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Climate of the Past Discussions

Interactive comment on "Atmospheric circulation controls on the inter-annual variability in precipitation isotope ratio in Japan" *by* N. Kurita et al.

Anonymous Referee #2

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Kurita et al., present an analysis on the controls of the stable isotopic ratio of precipitation over Japan. The work presents a new one-year long event-scale dataset of precipitation and vapor, which is used to interpret the interannual variability from the 17-year long record from the GNIP station in Tokyo. This manuscript provides a very thorough description of the synoptic meteorology and hydroclimatology for Japan as well as a large number of analyses on the controls of the isotopic variability at multiple scales. The work leaves very few "stones unturned" in coming to the conclusion that a combination of moisture sources and rainout can explain the preponderance of isotopic variability on the event scale. This is assessed by separating storm types seasonally using potential temperature to separate cold and warm precipitation and

looking at rainout using trajectory analysis. This, in turn, gives rise to a relatively clean perspective on how to interpret seasonal and interannual trends in the stable isotopic record from Tokyo. The authors derive an index of the ratio of warm to total rainfall for the Summer and the ratio of Nangan to total precipitation in the Winter to explain a significant amount of the observed variability. Finally, some discussion on the mid 1970s climate shift is discussed and its impact on the isotopic ratio of precipitation is discussed.

While some discussion on theoretical applicability of this work towards interpreting proxies is presented, there is no direct application, which makes me question whether CPD is the correct venue. There is so much heavy emphasis on synoptic meteorology, that is not balanced by a paleoclimate perspective, which warrants considering a journal more focused on meteorology. However, I was very interested by the discussion on the 1970s shift and wonder if this could be used to cast the paper into more of a paleoclimate light. The 1970s shift is a decadal feature that is the sort of feature that we would hope to be able to reconstruct from mid latitude circulation proxies. It is notable that many paragraphs are devoted to the topic of the 1970's shift in the discussion but it is not brought up in the abstract. It would be interesting for example, if throughout the paper a simple questions was weaved through such as, "how would the 1970s climate shift show up in an isotope proxy record?" This would ground the paper in a hypothesis with paleoclimate relevance. Ultimately, the paper suffers from too many analyses and figures, which makes it easy for the reader to get lost in one of the many tangents. Therefore, it is my recommendation that the authors define a clearer hypothesis and make sure everything they discuss and every figure is clearly necessary to address that specific hypotheses. A prime example of unnecessary material would be Figure 8. It would be easy to simply state no correlation exists and state the correlation coefficient rather than showing a cloud of uncorrelated data.

While there is nothing substantively wrong with the numerous impressive analyses in the manuscript, I do think its "citability" is hindered by the lack of focus and a clear

emphasis on a single question. I strongly encourage the authors to consider shortening the paper and condensing it towards testing a paleoclimate-relevant hypothesis.

3991 5 “develop”, please consider using present tense throughout manuscript 7 “reconstructions” 9 “correlations” 3992 5 “from tropical regions” 11 missing reference (?) 3993 1 “contrast with the tropics” 6 “in the mid-latitudes over” 14 “occurs in response” 24 “using a new” 27 “ composition” 3994 1 Unclear what is meant by “moisture-formed precipitation” 19 “much greater than” 3995 11 “In comparison, during the summer, low-level. . .” 3996 8 abbreviation “LT” was not introduced. 3997 1-4: I do not think it is valid to use the comparison between laser and cold trap to correct for both humidity dependence and drift. For example, is the difference between a given cold trap and laser measurement a product of the humidity or the drift? It would be better to correct for drift using only isotopic measurements taken from a narrow humidity window and then apply the humidity correction following the drift correction. 20 “consists” 3999 2-5 I do not follow the meaning of the sentence beginning “We can therefore. . .” 4000 17 Specify that the d excess is only from the cold trap samples 4001 2 “sensitive to precipitation amount” 3-5 What is meant by this: “amplitude of the depletion was closely related with the dD of the precipitation.” 6-9 It is not appropriate to say that the vapor is “identical” to the variation in the precipitation. Perhaps, you could say the vapor can be derived knowing the temperature and the dD of the precip. 20 “relatively higher. . .by low. . .rainfall amounts.” 4002 8 “connected” 11 “similar to” 15 Again, “identical” is not really an appropriate term. If the two are similar, how similar? Please specify. 17 “We conclude. . .” 25 “trajectories (Pcumul) over 9h. . .” 4003 8 “Also, since. . .” 4004 11 “Therefore, precipitation” 4005 4 “variations for central Japan. . ..” 12 “rainfall events” 16 “while the air mass travels through” 4007 24 “multiple scales” 4008 Much of the discussion on ENSO, AO, Pacific Japan patter should all be introduced in the Introduction when discussion on controls of synoptic meteorology are discussed. In general, all of the discussion on the met should be condensed. 2009 5-13 The discussion on the ENSO regime shift comes across as very speculative. 15 “well-known climate” 4010 19 “enhanced storm”

Figures Figures 1 and 2 should be condensed into single figure. Perhaps even Figure 13 could also be condensed into that same figure Figure 8 should be removed Figures 11 and 12 could also be represented in a single figure.

Interactive comment on Clim. Past Discuss., 10, 3989, 2014.