A Big Earth Data Platform for Three Poles

**Shear wave splitting discloses two episodes of collision‐related convergence in western North America**

1、Description

Seismic anisotropy imposes first-order constraints on the strain history of crust and upper mantle rocks. In this study, we analyze the mantle seismic anisotropy of the Western Canada Sedimentary Basin using a new shear wave spitting data set consisting of 1,333 teleseismic arrivals from 82 seismic stations. The resulting 332 high-quality measurements yield a regional mean apparent splitting time (i.e., the magnitude of anisotropy) of 1.10.3s and an average fast orientation (i.e., the direction of anisotropy) of 54.6 degrees 17.2 degrees, which favor a two-layer anisotropic model based on the 90 degrees back azimuthal periodicity in both parameters. The northeast trending fast orientations dominate the lower layer at lithospheric depths and are approximately parallel to the present-day absolute plate motions (APMs; i.e., <35 degrees) due to the active asthenospheric flow. On the other hand, deviations from the APMs along the Canadian Rocky Mountain foothills could reflect disrupted mantle flow surrounding a southwestward migrating cratonic lithosphere. Also revealed are two elongated upper-layer anisotropic anomalies in the lithosphere that are spatially correlated with Moho depths. Their characteristics suggest frozen-in anisotropy imprinted along two convergent boundaries: (1) the Paleoproterozoic Snowbird Tectonic Zone that separates northeast (north) from northwest (south) fast directions and (2) the foothills of the Rocky Mountains that exhibit northeast trending orientations consistent with those of the APMs, maximum crustal stress, and electromagnetic anisotropy. Compressions associated with the Cordilleran orogenesis could be responsible for the spatial changes in the shear wave anisotropy from the foothills to the cratonic interior.

2、Keywords

Theme：Remote Sensing Technology,Seismology  
Discipline：Remote Sensing Technology,Solid earth  
Places：Western North America  
Time：Paleoproterozoic, Mesozoic

3、Data details

1.Scale：None

2.Projection：

3.Filesize：0.01MB

4.Data format：None

4、Space scope

|  |  |  |
| --- | --- | --- |
| - | north：0.8 | - |
| west：33.8 | - | east：146.2 |
| - | south：0.8 | - |

5、Time frame:None--None

6、Reference method

References to data:

WU Lei. Shear wave splitting discloses two episodes of collision‐related convergence in western North America. A Big Earth Data Platform for Three Poles, doi:10.1029/2018JB0163522021

References to articles:

Wu, L., Gu, Y. J., Chen, Y. F., Liang, H. Y. (2019). Shear Wave Splitting Discloses Two Episodes of Collision-Related Convergence in Western North America, 124(3), 2990-3010. doi: 10.1029/2018JB016352

7、Supporting project information

Deep processes and resource effects of major geological events during the Yan Mountains period

8、Data resource provider

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