

# Earth's Response to Deep Earthquakes: Insights into Mantle Rheology

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Mantle rheology is one of the least constrained properties despite its importance in mantle dynamics. In this talk, I introduce a new approach to understanding mantle viscosity structure by examining the Earth's response to deep earthquakes. So far, geodetic observations have been mostly limited to shallow earthquakes since the amplitude of surface deformation from deep events is considered relatively small. Here, we take advantage of data processing techniques such as independent component analysis to extract post-seismic signals from deep earthquakes. We examine the GPS data of one of the largest deep earthquakes ever recorded, the 2018 Mw 8.2 Fiji earthquake, which occurred at ~600-km depth, and detect a large scale post-seismic deformation that has been taking place for about two years. The overall directionality and amplitude of the deformation strongly suggest the presence of rheologically weak structure on top of the lower mantle.