

Interactive comment on “Spatial distribution of stable water isotopes in alpine snow cover” by N. Dietermann and M. Weiler

Anonymous Referee #3

Received and published: 26 April 2013

General comments:

First of all I would like to follow my co-referees in expressing my condolences to the family, friends and colleagues of Nicolai Dietermann. Almost one year after his accident I am so pleased to see his excellent work being published here. Therefore my great respect goes to Markus Weiler for carrying on this work.

The authors present in their paper an interesting dataset of stable isotope values of a large number of snow samples collected at the end of the accumulation period and during the snowmelt season of 2010 in the Swiss Alps. Notable is the fact that the sampling strategy was set up in such a way that the samples span a wide range of elevations and that they were collected at different topographic locations. With this set

up the authors were able to use a multiple linear regression approach to explain the isotopic composition of the snow cover. As a result they could clearly demonstrate that variables like altitude, aspect, slope etc can hardly explain the variations of isotopes values in the snow cover, but that variables like deviation of snow depth and the day of the year have significant influence on predicting isotope values at the catchment scale.

The paper is well structured and written with an adequate amount of figures and tables. Results are presented in a clear and concise way and they contribute to an improved understanding of the spatial variability of stable isotopes in snow covers.

I am recommending accepting the paper for a publication in HESS, considering the minor revisions according to the specific suggestions and technical comments given below.

Specific comments:

The paper would benefit from an additional figure showing the relationship between oxygen-18 and deuterium. In such a classical diagram the values could be displayed in the context of the Global meteoric water line (GMWL) and the Local meteoric water lines (LMWL) of the investigated areas (one for the Eastern Alps and one for the Bernese Alps). This figure would also help interpreting possible fractionation effects of the snow samples during the ablation phase.

The method section could be improved by giving more information about the sample numbers and the location of those inside the catchments. Also the third ascent, presented in figure 3, is not explained in the methods section.

Like the second reviewer I also would like to suggest an independent regression analysis for the pre-melt and melt situation.

Technical comments:

2644, 20: The meaning of “expert” is not clear; Do you maybe mean “experience” or “undergo”?

2647, 12: Please reformulate the sentence “For this reason, ... ”.

2649, 16: Change “significantly” to “significantly”.

2651, 26: Change “in average” to “on average”.

2654, 6: Change “proof” to “prove” or to “verify”.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 2641, 2013.

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Interactive Discussion

Discussion Paper