

Interactive comment on “Post-depositional changes in snow isotope content: preliminary results of laboratory experiments” by A. A. Ekaykin et al.

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The authors of the manuscript thank a lot the anonymous Referee #3 for his constructive criticism and suggestions on how to improve the manuscript.

Below are the answers on his remarks.

The paper by Sokratov and Golubev (2009) was cited in the first version of the manuscript, but as an article in press. We will certainly update this reference. We absolutely agree that the deuterium excess values measured in the experimental snow would tell us much more about this PD story. Once $\delta^{18}\text{O}$ of the samples is measured, we will present the new data in a separate paper, while the main purpose of the current C1312

rent manuscript is to describe the experimental set-up, conditions and results, and to demonstrate (qualitatively, on this stage) the existence of the PD effects. According to the Referee, the description of the experiment is somewhat misleading. We will follow his advice and enlarge the experimental scheme in order to make it more readable (if we understand this recommendation correctly). The mass- and isotope model, and all related discussions, will be completely excluded from this manuscript, following the remarks by the other two Referees. We may agree that the bulk of the sublimation is delivered from a thin uppermost layer of the snow samples, which may explain a nearly constant surface snow density during the experiments. But more important for understanding the PD process is the mass exchange between the surface and deeper snow layers, which drives the “isotopic wave” into the snow thickness, as we can clearly see in the isotopic profiles. We will follow the Referee’s advice and will give more detailed presentation and discussion of the data on Figure 5, and will modify the figure itself accordingly. We appreciate a lot the Referee’s suggestions on how to improve the future experiments. We hope that we will be able to use these advices some time, though, unfortunately, no more experiments can be carried out in the nearest future. We will take into account the remarks concerning Fig. 6 and p. 2254. There is no discrepancy between data on Figures 5 and 6: the snow mass during experiment 6 has reduced by about 70% (Fig. 6). At the same time, snow height did by only about 60% (Fig. 5). The difference is explained by noticeable reduction of the snow density from 0.43 to 0.32 g cm⁻³.

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