Interactive comment on "Seasonal evolution of a ski slope under natural and artificial snow: detailed observations and modelling" *by* Pierre Spandre et al.

Anonymous Referee #3

Received and published: 16 November 2016

General comments:

The paper presents a quantitative assessment of the water mass that is lost during production of man-made (MM) snow within a French skiing area, using two distinct methods. The authors conclude that under the recorded production conditions around 40 % of the water used for MM snow is lost during the production, among which 10 % are attributed to thermodynamic effects and 30 % to mechanical and/or technical effects (wind, topography. . ..). I suggest accepting the paper but some moderate/major revisions are needed according to the listed specific comments.

Specific comments:

In general the manuscript is well structured but requires a general overview by a an english mother tongue. Moreover it should focus mainly on the main outcomes of the research, with a reduction of some sections that now are too wordy. In particular the abstract and the conclusions should be shortened.

Specific comments are listed below:

Pag 1 line 25: I think that snowmaking is not only related to the mitigation/adaptation of the effects of climate change but also to face the natural variability of snow conditions. Keep in mind the concept of natural variability as you reported in the abstract (Pag 1 line2).

Pag 2 line 5: See also: Signatures of Evaporation of Artificial Snow in the Alpine Lower Troposphere (SEASALT) Geophysical Research Abstracts, Vol. 10, EGU2008-A-11002, 2008 SRef-ID: 1607-7962/gra/EGU2008-A-11002 EGU General Assembly 2008

Pag 2 line 21: How did they explain such differences between fan and air water guns?

Pag 2 line 23: How the vegetation may influence the efficiency of MM snow?

Pag 2 line 24: Here the authors report as external factors wind, topography and vegetation. At pag 1 line 18 you reported human decisions and not vegetation. Please here and in the all text consider the same external factors.

Pag 2 line 30: Among the available data on the snow production why you don't consider the relative humidity in air?

Pag 3 line 4: What do you mean with the term important? Do you refer to the number of skiers that ski along the slope?

Pag 9 line 10: At what depth did you measure the snow density? Do you assume that the snow density was constant at the different depths in the snow piles? I think that the snow density could be higher at greater depths in the snow piles. What are the main

results from the application of the PICO coring auger (Pag 9 line 13).

Pag 9 line 11: Why you could not perform the snow density measurement?

Pag 11 line 3: Do you assume a higher melting rate due to the reduction of albedo caused by the deposition of dry particles?

Pag 20 line 10: I think that the authors should provide more details about the methodology elaborated by Eisel (1988) to calculate sublimation/evaporation. Since this is the main source of potential mass loss beside mechanical effects, this subject shoud be better clarified in the whole paper.

Pag 21 line 31: Among the ideal conditions I would add also the low water content in air.

Pag 23 line 6: Do you mean that in December you had an extreme meteorological event? Please take into account that December 2015 was exceptionally mild with little snow. How this extreme meteorological event affect the snowmaking in the study area? You reported this point in the conclusions but not in the Discussion section.

Technical corrections: Pag 3 line 4: add . after a.s.l.

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