

## ***Interactive comment on “A new Himalayan ice core CH<sub>4</sub> record: possible hints on the preindustrial latitudinal gradient” by S. Hou et al.***

**Anonymous Referee #2**

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General comments:

CH<sub>4</sub> is an important greenhouse gas, but the control mechanisms are not well constrained. CH<sub>4</sub> records from various latitudes may help us better constrain the source and sink budget, but until now reliable paleoatmospheric CH<sub>4</sub> records were obtained only from Greenland and Antarctic ice cores. The authors provide new ice core data sets from East Rongbuk Glacier, which is located in a low latitude (28°N). They also provide model simulations for the CH<sub>4</sub> latitudinal gradient. Although their results are not very conclusive, their work is very important for future studies and contributes to paleoclimate research community. The manuscript is concise and well written. Climate of the Past is an appropriate publication for this work. I suggest minor revision before publication.

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This paper would have benefited by clarifying as suggested in the “Specific comments.”

Specific comments:

Page 2472, Line 12: “small artifacts” can be specified with numbers (e.g., less than 40 ppbv).

Page 2472, Line 17: “wetland extent/CH<sub>4</sub> emissions” means “wetland extent AND CH<sub>4</sub> emissions”? Please reword it.

Page 2475, Line 4: Need to describe updates in methods since Chappellaz et al. (1997). Chappellaz et al. (1997) is 16 years old!

Page 2476, Line 1-8: The artifact by melting can be roughly quantified with gas solubility and ‘fraction of bubbles filled with melt’ as shown in Figure 2 of Campen et al. (2003, Geology).

Page 2478 Line 28-29 & Page 2479 Line 1-4: Need to explain potential causes that made the difference in CH<sub>4</sub> records from ER Core2002 and Dasuopu ice cores.

Page 2479 Line 24-25, Page 2480 Line 19-21: Discrete replicate sampling from same depth intervals would also help understanding the alteration of CH<sub>4</sub> records.

Figure 2. Some of the filtered data points (out of 15 black dots) indicate high CH<sub>4</sub> with low gas content. The readers may think that even samples for the filtered data have experienced alteration by melting. This is misleading because the high CH<sub>4</sub> data are from industrial samples. I suggest the authors to plot only preindustrial records to better estimate the effect of melting in the CH<sub>4</sub> record.

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Interactive comment on Clim. Past Discuss., 9, 2471, 2013.

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