The Cryosphere Discuss., 6, C963–C964, 2012
www.the-cryosphere-discuss.net/6/C963/2012/

The Cryosphere Discussions

Interactive comment on "Vapor flux and recrystallization during dry snow metamorphism under a steady temperature gradient as observed by time-lapse micro-tomography" *by* B. R. Pinzer et al.

Anonymous Referee #2

Received and published: 9 July 2012

General comments

This paper estimated the temperature gradient metamorphism measuring the microstructure using X-ray tomography. The positions of sublimation and condensation were analyzed for the first time. The residence time and vapor diffusion coefficient were estimated as analysis results. It is well-made and all right for me to accept this paper. I have just a few minor questions and comments as follows.

Specific comments

page number is for discussion paper.

p17

It is mentioned that "there is a general consensus that for molecularly rough surfaces $\alpha \approx 1$, while on facets $\alpha < 1$. " But the α was assumed to be 1 because the fraction of faceted surfaces are typically lower than 20%. However, in this experiment, the faceted crystals developed with time and the α value is expected to decrease in a precise sense. The influence of it on α value cannot be estimated because it is only mentioned that "α for faceted crystals is less than 1". Do you have any sample value of α for the faceted crystals and be able to verify the influence of the assumption "α=1" is sufficiently small?

p21

Figure 8 and 9 showed that the series 3 had different tendency from series 1 and 2. Series 3 increase mass turnover rate and structure number with time. Do you have any idea of the reason why the series 3 had different tendency?

p23

The experiment in this manuscript support the arguments of Giddings and LaChapelle (1962) in which the influence of snow structure on vapor diffusion coefficient is negligible. Adding chart or table which can be overlooked the state of the influence of snow on vapor diffusion coefficient, experimental condition such as snow density and temperature gradient, and estimation method for previous study and this study is helpful to understand the relationship between the state of the influence of snow and experimental condition.

Interactive comment on The Cryosphere Discuss., 6, 1673, 2012.