

EGU21-6113

<https://doi.org/10.5194/egusphere-egu21-6113>

EGU General Assembly 2021

© Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.



## Mapping mantle flows underneath the North American and Caribbean Plates

**Hejun Zhu**

UT Dallas , United States of America (hejun.zhu@utdallas.edu)

In this talk, I will present a new 3-D azimuthally anisotropic tomographic model, namely US32, for the North American and Caribbean Plates. This model is constrained by using seismic data from USArray and full waveform inversion. The inversion uses data from 180 regional earthquakes recorded by 4,516 seismographic stations, resulting in 586,185 frequency-dependent phase measurements. Three-component short-period body waves and long-period surface waves are combined to simultaneously constrain deep and shallow structures. The current azimuthally anisotropic model US32 is the result of 32 pre-conditioned conjugate-gradient iterations. In the current model, I observe a complex depth-dependent pattern for fast axis directions across the North American and Caribbean Plates. At shallow depths, these fast axis directions delineate local geological provinces, such as the Snake River Plain, Cascadia subduction zone, Rio Grand Rift, etc. At greater depths, the fast axis directions follow the absolute plate motion trajectories at most places. At depths around 700 km, the fast axis directions are perpendicular to the strikes of the mapped Farallon slab, suggesting the presence of 2-D corner flows induced by this ancient subduction underneath the mantle transition zone. In addition, underneath the Cascadia and Cocos subduction zones at depths from 250 to 500 km, the fast axis directions suggest the presence of toroid-mode mantle flows, following the geometry of fast downwelling materials.