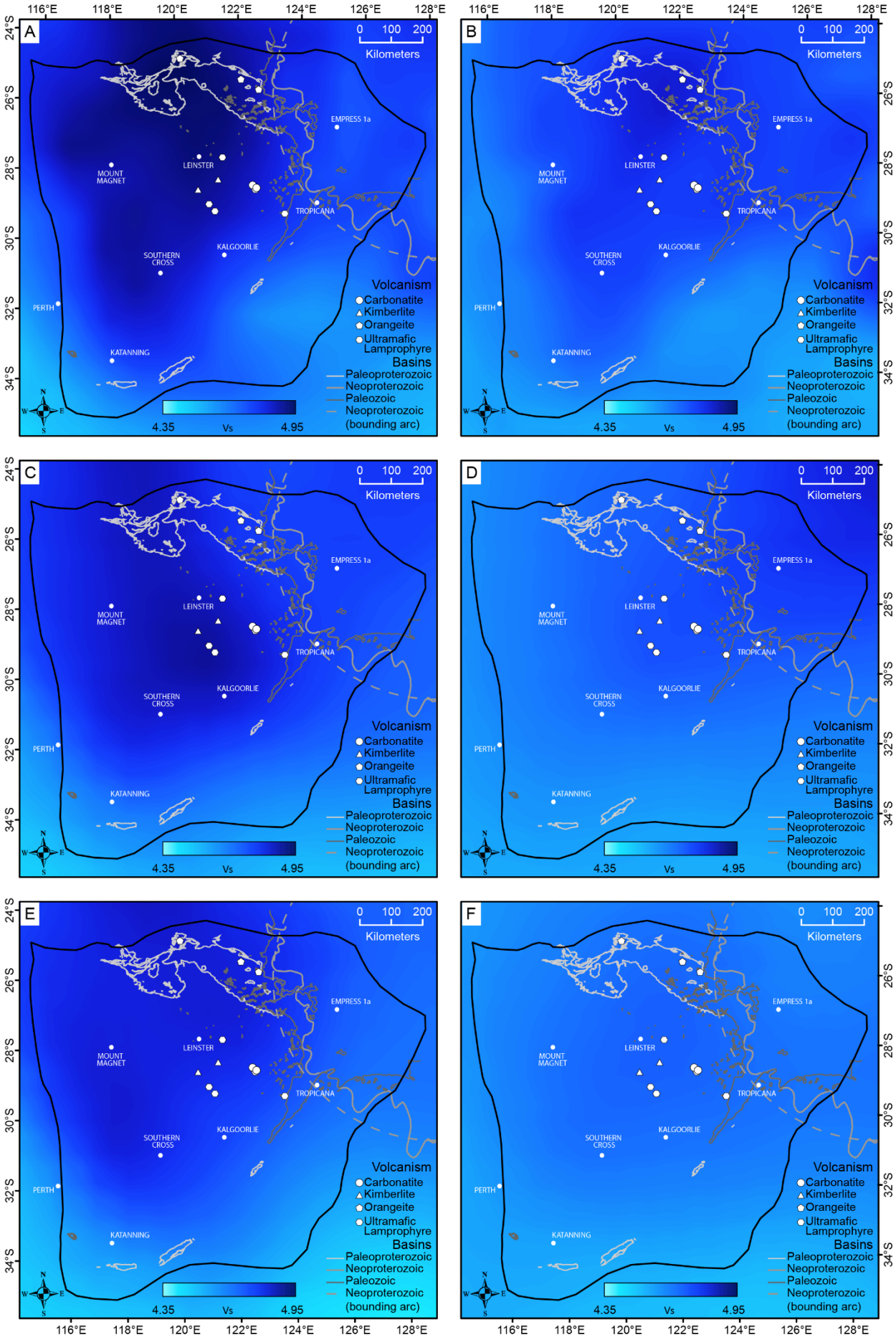
A
B
C
D
E
F
0 100 200
Kilometers
EMPRESS 1a
LEINSTER
MOUNT MAGNET
TROPICANA
SOUTHERN CROSS
KALGOORLIE
PERTH
KATANNING
Volcanism
Carbonatite
Kimberlite
Orangeite
Ultramafic Lamprophyre
Basins
Paleoproterozoic
Neoproterozoic
Paleozoic
Neoproterozoic (bounding arc)
4.35
Vs
4.95
116°E
118°E
120°E
122°E
124°E
126°E
128°E
24°S
26°S
28°S
30°S
32°S
34°S

Figure S3: Mantle seismic properties a) AuSREM Vsh (Kennett et al., 2013) at 100 km depth b) the same model at 200 km depth c) Vsh at 100 km depth from Yoshizawa (2014) d) the same model at 200 km depth e) Vsv at 100 km depth from Yoshizawa (2014) f) the same model at 200 km depth. Selected volcanic suites and basin outlines are shown

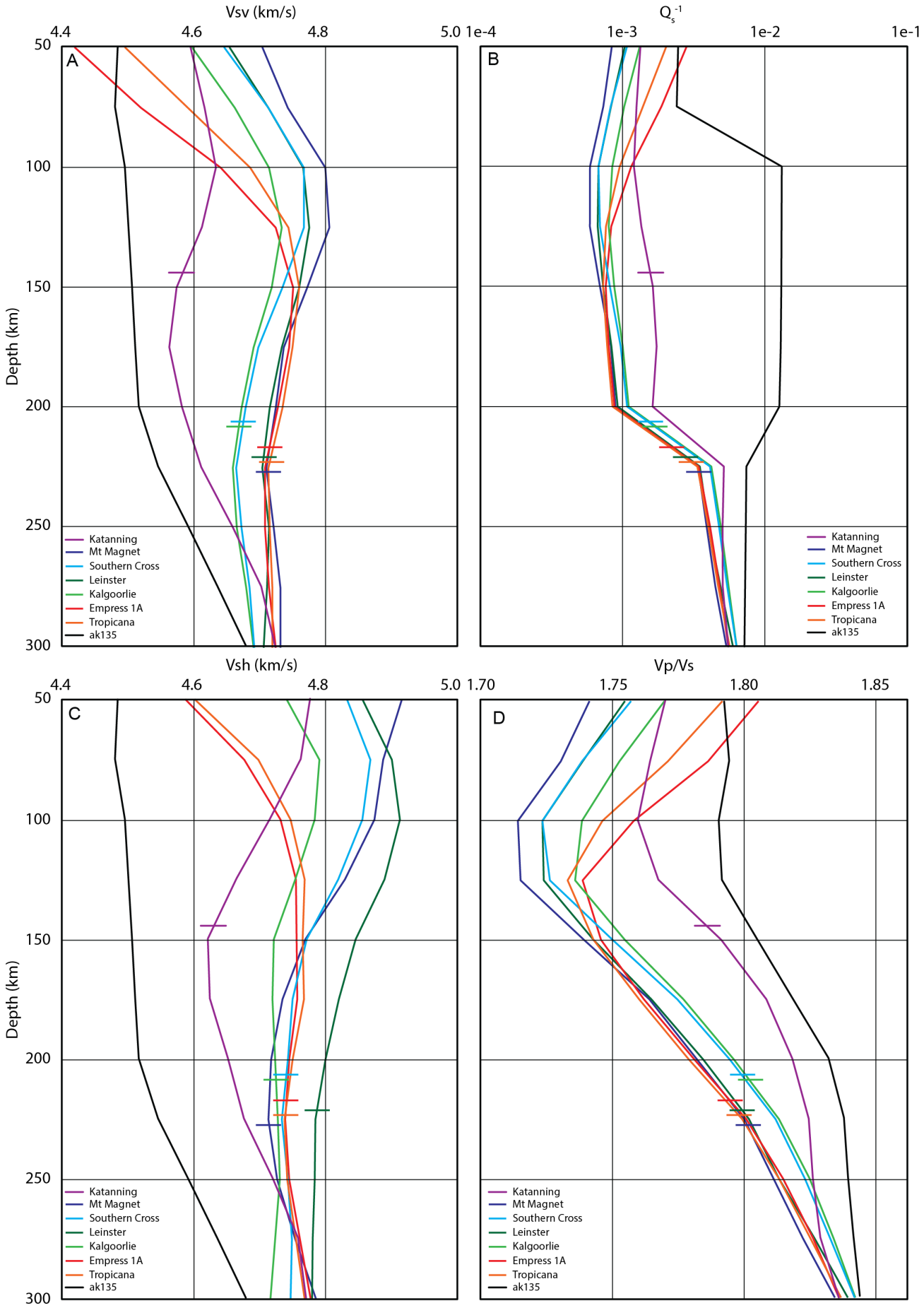
Vsv (km/s)
4.4
4.6
4.8
5.0
A
Depth (km)
50
100
150
200
250
300
Katanning
Mt Magnet
Southern Cross
Leinster
Kalgoorlie
Empress 1A
Tropicana
ak135
Q_s^{-1}
1e-4
1e-3
1e-2
1e-1
B
Vsh (km/s)
C
Vp/Vs
1.70
1.75
1.80
1.85
D

Figure S4: Seismological information at seven selected sites from AuSREM (Kennett et al., 2013) and for the global reference model ak135, showing a) Vsv, b) frequency independent Q_s^{-1} – note log scale. AuSREM derives Q_s^{-1} scaled from Vs anomaly, including a scale change at 200 km depth c) Vsh, d) Vp/Vsv. Horizontal bars indicate local LAB depth as the median of the models of Kennett et al. (2013), Hoggard et al. (2020) after Kennett et al. (2013), Hoggard et al. (2020) after Fishwick and Rawlinson (2012), Hoggard et al. (2020) after Yoshizawa (2014).