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# Slips, mudflows and unpredictability

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**OPINION:** Virtually nowhere in the Separation Point Granite belt, which stretches from Separation Point/Ligar Bay in the north to Tapawera in the south, is there classical hard-granite rock at the surface.

The about 115 million-year-old granite has undergone an immense period of chemical weathering during which the basic structure of the rock is broken down, to ultimately produce quartz particles in a groundmass of clays and sands.

The old Cornish miners, no strangers to granites, called this material "gruss", and it can range from solid-enough-looking material which, when struck, breaks up instantly, to extremely soft material with no character whatsoever. Once this large area of gruss was uplifted into often steep terrain it became susceptible to sometimes rapid erosion.

### **Gruss under saturation**

Once heavily loaded, or saturated, with water, gruss becomes potentially mobile. Even in moderately steep country, slips will occur, but in a landscape such as that traversed by the Totaranui and Wainui Hill roads (characterised by numerous short, steep gullies), a potentially more destructive kind of erosion occurs. Slips into the gullies will produce temporary dams of gruss and whatever vegetation has been mobilised; these debris dams will give way, and a mudflow is released.

The specific gravity of this material is high and it can easily transport material like boulders, large trees, etc. Huge granite corestones which stood in Ellis Creek until December 2011's massive mudflow, were transported in this way.

No vegetation type can prevent this kind of event. I have seen (following a 1978 event) intact centuries-old rimu forest on the Pukatea Walk, Totaranui, collapse into gullies. Clearly, and this is evidenced by the hills from Pohara to Ligar Bay, pasture and low shrubland are most at risk. Pine forests fare better but still release slips and flows. Native forest is probably the least susceptible but there's no guarantee.

One of the most frustrating things about gruss is its unpredictability. I've seen gullies in the National Park stripped by mudflows while similar-looking gullies only 100 metres away can be untouched. I made up a rule – if you think rotten granite will be stable, it'll fall down. If you think it'll fall down, it doesn't. Terrible stuff to predict on this sort of scale.

Mass movement under lubrication is another problem, when an entire hillside may slowly, over months or even years, slide downwards on to roads etc.

Two good examples from the 1970s and 80s are the Wainui Hill Road, about 300 metres or so from the top on the Wainui side, and the Takaka Hill Road, almost at the bottom on the Motueka side, where the last few steep little corners occur.

At both sites, slipping (not big scale) took place over many months then suddenly ceased, and the sites have been stable ever since. (I haven't seen the Wainui Hill site since the 2011 event, however.)

In both cases a mass of fissured, soft gruss somehow became stable in the reasonably long term.

### **Below the hills**

At the foot of the hills, where stream gradients ease and the material carried down is deposited, that's where most of our problems lie, since that's where we've chosen to build settlements, farm the land, etc.

Below the hills, from Ellis Creek (Thorpe's) to Wainui, is a series of debris fans, built from gruss over a long period of time. You can see this process in miniature on the Wainui Hill Rd, just past the top, where cleared slip faces produce beautiful, symmetrical little fans where the falling gruss particles come to a halt.

From time to time a major event pours debris on to a portion of a fan. Eventually the entire fan becomes coated and re-coated. In the maybe long periods between major events the streamlets cut back down into the fans and look (and act) benign.

There's a classic half-fan (the other half eroded by the sea) just at the bottom of the Wainui Hill in Wainui Bay where the stream that formed it is so tiny that you'd be hard-pressed to believe the relationship. (I am told that in the December 2011 event, this dribble became a roaring, mud-and-vegetation-filled torrent, all from a modest little catchment.)

#### A word about logging

Logging practices have been blamed by some folk for flood damage (Tapawera, Ligar Bay) in the very recent past. Having seen the huge amount of debris deposited by the small creek at Kingston's (Ligar Bay), which flows from standing mature pine forest, one can certainly wonder at the effect of suddenly clear-felling such country's forest cover, thus providing a mass of slash (tops, branches, unwanted lengths of timber), then enduring a major event.

My own view is that some logging practices can certainly exacerbate a mudflow event. Logging in the gruss country, and in particular hauler logging on steeper slopes, must be re-assessed now, notwithstanding the controls imposed years ago on such activities.

I can take you to hauler-logged areas between Ironstone and Scott's creeks, Uruwhenua, where the landings were sometimes huge (landings are where the logs are hauled to, cut to size for different end-uses and loaded on to trucks for despatch) and big piles of unwanted timber have been pushed over the landings' edges in cleanups.

Some of these piles have slumped under their own weight; these examples are on hard marble, so on much softer country it is obvious that every effort must be made to keep landing offcuts to a minimum and ensure their dispersal: scattered slash is much less potent than concentrations of it. And with the possibility that the pines behind Ligar Bay and Tata Beach are due for logging, this matter becomes urgent.

#### Living on the fans

Fans are designed by nature for the deposition of hill-country erosion products. Over the course of time a fan will be covered and re-covered with debris. That's how they grow, and the gruss hills will continue to deliver material to them. There have been two minor, and one major, events in eastern Golden Bay in the last half century, say – 1956, 1978 and 2011. Without expensive stream training, some settlements will continue to be at risk. A fan, long-term, is a dynamic place. If the global-warming scenario is correct, and in my view the evidence is for it being correct, then storms in the future will be more frequent and more powerful, since warmer oceans and atmosphere will provide more energy to sustain those storms.

We must therefore learn good lessons from the December 2011 event and apply them carefully, with the knowledge of what gruss country can do, and what a more energy-rich atmosphere will be capable of.

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