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Climate of the Past Discussions

Interactive comment on "Hydroclimatic variations in southeastern China during the 4.2 ka event reflected by stalagmite records" *by* Haiwei Zhang et al.

Haiwei Zhang et al.

zhanghaiwei@xjtu.edu.cn

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Response to referee #1.

General comments: The heterogeneity of the 4.2 ka BP climatic event requires intensive researches of high-quality, high-resolution proxy records from climatically sensitive and geographically representative regions in order to reveal the spatiotemporal pattern of the event and the associated mechanism. This manuscript provided the East Asian summer monsoon with a new stalagmite record spanning the interval of 5.3-3.6 ka BP from a cave in southeast China where is a key gap of high-resolution climate records in the Asian monsoon region and investigated the possible north-south pattern of the

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monsoon precipitation during the 4.2 ka BP event based on the comparison of previously published proxy records from southern and northern China. The data and inferences presented in the study are of great significance and would contribute to a better understanding of the mechanism responsible for East Asian summer monsoon variations on millennial to centennial scales. I recommend acceptance of this manuscript for publication in CP after revisions.

1. The manuscript interpreted the newly obtained stalagmite record and depicted the process of East Asian summer monsoon changes during the interval of 5.3-3.6 ka BP. Although it is necessary to do so, the 4.2 ka BP event itself should be paid more attention given that the manuscript is expected to contribute to the Special Issue "The 4.2 ka BP climatic event". I understand the authors' inference that the 4.2 ka BP event might manifest a wet spell in southern China but a dry spell in northern China. What is the timing of the 4.2 ka BP event occurring in monsoon China? When did it start and end in southern and northern China, respectively? Where does the boundary lies if the event displays different regional manifestations in northern and southern China? I suggest that the authors give more discussions about these issues. Answer# Thanks very much for your suggestions. We agree with you. Firstly, we will focus on the discussion of the timing and structure of the 4.2 ka BP event. Secondly, we will discuss the start and end timing of the 4.2 ka BP event in northern and southern China, respectively. Thirdly, we will give the boundary between the dry north and the wet south.

2. The authors made a comparison between stalagmite records and peat ones to investigate the spatial manifestation of the 4.2 ka BP event in the monsoon region. As everyone knows, peat sequences are unparalleled in both dating precision and resolution with stalagmites. In view of the sufficient number of the published stalagmite records from the monsoon China, I suggest that the authors remove the peat records mentioned in the manuscript and focus on the existing stalagmites records. Answer# Agree. The peat records will be removed from the comparison (figure 7), however, we

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will still mention some of them in the introduction and use them as possible evidences in the discussion.

Specific comments: 1. Abstract on lines 19-32. Better to clearly explain the nature, especially the timing of the 4.2 ka BP event in southern and northern China. Answer# Agree, it will be revised.

2. Lines 98-105. Is it possible to go over 1.5 km from the cave entrance to get stalagmites that consist of pure calcite? It is worthwhile if possible, because the cave lies in a key zone in monsoon China as shown in Figure 1. Answer# Yes, the calcite speleothems can be found in the more distal parts of the cave. We have already described this in lines 99-101. This was also discussed in another published paper by Zhang et al. (2015), which will be cited in revision.

3. Lines 117-119. State the purpose of sampling in different thickness intervals. Answer# 0-75 mm from the top was deposited between 3.7 and 4.6 ka BP with low growth rate, higher resolution obtained by increasing sampling interval in this section could show more detailed information around 4.2 ka BP. It will be clearly stated.

4. Lines 134-154. This paragraph, as a part of the results, should be focused on the description of features of _18O and _13C fluctuations on different timescales during the study interval. Remove the part regarding discussions of isotopic equilibrium (lines 140-151) to the next paragraph "4.1 Interpretation of _18O and _13C". Answer# Agree, the features of δ18O and δ13C records will be described in detailed and lines 140-151 will be removed to section 4.1.

5. Lines 158-169. Delete or reduce this part. Answer# It will be reduced.

6. Lines 169-178. Show the location of E'mei cave in Figure 1, and add one Figure to show the correlation between the speleothem _18O record from E'mei cave and the EASM precipitation amount in 1951-2009 AD. Answer# We will show the location of E'mei cave in Figure 1 and add one figure about the correlation between E'mei δ18O

record and the precipitation amount in 1951-2009AD.

7. Lines 179-192. Reduce this part and consider to integrate this part with the part on lines 140-151 to briefly explain 1) the relation between _18O and _13C (isotopic equilibrium), and 2) the implications of _18O and _13C. Answer# Agree, it will be revised.

8. Lines 205-252. This paragraph should be organized only on the basis of the data obtained from this study. Remove lines 225-227 to "4.3". Delete lines 245-249. Remove lines 249-252 to "4.3". More importantly, rewrite a new paragraph on the basis of the part on lines 242-244 to explain the nature and timing of the 4.2 ka BP event reflected by the study stalagmite. Answer# Agree, we will revise this paragraph according to your suggestions.

9. Lines 254-307. Delete the first paragraph on lines 255-271. The part "4.3" should give a clear view of 1) the nature and timing of the 4.2 ka BP event in southern and northern China, and the boundary between the dry north and the wet south based on the comparison of stalagmite records from monsoon China (eastern China). Answer# Agree, we will discuss the nature and timing of the 4.2 ka BP event in southern and northern China, and the boundary between the dry north and the wet south.

10. Figure 1. Remove sites of the peat records from Panel A, and show SN in a different sign. Answer# Agree, we will redraw figure 1.

11. Figure 2. Remove "0" from the X axis of Panels A and B and show months consecutively (better as abbreviations in English). In Panel C, the tick marks for each time interval showing on the X axis seem to be one less. Answer# Agree, we will redraw figure 2.

12. Figure 7. Delete Panel E. Panel H should be _13C rather than _18O. Answer# Agree, we will redraw it according to your suggestion.

13. Table 1. Better to show the distance from the top for each sample. Answer# Agree, we will add one column showing the distance from the top for each sample.

Related aspects: 1. Does the paper address relevant scientific questions within the scope of CP? Yes. 2. Does the paper present novel concepts, ideas, tools, or data? Yes. 3. Are substantial conclusions reached? Yes. 4. Are the scientific methods and assumptions valid and clearly outlined? Yes. 5. Are the results sufficient to support the interpretations and conclusions? Yes. 6. Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? Yes. 7. Do the authors give proper credit to related work and clearly indicate their own new/original contribution Yes. 8. Does the title clearly reflect the contents of the paper? Yes. 9. Does the abstract provide a concise and complete summary? Not sufficient. 10. Is the overall presentation well structured and clear? Not sufficient. 11. Is the language fluent and precise? Yes. 12. Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? Yes. 13. Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? Yes. 14. Are the number and quality of references appropriate? Yes. 15. Is the amount and quality of supplementary material appropriate? Yes. Answer# Thanks very much for your critical comments and helpfull suggestions. We will revise the manuscript according to your suggestions.

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