General comments

A nice manuscript. When I saw the title of this paper, I was really looking forward to read it, since it promised to give insights to a decision making aid of assessing avalanche problems in operational services. It was interesting and confirmative to see, that the decision trees you derived from snow and weather data follows at least some intuitive, physical understandable rules and has some parallels to the decision aid we use in operational service, which is based on expert opinion only.

Furthermore, you nicely showed that contextual information such as presence or absence of other avalanche problems have a great influence on the appearance of an avalanche problem as well. This fact should be considered in future decision aid developments, which should – as you suggest – combine data driven approaches, as you have undertaken in your study, and expert opinions.

The next step in my eyes would be to conduct similar studies in other context, e.g. other countries, forecast services or with different definitions of avalanche problem types. Anyway, thanks for breaking the ice into this direction.

I propose hereby some minor revisions as listed below. Since I see this piece of work as very relevant I encourage the authors to undertake the suggested revisions.

Specific comments
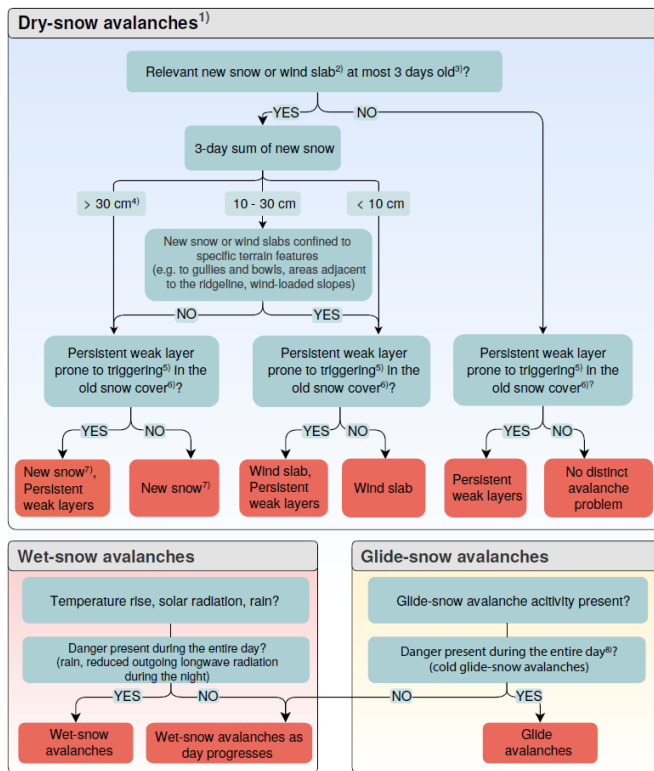
Page 2, Line 2: Problems are assessed by answering four questions:….

- ➔ I'm not sure, whether the questions you mention address only avalanche problems. In my eyes, the questions describe the approach of the conceptual model of avalanche hazard assessment. Accordingly, you should say "Avalanche hazard is assessed by …."

Page 2, Line 7-10: The four references you mention here do not really refer to guidelines for applying avalanche problems. Klassen, 2014 gives a very general and qualitative description of the problem types, Lazar, 2012 shows how danger ratings patterns on specific avalanche problem types, Müller, 2016 and 2018 describes a conceptual and an operational approach of avalanche hazard assessment. None, of these studies directly addresses the assessment of avalanche problems. Therefore, I suggest to reformulate this part. By the way, up to my knowledge, no direct decision making aids or guidelines for applying avalanche problems are published so far. At SLF, we have an internal guideline (see below), which is, however, not published and I guess there are more internal guidelines existing.

Decision guidance typical avalanche problems

Consider only avalanche problems that have a major influence on the hazard assessment.
Avalanche problems describe the source of the hazard and provide information on optimal behaviour.

Dry-snow avalanches[1]

Relevant new snow or wind slab[2] at most 3 days old[3]?
— YES / NO —

3-day sum of new snow
- > 30 cm[4]
- 10 - 30 cm
- < 10 cm

New snow or wind slabs confined to specific terrain features (e.g. to gullies and bowls, areas adjacent to the ridgeline, wind-loaded slopes)
— NO / YES —

Persistent weak layer prone to triggering[5] in the old snow cover[6]?
— YES / NO —

Persistent weak layer prone to triggering[5] in the old snow cover[6]?
— YES / NO —

Persistent weak layer prone to triggering[5] in the old snow cover[6]?
— YES / NO —

| New snow[7], Persistent weak layers | New snow[7] | Wind slab, Persistent weak layers | Wind slab | Persistent weak layers | No distinct avalanche problem |

Wet-snow avalanches

Temperature rise, solar radiation, rain?

Danger present during the entire day? (rain, reduced outgoing longwave radiation during the night)
— YES / NO —

| Wet-snow avalanches | Wet-snow avalanches as day progresses |

Glide-snow avalanches

Glide-snow avalanche activity present?

Danger present during the entire day[8]? (cold glide-snow avalanches)
— NO / YES —

Glide avalanches

1) If in (generally) favorable situations it remains unclear which problem causes the main hazards, use *dry-snow avalanches*.

2) Relevant layer of new snow or wind slab:
The hazard caused by new snow or wind slab has to be equal or higher than the hazard from persistent weak layers.

3) The problem wind slab can prevail for more than 3 days if the wind slabs can still be released and are recognizable as such.

4) If the wind blows in gale-force (average speed > 100 km/h) during the snowfall, use the avalanche problems *new snow and wind slab*.

5) Criteria to assess if a weak layer is prone to triggering:
The weak layer is at the failure layer of avalanches or identified in snow profiles/ stability tests and within the first meter from the snow surface.

6) Weak layer is not at the interface between new snow or wind slab and old snow, so that in case of an avalanche, parts of the old snow release as well. (Otherwise use *new snow or wind slab* and describe the unfavorable old snow surface in the text)

7) If after the snowfall wind slabs were formed that contribute to the overall danger: use both *new snow and wind slab*.

8) Warm glide-snow avalanches (probability of triggering increases during the day) are attributed to the problem *wet-snow avalanches as day progresses*, because both require the same measures for risk management in the field.

Page 3, Line 22: Why do you exclude early and late season? They would probably be interesting for wet snow and gliding snow avalanche problems? This needs more explanation. Probably, you have to adapt on page 4, line 3 as well.

Page 12, Line 7ff: In the decision tree for storm slabs, TSS is appearing, which is a bit surprising for me. Do you have any explanations of this? You did not mention in the text.

Page 19, Figure 7: In the bars at the lower end of the figure one cannot always read the "Surf", "Act" and "Dorm" notations. Maybe, they are better described in a legend.

References: please complete the information; many references are not clear where they were published (see comment of Rune Engeset for more detail)

Page 31-34, Appendix C: The figures are to small to read, make them bigger or increase resolution.