

## ***Interactive comment on “Stable water isotopes of precipitation and firn cores from the northern Antarctic Peninsula region as a proxy for climate reconstruction” by F. Fernandoy et al.***

**F. Fernandoy et al.**

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- Comment 1 from Reviewer: I would be careful in using estimated negative mean annual air temperatures as indicator for the presence of cold firn or ice. Surface melting in summer and subsequent release of latent heat during refreezing of the meltwater may result in significant energy input. This could explain the presence of a water table at KGI, despite of the estimated MAAT of -6 to -6.6°C.

Answer: The referee is right in this point. The release of latent heat it playing an important role especially on the upper firn-layer as stated by Blindow et al. (2010). In our paper we only referred to estimated mean annual air temperature of both study re-

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gions, but we have no evidence of the ice thermal regime. Nonetheless previous works by Rückamp et al. (2010) and Blindow et al. (2010) show evidence of a polythermal ice regime for the KGI ice sheet, unfortunately no similar investigation has been carried out for the northern Antarctic Peninsula region. References: Blindow, N., Suckro, S., Rückamp, M., Braun, M., Schindler, M., Breuer, B., Saurer, H., Simoes, J., and Lange, M.: Geometry and thermal regime of the King George Island ice cap, Antarctica, from GPR and GPS, *Ann. Glaciol.*, 51, 103- 109, 2010. Rückamp, M., Blindow, N., Suckro, S., Braun, M., and Humbert, A.: Dynamics of the ice cap on King George Island, Antarctica: field measurements and numerical simulations, *Ann. Glaciol.*, 51, 80-90, 2010.

- Comment 2 from Reviewer: Do you refer to amount or number of events when you state that the precipitation samples show almost no seasonal difference? Did you weigh the mean data presented in table 2 by precipitation amount?

Answer: Yes, we refer to the number of precipitation events as registered at O'Higgins Station. The values presented at table 2 are non-weighed. However, the weighing of the data is not unproblematic, because the measurement of the precipitation amount is complicated especially during snow fall in a daily basis. Snow blowing and drift are common for this region. Moreover no systematic monitoring of surface mass balance is carried out for this region at the moment. A comparison of weighed (w.) and non-weighed isotope values as registered at O'Higgins station is presented in the following table. No major difference is observed between both though.

- Comment 3: The correlation of the deuterium excess with local air temperature is intriguing. It would be interesting to look at spatial correlations, using for example NCEP reanalysis data, to confine the area.

Answer: Indeed this observation is highly interesting. Further analysis of the spatial correlation, as suggested by the reviewer, using NCEP reanalysis data confirm our previous conclusions. The better correlation is observed ( $r = 0.7$ ) with the northern

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Bellingshausen Sea/South Pacific sector. The following figure summarizes the spatial correlation of a combination from the monthly d excess means of the firn cores FP-1 and OH-6 to the air temperature. It is also interesting to observe that d excess better correlates with the South-Atlantic than to South-Pacific. However, a mechanism explaining this feature is difficult at this stage, due to the shortage of the time series.

- Comment 4: I suggest combining figs. 15 and 16. Answer: Will be done according to the suggestion.

- All other minor comments will be improved in the revised version of this paper

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Interactive comment on The Cryosphere Discuss., 5, 951, 2011.

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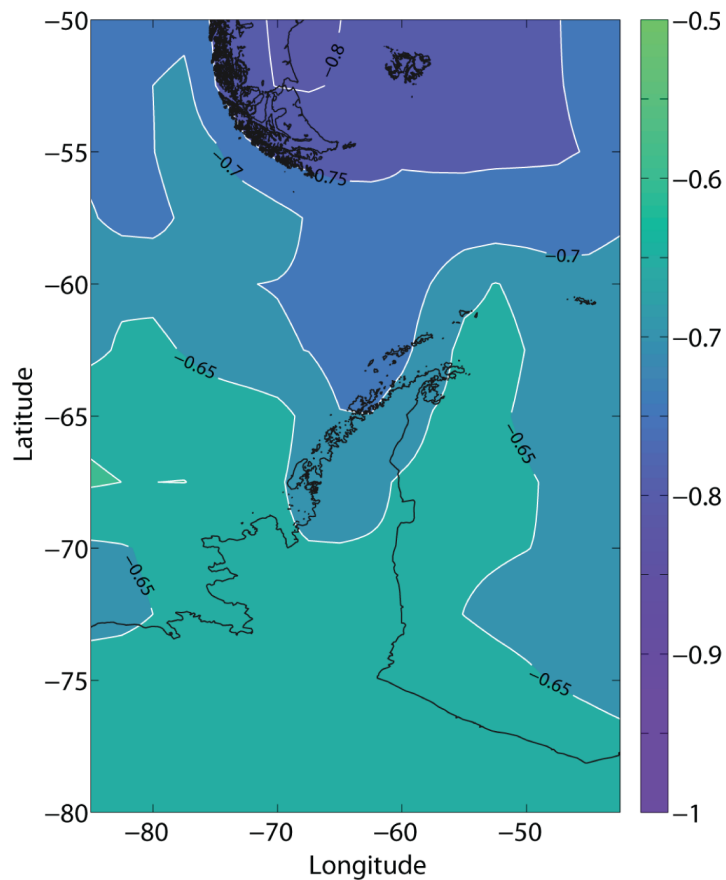
|         | $\delta^{18}\text{O}\text{‰}$ |       | $\delta\text{D}\text{‰}$ |        | $d_{\text{excess}}\text{‰}$ |      |
|---------|-------------------------------|-------|--------------------------|--------|-----------------------------|------|
|         | n.w.                          | w.    | n.w.                     | w.     | n.w.                        | w.   |
| mean    | -9.2                          | -9.7  | -70.5                    | -75.0  | 2.7                         | 2.7  |
| min     | -19.4                         | -19.4 | -150.6                   | -150.6 | -6.6                        | -6.6 |
| max     | -3.8                          | -3.8  | -21.8                    | -21.8  | 22.3                        | 22.3 |
| std.dev | 3.3                           | 3.1   | 26.4                     | 24.5   | 4.2                         | 3.4  |
| n       | 139                           |       | 139                      |        | 139                         |      |

**Fig. 1.** Comparison of weighed (w.) and non-weighed (n.w.) isotope values as registered at O'Higgins station is presented. No major difference is observed between both though.

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**Fig. 2.** Spatial correlation of the calculated d-excess monthly means against air temperature (at surface level) from NCEP reanalysis.

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