

Interactive comment on “Stable water isotope variation in a Central Andean watershed dominated by glacier- and snowmelt” by N. Ohlanders et al.

J. C. Yde (Referee)

jacob.yde@hisf.no

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This manuscript presents an interpretation of stable water isotope composition in water sources to Juncal River, Chile. The dataset is one of the most complete on glacier isotope hydrology I have ever seen as it covers an entire glacial year (April 2011 – March 2012) with acceptable temporal coverage and includes both d2H and d18O isotopes. One could always wish for more samples (e.g., a few more altitudinal transect surveys and diurnal sampling campaigns), but given the seasonal accessibility and logistics involved when dealing with glacier watersheds, there are enough data to address the

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research questions: What is the glacier-derived contribution to stream flow and does it vary throughout a dry La Nina year? The study area is excellent as it is of socio-economic importance to people living downstream, and it is relatively accessible. I find the manuscript well-written and well-organized, but most sections could be shortened without losing any significant information. The sampling and methodology seem robust and follow previous protocols. The estimation of the glacier-derived component in the hydrograph is rough and hampered by significant differences in snow-samples collected at the lowest altitudes (Fig. 5). A more repetitive sampling strategy could have helped here. Overall, I find that this is a significant study in its field that merits publication in HESS.

Comments:

12228, 7: Here and throughout the manuscript I recommend that ‘glacial’ is changed to ‘glacier’, which is a more correct term in this context. An exception is 12242,5 where ‘glacial’ should be changed to ‘glacierized’.

Introduction: Sections 1.1 and 1.2 could be shortened by about one-third.

12229,7: Change ‘water’ to ‘meltwater’.

12231,4: Insert comma after ‘molecules’.

12232,26-29: Delete this superfluous sentence. Also, there is no need to reference an unpublished study, as similar studies combining isotope hydrology and hydrochemistry have been published from other glacierized watersheds.

12233,11 and later: The many geographical abbreviations (JB, JR, JG, JM, JN, JS, GB, MB, NB) hampers the reading flow. I had to make a sketch of the area to keep track of the abbreviations. The readability will most likely be improved by writing the full location names and improving Figure 1b.

12233,24: I guess JB should be GB.

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12234,9-10: It is difficult to follow the logic in this sentence. What does 'therefore' refer to? The sentence should be rephrased, moved or deleted.

12236,8-13: Mention the number of samples in the text.

12236,14-17: These spring samples do not seem to have any influence on the 'Results and discussion', and should therefore be omitted.

12237,1: Show the sampling locations along the altitudinal transect in an improved version of Figure 1b.

12238,21-23: This sentence is confusing. The assumption of 0.5 m seems to derive from Figure 3, which makes it problematic to estimate the contribution of glacier melt from Figure 3.

12242,6: Why is JG and JM in brackets?

12242,8: Only use one digit.

12242,24: Insert period after '8'.

12243,3: Insert 'on a daily scale' after the second 'data'.

12244,23: 'Episodic' is misspelled.

Section 3.4.3: The representativeness of samples collected at 17:00 hours should be addressed in more detail in order to determine whether this is causing a seasonal bias. It should be possible to calculate a discharge-weighted daily mean isotope value for the 24-hour period and compare this value to the 17:00 value to get a rough idea of the deviation on a single day. Discuss the diurnal oscillation in relation to the seasonal '17:00' variation (standard variation).

12245,19: Was 3 April 2012 a clear sky or a cloudy day?

12246,5: The time of sampling should be mentioned in section 2.4. It should also be in 2.4 that a diurnal (three-hour) sampling campaign was conducted.

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12248,14: Could this 'high confidence' be estimated statistically?

12249,18-21: There is a contradiction in this sentence as loss of glacier volume results in increasing discharge, not decreasing discharge. The effect of decreasing discharge as a consequence of climate change may appear on a centennial time-scale. Unless projections of glacier meltwater changes have been made in the region, I recommend that this sentence is deleted.

Section 4: This section could be shortened by half.

Table 1: Explain the abbreviations in the caption.

Table 2: Explain the abbreviations in the caption. Use one digit for the standard deviation of d18O. Are the diurnal samples included in JR (they should not be included, except for the 17:00 sample)?

Fig. 1: Explain the abbreviations in the caption. Figure 1b should be larger and include the sampling locations along the altitude transect.

Fig. 2: It is standard for hypsometric curves to show Altitude on the y-axis.

Fig. 3: Mention the trend line equation and r²-value in the caption.

Fig. 6: Insert a reference to the Chilean Meteoric Water Line data.

Fig. 7: Insert a reference to the Chilean Meteoric Water Line data.

Fig. 8: The d18O-curve must be presented below the d2H-curve. This is very valuable information for the reader (despite that the signals co-vary).

Fig. 9: Insert the discharge curve in the figure.

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