

## ***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.***

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The study presents the stable isotope composition of water in precipitation and firn cores collected at the South Shetland Islands and the Antarctic Peninsula. The controlling meteorological variables were investigated using correlation analysis. The deuterium excess was the only isotope parameter showing a consistent relation (anticorrelation) with local air temperature for both types of samples, precipitation and firn cores (from the two highest locations). For delta-18-O, in contrast, a correlation with local air temperatures was observed just for the precipitation samples. The absence of the relation with the firn cores was explained by the limited seasonal temperature varia-

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tion. From the firn cores only the two from the highest locations (OH-6, FP-1) are not influenced by melting and contain suitable proxy information.

Overall this is a thorough study from a geographical area which is of high scientific interest due to the strong recent warming, but is logistically difficult to access and has very limited data coverage. Especially the year-round precipitation data are very valuable for the understanding of the complex stable isotope behavior. The results form a good basis for interpretation of future ice cores from this region. The manuscript is original, well written, has illustrative figures, and is of scientific interest.

Comments and questions

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.

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?

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.

I suggest combining figs. 15 and 16.

Minor comments:

The introductory parts of Chapter 4.1 and 4.2 would better fit to the introduction.

Page 952 Line 8: . . . meteorological variability. . . Here you could be more specific.

Line 15: appropriate locations for future ice core research?

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Line 20: ...The influence of the Antarctic Circumpolar Current on the ocean...

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Line 12: ...stratospheric ozone depletion...

Line 19: The interpretation of this proxy is not...

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Line 1: What was the diameter of the cores?

Line 7: Could you include the precision of the analysis?

Page 958, line 17: ... between the water molecules containing different stable isotopes of oxygen and hydrogen lead to fractionation...

Page 960, line 22: Could you add a reference for the Vernadsky station data?

Page 961, lines 8-10: This is a repetition and could be omitted.

Table 3: units are shifted for the O'Higgins – Monthly means

Table 4: Explain SIF in the caption.

Fig. 13, caption:...The first day of year...

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