

Accurate, real-time wave measurement improves vessels safety at port, example of the Port of Lyttelton in New Zealand

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Water level fluctuations in a harbour are a combination of tide, wind wave, tidal surge, and long wave signals over a wide range of frequencies which may differ greatly in space and time. Infragravity waves are especially a threat to the safety of operations and transit in most harbours. Due to their large wavelength, these long waves are difficult to dampen by port protective structures, such as dikes or breakwaters. Once they enter a harbour, they can be amplified and excite semi-closed port basins and/or cargo-type moored vessels. This phenomenon is an issue to port operations such as the Port of Lyttelton, the largest port on the South Island of New Zealand and crucial gateway for the region.

To accurately measure the complex water level fluctuations at Lyttelton, two radar gauges were installed at separate locations in the harbour providing millimetre accuracy, high frequency real-time wave and water level data. One is located in the relatively sheltered inner harbour and the other adjacent to the entrance channel. At this second location significant wind-waves and swell may also be experienced.

These data are combined in a Dynamic Under Keel Clearance (DUKC®) system together with modelling of waves, currents, tides and provide reliable estimates of the operational long wave climate at sites within the port.

The provided information to the port personnel has proven to be very useful for managing the risks to moored vessels posed by occasional long wave events.

Details of the instruments, processing and results obtained will be presented, along with the benefits and results for the port operations.