

## ***Interactive comment on “Effects of dating errors on nonparametric trend analyses of speleothem time series” by M. Mudelsee et al.***

**Anonymous Referee #2**

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The manuscript “Effects of dating errors on nonparametric trend analyses of speleothem time series” by Mudelsee and others uses existing climate proxy records (oxygen isotopes) combined with radiometric age constraints with statistical techniques to evaluate three stalagmite deposits from Germany. Two existing programs and modifications of these programs, are used to produce trends in these proxy records through time. It is illustrated that the error envelope is larger, though the trends are identical when uncertainties on the ages are considered.

Overall the paper is a thoughtful contribution but could benefit from a discussion of the radiometric dating techniques and their uncertainties. For example, assumptions are made for both U-series and radiocarbon with regards to starting conditions. It appears that if an age doesn’t agree with other ages it is thrown out, but what if the age that

C1352

is thrown out is correct and the others are in error? For example, for radiocarbon, what if some of the samples experience reservoir effects, or for U-series, what if the assumptions for correcting for initial  $^{230}\text{Th}$  are invalid?

As for the proxy data itself, it is admitted that the changes in oxygen isotopes can reflect temperature and or rainfall, such that it isn’t possible to put absolute numbers on these changes. However, one profound problem with oxygen isotopes in cave deposits is that it has been demonstrated that they can form well out of equilibrium with their drip waters. It is significant that the three records show a similar pattern of winter conditions of warm cold warm between 6500 and 5100 years ago. The fact that all records are similar suggests this is meaningful. It seems dicey to make much of the records that are not in agreement with each other. Could there be differences in kinetic fractionation, etc? Could the opening to the caves have changed such that there isn’t a good connection to the atmosphere?

In summary, this manuscript fits well in the special issue “Advances in understanding and applying speleothem climate proxies” and is a significant contribution. I recommend it’s inclusion in this special publication.

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Interactive comment on Clim. Past Discuss., 8, 1973, 2012.

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