

Structure of the Upper Mantle Beneath Mongolia Based on Surface Waves: Consequences for the Western Edge of the Amurian Plate

Baigalimaa Ganbat¹, Kazunori Yoshizawa², Demberel Sodnomsambuu³, Ulziibat Munkhuu¹

(1. Institute of Astronomy and Geophysics of Mongolia, MAS, 2.Dept Earth & Planetary Sciences, Faculty of Science, Hokkaido University, 3. Mongolian Academy of Sciences)

1.Introduction 2. Methods

- Mongolia is a part of the Central Asian Orogenic Belt, a long-lasting accretionary orogen in the central and eastern Asia.
- East Asia has experienced tectonic deformations during Cenozoic due to the collision between the Indian, the Pacific, Eurasian plates, and the subduction of Philippine sea plates beneath Japan.
- Mongolia locates at the border between Eurasian and Amurian Plates.

Purpose: Unravel the current tectonics and mantle dynamics under Mongolia and Amurian Plate using multi-mode surface waves with high-density networks.

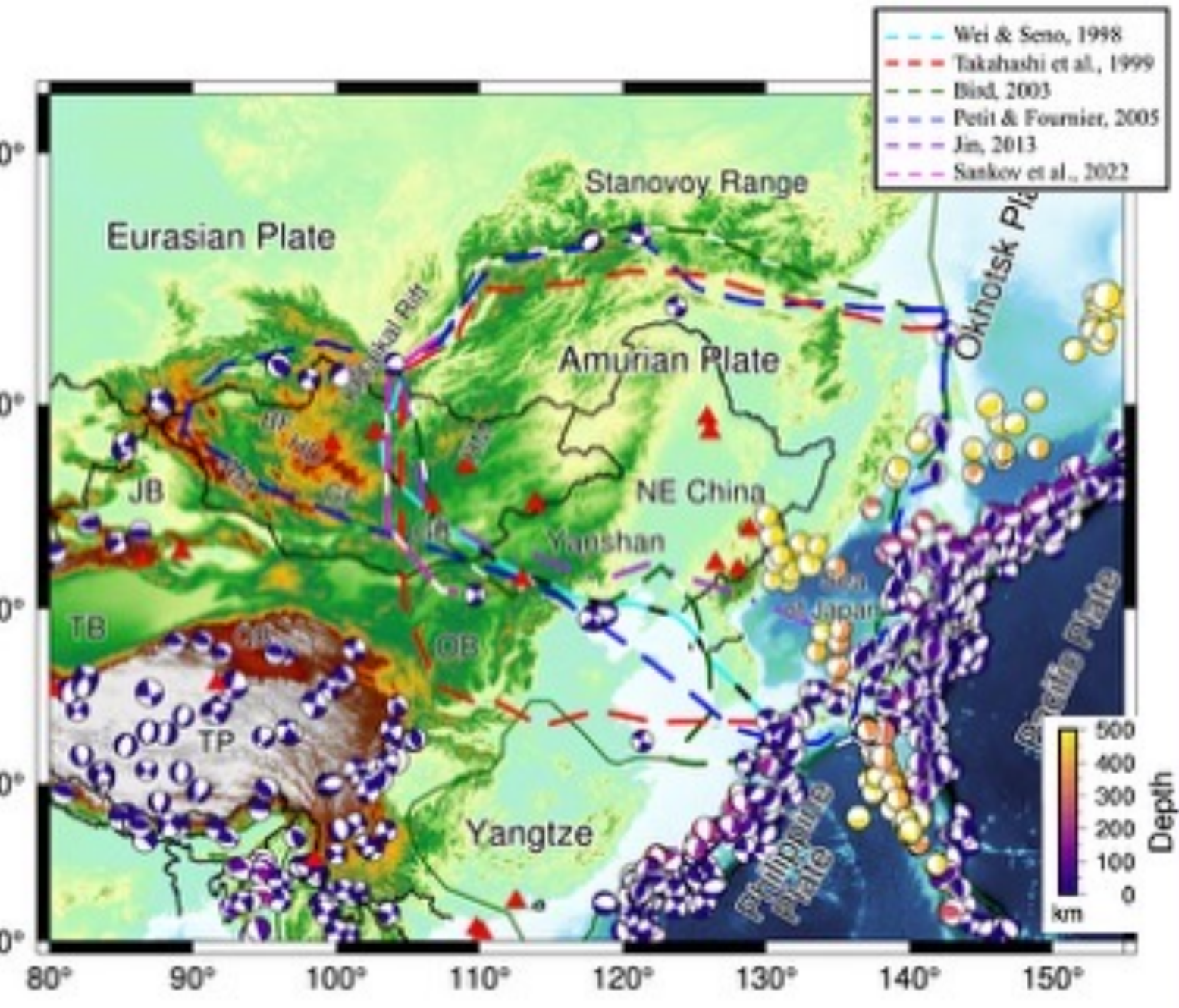


Figure 1. Tectonic and topographic map of eastern Asia

Flow of 3-stage Surface Wave Tomography

Step1: Multi-mode phase speed measurements

Nonlinear waveform fitting with Neighborhood Algorithm (Yoshizawa & Kennett, 2002a, GJI; Yoshizawa & Ekström, 2010, GJI)

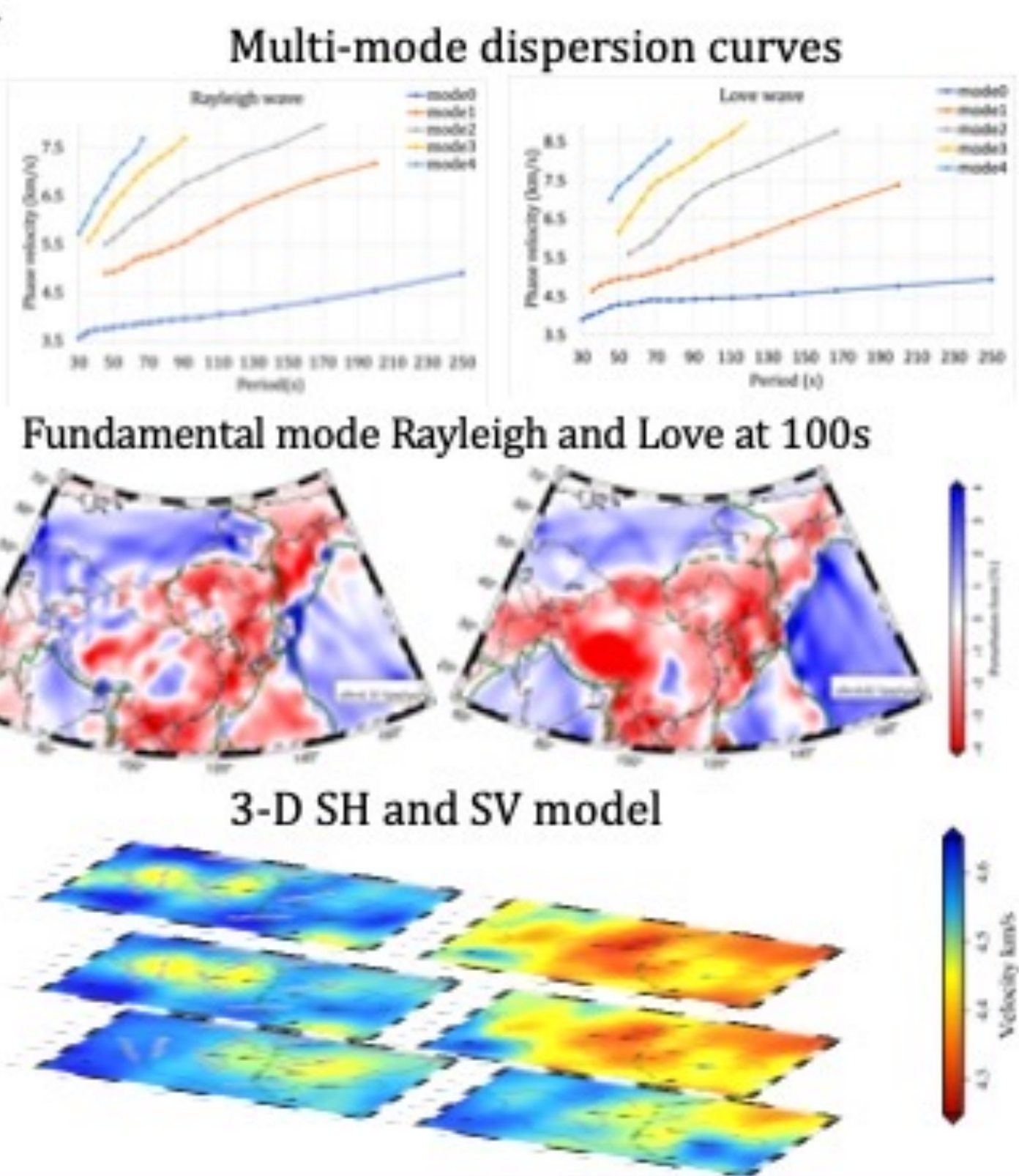
Step2: Multi-mode phase speed maps

Surface-wave tomography (Yoshizawa & Kennett, 2004, JGR)

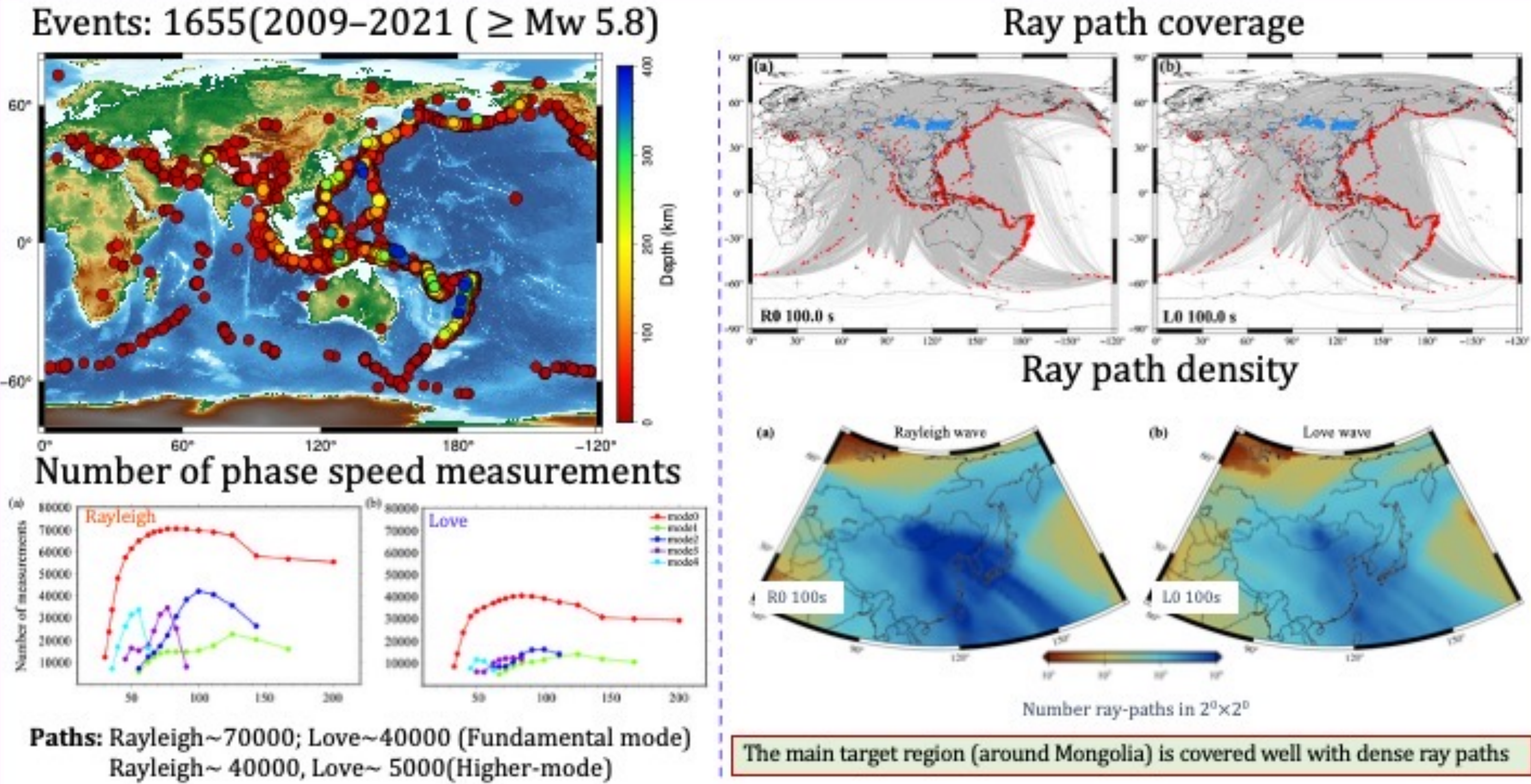
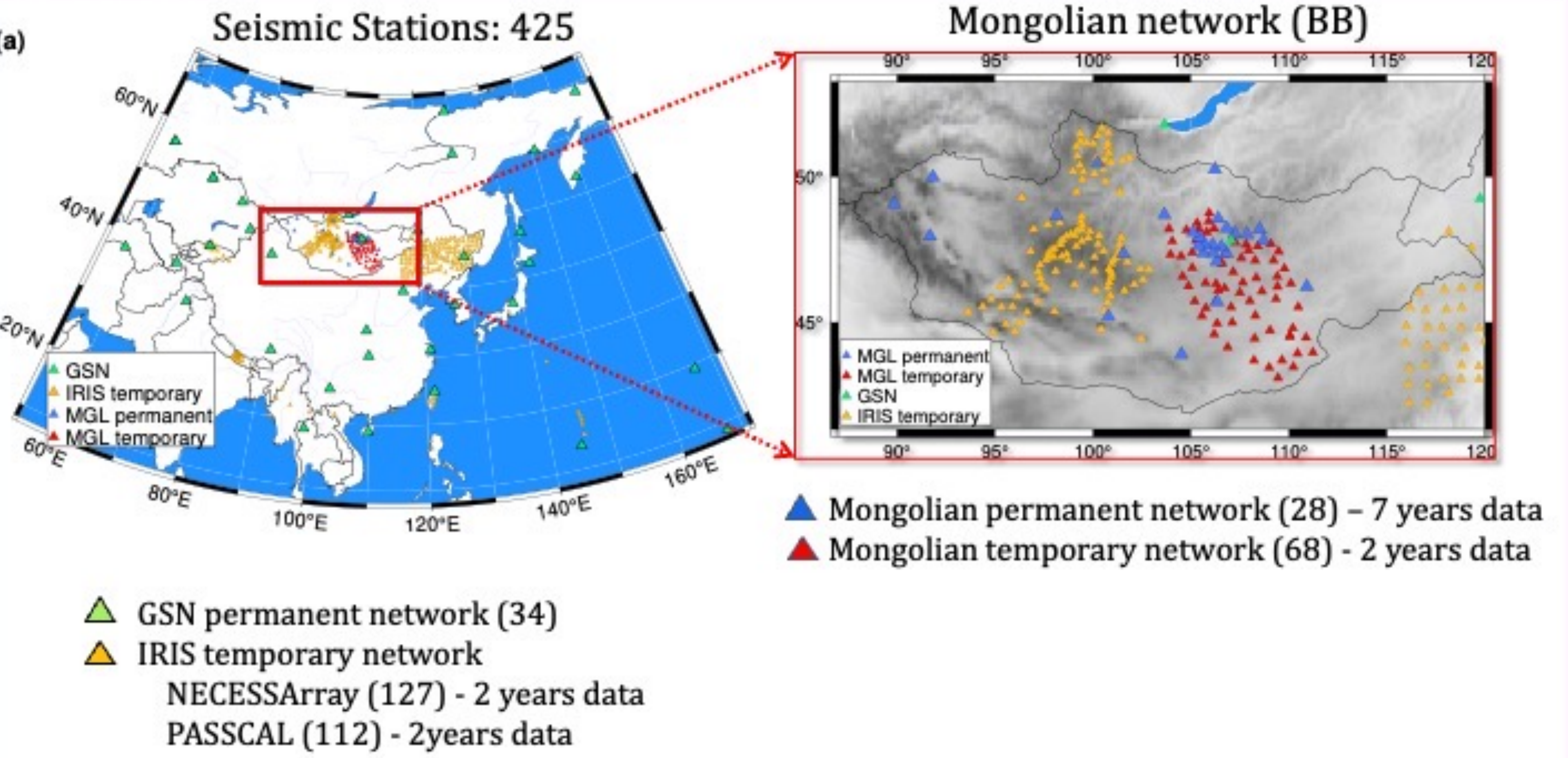
Step3: 3-D S wave model

Inversions for local anisotropic S-wave speed models (Yoshizawa, 2014, PEPI)

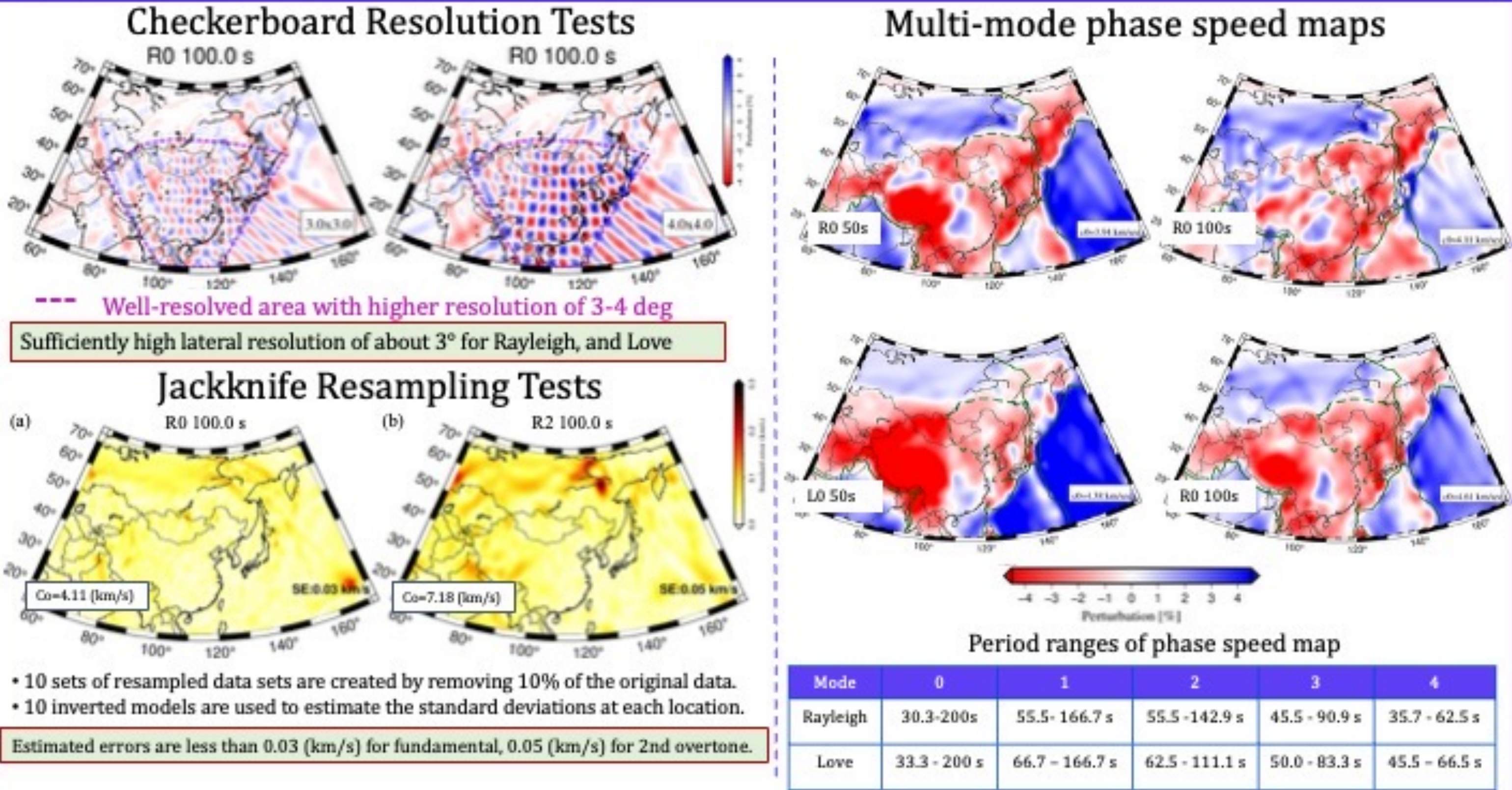
Mode	Rayleigh wave	Love wave
0	30.3-200.0s	33.3-200.0s
1	55.5-166.7s	66.7-166.7s
2	55.5-142.9s	62.5-111.1s
3	45.5-90.9s	50.0-83.3s
4	35.7-62.5s	45.5-66.5s



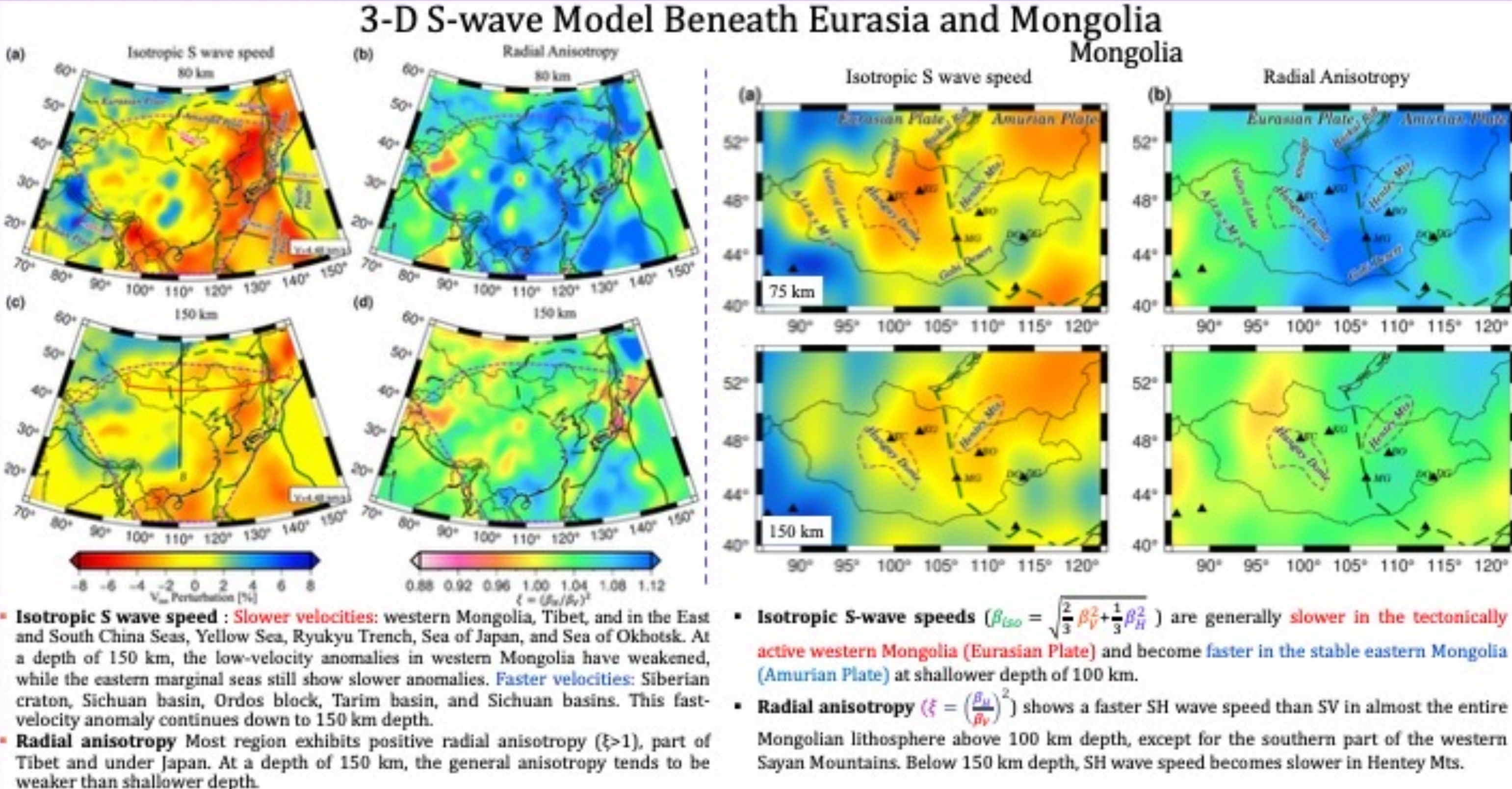
3.Datasets



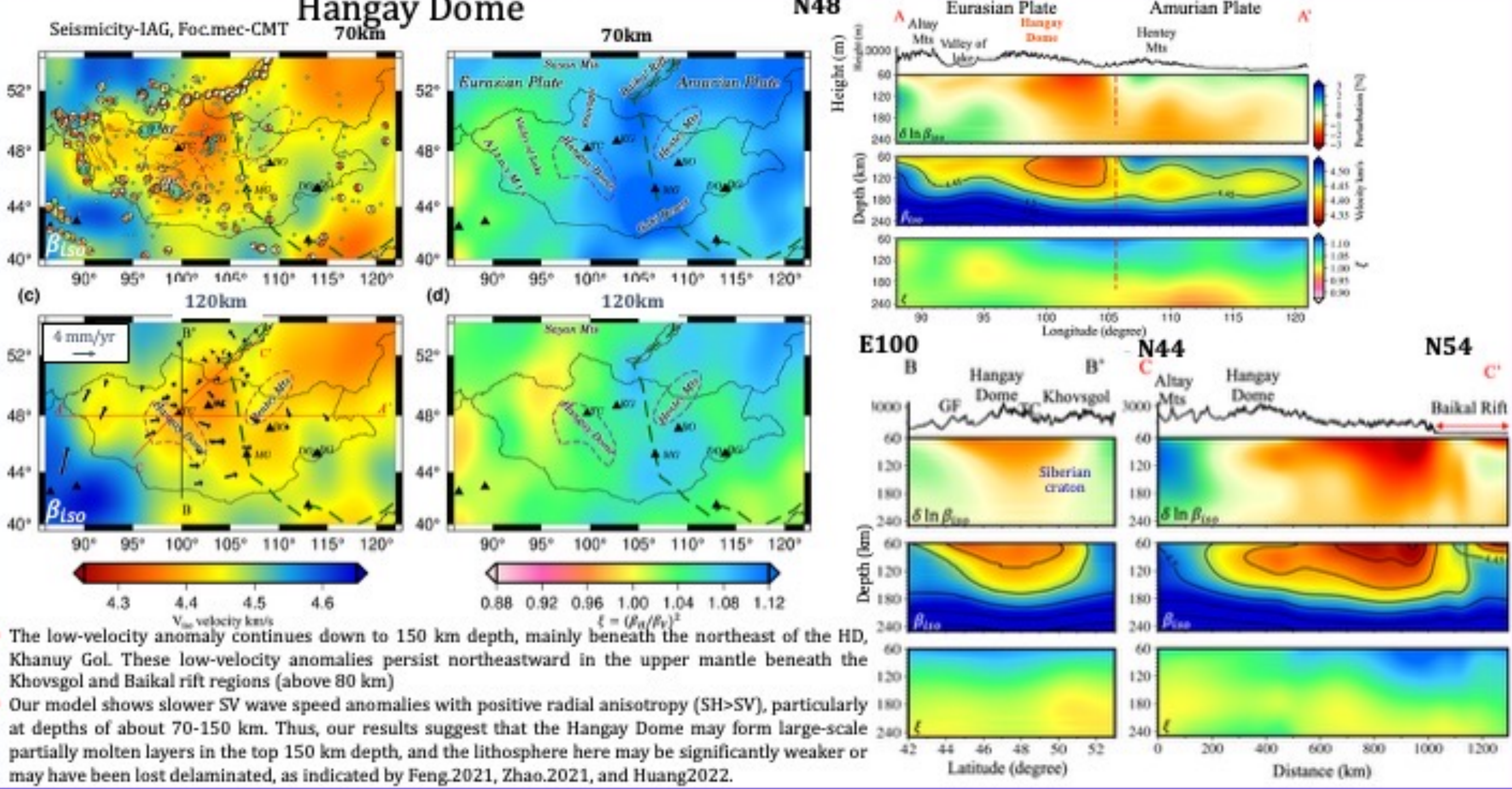
4.Multi-mode phase speed maps



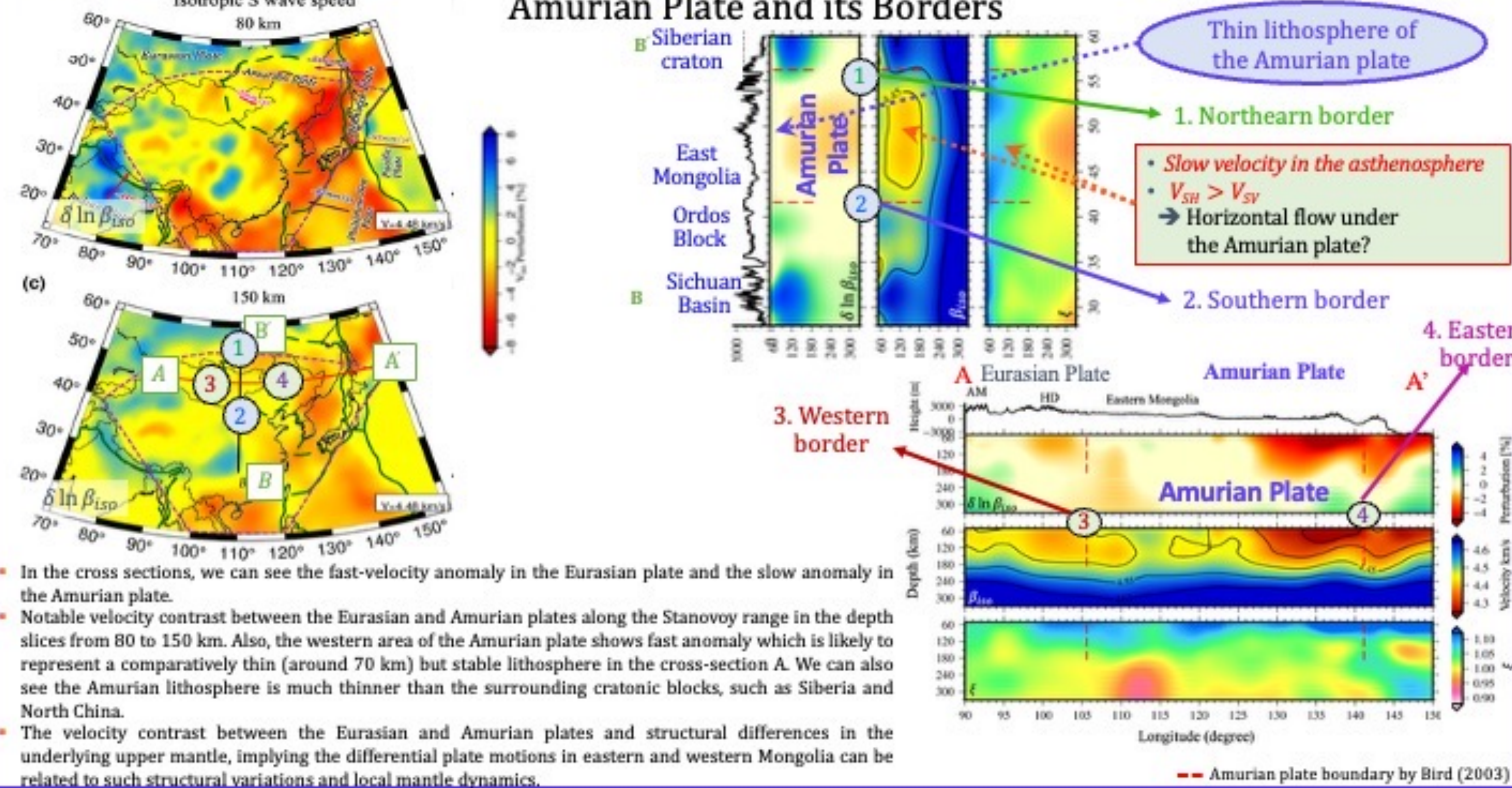
5.3-D S wave model



6.Discussion of Western Mongolia



6.Discussion of Eastern Mongolia



Conclusions

- We constructed a new **anisotropic 3-D S-wave model beneath central Eurasia around Mongolia** from multi-mode phase speeds of Rayleigh and Loves waves, using seismic networks in Mongolia.
- S-wave speeds in the Mongolian upper mantle (above 100km) exhibits a **significant velocity contrast between the western and eastern** areas.
- The significant velocity contrast in Mongolia may reflect the enigmatic boundary between the Eurasian and Amurian plates.
- In western Mongolia:**
 - Altay Mts: slow anomaly down to 100 km - India-Asia collision?
 - Hangay Dome: slow anomaly down to 150 km - Partial melt at shallower depth?
- In eastern Mongolia:**
 - Along the Amurian plate boundary: fast anomaly
 - Relatively stable lithosphere (70-100 km)?
- The structural differences in the upper mantle beneath the Eurasian and Amurian plates may suggest its relation to the distinctive plate motions in eastern and western Mongolia.

