

Interactive comment on “An introduction to stable water isotopes in climate models: benefits of forward proxy modelling for paleoclimatology” by C. Sturm et al.

Anonymous Referee #3

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General comments

This article is a welcome addition to the literature. It will be of value to isotope paleoclimatologists, who need to be informed about the opportunities of forward-modelling techniques. These promise the development of much closer links between the stable water isotope (SWI) data that are routinely obtained from lake sediments, tree rings, ice cores, speleothems and other natural archives, versus what can be modelled in an isotope-enabled GCM or RCM. Ideally, this could short-circuit the need to transform quantitative isotope data into secondarily-inferred paleoclimate parameters, while fostering the development and application of improved mechanistic understanding of SWI

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cycling in the environment via physical and biological processes. The authors have done a good job of writing at the appropriate level for this community, without becoming bogged down in excessive detail. Although the full realization of paleo-data assimilation will take some time, this article is a bold attempt to point the way, at least conceptually, and to build bridges between paleo-data producers and climate modellers. Only minor corrections (see below) are needed prior to acceptance.

Specific comments

Page 1700, line 22 and Page 1721, lines 31-32 – I do not think that this is a valid reference to the so-called "GNIP Booklet", which should be Schotterer et al. (1996). Although a selectively abbreviated version is available on-line, the correct reference should probably be:

Schotterer, U., Oldfield, F., and Froehlich, K.: GNIP - Global Network for Isotopes in Precipitation, Laederach AG, Bern, Switzerland, 48pp, 1996. 1700, 1708

Technical corrections

Page 1698, line 10 – "infirm" should be "inform"

Page 1702, line 14 – "at day" should be "today"

Page 1705, line 11 – "parametrisations" should be "parameterisations"

Page 1705, line 14 – "Navier-Stockes" should be "Navier-Stokes"

Page 1706, line 11 – "parametrisations" should be "parameterisations"

Page 1706, line 13 – "fractionation needs" should be "fractionations need"

Page 1706, line 16 – I suggest "comprising" instead of "making out"

Page 1706, line 17 – "...what daunting..." should be "...what a daunting..."

Page 1706, line 20 – ""an good description" should be "a good description"

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Page 1706, line 21 – Noone and Sturm (2009) is missing from the references – Is this the chapter in the Isoscapes compilation?

Page 1707, line 20 – "non-frationing" should be "non-fractionating"

Page 1707, line 22 – "better appropriate" should be "better suited"

Page 1707, line 27 – "GCM" should be "GCMs"

Page 1707, line 28 – "noticing" should be "noting"

Page 1708, line 25 – "RCM" should be "RCMs"

Page 1708, line 26 – "module" should be "modules"

Page 1709, line 7 – This sentence is a bit awkward, perhaps it could be worded: "A major limitation of climate models is that phenomena..."

Page 1709, line 14 – "even-more" should simply be "even more"

Page 1711, line 12 – "estimate changes" should be "estimate of changes" or "estimated changes"

Page 1713, line 16 – "uphills" should be "uphill"

Page 1714, line 7 – "noticing" should be "noting"

Page 1714, line 22 – I'm not quite sure of the intended meaning here. Could this be rephrased as "...signal is dependent on..." rather than "...signal is tributary to...?"

Page 1714, line 24 – "infirm" should be "inform"

Page 1715, line 27 – "comprised" should be "bounded"

Page 1716, line 1 – Should "The previous analysis..." be "A previous analysis...?"

Page 1717, line 23 – "(Sturm et al., 2009)" is not in the references

Page 1718, line 19 – The meaning is a bit unclear to me. Should "...to give way to the

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assimilation..." be "...leading to the assimilation..." ?

Page 1718, line 25 and Page 1719, line 5 – "be compared directly" would flow better than "directly be compared" in both cases

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