

Interactive comment on “Snow and weather climatic control on snow avalanche occurrence fluctuations over 50 yr in the French Alps” by H. Castebrunet et al.

Anonymous Referee #2

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This is an interesting paper dealing with a novel analysis of a snow avalanche dataset in order to model annual avalanche activity in the French Alps during the last 51 years. The authors found very interesting results, and in particular 2 interesting temporal patterns: a) an increase for the different indicators, which seems to be related to temperature increases at high elevations; b) a generally higher avalanche activity around 1980. The methods proposed take into account, among others, 2 important uncertainties, connected to the quality of records by rangers and the lack of informations about avalanche activity at high elevations, since EPA are carried out mainly by observations from valley floors. Among the variables considered it would be great to underline in the results and discussion sections the wind variable, considering the great contribu-

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tion of this meteorological factor to the slab formation and the avalanche release. Did you find any trend concerning the wind speed? See for example Vautard, R., Cattiaux, J., Yiou, P., Thépaut, J.N., Ciais, P., 2010. Northern Hemisphere atmospheric stilling partly attributed to an increase in surface roughness. *Nature Geoscience* 3, 756-761. If I understood the maximum wind speed and the associated direction are an output of the SAFRAN model.

Other comments Pag 4175 line 13 add temperature fluctuations and wind activity Pag 4175 line 26 What about the potential of sedimentology and stratigraphy in avalanche-hazard research? See for example Blikra L.H. and T. Saemundson. The potential of sedimentology and stratigraphy in avalanche-hazard research. *NGI Publication n° 203 (1998) 60-64*. Pag 4176 line 24 add . at the end etc.. Pag 4178 lines 7, 10. delete . and add ; at the end of the sentences Pag 4179 line 26 delete . and add ; at the end of the sentences Pag 4181 line 3 add a.s.l. after 3000 m Pag 4181 line 6 Why did you consider a threshold value of 40° slope for the avalanche release? Pag 4181, line 11: Wet snow is defined with a liquid water content greater than 0,01 %. Explain why, as usually the value is 8% (volumetric moisture). Only if the water content reaches 7% by volume does strength start to considerably decrease. See for example Mitterer et al., 2011 *Annals of Glaciology* 52(58) 2011 Pag 4181 line 20: Why you didn't consider the meteorological seasons? Pag 4182 line 11: change “– the 57 explanatory SAFRAN-CROCUS snow and weather covariates” into “– the 57 explanatory SAFRAN-CROCUS weather and snow covariates Pag 4184 line 3 add . at the end etc.. Pag 4187 line 24. The stabilizing effect of large snow accumulation may be explained by the prevalence of destructive metamorphism? In this case it could be important to consider also if the large snow accumulation took place early in the winter season. This might be also an artifact of the stepwise procedure, but it would be interesting also to consider the previous thoughts. The same inverse correlation was found also in analyzing the years of high avalanche activity (sections 3.3-3.6). Pag 4190 line 22. Add “It also affected the Western Piedmont Alps, in Italy” (Maggioni et al., 2009). Pag 4193 lines 7-10 see comment above

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