Clim. Past Discuss., 1, S189–S191, 2006
www.clim-past-discuss.net/1/S189/2006/

Climate of the Past Discussions

Interactive comment on "Summer temperature trend over the past two millennia using air content in Himalayan ice" *by* S. Hou et al.

S. Hou et al.

Received and published: 27 November 2006

We want to thank Referee 2 for the positive and constructive review. In the following, comments are addressed in the same order as in the review:

The experimental work seems well done, though I am curious why the uncertainty in using the GC air peak is 5% - it seems like it would be smaller, but I am not sure what this uncertainty refers to - repeatability of real samples or some kind of calibration?

The uncertainty is not linked with the calibration of the GC air peak but to the estimate of the gas temperature in the sample cell at the time of expansion in the sample loop. There is no direct measurement of this temperature, which can vary due to the amount of ice in the container, the temperature of the cooling alcohol bath, or the degree of immersion of the container in the bath. This average gas temperature through several

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samples is estimated by comparison with another method of gas content measurement, being absolute. In the case of the East Rongbuk samples, the comparison was performed on the EPICA / Dome C ice core, which samples were run within the same time frame as the ones presented here.The uncertainty is then estimated by comparison of the deviation around mean values of the records obtained with the two methods on the same ice core.

Regarding interpretation of the air content data as a temperature record: the authors claim two influences on air content via influence on melting in wet seasons, warmer temperatures and higher humidity. Since both coincide in the wet season, and it is not clear how to distinguish them, is it proper to claim that the data are a record of temperature? Would it be more accurate to say the data are a record of temperature and humidity? Or can it be argued from meteorological grounds that temperature must be higher when humidity is higher? Some clarification here is in order.

See our response to the point 4.1 of reviewer #1.

The authors discuss their records relative to several other paleoclimate records, some they claim agree, some that don't. I suggest plotting some of these records, particularly the ones that are closer geographically, in Figure 3 (for example the met data from the Himalayas or the dendroclimatological data from the Himalayas and central Asia) so the reader can make the comparison.

Though the comparison with the Palmyra corals is interesting the discontinuous nature of the coral record makes it hard to discern trends. Cobb et al. did discuss ENSO activity inferred from their records though, and the authors could elaborate a little on their proposed link between ENSO and their record. Finally, there are other SST records that might be useful to compare to the air content data, for example from the Great Barrier Reef region (Hendy et al., Science, 295).

The reconstructions of tree rings from Nepal, Central Asia and Tibetan Plateau, as well as the coral cores from the Great Barrier Reef is $\sim$400-year old. This is too short to

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make a relevant comparison when we focus on the temperature trend over the past two millennia.

Interactive comment on Clim. Past Discuss., 1, 155, 2005.