AGU PUBLICATIONS

Geochemistry, Geophysics, Geosystems

Supporting Information for

Thermal and Rheological Structure of Lithosphere beneath Northeast China

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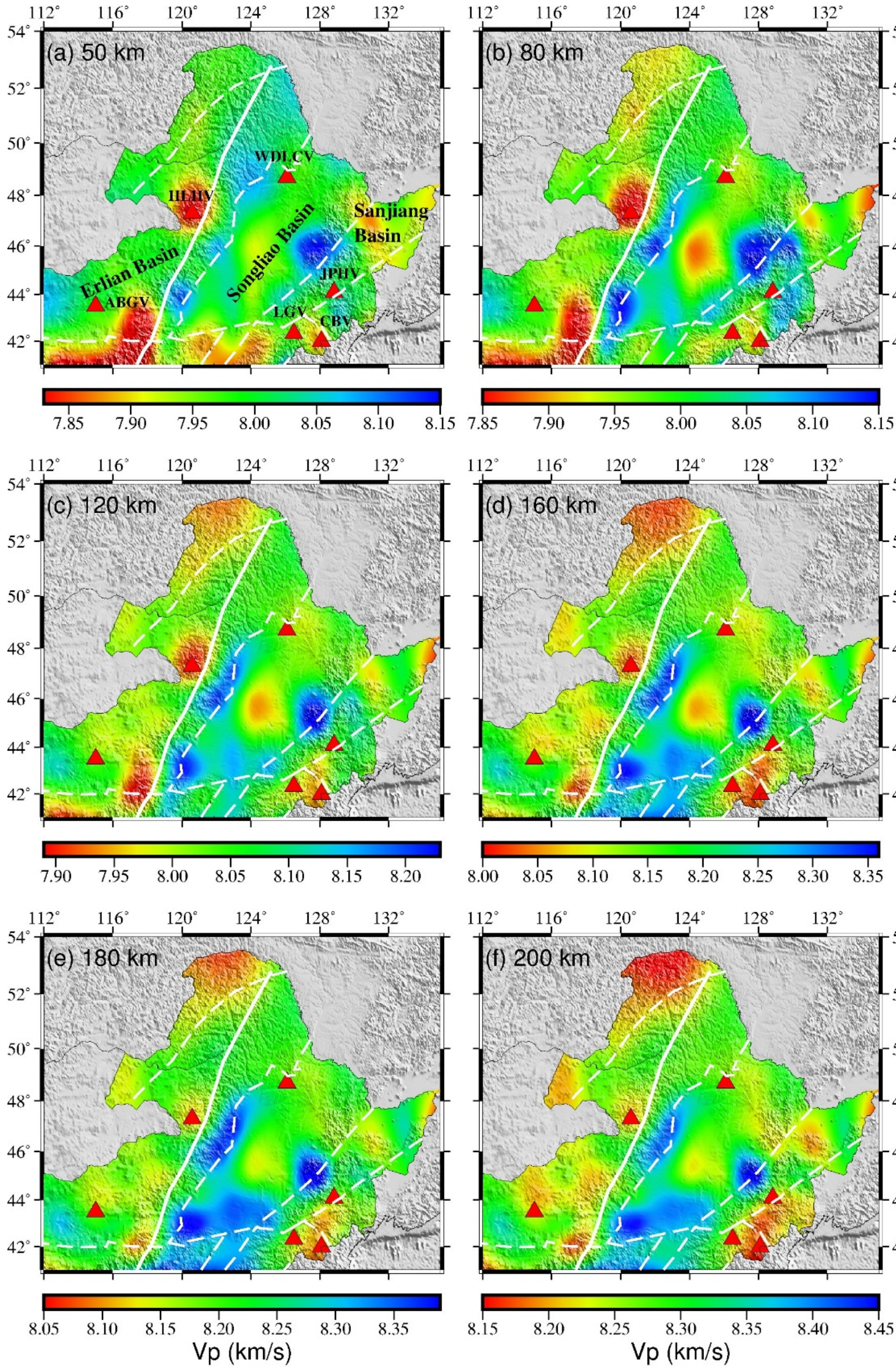

Figure S1. Map views of the 3-D P-wave velocity (Vp) model of Ma et al. (2018). The layer depth is shown at the upper-left corner of each map. The red and blue colors represent low Vp and high Vp, respectively, whose scale is shown below each panel. Other labels are the same as those in Figure 1.

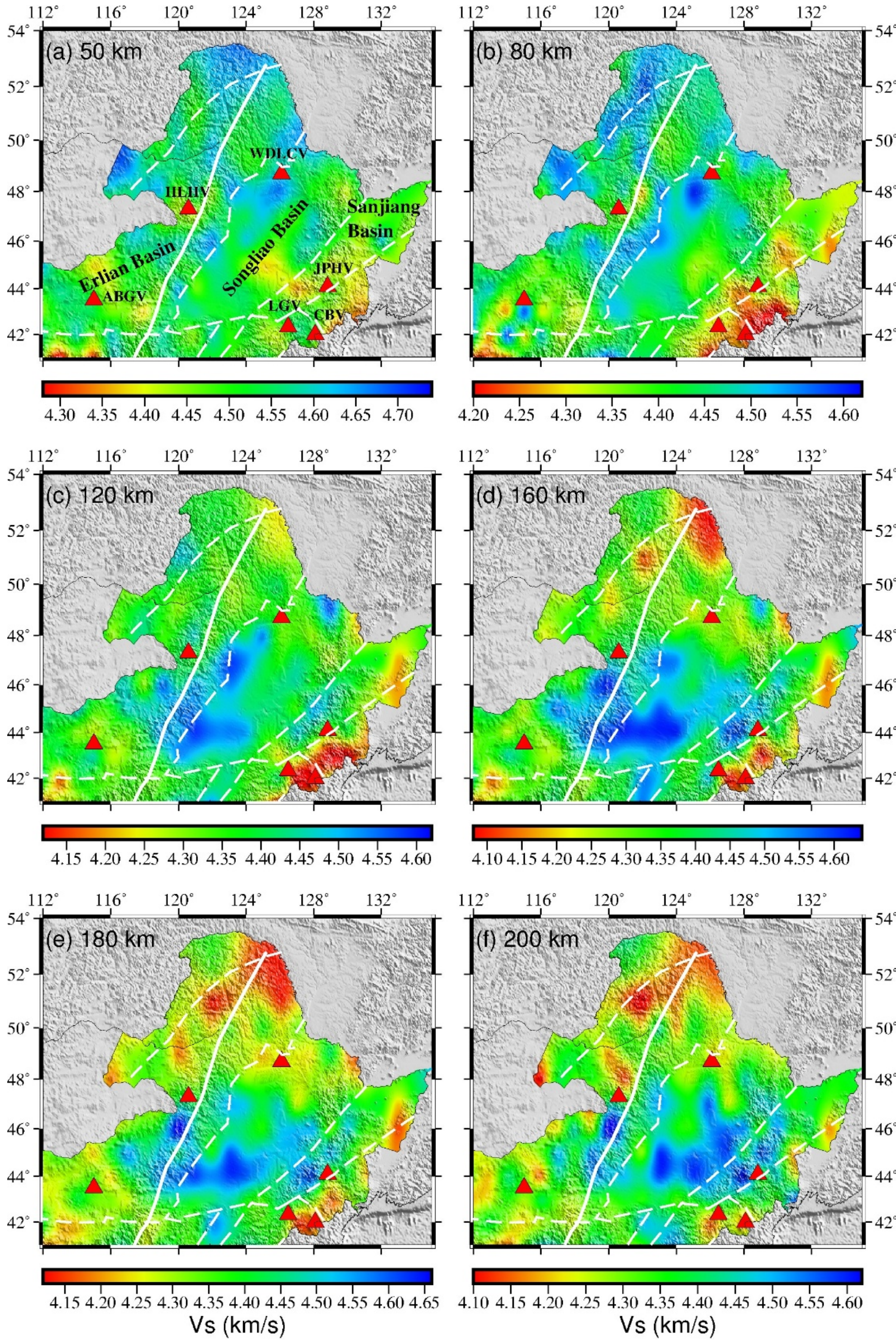

Figure S2. The same as Figure S1 but for the 3-D S-wave velocity (Vs) model of Shen et al. (2016).

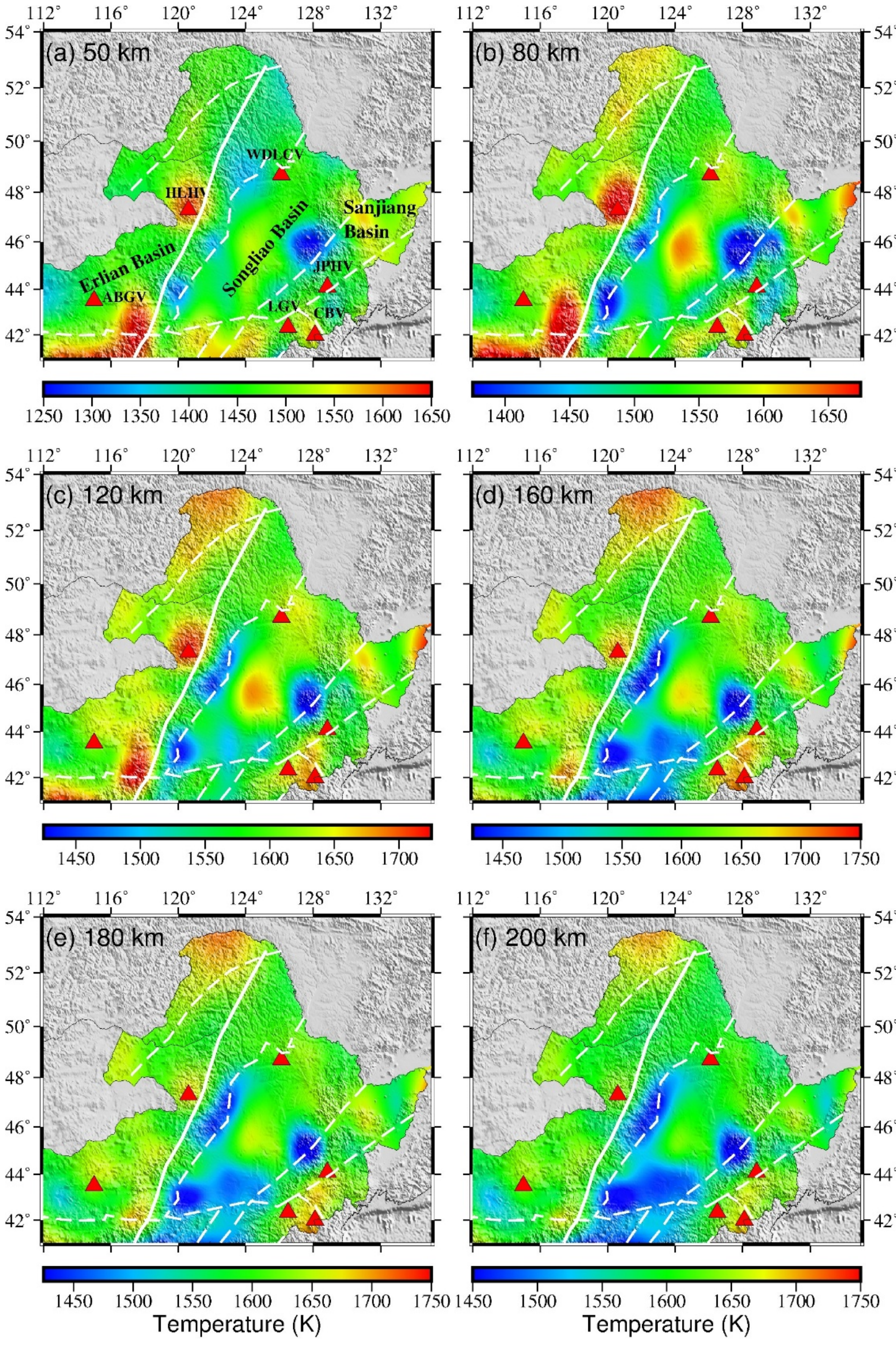

Figure S3. Map views of the temperature image estimated from the 3-D Vp model (Figure S1). The red and blue colors represent high and low temperatures, respectively, whose scale is shown below each panel.

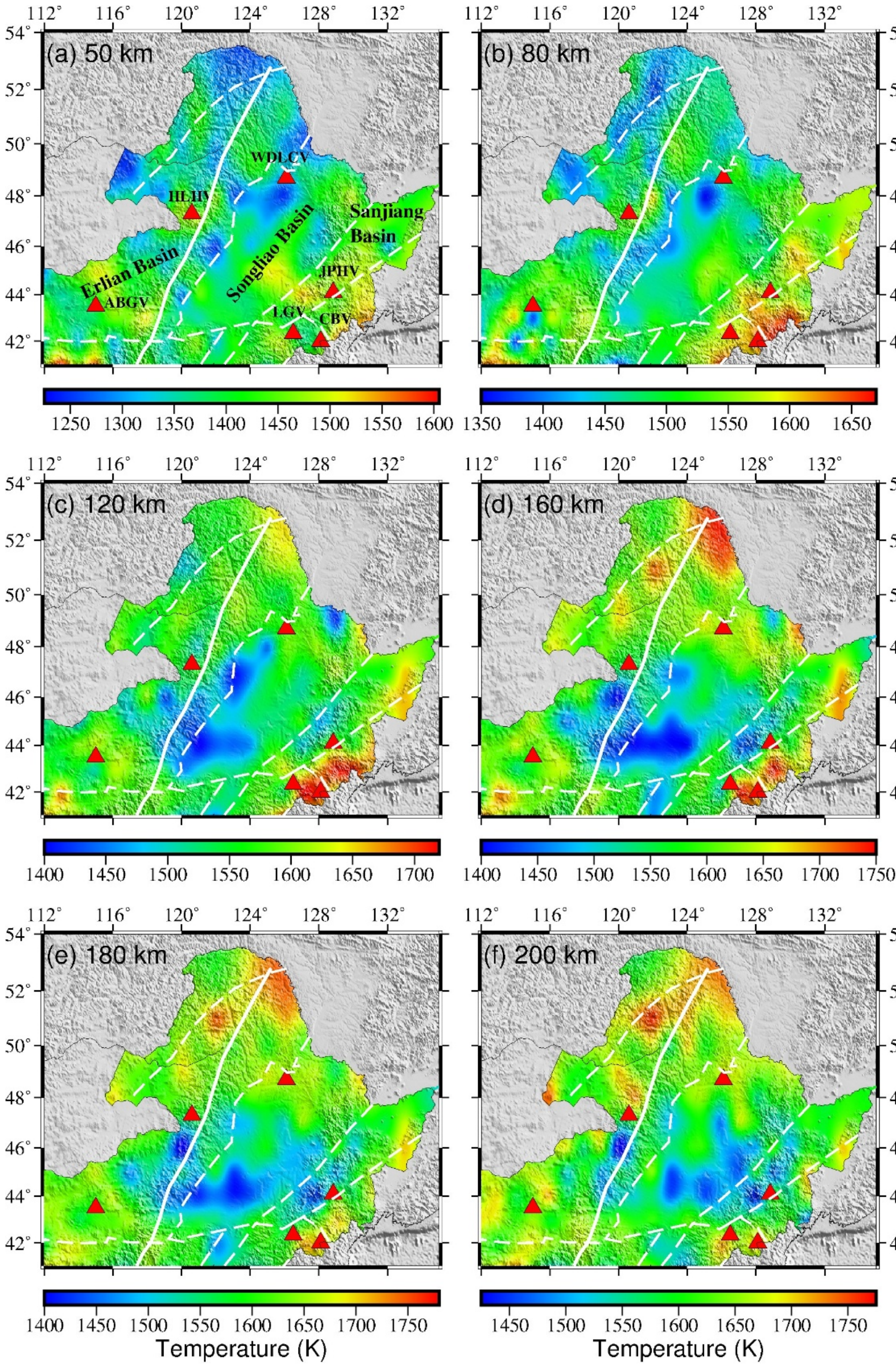

Figure S4. The same as Figure S3 but for the temperature image estimated from the 3-D Vs model (Figure S2).

Table S1. Temperature and pressure derivatives used in the V_P correction formula (compiled from Rybach & Buntebarth, 1984; Wang &Wang, 1992).

Layers	V_P(km·s^{-1})	$\partial V_P/\partial T$(×10^{-4} km·s^{-1}·K^{-1})	$\partial V_P/\partial P$(×10^{-4} km·s^{-1}·MPa^{-1})
Upper crust	< 6.2	-4	4
Middle crust	6.2-6.5	-4	3
Lower crust		-5	3

Table S2. Brittle fracture parameters of several large-scale lithospheric rock samples (compiled from Zang et al., 2007).

Rocks	B_0(MPa)	K	m	α	β	γ
Granite	34.1	4.57	0.52	-1.128	1.732	0.035
Gabbro	36.1	3.18	0.55	-2.536	2.340	0.035
Basalt	48.5	2.98	0.51	-2.536	2.340	0.035
Peridotite	28.3	3.35	0.68	-1.875	1.310	0.035

Table S3. Creep parameters for lithospheric rocks used in this study (compiled from Wang, 2001; Zang et al., 2002b; Liu et al., 2005; Qiu et al., 2017).

Layers	Lithology	ρ(g·cm^{-3})	C(MPa^{-n}·s^{-1})	n	Q (kJ·mol^{-1})
Upper crust	Granite	2.7	1.8×10^{-9}	3.2	123
Middle crust	Anorthosite	2.83	3.2×10^{-4}	3.2	238
Lower crust	Felsic granulite	2.95	8.0×10^{-3}	3.1	243
Lithospheric mantle	Wet peridotite	3.30	2.0×10^{3}	4.0	471

Table S4. Elastic parameters of common upper mantle minerals adopted for this study (compiled from Duffy & Anderson, 1989; Goes et al., 2000).

Mineral	Unit	Olivine	Orthopyroxene	Clinopyroxene	Garnet
ρ	g/cm^3	3.222	3.198	3.280	3.565
K	GPa	129	111	105	173
μ	GPa	82	81	67	92
$\partial K/\partial P$		4.2	6.0	6.2	4.9
$\partial \mu/\partial P$		1.4	2.0	1.7	1.4
$\partial K/\partial T$	MPa/K	-16	-12	-13	-21
$\partial \mu/\partial T$	MPa/K	-14	-11	-10	-10
a_0	$10^{-4}K^{-1}$	0.2010	0.3871	0.3206	0.0991
a_1	$10^{-7}K^{-2}$	0.1390	0.0446	0.0811	0.1165
a_2	10^{-2}	0.1627	0.0343	0.1347	1.0624
a_3	K	-0.3380	-1.7278	-1.8167	-2.5000