# Reply to Erich Peitzsch

We sincerely thank Erich Peitzsch for his thorough and constructive review. We tried to address each point raised below.

## General comments

In this study, the authors provided a thorough background on the European Avalanche Danger Scale (EADS) and European Avalanche Warning Services (EAWS) Matrix development and definitions, described the revised EAWS Matrix and associated methods of updating the Matrix, and then presented relevant results of using the newly revised EAWS Matrix for one full season. This manuscript is well written and logically organized. The methods are sound, and the results are supported by sufficient evidence. The interpretation of those results is reasonable with reference to existing literature. The recommendations section of this paper is very useful and points to limitations of consistency by providing solutions. Overall, I think this is a valuable contribution to the literature, fit well within this Special Issue, and should be published. I have a couple of general comments for the authors to consider and a few specific and technical comments as well.

I understand that this study focuses on evaluating the updated (current) EAWS matrix, its use and consistency among forecasters, and compatibility with EADS, and not necessarily an evaluation of the individual three key factors that determine the danger rating. As the authors point out, consistency in forecasters' evaluation or interpretation of the three key factors is crucial for the matrix to be used to its full potential. Indeed, the authors provide recommendations on how to enhance the use of the matrix by improving consistency in the three contributing factors. However, it seems that across the surveyed regions, a variety of input data (in-situ observations, model output, meteorological data, etc.) exist. The authors mention the influence of input data very briefly (lines 485-489), but the quality and quantity of input data plays a crucial role in danger assessment and would potentially influence the assessment variability across forecasters and regions. Can the authors provide information or comment on, generally, what data types each region uses and/or provide evidence on how the assimilation process of various types of data across regions may influence the classification of the three factors and ultimately the danger rating?

We agree that the type and availability of relevant data and their spatial and temporal density likely influences the assessment. To our knowledge, field observations, measurements from automatic weather stations, and weather- and snowpack models are used to varying degrees in different warning services. As we have not collected data regarding this, we are not able to relate availability of various data sources to Matrix usage. While this could be interesting to investigate in a future study, here we will not speculate on this.

The authors present a thorough summary on the evolution of EAWS and the EADS and provide some geographic references to other non-European forecasting tools like the CMAH in North America. However, there are no references to other avalanche sector decision making tools. In other words, this study focuses on public avalanche forecasting operations, but not forecasting in other sectors like transportation corridors, ski areas, natural resource industry, etc. Is the same tool used for those sectors throughout Europe? I suggest being clear that this study focuses on a

matrix for public avalanche forecasting or state how using the EAWS matrix in those sectors differs, if at all, from public avalanche forecasting.

You are right. The EAWS Matrix is solely applied in regional avalanche forecasting and not in other operations such as guiding. We will update the introduction and background accordingly and emphasize that we focus on regional avalanche forecasting.

# Specific and Technical Comments

**Figure 2:** Consider adding a legend to the proportion scales for b) and c) that easily shows the reader which colors represent higher correlation values.

On purpose, we avoided adding a legend to keep the figure compact but added actual values in the cells instead. However, we noted that the explanation in the caption "Stronger color saturation indicates a larger proportion of responses." is erroneous. We will update the figure caption to "Cells with stronger color saturation indicate cells with lower agreement (b) or fewer responses (c)."

**Figure 6:** The use of D1 and D2 here is confusing. Is this the same as the median D1 and D2 used in Figure 2a and defined in Lines 262 -264? Also, if there was disagreement with D (forecaster derived) and D1 (Matrix derived), that is indicated in the left column in Figure 6, correct? If the second column represents D1 ≠ D2, then forecasters used D2 (again the median second selection from Figure 2a)? Please clarify.

Yes, D1 refers to the majority voting for a D and D2 to a second D in case of more than 25% of the votes (interquartile range) in both cases. We can update the caption to clarify that. E.g., "Proportion of cases that D=D1 or D=D2 was used by groups of warning services (center column)."

**Line 88:** four? In “Despite for minor changes in 1994…” or do you mean “Except for minor changes…”

We will change to "Except"

**Line 104:** the way this is written is confusing to me. I read it as ‘as stability decreases you need a greater load to trigger an avalanche.’ (i.e. inverse relationship). Perhaps ‘instability’ should be used here instead of stability.

The point we wanted to make here was that both columns, on snowpack stability and likelihood of triggering, describe the same phenomena and are to some extent redundant. We will remove the word "inversely" and state that "The load necessary to trigger an avalanche is correlated to snowpack stability".

**Line 241 & 244:** 60 responses in total in line 241, but in line 244, you state 76 responses. What is the difference?

60 was the number of responses in our survey. In addition, we considered the responses from the EAWS working group members in 2019 and in 2022, which added 14 votes. The remaining two votes came from the referenced literature making a total of 76. So 60 votes from an online survey

among EAWS forecasters and 16 votes from outside the online survey. We list the sources in the bullet points in line 236-243.

**Line 258:** Similar to the comment above (Line 104). I view an increase in stability as the snowpack becoming more stable. Instability?

We will rephrase "Examining the most frequently selected combinations confirms that stability, frequency, and size tend to increase with higher danger levels." to "The most frequently selected combinations confirm that snowpack stability decreases, while the frequency of the respective stability class and avalanche size tend to increase with increasing avalanche danger level."

**Line 345:** “center of gravity”? Do you mean largest proportion?

We will rephrase "D = 2 (n = 6806, 56%) has its center of gravity at poor stability with a few or some locations and avalanche size 2." to "D = 2 (n = 6806, 56%) is primarily clustered around poor stability, with a few or some locations and avalanche size 2."