

Minor revision: point-by-point changes

Frank Techel, and co-authors

Please find below a point-by-point response to changes made.

Below, each reviewer comment is reproduced in **gray**, followed by our revisions to the manuscript in **red**.

1 Changes made to address review by Benjamin Reuter

- The authors state in the Introduction (L49) and in the Discussion (L337) that the assessed parameters are not measurable. This lack of an “independent reference” (L337) is somewhat true for the danger level, but less so for the input parameters of the look-up table. Frequency distributions were derived from avalanche observations, stability tests or snow pits (including tests). A classification for dry-snow stability classes is available in Schweizer et al. (2021). Hence, examples of typical avalanche situations and their respective stability/frequency classes – and possibly, independent data to verify the danger level, are available. Such data will not do the job of choosing the final danger level (which remains the goal of the look-up table), but uncertainty in data interpretation, and difficulty in concept application are mitigated; possibly making for useful complement data. These data should not go unmentioned, and even be considered for improving the descriptions of the frequency classes and stability classes. - **We added a remark regarding the potential use of distributed snow-cover simulations for providing the necessary real-time data for stability and frequency estimation in a forecast setting. (1435-437)**
- If sub-classes are introduced or fields further divided (Fig. 8), the classification concept is being eroded and the ultimate goal may move out of sight. The authors are encouraged to reflect on the required level of detail. Suggestions to refine the matrix (L434) should be reconsidered with possible disadvantages mentioned. - **We now discuss in greater detail pros and cons of combining coarser with finer-grained relative scales (absolute-relative assessments) (L372-396).**
- Table A1, describing point-scale snow-stability classes, provides little conclusive information (definition of “difficult”, “easy”, “very easy”?), is misleading (“natural” cannot be a special case of “very easy to trigger”) and lacks information to assess stability classes in wet and glide snow situations. - **We updated the table in the Appendix with the version from Müller et al. (2025). (Table A1)**
- A strong point is that the authors shed light on how forecasting services comply with the matrix. Monitoring matrix compliance seems an interesting path for forecasting services to identify diverging situations. If they manage to identify and train, they can increase forecasting quality and consistency. This could be included in the conclusions (currently touched on at L430). - **We took this up in the conclusions. (L498-500)**

- L176: clarify computation of disagreement between forecast and matrix-derived levels. - We have rewritten this paragraph (L170-179).
- L198: justify assumption that Scottish data represent mostly dry-snow conditions. - We now provide the justification for this assumption (L201-203, and footnote).
- L222–226: reconsider interpretation of “very poor” stability and “natural activity rare”. - We now mention natural avalanche and very easy to triggering (L229-230).
- L243, 259: re-word statements where “single danger level” is used. - We checked whether rewording these two sentences could improve clarity. We came to the conclusion that “single danger level” best described what we want to express.
- Comparisons with benchmark situations are appreciated, but some statements should be double-checked (e.g. L225, L255); relate observed patterns to field studies (Techel et al., 2020; Schweizer et al., 2020). - We now refer to the revised Table A1 providing the stability definitions and examples, including typical field observations.
- L268: Clarify meaning of “neighboring cells” - We clarified the meaning of “neighbouring cells” (L278-279).
- Glide- and wet-snow avalanches are natural releases; clarify wording. - We checked the manuscript to ensure that glide- and wet-snow avalanches are natural releases, in most cases.
- L351–353: improve clarity of described discrepancies. - We describe the discrepancies more clearly dedicating a paragraph in the discussions to it (L360-368).
- L375–394: avoid circular statements when defining compliance; check interpretation. - We reviewed the entire discussion section (Section 6.1) to streamline and to bring in a logical order. This included adding subheader titles (L397-436).
- L408–458: ensure consistent terminology for avalanche types vs problems; reconsider statements on “effective” and “supporting consistent danger-level assessment”. - We checked for consistent terminology throughout, revising where necessary.
- Use one consistent term for the danger level chosen by forecasters (“issued”, “forecast”, or “assigned”). - We change to assigned danger level.
- L47: clarify meaning of “quality” vs “consistency”; perhaps use “accuracy”. - We changed to accuracy and consistency (L48-49).
- L56 + L59: choose between “practical” or “operational” implementation. - We changed to operational throughout the manuscript.
- L75: choose between “factors” or “components”. - We changed to input "factors" throughout the manuscript.

- L173 + L176: choose either “matrix-derived” or “matrix-suggested”. - **We changed to "matrix-suggested" throughout the manuscript.**
- L174: clarify colon usage (“the disagreement was computed as ...”). - **We rewrote this paragraph (L170-180).**
- L218: specify “dry- or wet-snow conditions”. - **For clarity, we now refer to avalanche problems.**
- Figure 3 and 5: improve captions and axis labels; highlight matrix-suggested danger levels. - **We increased the font size of axis labels and now highlight the Matrix-suggested danger levels (bold) and the optional level (italics) in the figures (Figures 3, 5, 7).**
- L257: clarify whether “avalanche problems” or “dry-snow situations” are meant. - **We now make it clearer, which problems relate to dry-snow conditions (Table 2). In the manuscript, we now refer to dry-snow avalanche problems rather than dry-snow conditions throughout.**
- L261 + L266 + L328 ff: improve transitions and clarity in discussion. - **We restructured the discussion including splitting into subsections to make it easier to follow.**
- L417–424: adjust adjectives and phrasing for clarity (“often”, “frequently”, “under-supported”, etc.). - **We checked whether other adjectives were more suitable.**

2 Changes made to address review by Erich Peitzsch

Line 2–3: Second sentence in abstract isn’t a complete sentence. Consider: “To promote greater consistency..., a revised version of the EAWS Matrix – a structured... – was developed.” - **We changed accordingly.**

References

- Müller, K., Techel, F., and Mitterer, C.: The EAWS matrix, a decision support tool to determine the regional avalanche danger level (Part A): conceptual development, *Natural Hazards and Earth System Sciences*, 25, 4503–4525, <https://doi.org/10.5194/nhess-25-4503-2025>, 2025.
- Schweizer, J., Mitterer, C., Reuter, B., and Techel, F.: Avalanche danger level characteristics from field observations of snow instability, *The Cryosphere*, 15, 3293–3315, <https://doi.org/10.5194/tc-15-3293-2021>, 2020.
- Schweizer, J., Mitterer, C., Reuter, B., and Techel, F.: Avalanche danger level characteristics from field observations of snow instability, *The Cryosphere*, 15, 3293–3315, <https://doi.org/10.5194/tc-15-3293-2021>, 2021.
- Techel, F., Müller, K., and Schweizer, J.: On the importance of snowpack stability, the frequency distribution of snowpack stability and avalanche size in assessing the avalanche danger level, *The Cryosphere*, 14, 3503 – 3521, <https://doi.org/10.5194/tc-2020-42>, 2020.