



Methodology: pebble analysis and beach profiles at Robin Hood's Bay

Pebble roundness

Description of technique: A tape measure was laid out along the beach at the Northern end of Robin Hood's Bay (NZ 9529 0519) and at the Southern end (NZ 9532 0469). Over a 10m section we used random numbers to select a location along the tape and then we picked up the pebble closest to that spot. This was repeated 50 times. We compared pebbles to the Power's chart to subjectively assess roundness, we also used a Cailleux chart to measure the radius of the sharpest angle and then utilised the Cailleux roundness formula to assess roundness, with 1000 being very round and values close to 0 being very angular.

Purpose of technique: We were looking for evidence of longshore drift, with rounder material likely further south after it had been transported and eroded on its journey south.

Limitations: The Power's scale is subjective. The Cailleux Roundness chart is very fiddly and it is often hard to accurately measure the sharpest angle.

Improvements: More than one of the group could have together assessed the roundness using the Power's Scale to mitigate the subjective nature of this approach.

Pebble size

Description of technique: The same pebbles selected using random sampling for pebble roundness were used to measure pebble size. Using a ruler we measured the pebbles longest axis (a-axis), the second longest axis (b-axis) and the smallest axis (c-axis).

Purpose of technique: To see if smaller material was at the southern end of the bay, after it had been eroded through attrition on its journey from the north.

Limitations: We only collected 50 pebbles in each location, and more samples from more than one spot at the southern and northern end may well have shown a clearer trend.

Improvements: Sample at sites at the top of the beach and bottom of the beach at both the North and South of the bay and collect over 100 pebbles at each site.

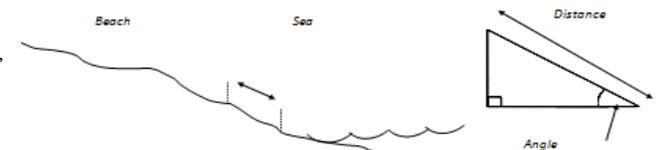


Sampling strategy: We sampled roughly every 100m south down the bay (systematic sampling) but we also adapted this approach in two locations to avoid large pools of water and to ensure we collected data for beach profiles in front of all the sea defences. Systematic sampling allowed us to ensure we were spread across the full length of the beach (random sampling could, by luck have left us with sampling locations predominantly in one part of the beach).

Beach profiling:

Description of technique (a diagram is useful): Starting from a safe distance near the sea, we used ranging poles and a clinometer to measure the angle and the length (with a tape measure) of each facet of the beach as we moved inland. Then using trigonometry we were able to calculate the distance up and inland of each change in slope and then plot these as beach profiles.

Purpose of technique: To collect data which allowed us to calculate the cross-sectional area (CSA) of the beach, and so see if the size of the beach increased with distance south due to Long Shore Drift transporting material in this direction.



Limitations: It was sometimes hard to spot where the angle changed on the beach, particularly on very gentle angled parts of the beach. The clinometer was also sometimes quite inaccurate and could not accurately measure small changes in angle. Some of our beach measurements were taken at different times; which means that the tide would have come in, and this would have created a smaller beach in some location.

Improvements: We could have used a different piece of equipment to measure beach angle (such as a theodolite and dumpy level, though not only are these expensive but they are also slow and tricky to set up).

We also could have measured at all our sample sites at the same time, by sending different groups to each location and all agreeing the same start time, thus limiting the impact of tide changing the sea level on the size of the beach.

Finally, beaches change shape and size regularly due to wave conditions, so undertaking the investigation at more than one time of year would provide helpful data to see if any trends were evident at some points of the year, even if this was not the case when we were there.