Interplate coupling and slow slip events in the North Island, New Zealand

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New Zealand is located at the plate boundary between the Pacific and the Australian plates. The North Island of New Zealand is affiliated to the Australian plate, and the Pacific plate is subducting westward eastern offshore from the Hikurangi Trough. Along this subduction zone, slow slip events have been reported based on GPS observations [e.g. Douglas et al. (2005)]. We analyzed 3 slow slip events at the Hikurangi Trough in January, March, and August of 2008 near Gisbone based on the GPS network of New Zealand called GeoNet. We applied a geodetic inversion technique using ABIC by Yabuki and Matsu'ura (1992) to estimate slip distributions. All three events are interpreted as reverse faulting on the plate interface, but at a very shallow depth less than 10km. The maximum slip of 68mm was obtained for the January event, while the August event had the smallest slip of 21mm. The March event is located to the further south.

Because of these episodic slow slip events, crustal displacement rates between slow slip events are different from the long-term average rates. Wallace et al. (2004) estimate interplate coupling distribution by analyzing the long-term average displacement rates, but it is also important to analyze inter-slow slip rates. We conducted a preliminary analysis from such a viewpoint, and obtained the maximum slip deficit of 63mm/yr at the depth of 10-15km. The slow slip events appear to occur where the slip deficit is rather small.

We will also present a comparison of the new results with those obtained in New Zealand with different analysis methods.