

Subduction Zone Observatory Initiatives and Opportunities in New Zealand

Nicola LITCHFIELD^{#+}, Laura WALLACE

GNS Science, New Zealand

#Corresponding author: n.litchfield@gns.cri.nz +Presenter

The Hikurangi subduction zone, where the Pacific Plate subducts beneath the North Island, is New Zealand's least understood and potentially largest source of geohazard. It is an ideal locale to investigate subduction plate boundary processes as it exhibits contrasting behaviour along its length: In the south the plate boundary is mostly locked, accumulating stress to be relieved by future earthquakes, whereas in the north it largely creeping or moving in slow slip events (SSEs). Subduction of the Hikurangi Plateau has raised much of the plate boundary above sealevel, enabling amphibious approaches to investigate subduction processes. These aspects, combined with selection of NZ as a NSF GeoPRISMS focus site, upcoming IODP drilling, and a comprehensive seismic and geodetic network (www.geonet.org.nz) have spurred on large (>\$30M USD) NZ and internationally funded efforts to unravel the processes controlling megathrust behavior. Onshore and offshore (turbidite) paleoseismology is building a record of the history of earthquakes on the subduction zone. Seafloor geodetic and seismological experiments are revealing the behavior of the offshore megathrust. IODP Drilling, active source seismic, and electromagnetic methods are addressing questions regarding the physical processes controlling megathrust behavior. IODP efforts also involve sub-seafloor observatory installations to monitor changes during multiple SSE cycles, in the very near-field of the world's shallowest, well-documented SSEs at northern Hikurangi. Many of these efforts are taking place over the next five years, and we hope that the results will inspire future efforts to expand our understanding of this intriguing subduction zone. We are also anticipating the next frontier of using cabled networks to undertake real-time monitoring of the offshore plate boundary. Current efforts at the Hikurangi margin involve strong collaborations between researchers in NZ, the US, Japan, and Europe, and is an excellent example of how to bring subduction zone observatory efforts to fruition through international cooperation.