Auxiliary Material for

Hydrological modelling of stalagmite 18O response to glacial-inter-glacial transitions

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Introduction

The Auxiliary materials comprise additional figures, a table, and the KarstFor model code:

1. ts01.doc (Table S1) The atmospheric greenhouse gas concentrations specified in the CSIRO Mk3L climate system model simulations that are used in this study.
2. fs01.tif (Figure S1) Conceptualisation of the KarstFor hydrological model
3. fs02a.tif, fs02b.tif, fs02c.tif (FigureS2) Comparison of glacial and post-glacial model simulations, presenting an arbitrary 50-yr time slices at 12ka, 11ka and 10ka, for steady-state parameters of F3=0.008, F5=0.005, OVCAP=100. Time slices are at model months 3000-3600 (A), 6000-6600 (B) and 9000-9600 (C). x-axis tick marks are every five years.
4. fs03.tif (Figure S3). Variability of pseudproxy series Stal\_1 to Stal\_6 for the 10ka, 11ka and 12ka time slice experiments. Boxplots present the range (-), 1 and 99 percentiles (x), mean (square) and the inter-quartile range.
5. Fs04.tif (Figure S4) Input series for the karst model. Temperature and precipitation are from general circulation output, PET is calculated using the Thornthwaite method. 12ka: triangles, 11ka circles, 10ka squares. 18Op is using last glacial maximum conditions (21ka) from *Pausata et al.* [2011].
6. Fs05.tif (Figure S5) Stalagmite 18O sensitivity to precipitation amount. The example shown uses the steady-state model configuration (the same as Figure 1) with four different scenarios (1) 12ka state and 10 wettest July precipitation (2) 12ka state and 10 driest July precipitation (3) 10ka state and 10 wettest July precipitation and (4) 10 ka state and 10 driest July precipitation. 25-yr of model output are shown, with the dry / wet July occurring at 0.5 yrs. Results show an immediate short term response in the soil store, and the epikarst store decreasing from capacity from (1) to (2), (3) and (4). However, difference between pseudoproxy 18O at 12ka and 10ka is unrelated to July rainfall amount.
7. Fs06.tif (Figure S6). Non-stationarity in pseudoproxy stalagmite 18O variability. The standard deviation is that of the nine stable model configurations for each time-slice. The non-linear changes in variability in pseudoproxies stal\_1 and stal\_6 and high variability are a result of model configurations intermittently exceeding the *ovcap* and *epicap* thresholds. Variability in stal\_2, Stal\_3 and stal\_4 increases from 12ka to 10ka due to increased *ET*, and decreased water in the epikarst store, leading to more variability in stalagmite 18O.
8. Text01. KarstFor Fortran code