Natural Hazards
and Earth System
Sciences

EGU

Discussions

Interactive comment on "Communicating public avalanche warnings – what works?" *by* Rune V. Engeset et al.

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*My apologies if these comments are difficult to understand. I have been working on several emergency wildfire assignments in Utah and Oregon and have been adding comments to this document when I've had a few spare minutes here and there.

Communicating public avalanche warnings – what works?

Overall this seems like a great study and a great effort to quantify the effectiveness of different elements of avalanche warnings. It's a very difficult topic, and I think they did a great job combining qualitative and quantitative data to form a picture of what maybe works and what doesn't. The topic is very significant scientifically as we continually debate the format, style, layout, etc of avalanche warnings; however, we have very

little data on how well people understand our products. Part of this study collected is what people like and what they want. What our users prefer may not be the same as what helps them understand the avalanche hazard, and what causes them to alter their behavior. The section on comprehension was useful. This does not conclusively answer many questions, but it provides solid guidance for the NAWS to provide their users with a useful product.

My background includes running a large avalanche center in the U.S. as well as a graduate degree in engineering. I do not have a background in statistics, nor do I have any expertise in designing surveys. For these reasons, I am not qualified to comment on the scientific quality of the statistical part of this work.

Some of the biggest issues were with the presentation and writing. It was very difficult to follow this paper and understand what they did.

Section 1

The challenges of communicating avalanche hazard to the public (section 1.2) were described very well. However, the first part of this section (lines 15-26) about impact-based warnings was confusing. If exposure and vulnerability are determined by individual users, how can AWS's issue impact-based warnings?

U.S. successes (page 4, line 28) perhaps don't match other trends and could be worth mentioning. U.S system is unique in that it has very different styles and formats yet seems to be effective. The trend in the U.S. has been a declining fatality rate. The number of fatalities has been flat while use has surged, thus the rate has declined. https://avalanche.org/2016/06/27/2016627us-avalanche-fatality-trend-is-flat-for-the-past-22-seasons/

It would be very helpful to have an English version of Figure 2 (page 6). This would help some readers really understand the content of elements of avalanche warnings. Do any of the sections in the avalanche warning use stock language? Are they written

from scratch each day? This is extremely important to know. Whether or not it contains original writing has a major effect on credibility.

Many issues with this paper seem to stem from a translation issue. Use of some words like "danger" and "hazard" made this paper very confusing to follow. It was sometimes unclear when the word "danger" meant specific danger rating (i.e. Low, Moderate, etc.) or a general reference to hazard. Sometimes they called it the "danger rating" other times the "danger level". While not a huge issue, this made the paper confusing.

Table 1 (page 7) needs to be rewritten. This table is referenced in Figure 5 (page 16); however, the element names in Table 1 and Figure 5 do not match. They are not presented in the same order either. Both of these issues make it very difficult to understand the results of this study. This was a serious problem for me.

Figure 2 shows elements of the avalanche warning. Each one is labeled with a number, and the caption has a description for each element. Figure 5 shows how users ranked elements in the avalanche warning. However, it was difficult to cross-reference these two figures because the wording in the caption for Figure 2 does not exactly match the wording in Figure 5. Additionally, the elements in Figure 5 are listed in a different order than they are in Figure 2. These issues made it challenging for me to fully understand the results.

Section 2

The way the male/female demographic was described on page 9, line 10 should be changed to mirror the way it is described in page 9, line 20. Line 10 perpetuates gender biases.

Survey design: I do not know how to design a survey, but I know the way questions are phrased can have a big effect on responses. I assume that questions on this survey were written in a neutral way.

It seems very difficult to truly assess comprehension. Given this difficulty, the authors

did a great job trying to quantify comprehension with their system described on page 12, lines 1-5.

Why did you test comprehension of wet slabs? Do they kill a lot of people in Norway? Persistent slab avalanches kill many people in the U.S., and they are difficult for users to understand. Risk management and travel advice messages for persistent slab avalanches are difficult to communicate. Additionally, there can be significant message fatigue with this avalanche type. Personally, I would have tested comprehension regarding this avalanche type.

Wind slabs were a good problem to test because they are so common.

The four alternative ways to present the forecast (is it a forecast or is it an avalanche warning?) on page 11, lines 10-12 do not match items listed in Table 2, section D. For example, item 1 is listed in the table as "Avalanche danger with explanation (general advice associated with the danger level)" and it is listed on page 11 as "only the avalanche danger level and very limited travel advice". This is not a major issue, but it makes it hard for me to follow the paper. Is "general advice" the same thing as "very limited travel advice"?

The communication effectiveness score, page 13 line 1, seemed like a great way to assess the responses from participants. Is it perfect? Who knows? Using "expert" answers as a way to evaluate participant answers seems like a great process to me.

Section 3

Another inconsistency involved the level of avalanche knowledge. The categories mentioned on page 13, lines 18-21 do not match the categories of "competence" listed in Table 4 (page 14).

In table 4 the level of experience is categorized by "ski tours per year". How did you measure the experience of other users like snowmobilers, snow shoers, etc?

Again, the warning elements in figure 5 do not match the elements of the warning listed

in table 1 and figure 2. While the authors may be referring to the same elements, using different wording to describe the elements made it very difficult for me to understand.

The authors did a great job summarizing the qualitative results. In the few surveys I have conducted with users in the U.S., comments often contain the most valuable info. Sometimes a single comment from a single person can be the most valuable part of the survey.

Page 21, lines 9. The authors comment that "user's competence had no effect on the ranking" in line 9. Did experience have an effect? As I understand it, "competene" and "experience" are two different things.

Similarly, in line 20, the authors comment that "experience did not influence the ranking." What about competence? Later in line 25 they say that "compentence had no effect on comprehension". Which is it? Is it both? This is confusing and not clear.

Section 4

Page 22, lines 20-22 – That sentence states the purpose of an avalanche warning really well.

The discussion of symbols vs text, page 23 line 25, is interesting because the tech industry has struggled with and gone back and forth on. Symbols can be confusing. Text is not, but there are issues in translating between languages.

Page 24, line 15, The words danger and hazard seemed to have been used interchangeably. While they may mean the same thing, it would be better to pick one for this paper. It could be easier to use the word "danger" when referring to the danger level. This added an extra layer of confusion for me.

Page 24 lines 22-24 suggest that danger level is well understood by users. Section 3.2.3 suggests that users have difficulty understanding the danger level. Another inconsistency is that the authors would sometimes say "danger level" and other times say "danger rating". It would help to use just one.

All of page 25 is a great discussion. A huge issue is you addressed is when 2-3 avalanche problems are present. There are almost always 2 problems present. Great topic for further discussion in another study.

Section 5

This study delivered some concrete findings. It seems to have been well designed, but it was challenging to understand because of the writing. The authors did a good job with their conclusions by not presenting conclusions with too much specificity. It would be easy to read too much into the results, but they did a good job of keeping their conclusions more general.