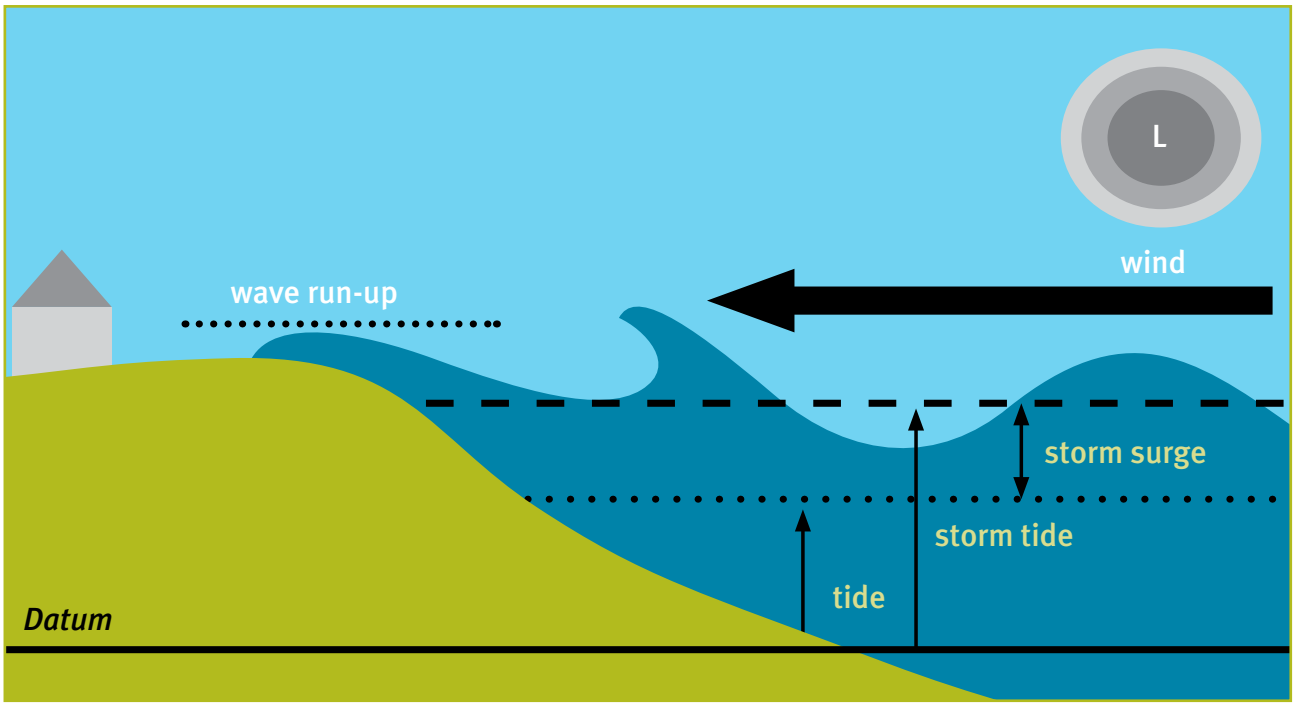
Ministry for the Environment
Manatū Mō Te Taiao

Factsheet 1

Components of sea level



The elevation that the sea reaches at a shoreline is made up from the following components:

1. At any given time, there is a ***predicted astronomical tide*** level above a datum (eg, Chart Datum or Local Vertical Datum). The tide oscillates about the mean level of the sea.
2. The mean level of the sea is influenced by longer-term climate fluctuations relating to ***seasonal effects***, the ***El Niño-Southern Oscillation*** and the ***Interdecadal Pacific Oscillation (IPO)***. Seasonal sea levels are a few centimetres higher in late summer/early autumn (and a few centimetres lower in winter/early spring). During El Niño phases, sea levels tend to be depressed, and during La Niña phases, sea levels tend to be higher. The IPO in its negative phase can increase sea levels by up to 5 cm.
3. ***Storm surge*** is the increase in regional ocean level (excluding the effects of waves) due to low barometric pressure and winds blowing either onshore or alongshore over the ocean (with the coast on left). Conversely, high pressure and winds blowing offshore, or alongshore with the coast on the right, tend to decrease ocean level.
4. ***Storm tide*** is the temporary rise in level of the sea offshore of the wave breaker zone. Storm tide is the combination of the above three components (mean level of the sea, the predicted tide at the time of the event and the storm surge height).
5. At the shoreline, the maximum vertical elevation reached by the sea is a combination of the ***wave set-up*** that is induced landward of the wave breaking zone and ***wave run-up*** (or swash). These act on top of the storm-tide level. Wave run-up is highly variable even over a short length of coast, varying according to the type of beach, the beach slope, the backshore features and presence of any coastal defence structure.

New Zealand Government

Published in March 2009 as part of *Preparing for coastal change: A guide for local government in New Zealand* by the Ministry for the Environment, Manatū Mō Te Taiao, PO Box 10362, Wellington 6143. INFO 367