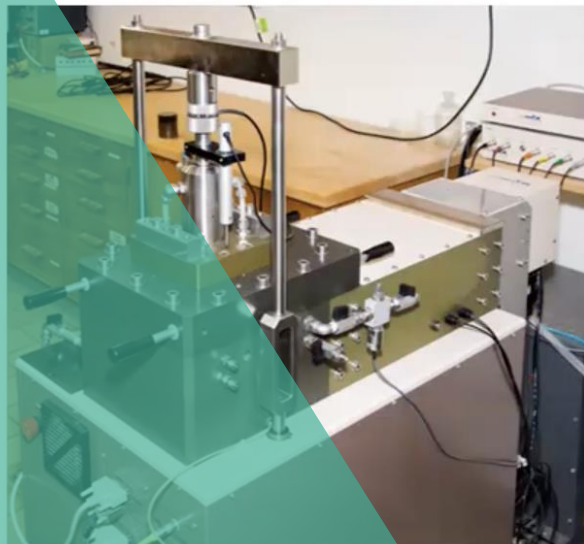




Laboratory simulations of slip behaviour in
shallow subduction zones and landslides



Jonathan Carey

Geotechnical Meetings
@PoliTO

Thursday, 13th November 2025
16:00

Albenga Room,
DISEG, Entry 1



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Abstract

Earthquakes and landslides are major geological hazards that pose significant risks to human lives, infrastructure, and the environment. Despite advances in earth surface monitoring, our understanding of how and why different styles of slip occur in faults and their relationship to large earthquakes remains poor and our ability to determine when landslides will accelerate catastrophically remains limited. This is because fault and landslide movement are significantly influenced by the geotechnical properties of the deforming sediments but the relationship between material behaviour and movement (slip) responses remain poorly constrained in both environments. Using sediments collected from terrestrial landslides, submarine landslides and shallow subduction zone faults we undertook a variety of experiments in advanced shear boxes to replicate the field stress conditions in each environment and study how slip developed in response to seismic loading from earthquakes and elevated pore pressures.

The results provide new insights into the complex mechanical behaviour of landslide and subduction zone sediments. Importantly the study provides new data on how the strength properties of different types of landslide and fault sediments can vary through time dependent on their stress history. This has provided a better understanding of the conditions under which these sediments may undergo different styles of slip which is essential to improve future earthquake and landslide hazard models.

Biosketch

Jon studies landslide failure mechanisms and fault behaviour in response to elevated pore fluid pressures and earthquake shaking. His research combines specialist laboratory testing with field monitoring and remote sensing to better understand slope failure and fault movement processes in both terrestrial and marine environments.

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