TOWARDS GROUND MOTION PREDICTIONS FOR A LARGE HIKURANGI SUBDUCTION EARTHQUAKE: LESSONS FROM THE KAIKŌURA EARTHQUAKE

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The 2016 M7.8 Kaikōura, New Zealand, earthquake struck the East coast of the northern South Island on November 13th 11:02 (UTM). The damaging earthquake generated extreme surface displacements, land deformations and ground motions, a regional tsunami and triggered significant slow slip events on the Hikurangi interface (Kaneko et al., 2017). Sadly, it also caused 2 fatalities and many New Zealanders were affected by this earthquake. The overall earthquake rupture process as suggested by advanced source models (Hamling et al.,2017; Holden et al.,2017; Kaiser et al.,2017; Bradley et al.,2017) is complex and unexpected. The earthquake bypassed the Hope fault, largest source of regional seismic hazard, as it ruptured exclusively to the North (despite most of the stress accumulated from the 2010-2016 Canterbury earthquake sequence was to the South). Source models based on teleseismic and/or regional data suggest that the interface did contribute to the overall rupture (Bai et al.,2017; Duputel & Rivera,2017; Kaiser et al.,2017). However, many observations strongly support evidence of minor (if any) contribution of the interface in the overall rupture (Holden et al.,2017; Clark et al.,2017; Cesca et al.,2017). These unexpected source characteristics are not considered into best practice but significantly impact ground motion results. We entertain a range of realistic source characteristics (Kaneko et al., 2018) of a future Hikurangi earthquake to explore ground motion variability. Our findings show that strong ground motion is mostly controlled by rupture directivity, stress drop, asperity size, and the presence of sediments and exhibits a large variability despite the tight range of “realistic” parameters employed in our simulations (Holden et al.,2018).