Auxiliary material

Figure S1. Distribution of dispersion measurements for different periods (**a**) ray density map for the period of 15 s (**b**). (**a**) The total number of paths takes into account data availability for pairing up stations. (**b**) The ray density is the number of rays inside 1 degree by 1 degree cell. The rays are station pairs for which dispersion measurements have been obtained. The ray coverage is best for periods 10 to 30 s. Coverages for shorter or longer periods deteriorate, but the spatial coverage patterns remain similar.

Figure S2. Comaprison of group velocities with and sediment thickness (**top**) and crustal thickness (**bottom**). Plotted in the background are major block boundaries (Liang et al., 2004) and basin outlines (Figure 1). (**Top**) The group velocity map is for 15 s Rayleigh waves. The major basins (including Tarim, Junggar, Qadaim, Sichuan, Bohai Wan, Songliang, Southern North China, Jianghang) are well delineated by slow velocities. (**Bottom**) The group velocity map is for 30 s Rayleigh waves. The major trend of crust thickening from the east to west (right) is well represented by the velocity decreases from east to west (left).

Figure S3. Temporal (**top**) and spatial (**bottom**) consistency of dispersion measurements. (**Top**) Comparison of dispersion curves from different time windows. We select two pairs, BJT-BRVK on east-west direction and XAN-CHTO along north-south direction. For each pair, we calculate two sets of EGFs. For each calculation of the EGF, a total of 12 months of data are used. The 18-month stack (including all the data we collected) is plotted for comparison. One set uses seasonal data (red, green, blue, and cyan), i.e., data from the same season over a period of 4 years. The other set uses 12-months of data with a sliding time window of 10 days (total of 19 curves, all in magenta). For either pair, we find the standard deviation of the 23 curves to be less than 2% for all periods and the standard deviation of the mean to be less than 0.5%. (**Bottom**) Comparison of dispersion curves between a far-way station and two close stations. We select two pathways, one from GOM to GZH/SZN (distance about 2400 km) and the other from WMQ to SSE/NJ2 (distance about 3100 km). The distance between GZH and SZN is about 133 km, and that between SSE and NJ2 is 245 km. The group velocities quick similar for both pathways. The small difference between GOM-GZH and GOM-SZN at periods greater than 40 s is within the uncertainties as indicted in the temporal plot (top).

Fig. S1

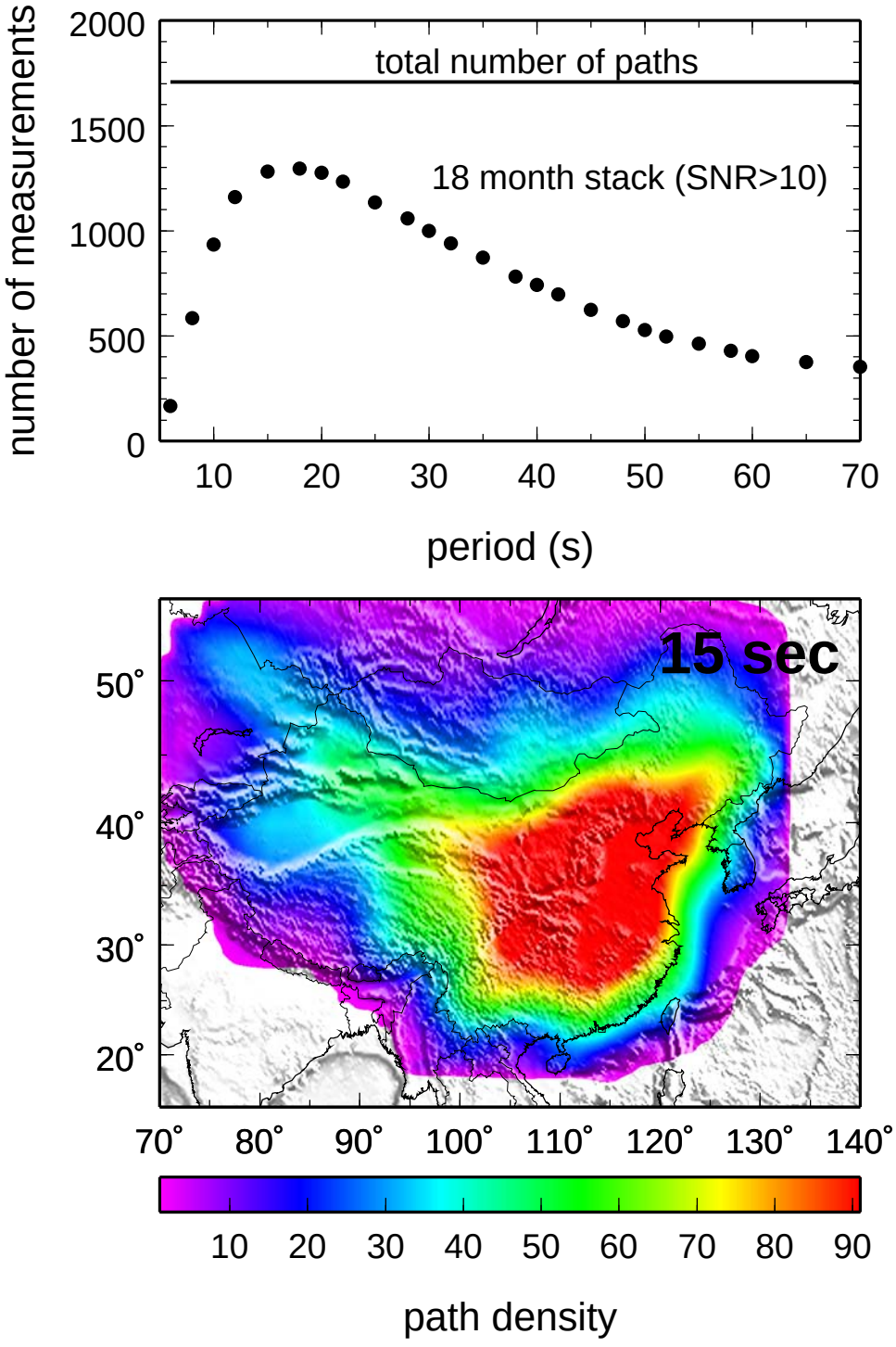

number of measurements
2000
1500
1000
500
0
total number of paths
18 month stack (SNR>10)
10
20
30
40
50
60
70
period (s)
15 sec
50°
40°
30°
20°
70°
80°
90°
100°
110°
120°
130°
140°
10
20
30
40
50
60
70
80
90
path density

Fig. S2

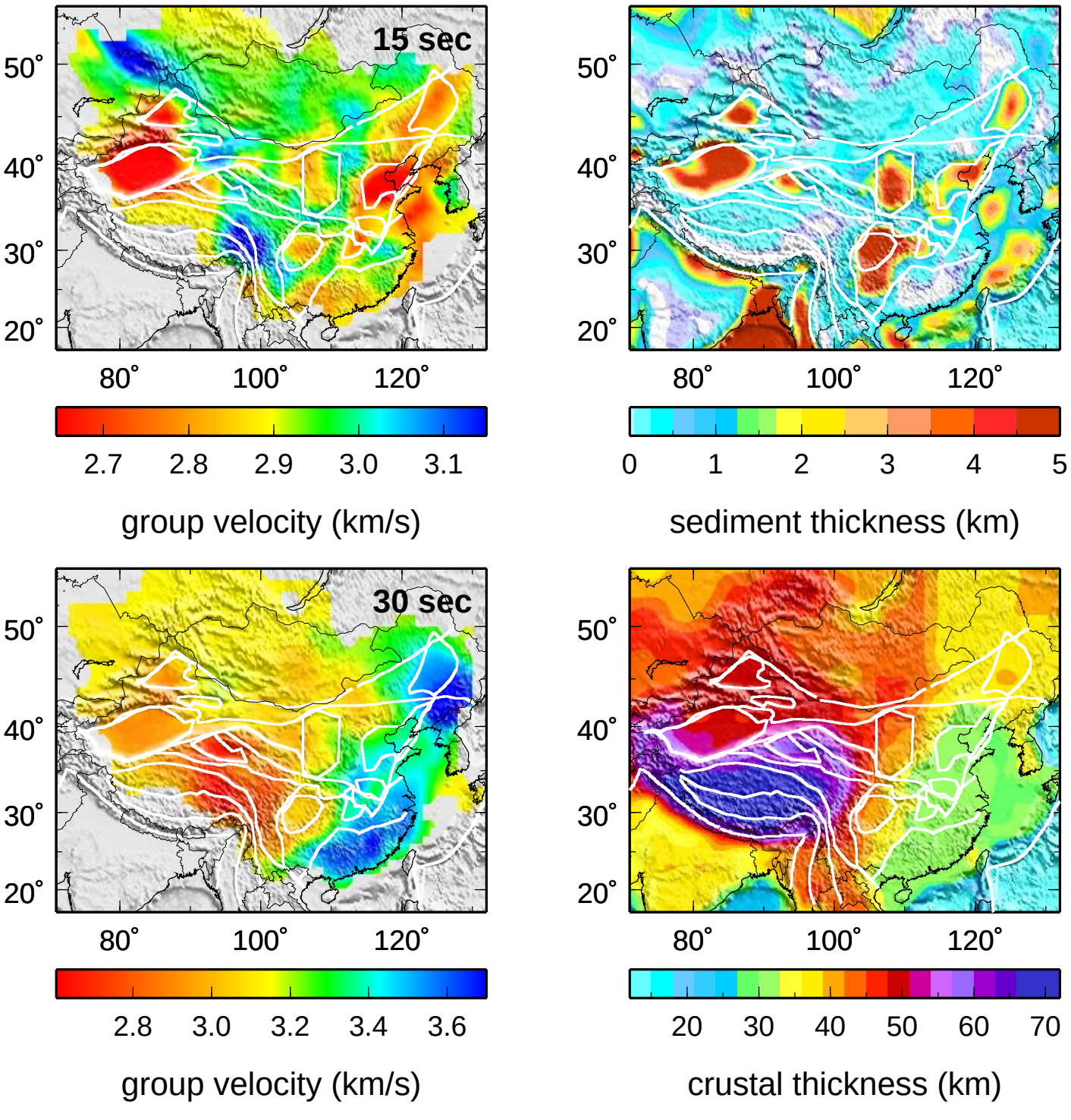
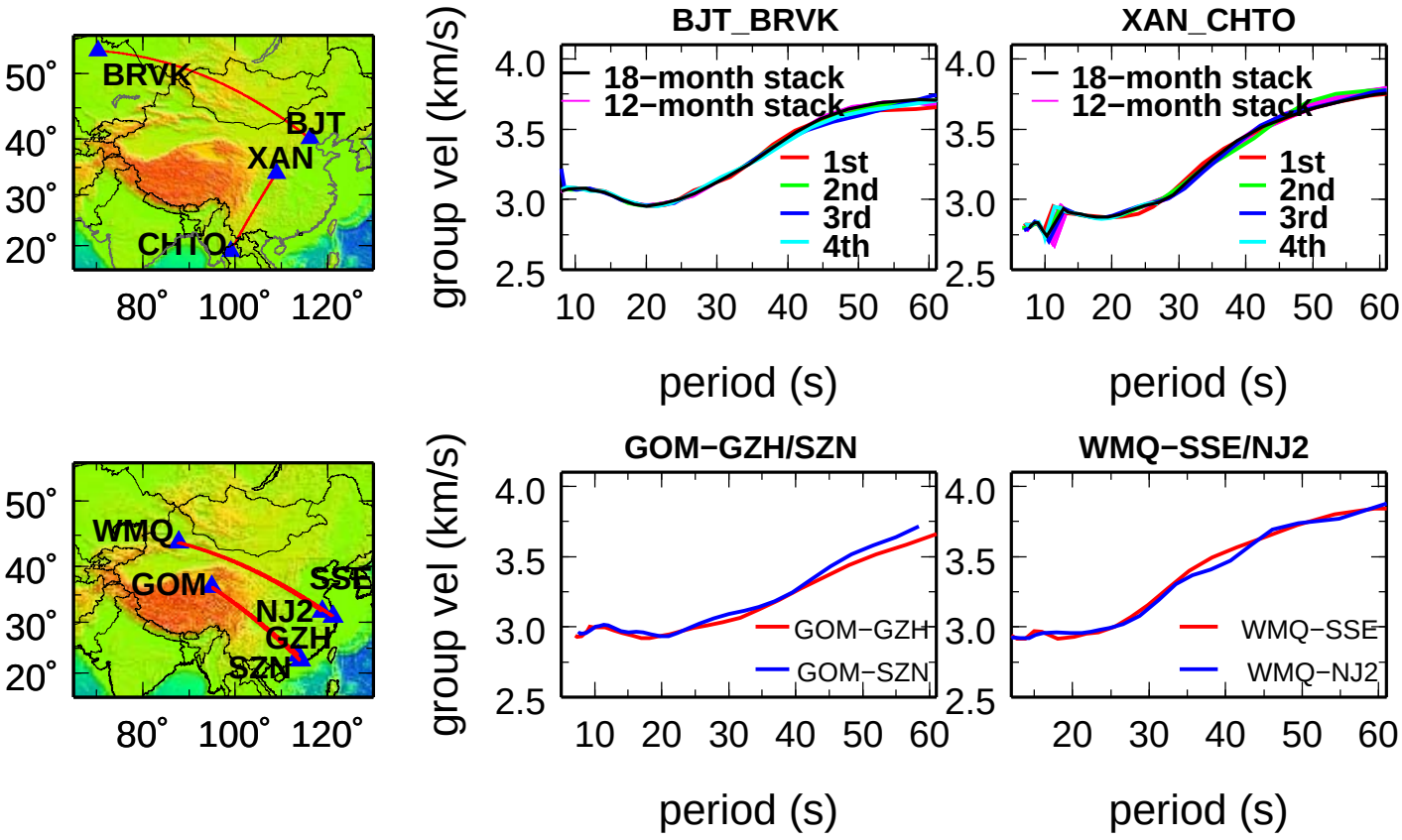

15 sec
50°
40°
30°
20°
80°
100°
120°
2.7
2.8
2.9
3.0
3.1
group velocity (km/s)
0
1
2
3
4
5
sediment thickness (km)
30 sec
2.8
3.0
3.2
3.4
3.6
group velocity (km/s)
20
30
40
50
60
70
crustal thickness (km)

Fig. S3


BRVK
BJT
XAN
CHTO
50°
40°
30°
20°
80°
100°
120°
group vel (km/s)
BJT_BRVK
XAN_CHTO
18−month stack
12−month stack
1st
2nd
3rd
4th
4.0
3.5
3.0
2.5
10
20
30
40
50
60
period (s)
WMQ
GOM
SSE
NJ2
GZH
SZN
GOM−GZH/SZN
WMQ−SSE/NJ2
GOM−GZH
GOM−SZN
WMQ−SSE
WMQ−NJ2