

## Response to anonymous referee #2

### 1 General comments

This paper analyses isotopic data collected in the Chishui forest region in the southwest of China to characterise the underlying hydrological processes and quantify the contribution of fog water to a waterfall system. By using data collected in two campaigns, one in June 2011 and another, more detailed, in December 2014, the authors attempt to test the hypothesis that "the baseflow in the Chishui forest catchments was not just a mixture of rainwater from different rainfall events, but a mixture of both rainwater and a considerable amount of fog drip water". They conclude that fog in this region contributes between 8% and 31% of baseflow, which at the same time is considered the main component of waterfall discharge. Given the uncertainty in the results, the authors consider this estimate to be the lower bound of fog water contribution to baseflow.

The paper is interesting and the analysis is extensive however, however there are some factors in both format and content that would need to be addressed before the manuscript can be considered for publication in HESS. In terms of format, the structure of the document needs to be improved, for instance, with a clearer and more concise description of the methods both as generic procedures and specific activities for this study, and most importantly a division between results and discussion. In terms of format, although the isotopic analysis is very thorough, there are several assumptions that add uncertainty to the outcomes, or simply invalidate the results. These are the reasons to recommend major revisions to the document and potential rejection in its current form.

**Response:** We appreciate the reviewer's constructive comments and will revise the manuscript accordingly. We will restructure the paper to concentrate on the evidences of fog water's presence in local hydrological system. Statements that are not supported by available data, especially those on the detailed hydrological processes and the fog water's exact proportion, will be removed.

Detailed responses to the specific comments and possible revisions are listed below.

### 2 Specific comments

#### 2.1

Section 2.2: Consider improving the methods section. This does not mean extending the details and length of this section but being sharper and clearer. L 150-160: The description of the drought is suddenly mixed with the following presentation of methods. L 190-191: For instance here and elsewhere, divide the description of instruments and methods from the description of the monitoring campaigns.

**Response:** We agree with your suggestions. The methods section was simply organized in a chronological order of the three sampling campaigns. This part will be restructured following the reviewer's suggestions.

**Changes to the manuscript:** The descriptions of the sampling methods will be rewritten for clarity. A separate paragraph will be added to include our field observing phenomenon and results, as well as the detailed description of the drought in 2011. The description of sampling methods and the instruments we used will also be separated from the description of sampling campaigns.

## 2.2

Section 3: Divide the section in two: Results, and Discussion separately. This will allow understanding the actual outcomes from the experiments and their implications for understanding the processes and contributions to the system.

**Response:** We agree to divide the results and discussion, which is suggested by both two referees.

**Changes to the manuscript:** Results and discussion sections will be separated. In the results section, general isotopic results from three sampling campaigns will be presented with basic findings drawn. In the discussion part, further analyses, discussions and implications of the results will be presented. The findings from the three sampling campaigns will be combined to reveal the contribution of fog to the hydrological system.

## 2.3

L 365-367: Although it is mentioned that isotopes in rainwater changed significantly at the end of the year, without changes in the isotopic composition of stream water, there is a lack of data for the start of the year. To have a clearer picture, it would be necessary to know the stream isotopic composition then as well, to back up some of the assumptions and conclusions of the paper.

**Response and changes to the manuscript:** Similar comments were also made by reviewer 1. We agree with both reviewers – assumptions and conclusions that are not supported by available data should be removed and will do so. The paper will focus on the evidences for fog water's recharge to the baseflow, with the discussions on the rainfall-runoff processes shortened.

## 2.4

L 386-388: Although it may seem a bit obvious to agree with the hypothesis that baseflow is a mixture of both rainwater and fog drip, I am afraid there is enough evidence to quantify these contributions.

L 398-400: The fact that fog water samples were not collected all year round undermines some of the assumptions and conclusions of the paper. For instance, what is the seasonality of the fog in the area? What is the isotopic composition of fog depending on such seasonality? Is it correct to assume a constant isotopic composition for the fog? Is it correct to assume a constant isotopic composition in the baseflow and rainwater for the mixing model? Justify these assumptions.

L 413-419: The fact that rainfall data comes from monitoring of stations not located specifically in the study area at the local scale necessary to understand the contribution to processes, and especially that rainwater samples were collected at an elevation much lower than the two featured catchments increases substantially the uncertainty in the results. Given the lack of specific data, some of the assumptions, such as considering similar rainfall amounts and isotopic compositions, limit the correct quantification of fog contribution to baseflow. Although the explicit exposition of limitations is very welcome, more specific and detailed data is needed to back up some of the assumptions and conclusions in the study.

**Response:** We share the reviewer's concerns with the quantification of fog water's proportion to the baseflow. As we discussed in the manuscript, there were indeed many uncertainties in the estimation. Because fog water was only collected once, the seasonal variations of its isotope composition are unknown, and the exact long-term isotopic input from fog water cannot be determined readily. In addition, the rainwater samples collected at a lower elevation cannot exactly represent the real end member of rainfall input. More long-term measurements are clearly needed to fill these gaps. The quantitative contribution of fog in the stream flow should be determined based on a more solid dataset, which will be established in our future studies.

**Changes to the manuscript:** The estimation of fog water's contribution to local water budget will be removed. The revised paper will concentrate on the evidences of fog water's presence in the local hydrological system.

## 2.5

L96-97: "It is unclear why frequent fog appears in this region and where the water through the large number of waterfalls in the dry period originates". This is a strong statement. Consider rephrasing and citing relevant sources to support this.

**Response:** We are going to add more data (visibility) and references for the occurrence of fogs.

**Changes to the manuscript:** Long-term visibility data in the study area, reflecting the occurrence of fog events, will be added and analyzed. Related statements will be rewritten for clarity.

## 2.6

L101: "Using the methods of isotope hydrology" is too of a vague statement. Consider improving the terminology and description of the methods.

**Response and changes to the manuscript:** Agree. This will be rewritten.

## 2.7

L 234: "main stream" should be used instead of "mainstream".

**Response and changes to the manuscript:** "mainstream" will be replaced by "main stream" throughout the manuscript.

## 2.8

Although the paper is, in general, well written, there are some languages issues that need to be improved to provide a much better presentation of the paper and a clearer exposition of the results.

**Response and changes to the manuscript:** The English writing will be further improved following suggestions of both reviewers'.