Two years of deep slow slip in New Zealand, in fits in spurts

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From early 2013 to early 2014, continuous GPS stations maintained by GeoNet in New Zealand recorded slip on the Kapiti slow slip patch of the Hikurangi subduction zone plate interface. This patch previously hosted slow slip events (SSEs) in 2003 and 2008 (Wallace and Beavan, JGR, 2010). The 2014 Kapiti SSE is unique because it was rapidly decelerated following increased normal stress (clamping) caused by a nearby M 6.3 earthquake (Wallace et al., GRL, 2014). However, GPS data indicates that slip did not stop entirely, and soon after the adjacent Manawatu slow slip patch ruptured. The Manawatu slow slip patch is directly adjacent to the Kapiti patch along strike, to the northeast. The patch previously had large SSEs in 2004/2005 and 2010/2011. Given the previous repeat interval of ~5.5 years, the currently ongoing 2014/2015 Manawatu SSE is early; however with only 3 SSEs it is difficult to tell how regular SSEs on this patch are usually. Here we show Network Inversion Filter derived models of slow slip for the various phases of the Kapiti and Manawatu SSEs, and investigate the possibility that this is a continuous slip event, or if the Kapiti SSE may have triggered the Manawatu SSE.

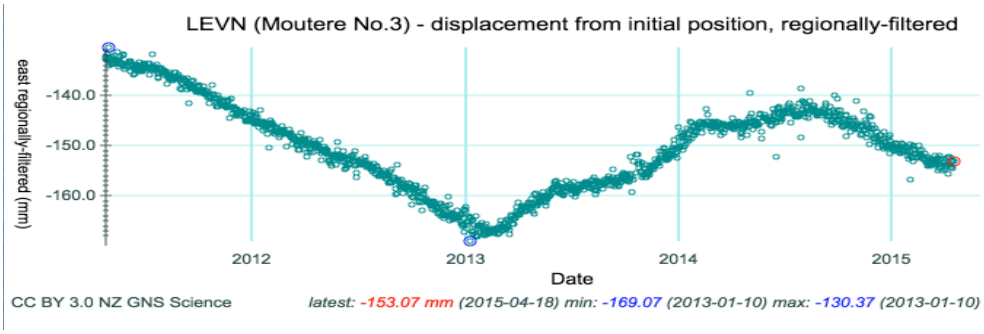

Fig 1. The East component of station LEVN, showing multiple phases of the Kapiti and Manawatu SSEs.

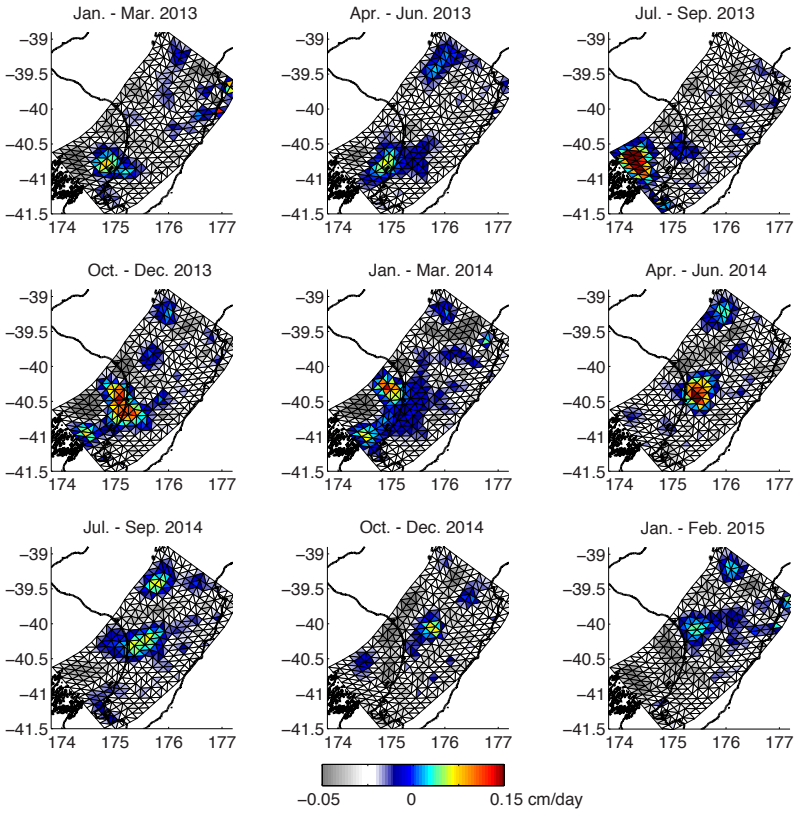

Fig 2. 3-month time panels of average slip-rate on the plate interface in New Zealand