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Lifting the Seismic Lid Beneath Cameroon Volcanic Line Using 1D Shear Wave Velocities

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The composition of the lithosphere beneath Cameroon and the origin of the Cameroon Volcanic Line (CVL) is a matter of debate. Although many studies based on regional or global observations provide models for the setting of the CVL, none of them are strong enough to be considered as definitive. We used the joint inversion of Rayleigh wave group velocities and Rayleigh wave group velocities to derive shear wave velocity profiles of the lithosphere beneath Cameroon andshow that lithosphere is, on average, faster beneath the Congo Craton than beneath the Pan-African age crust. Using recently published dispersion curves, we extend the depth of investigation from 60 to 200 km. The calculated velocity-depth profiles do not show any sharp discontinuity that could be interpreted as the lithosphere-asthenosphere transition. Furthermore, there is no clear evidence of the existence of a low velocity zone beneath any geologic province within Cameroon. The smooth velocity variations observed on the velocity models are believed to be influenced by lateral mantle heterogeneities rather than vertical ones. The shear wave velocities for the uppermost mantle are in general greater than 4.3 km/s at all stations. This is higher than the values obtained in the Main Ethiopian Rift, and suggest that the perturbation of the by thermal anomalies does not extend as far as the CVL. This suggests that the source of volcanism along the CVL is from small scale convection in the asthenosphere and controlled by lithospheric fractures that are probably driven by the cold (and fast) edge of the Congo Craton.