Hydrol. Earth Syst. Sci. Discuss., 9, C5717–C5719, 2012
www.hydrol-earth-syst-sci-discuss.net/9/C5717/2012/

Hydrology and Earth System Sciences Discussions

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

Anonymous Referee #1

Received and published: 10 December 2012

General Comments

This manuscript has challenged to quantify the source of streamflow, whether they are from snow melt or melt of glacier, in a central Andean watershed using stable isotopes of water. This manuscript contains valuable data that should be published and the topic is also very important and challenging and will be suitable to publish at Hydrology and Earth System Sciences. However, at this present condition, it is difficult to follow and understand the results and discussion. I cannot judge if the quantified numbers are sufficient (50-80%) but information and data presented in this manuscript is certainly

valuable.

Specific comments

(1) It lucks information and consideration of flowpath. Is the glacier and snowmelt reaches to stream as an overland flow without mixing with groundwater, or they once infiltrated into soil and bedrock and discharge? It may be different depending of temperature and/or season. Schematic illustration and/or description of (assumed) flowpath at this watershed is helpful to understand.

(2) It is regrettable that this study only uses water isotopes as tracers. It is generally recommended to use multiple tracers for the flowpath understanding and separation of hydrograph. Other tracers, such as dissolved silica and/or even Electrical Conductivity may enrich the understanding of flowpath and increase the precision of separation. There is description mentioning EC in the manuscript so I assume that authors have measured EC.

(2) One of the main finding of this study is that clear altitudinal gradient of isotope concentrations in snow and these differences are, assumingly, relatively larger than temporal changes in isotope concentrations of snowmelt from each location. Therefore, variation in water isotopes in stream can be used to separate the altitudinal source of snowmelt. Here, I wonder if there are altitudinal gradient of isotope concentration in glacier melt and they should be considered. I also wonder possible ranges of temporal changes in snowmelt isotope concentration and their effect on stream isotope concentration.

(3) Manuscripts is too long. Some sections can be removed. (ex. P12230, L12-17)

(4) It seems that title does not clearly reflect the contents of the paper.

Technical corrections

P12230, L1: "melt" is "snow melt"?

P12230, L24: Many previous studies have used isotopes to detect the “time source” of stream. But I understand this study tried to justify that isotope can be used to separate “spatial source (snow melt and glacier melt, melt from different elevation) at large watershed with large altitude ranges.

P12233 : Study Objectives are not clear.

P1233, L16: Use of many abbreviations, such as JN, JM, JB made me difficult to follow lines.

P12236, L12-13: “while the outlet of the Monos de Agua (JM) and Navarro (JN) tributaries were sampled. . . ” what these samples represent for?

P12236, L14-17: There are no isotope data shown for this spring.

P12243, L1-: It is difficult to follow lines. Please insert figure numbers in approximate locations. I did not understand the expression “line 5” in P12243 L20. Then explanation of lines in Fig8 appears later in P12244, L24. This explanation should appear before “line5”.

Table 1 and Table 2: It is difficult to understand what abbreviations such as “JG”,”JM” represented for. “JG” represents sample type?

Table 3: It is difficult to read and understand this table.

Figure 6: there are no Glacier points in lower figure.

Figure 9: It should be informative to show discharge together with isotopic variation.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 12227, 2012.