



New insights into Wellington Harbours' tectonic settings from marine geophysical and sedimentological data

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After the experience of several damaging coastal earthquakes in New Zealand in the last three years, the importance of locating and characterising the earthquake potential of active faults close to urban areas has become more obvious, especially when cities lie in complex tectonic settings as it is the case for Wellington. To assess the earthquake and tsunami potential and the associated hazard posed by such faults, it is necessary to characterise fault geometry, slip rate, earthquake history and earthquake potential. In the marine environment, we have the advantage that faults can be assessed cross-sectionally through the application of high-resolution geophysical data without having to excavate trenches across the active fault trace.

We present new marine data from Wellington Harbour that helps to characterise three faults; the Wellington Fault at Kaiwharawhara, the Evans Bay Fault, and a newly discovered fault off Oriental Bay, informally referred to as the Mount Victoria Fault. New marine geophysical data has better delineated the location and characteristics of these faults. High-resolution multi-beam bathymetric data (50 cm grid-cell size), covering the entire Wellington Harbour, were also used to determine the occurrence of seafloor scarps associated with surface ruptures on the faults. Sediment cores from either side of the Wellington Fault off Kaiwharawhara Stream, in about 17.5 m water depth, provide insight into the late Quaternary-Holocene stratigraphy and age of sediments that have been deformed by activity on the faults delineated in Wellington Harbour. The stratigraphy reveals details of the post-glacial marine flooding of the harbour that occurred about 10,000 years ago.