Plate coupling at the northern Hikurangi margin: new results from magnetotellurics

Wiebke Heise[1], Grant Caldwell[1], Ted Bertrand[1], Yasuo Ogawa[2], Stephen Bannister[1], Garth Archibald[1], Stewart Bennie[1], Rory Hart[1], Neville Palmer[1], Kaori Seki[2], Masato Fukai[2], Kuo Hsuen Tseng [2], Tatsuji Nishizawa[2], Jack McGrath[4]

[1]GNS Science, Lower Hutt, New Zealand, w.heise@gns.cri.nz

[2]Volcanic Fluid Research Center, Tokyo Institute of Technology, Tokyo, Japan

[4] School of Earth and Environment, University of Leeds, UK

At the Hikurangi subduction margin along the east coast of New Zealand's North Island, plate coupling changes from weakly coupled in the northern part of the margin to locked in the south. Shallow slow slip events occur quasi-regularly in the northern weakly coupled part of the margin. While the conditions that lead to slow slip and changes in plate coupling are not fully understood, the presence of fluids within the subduction-interface-shear-zone is believed to play an important role. This is supported by the correlation between the resistivity at the depth of the plate interface inferred from MT data and the areal strain rate derived from GPS measurements.

52 new MT measurements have been done in the northernmost part of the Raukumara Peninsula in an area without previous MT data coverage. 3-D inverse modelling of impedance tensor data and geomagnetic transfer functions has been carried out at 322 at the northern half of the margin. The results data show that the dipping conductor above the subduction interface imaged previously to the south is present beneath the entire Raukumara Peninsula and correlates with the area of extensional strain rate consistent with weak plate coupling. Relocated seismicity within 3km of the interface shows a paucity of seismicity in the conductive areas of the plate interface. This confirms that fluid and/or clay-rich sediments are consistent with an area with a decreased density of asperities and stored strain.