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Role of elastic variations in the interseismic deformation of the Andean subduction margin: case of study at 21°S

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In recent years, numerous studies have focused on quantifying the variation of surface deformation to obtain estimates of interseismic locking and thus identify areas of high seismic risk. However, most of these works have used plate models with homogeneous physical properties.

In this study, heterogeneous plate models have been developed considering the geometry of the profile at 21°S in northern Chile, where a shortening of the deformation in the Andean backarc is observed. Variations in elastic and viscous properties have been incorporated into the different models to evaluate their effect on the propagation of the interseismic deformation observed at the surface.

The results indicate that heterogeneities in the areas near the plate interaction zone play a crucial role in surface deformation. Using real data showing an increase in bulk and shear modulus with depth, higher near-field deformation and lower far-field deformation are observed compared to a homogeneous viscoelastic model.

This study highlights the importance of incorporating heterogeneities in interseismic deformation models, as these can provide a better fit to surface measured deformation patterns and thus improve interseismic locking estimates.