

## 4. Inundation results

The results from the modelling of inundation from potential tsunamigenic sources are discussed in the subsections below. Results from all three scenarios, the South American and subduction zone source, are presented. The largest tsunamis for the Northland region generally occurred in response to the  $M_w$ 9.0 subduction zone earthquakes in the Tonga-Kermadec Trench.

### 4.1. Model outputs

Maps of maximum inundation depth and maximum water velocity for each tsunami source scenario and each sea level for all of the Northland communities listed above are presented and discussed below.

Animations for the South American and Tonga-Kermadec tsunamis at Marsden Point, Oakura and Ohawini Bays, Paihia and Tokerau Beach are provided on DVD, together with an overview animation for all of Northland. The maximum water depth and maximum water speed in the fifteen communities are also provided in ASCII and ArcGIS shapefile formats. Arrival times of the first wave and the maximum wave at each location are also provided in tabulated format for the three scenarios (changes in arrival times due to sea level rise are negligible). The first wave arrival was deemed to have occurred when the water level first increases over 5cm above the undisturbed level of the sea (in this case MHWS). Unlike 'ordinary' waves, tsunami waves may sometimes occur more like an unusually fast high tide. It can take several (even up to 10-20) minutes for the water level to rise to the maximum level. The maximum wave height arrival records when the maximum water level during the simulation was reached. The times given for the South American tsunami are indicative and/or relative only, as the actual time taken depends on exactly where the source occurs. The South American tsunami takes approximately 15-16 hours to reach New Zealand. The first arrival of Tonga-Kermadec subduction zone tsunamis to Northland occurs between 60 and 180 minutes at the outer coast (see Lane et al., 2007).

#### 4.1.1. Interpreting the figures

Sea areas in the maps have been blanked in order to emphasize the inundation predicted on land areas. The inundation depth represents the maximum depth of water on land areas that results from the tsunami. The dashed lines in the figures represent the spatial extent of the inundation modelling on land, as determined by the coverage of the LiDAR data; areas outside these lines are not modelled and may therefore also

be subject to inundation that is not shown. In some instances, inundation is predicted up to the inland extent of the modelled area: in these cases, inundation may extend beyond the marked area, but cannot be modelled. Maximum speed is the maximum water speed associated with the arrival of the tsunami.