Hydrol. Earth Syst. Sci. Discuss., 11, C5453–C5464, 2014
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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Spatial distribution of oxygen-18 and deuterium in stream waters across the Japanese archipelago" *by* M. Katsuyama et al.

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Dear Anonymous reviewer,

We would like to thank anonymous referee #1 for the valuable review. Her/his comments significantly helped to improve the quality of our study and the manuscript. Below we provide our responses to the reviewer's comments:

Reviewer's comment In this manuscript the authors use a dense network of surface water isotope data across Japan, combined with precipitation isotope data, to show spatial pattern of surface water isotopes and their controls, the validity of surface water sample as a proxy for precipitation isotopes in aiding in the improvement and refinement of isotope hydrology and research of other fields in this region. The manuscript

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is well organized and written, and the interpretations seem to be reasonable given the available data. Therefore I would like to suggest the editor to accept the paper after clarifying some minor issues below:

Authors' Reply We appreciate your many useful comments. Following to another reviewer's suggestion, we will publish our dataset as a supplementary material, as an important step towards leveraging this issue.

Reviewer's comment 1. Given the important influence of the geographical parameters (e.g., ELV) on the surface water isotope distribution, it would be better to show a topographic map that helps reader to understand your analysis. To this end, you may add DEM information in your Figure 3. Authors' Reply Figure 3 is changed to the topographic map of Japan.

Reviewer's comment 2. For your interpolated isotope maps, they are not highly visualized based on contour maps, I would recommend instead some color-shaded maps.

Authors' Reply Another reviewer also pointed out about this. The Figures 4 and 5 are replaced to colour-coding maps according to observed ïĄď18O and ïĄď 2H, as well as d-excess value. These maps clearly show the spatial distribution of the stream water isotope signature across Japan.

Reviewer's comment 3. In section 3.3, the authors should briefly explain the reason why the d-values of precipitation have such a seasonal pattern. If moisture sources are a dominant control on the seasonal variation in d values of precipitation and stream water, so the spatial difference in d values may be a reflective of the seasonal balance of precipitation input. As the authors pointed out, late snowmelt may affect the difference in d values between river water and precipitation on the on the Sea of Japan side. But this may be not the whole truth. The groundwater and surface flow recharged from winter precipitation may also contribute to this difference?

Authors' Reply Waseda and Nakai (1983) is the pioneer work about the dual moisture

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source regime of Japan, which control the seasonality of the d-values of precipitation, and other studies also explained the same mechanism. One of the example, we referred Araguás-Araguás et al. (1998) in Section 3.3. As for seasonality, we revised Figure 6 to show the long-term variation of monthly d-excess in precipitation in addition to previous panels. We are afraid that the reviewer somewhat misunderstand about what we pointed out: we pointed out that late snowmelt recharges the groundwater which is the source of stream flow, and/or directly recharges the stream at the Sea of Japan side. This cause the difference of the relationship between precipitation and streamwater d-excess in the Sea of Japan side and in the Pacific Ocean side.

Reviewer's comment 4. The difference in d-value between precipitation and streamwater may also reflect the balance of precipitation and evaporation. The streamwater isotopes on the on the Sea of Japan side have smaller slopes and intercepts (for example, in the regions of F and G shown in Table 2). The evaporation may also have a strong influence on these differences. The authors should check this factor.

Authors' Reply As you pointed out here, the regression lines for the individual regions are disperse. In regions of F and G, however, the data range (difference of max. and min. values) are narrow compared to of the other regions. The AET is not so large at these region compared to the other regions (Figure not shown, but we are ready to open our data set as a supplementary material). At the nationwide scales, the regression will approach to GMWL. Needless to say, there are some inherent processes and mechanisms for the diverse regression (or LMWL) in each region, but this should be discussed in a detailed studies at small scales.

Some minor comments:

Page 10904:

5. Line 3: '. . .a data set by compiling. . .'

Authors' Reply

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Corrected.

6. Line 23: '. . .research questions in a wide range of fields at large scales'

Authors' Reply

Corrected.

Page 10905: 7. Line 9: 'which integrating' should be 'which integrates'

Authors' Reply

Corrected.

8. Line 10: 'and using' should be 'and uses'

Authors' Reply

Corrected.

9. Line 12: ' rainfall isoscape' should be 'precipitation isoscape'

Authors' Reply

Corrected.

10. Line 14: remove 'However'

Authors' Reply

Corrected.

11. Line 16: 'they do not discuss'

Authors' Reply

Corrected.

12. Line 20: 'These changes' mean what? 'The hydrological changes are. . .'?

Authors' Reply

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The phrase is changed as “These changes of the hydrological responses. . .”

13. Line 26: ‘of river water’

Authors’ Reply

Corrected.

Page 10906:

14. Line 1: In my opinion, you can say ‘. . .spatially dense stream water isotope network. . .’ rather than ‘. . .spatially dense stream water isoscape. . .’

Authors’ Reply

Thank you. I have changed as you mentioned.

15. Line 4: ‘d18O and d2H isoscapes of. . .’

Authors’ Reply

Corrected.

Page 10907:

16. Line 1: ‘were analyzed for both 18O and 2H’

Authors’ Reply

Corrected.

17. Line 9: ‘precipitation inputs’

Authors’ Reply

Corrected.

18. Lines 19-22: Only 18O was measured here? If so, you should state it.

Authors’ Reply

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No. We analyzed for both 18O and 2H. Corrected

Page 10908:

19. In section 2.3, why are only MAP and MAT data of 2000 year selected?

Authors' Reply

It was our mistake. Collected as: "...Mesh climatic data averaged for the years from 1971 to 2000"

Page 10909:

20. Line 15: 'the linear regressions are applied...'

Authors' Reply

Corrected.

Page 10910:

21. Line 3: 'are reflected in the isotopic compositions...'

Authors' Reply

Corrected.

22. Line 19: I am somewhat confused with the logical relationship of the sentence 'The smallest values....'.

Authors' Reply

The sentence separated two. "The smallest values were observed at the Mt. Daisetsu region of Hokkaido. On the other hand, the intervals in southwest Japan were very sparse."

23. Line 20: Maybe you should have a reference for d excess here.

Authors' Reply

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We referred the following paper; Dansgaard, W.: Stable isotopes in precipitation, Tellus 16, 436-468, 1964. Page 10911:

24. Lines 24-25: This sentence is difficult to follow and does not flow well.

Authors' Reply

Corrected as follows;

Here, we will discuss the effect on the δ18O of stream water of these parameters to discuss whether the stream water can be treated as a proxy of precipitation.

Page 10912:

25. Line 3: 'effects on precipitation isotope'

Authors' Reply

Corrected.

Page 10914:

26. Line 9: Fig 6 rather than Fig 7.

Authors' Reply

Corrected.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 10903, 2014.

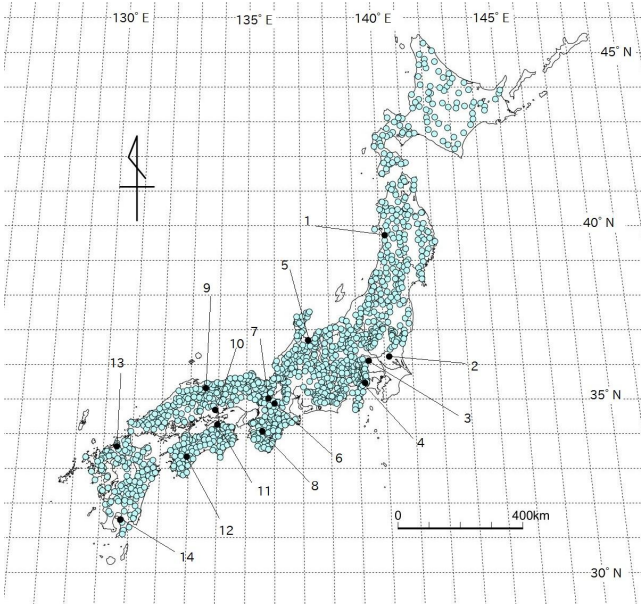

Fig. 1. Replaced Figure 1

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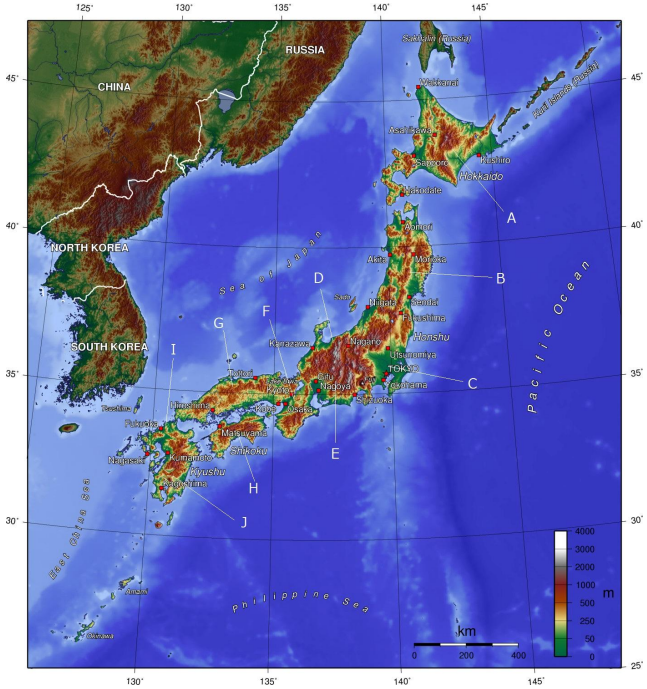

Fig. 2. Replaced Figure 3

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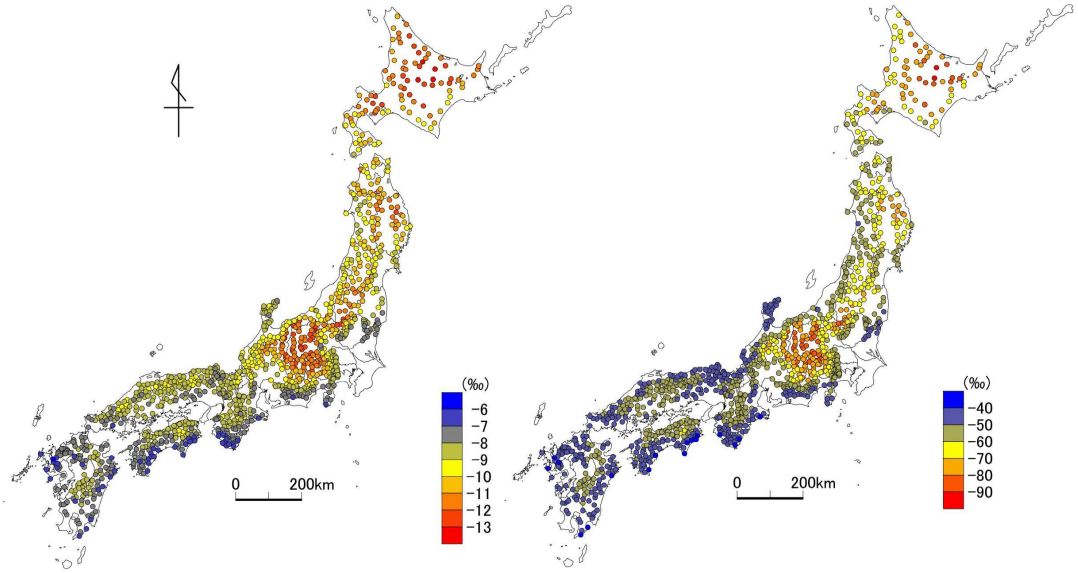

Fig. 3. Replaced Figure 4

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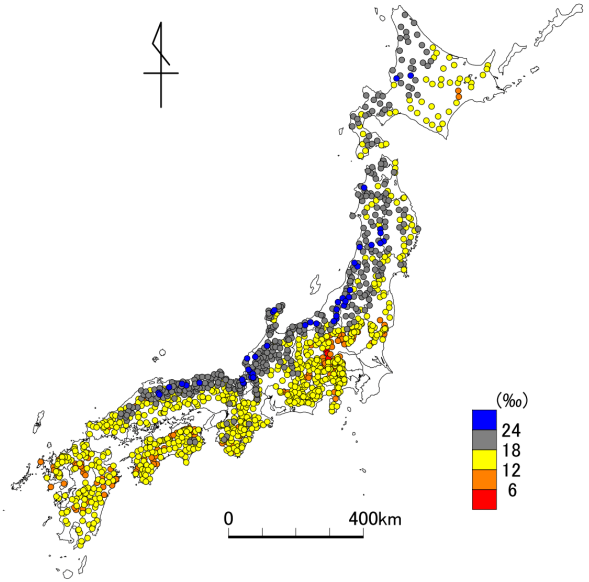

Fig. 4. Replaced Figure 5

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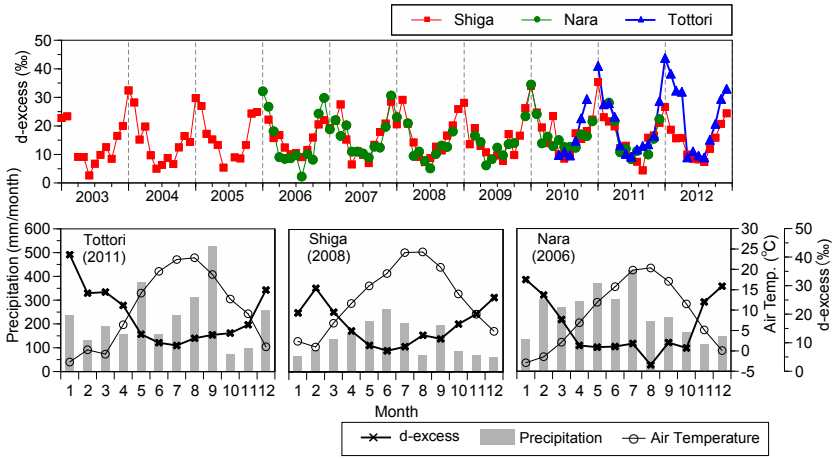

Fig. 5. Replaced Figure 6

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