[Journal of Geophysical Research: Solid Earth]

Supporting Information for

Reconciling high-resolution strain rate of continental China from GNSS data with the spherical spline interpolation

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Introduction

Supporting materials included in the file include the following:

1） Other strain rate results of rigid rotation detection with spherical spline (Figure S1-S2).
2） Longitude direction derivative of velocity ($\frac{dv_\theta}{d\varphi}, \frac{dv_\varphi}{d\varphi}$) of spherical harmonics and fitting results of spherical spline (Figure S3, S6).
3） Theoretical Strain rate of spherical harmonics detection model and fitting results of spherical spline (Figure S4 to S5, S7 to S8).
4） The rotation rate of continental China (Figure 9).
5） The strain rate of North China (Figure 10).
6） The GNSS velocity data of continental China (Table S1).
7） The data set of strain rate of continental China (table S2 to S4)

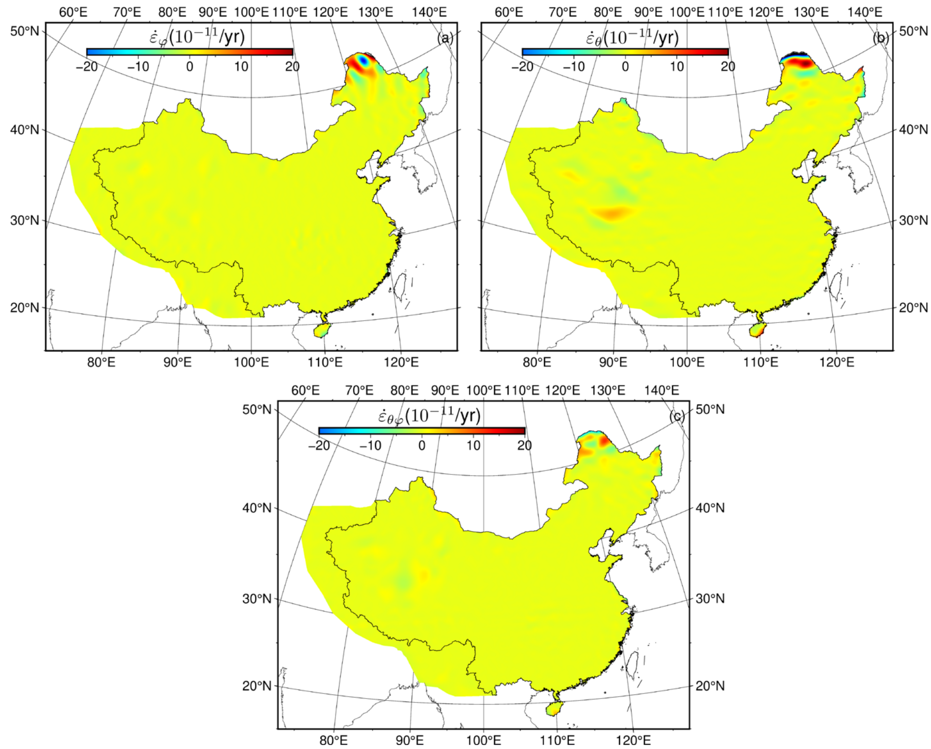

Figure S1. (a) $\dot{\boldsymbol{\varepsilon}}_{\boldsymbol{\varphi}}$ (spherical spline). (b) $\dot{\boldsymbol{\varepsilon}}_{\boldsymbol{\theta}}$ (spherical spline). (c) $\dot{\boldsymbol{\varepsilon}}_{\boldsymbol{\theta\varphi}}$ (spherical spline). The Euler polar is $\mathbf{35°}\ \boldsymbol{N}, \mathbf{105°}\ \boldsymbol{E}$.

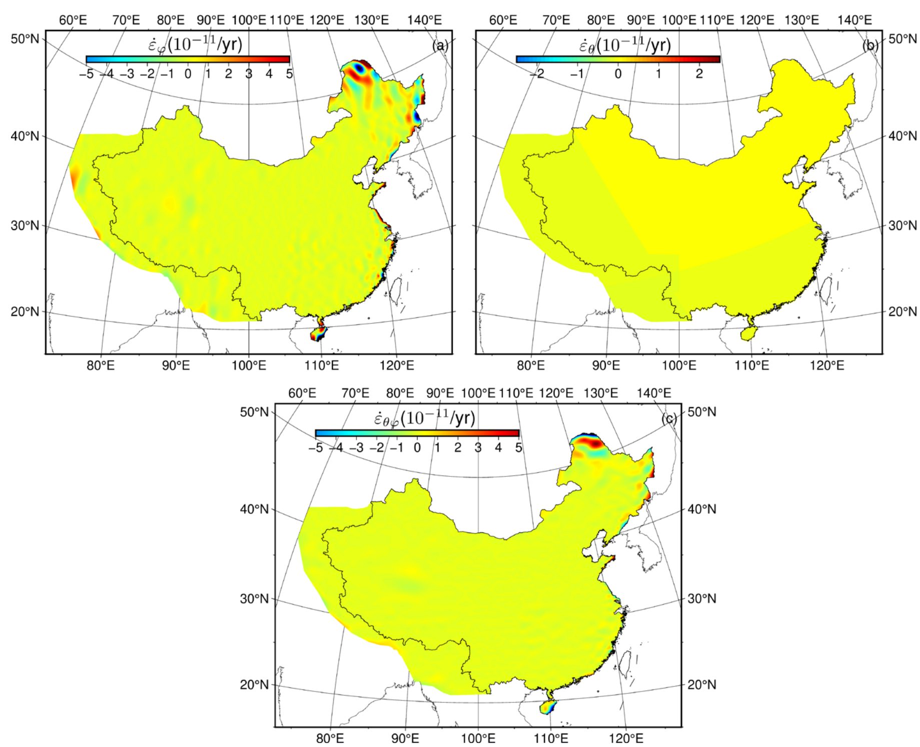

Figure S2. (a) $\dot{\boldsymbol{\varepsilon}}_{\boldsymbol{\varphi}}$ (spherical spline). (b) $\dot{\boldsymbol{\varepsilon}}_{\boldsymbol{\theta}}$ (spherical spline). (c) $\dot{\boldsymbol{\varepsilon}}_{\boldsymbol{\theta\varphi}}$ (spherical spline). The Euler polar is $\mathbf{90°}\ \boldsymbol{N}, \mathbf{105°}\ \boldsymbol{E}$.

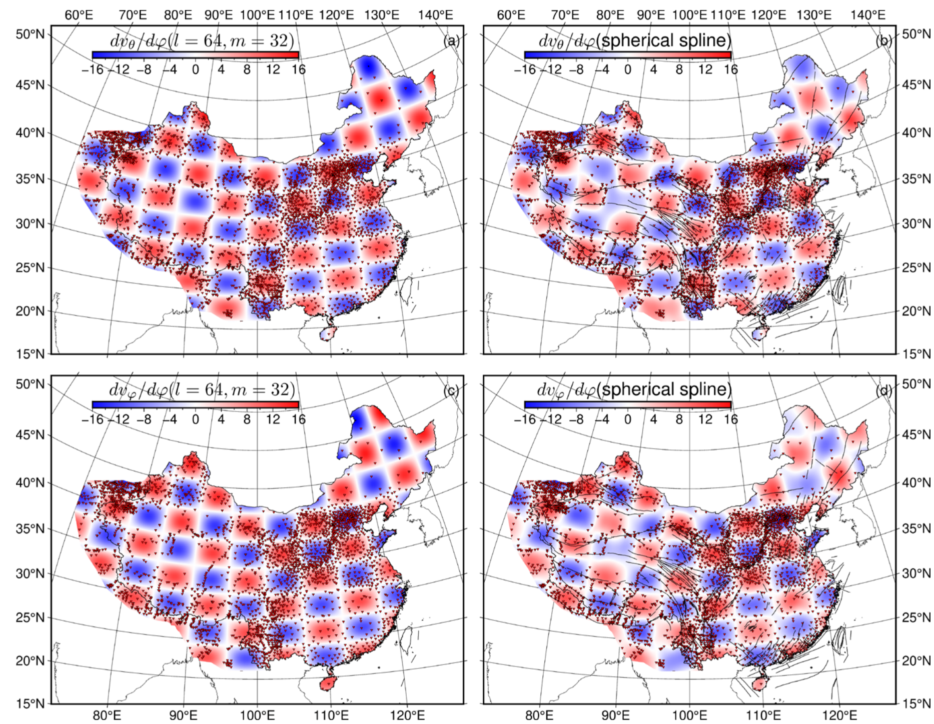

Figure S3. (a) $\frac{dv_\varphi}{d\varphi}$ calculated by spherical harmonics. (b) $\frac{dv_\varphi}{d\varphi}$ estimated by spherical spline. (c) $\frac{dv_\theta}{d\varphi}$ calculated by spherical harmonics. (d) $\frac{dv_\theta}{d\varphi}$ estimated by spherical spline.

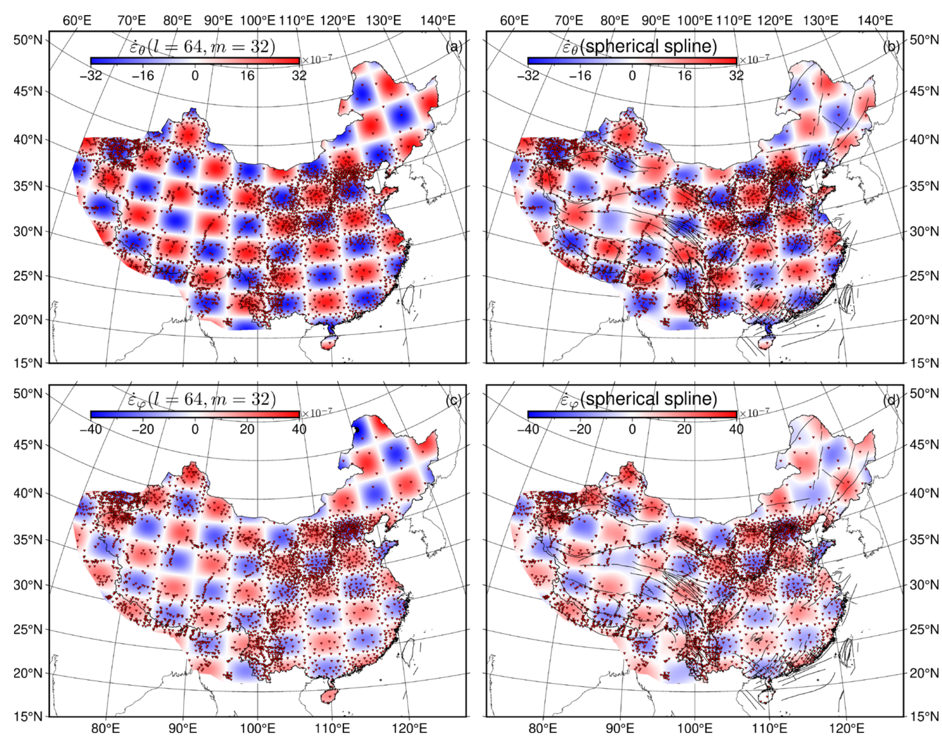

Figure S4. (a) $\dot{\varepsilon}_\theta$ calculated by spherical harmonics. (b) $\dot{\varepsilon}_\theta$ estimated by spherical spline. (c) $\dot{\varepsilon}_\varphi$calculated by spherical harmonics. (d) $\dot{\varepsilon}_\varphi$ estimated by spherical spline.

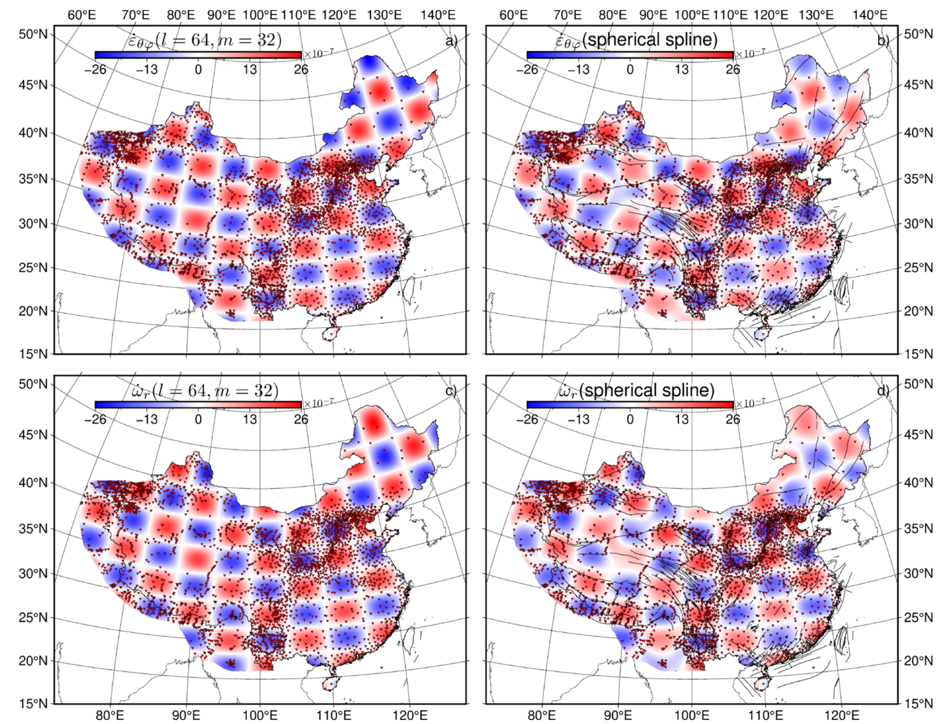

Figure S5. (a) $\dot{\varepsilon}_{\theta\varphi}$ calculated by spherical harmonics. (b) $\dot{\varepsilon}_{\theta\varphi}$ estimated by spherical spline. (c) $\dot{\omega}_r$ calculated by spherical harmonics. (d) $\dot{\omega}_r$ estimated by spherical spline.

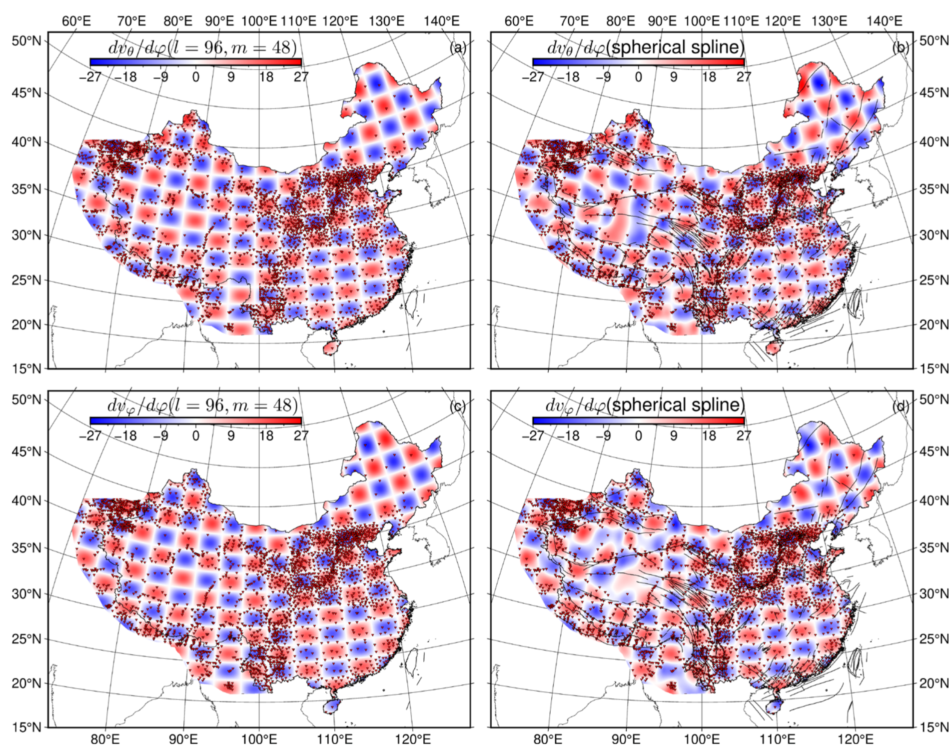

Figure S6. (a) $\frac{dv_\varphi}{d\varphi}$ calculated by spherical harmonics. (b) $\frac{dv_\varphi}{d\varphi}$ estimated by spherical spline. (c) $\frac{dv_\theta}{d\varphi}$ calculated by spherical harmonics. (d) $\frac{dv_\theta}{d\varphi}$ estimated by spherical spline.

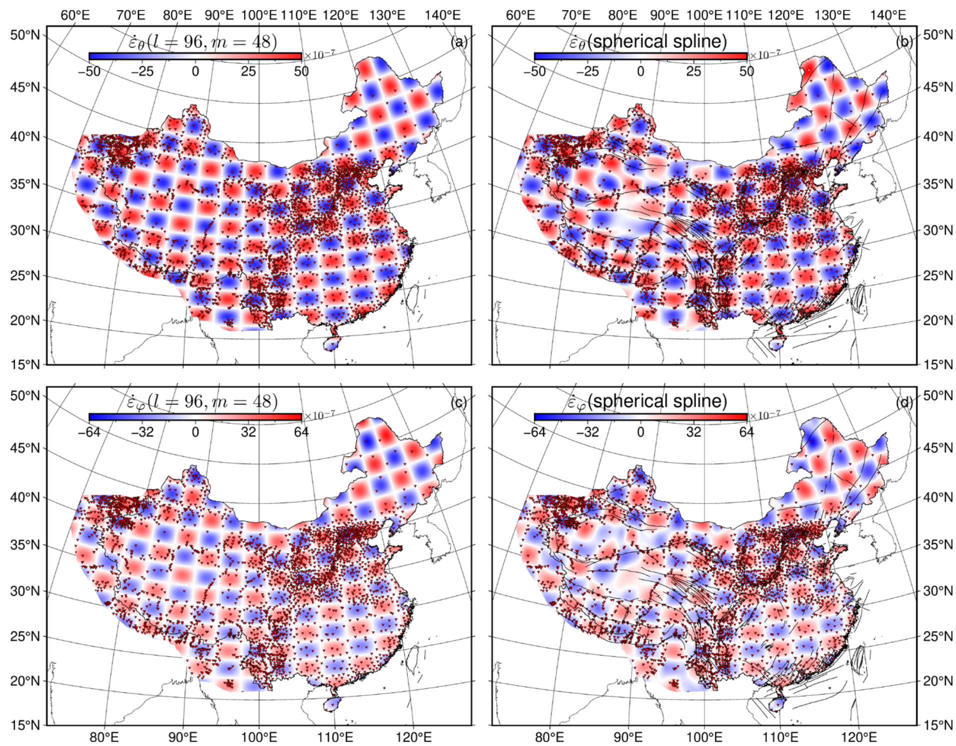

Figure S7. (a) $\dot{\varepsilon}_\theta$ calculated by spherical harmonics. (b) $\dot{\varepsilon}_\theta$ estimated by spherical spline. (c) $\dot{\varepsilon}_\varphi$ calculated by spherical harmonics. (d) $\dot{\varepsilon}_\varphi$ estimated by spherical spline.

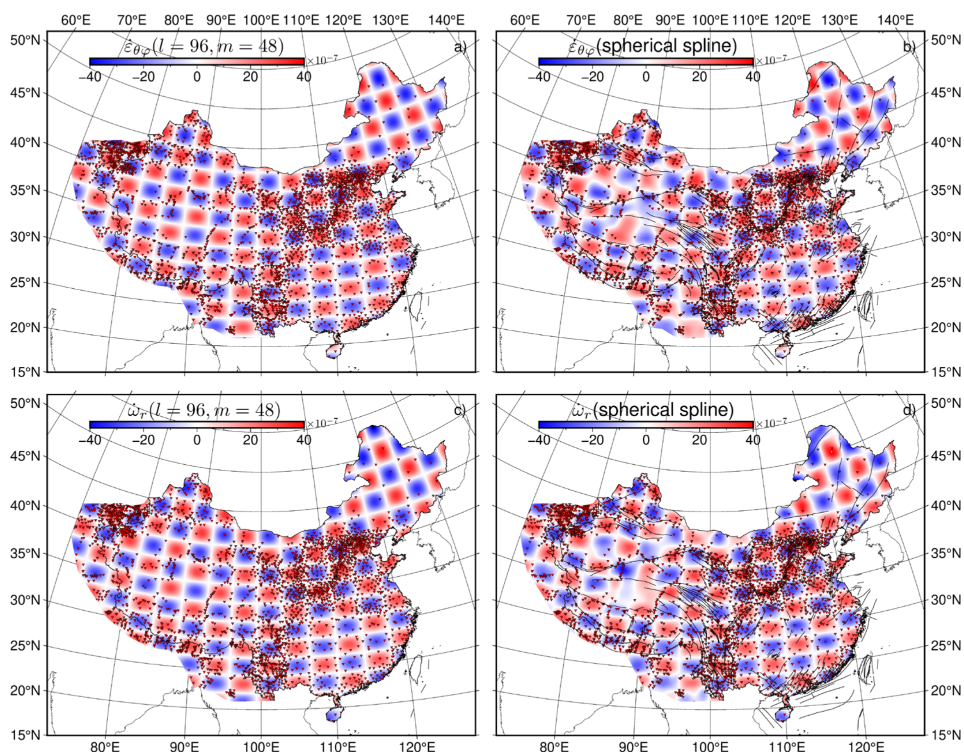

Figure S8. (a) $\dot{\varepsilon}_{\theta\varphi}$ calculated by spherical harmonics. (b) $\dot{\varepsilon}_{\theta\varphi}$ estimated by spherical spline. (c) $\dot{\omega}_r$ calculated by spherical harmonics. (d) $\dot{\omega}_r$ estimated by spherical spline.

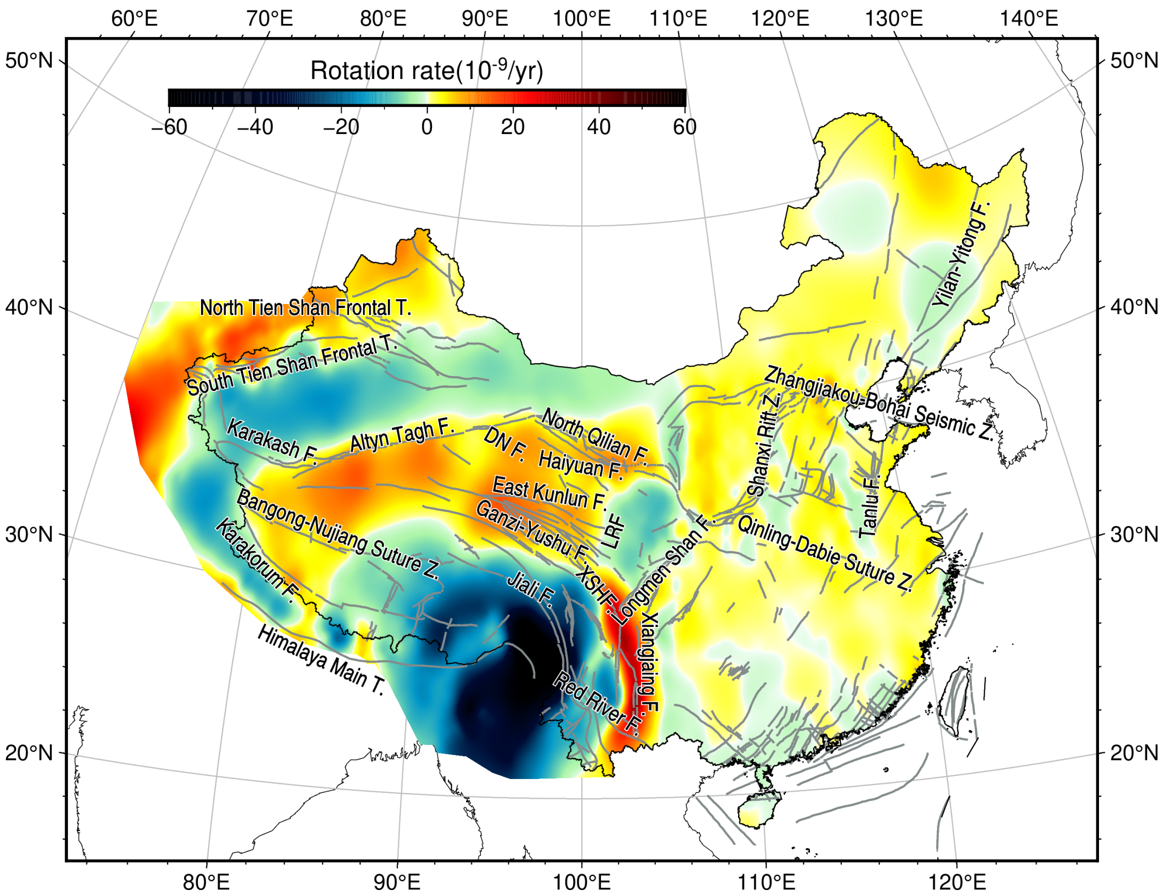

Figure S9. The rotation rate of continental China.

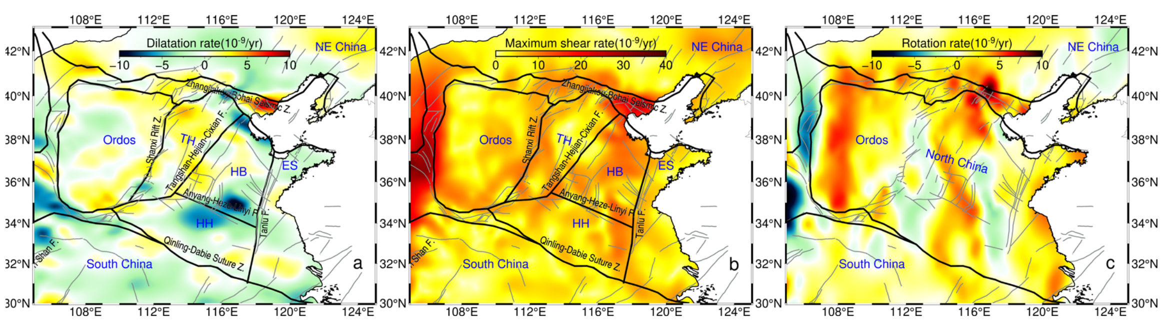

Figure S10. (a)Dilatation rate of North China. (b) maximum shear rate of North China. (c) Rotation rate of North China. The bold black lines indicate block boundaries; The thin gray lines indicate active faults; Block names: TH (Taihang Mountain), HB (Hebei), ES (East Shandong), HH (Hehuai).