VUW contributions to Hikurangi research proposed or in process

• SAHKE studies
  – LAB/Receiver Functions/Anisotropy
• SEASI deployment: Plate structure
• Volcano-tectonic interactions: Geodesy and seismology and volcanic activity
SAHKE 2009 - Present: Active and passive seismology  GNS, VUW, ERI, USC

M 8.2/1855 Wairarapa earthquake

Henrys et al. Geochemistry, Geophysics, Geosystems, 2013
Teleseismic S-wave splitting

Dt changes by > 0.5 s in 4 km
Must be strong crustal effect
Preliminary results - Local Earthquakes

- Rose plots show fast direction measured at SAHKE stations
- Direction of maximum horizontal compressive stress from (Townend et al., 2012)

Tom Wilson will start MSc 2015
Figure 64 Best and Final CCP stack. Interpreted using OC14D20 at 1Hz with a VP/Vs = 1.77. Dashed black line showing discontinuities in the upper mantle at depths <100 km, dipping in the opposite direction to the dip of the downgoing slab. Solid black line showing down going slab with imbricated structure to the west (left). Small black dotted line delineating top and bottom of the low velocity layer (LVL) at the top of the down going slab. Short dashes indicate a low velocity layer at shallow crustal depths.
Checks:
1. Side swipe?
2. Multiples?
3. Earthquakes?
SEASI – Imaging Parallel to the Southern Hikurangi Margin

Top: Wedge at 25-35 km depth – possibly underplating seen by SAHKE (Henrys et al., 2013). (Dip filtered to emphasise horizontal reflectors.)

Bottom: Reflector with apparent dip of 30° at 15-25 km depth. (2-4 Hz bandpass filtered.)

SEASI stations: black triangles
Migrated profile: blue line
Used (relocated) earthquakes: blue circles
Interactions between Slow slip & volcanoes

- Katrina Jacobs
- Nico Fournier
- Martha Savage

- Calculate strain and seismic properties near volcanoes at time of slow slip events on Hikurangi
- Numerical modelling of strain
Secular velocities can be split into components

A catalogue of Hikurangi, New Zealand, Slow Slip Earthquakes: Preliminary results

Peter Baxter¹, Euan Smith²

¹MSc candidate, Geophysics
²Emeritus Professor, Institute of Geophysics
Victoria University of Wellington

overall secular (red) = SSE-free (blue) + average SSE (black)
Regional average strain rates

SSE-free principal strain rates

Average SSE principal strain rates