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Addressing scale bias and the requirement for small-scale landslide study in submarine geomorphology

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Many scientific studies focus on large-scale landslides as they are easier to image in detail than smaller failures, which may be close to the resolution limits of some of the more widely-available imaging techniques. These larger events are often also considered to pose a greater risk to human lives in, for example, their greater tsunamigenic potential, and as such are the focus of more academic attention. However, even the small landslides can pose hazard to seafloor infrastructure and their combined influence on net sediment transport may be as significant as a single larger slope failure event. As a result, the degree of risk posed by the smaller submarine failures may equal or surpass that of larger seafloor mas movement events.

There is often a pressure on the engineering geoscience community to make detailed assessments of the impact of smaller landslides on proposed seafloor infrastructure due to the frequency of occurrence of these smaller failures. However, there is relatively little literature to support an in-depth review, and consequently assumptions are made on the behaviour of smaller failures by scaling down larger ones – which may or may not be valid. Given the often-considerable time constraints on projects which might require this sort of research, it is difficult for those in the industry to undertake it.

With the greater availability of more resolute datasets available to all, we propose that future efforts can and should be made to integrate the measurement and understanding of smaller landslides into academic studies. Although several recent studies are attempting to do this (e.g. Baeten et al. 2013; Casas et al. 2016; Dabson et al. 2016; Madhusudhan et al. 2017), we are able to lend a perspective into the importance of these smaller failures to the industry, the workflow that is undertaken to map and assess them in submarine geohazard risk studies, and some of the current research gaps that are still present within the science. The database of Clare et al (2018) facilitates collaboration between the academic and engineering communities, and as such can be a useful first step in gathering a subpopulation of smaller failures to investigate. It is anticipated that this will translate into direction and rationale for further research, which is seen as a crucial requirement to support industry work given the significant impacts these failures can have.