

## ***Interactive comment on “The snowdrift effect on snow deposition: insights from a comparison of a snow pit profile and meteorological observations” by M. Ding et al.***

**Anonymous Referee #3**

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### General comments

The paper deals with the important issue of dating uncertainties of polar ice cores with the focus on the role of discontinuous snow deposition due to snowdrift events. The authors present a comparison study between meteorological observations measured with the means of an automatic weather station and snow pit investigations. They performed two different dating procedures over a 3 year period, one based on the precipitation and temperature data of the weather station and one based on the chemical/isotopic records of the snow pit samples. The dating differences cumulate to 1 year which is quite large in respect to the 3 year period of consideration. Therefore they concluded that snowdrift processes have a significant influence on ice core dat-

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ing. Due to the close vicinity of the area of investigation and Dome A they underline the importance of their findings especially for the dating of the deep ice core at Dome A.

In my opinion the paper in its actual configuration might be not suitable for publication in TCD for several reasons. The structure of the paper confused me. There is no separate chapter where the results are presented. Therefore it was very hard to distinguish between observations, implications and conclusions. The dating methods are not well explained. A critical discussion about the interpretation of the deposition records from the ultrasonic sounder is missing. The conclusion that the dating differences are solely due to snowdrift events is not convincing me. There is no discussion about the post-depositional change of the isotopic signal. On the other side there is unnecessary information presented that is not used for dating or other conclusions (density profile, wind direction, ...). The generalization of their findings and the special importance for Dome A seems to be doubtful since Dome A has much lower accumulation and much less of wind. Overall, I would suggest major restructuring and rewriting before publication.

### Specific comments

#1 The historical context of ice coring projects is not necessary to describe.

#2 Acronyms are not explained including EPICA, NEEM, GNIP (GRIP?), SPWD, SMB).

#3 Introduction: The enormous difference of 1275 yr in the dating of a shallow firn core by Jiang et al.(2012) and Li et al. (2012) might have other reasons than the suggested one of a disturbance of the stratigraphy by post-depositional events. In general, the dating is performed using well-documented volcanic events measured in the ice by chemical analysis or dielectric profiling.

#4 Accumulation must be related to water or ice equivalent (page 1419: line 18, page 1438: Fig. 6)

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#5 Figure 7 is confusing me. Is Fig 7a the result of the dating mismatch? And what is the typical regression between  $\delta^{18}\text{O}$  and Temperature in this area? The labels on the axes of Figure 7 are to small.

#6 It would be helpful if additional information about the snow pit's stratigraphy (layering, crusts) and more chemical components like  $\text{Ca}^{2+}$  are available.

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Interactive comment on The Cryosphere Discuss., 7, 1415, 2013.

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