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Phase velocity and azimuthal anisotropy variations beneath the central Tien Shan

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The Tien Shan is the world's largest and most active intracontinental orogen with the actual shortening rate of 20 mm/year and earthquake magnitude up to 8.0. The tectonic reactivation is usually attributed to the India-Eurasia collision. However the mechanism responsible for the actual tectonic setting of the Tien Shan remains debated. The final goal of this study is to construct 3-D shear-wave structure beneath the central Tien Shan. Our temporary objective is to obtain Rayleigh wave phase velocity maps in the central Tien Shan. We have analyzed Rayleigh waves recorded at the CHENGIS and KNET seismic networks, which consist of 41 broadband seismic stations. We have extracted fundamental mode Rayleigh wave trains from 52 teleseismic events at central frequencies from 7.5 mHz to 50 mHz with a 10 mHz frequency interval. A two-plane-wave tomography technique is used to solve for 2-D phase velocities by inverting all the Rayleigh wave phases and amplitudes. We have generated phase velocity maps at the periods of 20-133 s that reflect structure at depths between 20 and 190 km. Our results of phase velocity maps show that a low velocity structure is present beneath the Tien Shan range and that the lateral variations of phase velocities increase with depth. Furthermore, the low velocity area seems to migrate towards north for periods larger than 60 s. We also estimated the azimuthal anisotropy from Rayleigh wave data in order to obtain useful indications about the strain and mantle flow pattern beneath the range. We will present our findings and discuss their implications and contributions in constraining the geodynamic mechanism in the central Tien Shan.