Public Abstract
First Name:Savas
Middle Name:
Last Name:Ceylan
Adviser's First Name:Eric
Adviser's Last Name:Sandvol
Co-Adviser's First Name:
Co-Adviser's Last Name:
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Seismic surface waves provide better depth resolution than body waves due to their dispersive characteristics, i.e. each frequency band travels at a particular wave speed at a certain depth range. In the first part of this research, using a type of surface waves named Rayleigh waves, I investigate the earth structure beneath eastern Tibetan Plateau. In the second part, I use a computer-generated earth model and calculate synthetic seismograms to improve the tomographic method I employ – two plane wave tomography (TPWT).

Despite decades of research, the structure beneath E. Tibet is not well understood. Previous seismic experiments in the region are not able to provide detailed images due to the insufficient coverage. My research presents new tomographic models of the plateau, using data from INDEPTH-IV (**IN**ternational **D**eep **P**rofiling of **T**ibet and the **H**imalayas) seismic experiment. My results reveal that the Indian Plate beneath the region has a sub-horizontal geometry and does not extend much further north of Bongong-Nijuang Suture. This observation provides evidence against the models that propose wholesale underthrusting beneath the plateau. Moreover, my tomographic models indicate that the Indian plate is laterally fragmented into at least two wings. The westernmost wing is detached from the rest of the Indian Plate and sinking into the astenosphere vertically. Further north, I observe continuous low velocity zones beneath Kunlun Shan, and I attribute these zones to shear heating due to ductile deformation. The continuous geometry of these zones also argues against models suggesting southward continental subduction beneath the northern part of my study region.

One of the most important limitations of surface wave tomography includes reduced ability to detect heterogeneities in the earth due to their long wavelengths. The resolving capabilities of TPWT and its applicability to the other type of surface waves (Love waves) remain unknown. My study proves that, using Rayleigh waves, the method can successfully retrieve anomalies down to ~200 km. Moreover, I apply TPWT to Love waves successfully, modifying the method by decomposing plane wave solutions into two perpendicular components. I show that the method exhibits adequate resolving capabilities using Love waves down to ~100 km.