**RESPONSES TO REFEREE REPORTS**

Note: The numbering of the lines along with observations refer to the original document of the referees.

**REFEREE REPORT 1**

**Observation 1: line 169**

Usually, in order to define the uncertainty of a measurement the precision is reported. The precision is the "Measure of the degree of agreement between replicate measurement results obtained on the same sample under stipulated conditions

(repeatability, intermediate precision/within-laboratory reproducibility,

reproducibility)."

While, the accuracy is defined as "Closeness of agreement between a measurement result and the true value of the property being measured." from the J. F. Carter and V. J. Barwick (Eds), Good practice guide for isotope ratio mass spectrometry, FIRMS (2011). ISBN 978-0-948926-31-0.

Please, explain why the authors have reported only the accuracy.

R: We thank the reviewer for this lesion and apologize for our imprecision. We attended the observation correspondingly throughout the document.

**Observation 2: lines 616**

Please, report data always with the same number of significative digits (after the decimal separator). In general, I would report just one significative digit, except for EC (no significative digits) and Fe, F, Zn, Li, Mn, Ba (two significative digits).

R: We corrected Table 1 according to the suggestion.

**Observation 3: lines 619**

Please, report the analytes in the same order as in Table 1.

Correct the symbol.

‰ vs VSMOW

Please, report data always with the same number of significative digits (after the point). In this case, I would report just one significative digit.

Is Si or SIO2?

R: We corrected Table 2 according to the suggestions.

**REFEREE REPORT 2**

**Observation 1: line 16**

In the paper you refer to Group 1, Group 2, Group 3, and Group 4. These names are NOT helpful to the reader and are frustrating because the reader MUST remember what water corresponds to each group. Here, you introduce categories of water that correspond to your group names. PLEASE substitute these names in place of "Group" so the reader can follow your science MUCH easier.

R: We changed the names of the groups in the whole manuscript according to the observation.

**Observation 2: line 23**

n=? samples

please add number of samples

Most groundwater contains at least a small fraction of modern water.

R: We added the number of samples. Twenty-seven out of 40 groundwater samples contain at least a small fraction of modern water.

**Observation 3: line 25**

"may help" is a weak statement

This study may help local water authorities to identify and dimension groundwater contamination, and act accordingly.

R: We changed the sentence to: This study will help local water authorities to identify and dimension groundwater contamination, and act accordingly.

**Observation 4: line 77**

And may be broadly applicable to other active volcanic systems on Earth...

R: We accept and added the suggested text: ...and may be broadly applicable to other active volcanic systems on Earth

**Observation 5: line 80**

This statement is confusing - you say according to Koppen and cite Peel and include "Cwa" I don't know what Cwa is. Please reword sentence.

R: We accept. The new sentence is as follows: According to Köppen classification, the climate in Guadalajara is considered a warm temperate climate “Cwa” (Köppen, 1936).

**Observation 6: line 85**

This section better describes "TECTONIC SETTING" Change the heading?

Also, this section probably has WAY more detail than what is necessary for the reader to gain a grasp that the geologic setting is complex. Furthermore, many of the details in this section are not necessary to understand the science in your paper.

R: In the previous revision one reviewer required us to describe the hydrogeological settings with more detail. We propose to divide section 2.1 into two sections: 2.1 Tectonic Settings and 2.2 Hydrogeological Settings.

**Observation 7: line 102**

The following paragraphs describe the HYDROGEOLOGICAL SETTING - new heading?

R: Section 2.1 was divided into two sections: 2.1 Tectonic Settings and 2.2 Hydrogeological Settings. The hydrogeological section was revised.

**Observation 8: line 105**

References listed out of order

R: The references were order chronologically: Gutiérrez-Negrín, 1988; Urrutia et al., 2000; Campos-Enríquez et al., 2005

**Observation 9: line 109**

In other parts of the paper you use ms-1 (for example) - please pick one style of unit reporting and stick to it.

R: We unified the style of unit reporting in the whole document.

**Observation 10: line 114**

Statement is not clear - is the confined aquifer a source of the fluids or does it transmit the fluids or do something else?

R: This observation was attended correspondingly. In the lines 113 and 114 we specified that the lower aquifer (the confined) is the recharge source of the upper aquifer (the semi-confined) and this recharge is done by ascending vertical fluids so it also transmits the fluids. The geothermal fluids are related to this aquifer because the hottest water coming from the lower aquifer is ascending toward the upper one and recharging it.

**Observation 10: line 136**

References listed out of order

R: The references were ordered to: Urrutia et al., 2000; Campos-Enríquez et al, 2005; Verma et al., 2012

**Observation 11: line 151**

Were your samples collected during a rainy season, a dry season, or other? Please say so here to link sample collection to weather and climate presented earlier

R: We reported the season the samples were collected: Water samples were collected from 40 production wells using standard protocols in March 2011 when, according to the climatology history of CONAGUA (2012), the season is dry.

**Observation 12: line 152**

# Please list your ions here so the reader knows exactly what you measured

R: We included the analyzed ions: The samples were analyzed for major and minor ions (Na, K, Ca, Mg, Cl, SO4, HCO3, SiO2), trace elements (Sr, F, Fe Zn, Li, Mn, Ba, NO3-N) and isotopes (δ2H, δ18O, 3H).

**Observation 13: line 164**

Report precision of isotope O and H isotope analyses

R: We reported: The analytical precision was ±0.15% (d18O) and ±2% (d2H), respectively.

**Observation 14: line 171**

vague - like what? (line 171)

R: We included the processes: A preliminary description of water chemistry and identification of possible processes as water-rock interaction, mixing, evaporation, hydrothermal processes, anthropogenic contamination and transport of contaminants were performed using a correlation analysis.

**Observation 15: line 206**

I really think that Fig. 4 is unnecessary. You can just say that previous studies have tried to find relationships using linear plots but this practice has led to little success (and cite the studies)

R: We accept the suggestions and eliminated Fig. 4. Previous studies are mentioned and the paragraph corrected. Sánchez-Diaz (2007) used groundwater temperature and total dissolved solids as criteria to classify wells in hydrothermal water from Toluquilla, hydrothermal water from springs NE of Guadalajara, non-hydrothermal, local groundwater, and mixed groundwater with both hydrothermal water and local groundwater (Gutiérrez Negrin, 1988; Maciel-Flores and Rosas-Elguera, 1982).

**Observation 16: line 208**

BIG RED FLAG - You really need to comment on this more thoroughly. Did the inconsistencies result from seasonal biases or is the water chemistry really that dynamic? Please elaborate.

R: The paragraph was corrected accordingly. The variation is because most of the sampled sites do no agree between the different sampling campaigns. Also, seasonal biases play a role.

Furthermore, some inconsistencies between correlation results from different sampling campaigns show that the interpretation is not straightforward.

R: We did not have another sampling campaign which makes it difficult to interpret. This has been mentioned previously.

**Observation 17: line 215**

Why does it vary? How does this impact your data and analysis?

R: Because the measured parameters varied considerably from study to study, only data from this study were considered for chemical characterization and multivariate analyses.

**Observation 18: line 220**

Subscript ions

R: We attended the observation accordingly.

**Observation 19: line 225**

THIS IS NOT HELPFUL - As I suggested in the beginning, here is where you NEED to also say what your four group names are as in "Cold Groundwater" etc. Please change all "Group" names to the explicit name you decide on like "Cold Groundwater" - this includes replacing "Group" in all of your graphs with the appropriate name.

R: We agree. We replaced the numbers with the names of the groups. The HCA samples were classified into cold groundwater (CG), polluted groundwater (PG), mixed groundwater (MG) and hydrothermal groundwater (HG) as represented by the dendrogram (Fig. 5) and median values (Table 2).

**Observation 20: line 228**

Please talk about your groups in order of how you introduce them in the previous paragraph or in your figures

R: Groundwaters were grouped as they were presented in previous paragraphs.

**Observation 21: line 242**

Why are you referencing Fig 3?

R: The reference was eliminated.

**Observation 22: line 255**

Can you help the reader out to make some connections. Does any of this discussion refer to any of your four groups? If so, please make the connection

R: In the description of the PCA factors the groundwater groups were related correspondingly with groundwater types.

**Observation 23: line 273**

Which groups?

R: CG shows to be principally of meteoric origin. PG is influenced by evaporation, MG is a mix of meteoric and thermal water and HG is of thermal origin. The paragraph was modified correspondingly.

**Observation 24: line 274**

Need hydrothermal fluid end member on plot or indicate which "Group" you are using as your hydrothermal end member (line 274)

R: We attended the suggestion and added end members CG y HG (AT05 and AT37) in new Fig. 6.

**Observation 25: line 279**

Vague - please specify the different climate conditions

R: After a revision of other literature we came to the following conclusion: In general, they tend to fall slightly below and parallel to the RMWL, which most likely represents precipitation of a different origin, i.e. from rainstorms coming from outside the basin limits (e.g. Mahlknecht et al., 2004)

**Observation 26: line 288**

I disagree (line 288)

R: We modified the sentence as follows: These values fall between cold and hydrothermal groundwater indicating the mixing between both

**Observation 27: line 292, 293, 294**

Is this irrigation? If so, it may explain some of your data.

R: We considered this observation correspondingly.

**Observation 28: line 298**

Specify which times

R: This observation was attended correspondingly. Recharge occurs mainly between June and September.

**Observation 29: line 302 to 312**

Are any of these relationships associated with waters from any group? (line 302)

n=?

Please don't make the reader sift through your tables (line 304)

X # of samples (line 305)

n=? (line 305)

Associated with any group? (line 309, 310, 311, 312)

R: We attended the observations accordingly. The parragraph was modified as follows: Tritium results indicate that groundwater within the study area includes both pre-modern (pre-1950s) and modern recharge. The values range from 0.3 to 3.0 TU which suggests a contribution from modern water in most sampled sites. Hydrothermal groundwater and mixed groundwater show less tritium activity in comparison to cold and contaminated groundwater (Table 2). Lowest values are in the order of analytical precision, thus eight samples may not contain modern water. Twenty one samples considering hydrothermal and mixed groundwater with 3H lower than 1.0 TU are in the southern portion of the aquifer system. Cold groundwater with elevated 3H values (>1.5 TU) located mostly in the La Primavera volcanic system represent young waters or recent recharge with little mixing of path lines. Waters with 3H values <1.5 TU illustrate that these wells may represent mixing of flow paths with modern and pre-modern groundwater residence times. These waters are found mostly in Toluquilla referred to as hydrothermal groundwater, corresponding to elevated EC, Cl and DIC values. The mixing of water from different ages is expectable because the aquifer is under unconfined conditions, while wells penetrate the saturated zone to a considerable depth, at times up to 500 m, and are almost always completely screened.

**Observation 30: line 319**

1.7 in table (line 319)

R: We agree. We modified the number: 1.7 is the correct one.

**Observation 31: line 326**

Please relate back to your groups (line 326)

R: This suggestion was attended correspondingly.

**Observation 32: line 598**

. at end of sentence

Please describe black lines (line 598)

R: We attended the suggested changes.

**Observation 33: line 601**

Log plot

R: This observation could not be attended because the figure was eliminated following observation 15.

**Observation 34: line 610**

Atas?

R: “ATAS” was replaced for “Atemajac-Toluquilla aquifer system”

**Observation 35: line 613**

From figure legend -

What is imta, geoex, and siapa

R: The abbreviations are now explained in the figure legend.

IMTA = Instituto Mexicano de Tecnología del Agua, GEOEX = Geología y Exploraciones, SIAPA = Sistema Intermunicipal para los Servicios de Agua Potable y Alcantarillado.

**Observation 36: line 628**

Add spring locations?

R: We added the spring locations

**Observation 37: line 630**

label upper and lower aquifers in all three sections

why no hydrothermal flow in section 2?

Please put water tables or approximate water tables in sections 1 and 3

Section 3 has funny geology. You middle fault block cannot go up on the left side and down on the right. You have violated basic physics. Please revise your fault planes.

R: We attended all suggested changes correspondingly in the three sections

**Observation 38: line 635**

Rename group names to descriptors in abstract

R: We renamed the groups (new figure 4)

**Observation 39: line 637**

Rename group names to descriptors in abstract

R: We renamed the groups (new figure 5)

**Observation 40: line 639**

Rename group names to descriptors in abstract

R: We renamed the groups (new figure 6)

**Observation 41: line 642**

Why do all three panels look the same?

R: The figure presents the calculation with three different hydrothermal end members as indicated in the text. The idea is to compare and identify changes in the thermal fraction using the three different potential end members.