Referee report to the paper "Structure, stability and tsunami hazard associated with a rock slope in Knight Inlet, British Columbia", by van Zeyl et al.

General comment

The paper by van Zyel et al. deals with rockslides along the Knight Inlet – British Columbia, close to the Adeane Point, generating a tsunami in late 1500s destroying a village located at Kwalate site. This work aims at recognizing and studying the stability of rock masses characterized by different volumes and failure mechanisms, in order to reconstruct the Kwalate event and evaluate the related tsunamigenic potential by means of empirical relations between the slide dynamics and the generated waves in the source zone. This provides an assessment for further future tsunami hazards in the area.

The paper is in general well written and clear, with proper references and clear figures.

Only for section 6 – Wave height estimates, some doubts remain, as discussed later more in the specific.

To my concern, I recommend it for **publication after minor revisions**.

Specific Comments and Remarks

Abstract

OK

1. Introduction

The area under study, as reported in the text, is scarcely populated but is expected to see future improvements: are there any plans or sensible infrastructures under construction now? What is the situation now? How many people or facilities are expected to be interested by a tsunami? (This mainly refers to vulnerability, while the paper title reports to "tsunami hazard", but some words about this are useful).

p. 163 lines 7-8. Have the submarine deposits been generated only by subaerial collapses? Do some submarine scars exist? Has the possibility of submarine landslides to be completely discarded?

p. 163 line 17. Concerning the late 1500s tsunami: does some evidence of this tsunami exist to make some validation? (Historical or eyewitness reports, tsunami deposits on the shore…)

2. Regional setting

OK

3. Methodology

p. 166, Stability analysis, line 17. Please justify the assumptions for the slope, for the friction angle and for the cohesion in the stability analysis.

4. Rock slope characterization

p. 167, Slope deposits, line 21. Probably it would be better to refer to Figure 6 when describing the submarine debris cone.

5. Slope stability

OK

6. Wave height estimate

As a general comment on this section, I personally have doubts on using empiric formulas when dealing with tsunami hazard. They can give good indications on wave characteristics in the source area, but they cannot account for wave propagation and run-up along the coasts around the study area.

Especially landslide-tsunami, furthermore, are affected by energy dispersion, reducing considerably wave amplitude with distance. This means that many of the conclusions here reported concerning the tsunami hazard are valid only in a very local scale (i.e. for the event destroying the Kwalate village), while for the whole area of Knight Inlet some further studies about the propagation should be needed.

p. 176, line 8-9. What is the shape of the assumed sliding masses? How are they positioned and dimensioned? From Table 3 one can infer that *s* (the distance toe-shoreline) decreases when the volume increases. Does this mean that the upper part of the sliding body is fixed and the toe gets closer to the shore when increasing the volume? Or is the barycentre kept at a constant height, and the slide extended in both sides in order to account for the volume increase? Please add a sentence describing briefly how the adopted masses are shaped.

p. 176, line 17. How is the value of the friction angle assumed?

p. 176, line 25. Given the importance of such quantity in the Froude number computation, please justify why you assumed 500 m as the water depth in the impact zone.

p. 178, line 23. "*the wave height is 1.2 times the wave height*" sentence not clear

p. 179, line 20. The wave height range 6 to 26 meters seems too wide and unclear for hazard evalutation

7. Conclusions

p. 181, line 5. Same as Introduction, "*such waves could threaten vessels and coastal infrastructures in Knight Inlet*". A short description of communities or facilities located along the coasts of the fjord, addressing briefly vulnerability, could improve the paper.

References

p. 181, line 16. Adams and Atkinson in the text is 2003, here 2005.

Tables

Tables 4 and 5 can be merged in one single Table, with the indications of the used formulas as in Table 5.

Figures

Figure 1. Please consider to add a map of Canada locating the area of study, if not filling too much the figure.

Mark the position of zoomed area of Figure 2.

Figure 2. In the caption, the Three Finger Creek event occurring in 1999 is cited, maybe it is worth reporting it in the Introduction when dealing with tsunami hazard in the area, this seeming a recent and significant event. Are there some measures of that tsunami?
Increase the character dimension of the locations accounted for in the paper: Adeane Point, Kwalate village, Three Fingers Peak. In the published version they will be probably hardly readable.

Figure 3. Evidence better in the figure the letter *c* (central gully).

Figure 4. Can't see in the figure the letter *n* (north gully) reported in the caption.

All remaining figures OK

Filippo Zaniboni
University of Bologna, Italy
filippo.zaniboni@unibo.it
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