

## ***Interactive comment on “Continuous measurements of methane mixing ratios from ice cores” by C. Stowasser et al.***

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### Assessment

This manuscript describes a unique and exciting advancement in trace gas analysis for ice cores that could revolutionize the methods that are employed for this kind of research. Other reviewers have already raised most of the main concerns. Anonymous Referee # 2's point regarding further clarification on the calibration procedure is probably most important. In summary, this work is novel, well written, and showcases a significant step forward in analytical techniques for gas analysis in ice cores. Moving from analytically time consuming low-resolution records to rapid high-resolution records is a giant step forward. I would strongly recommend that it be published, with minor changes as noted.

C192

### Specifics

1. Incorporate the changes recommended by Eugseter and Referee # 2.
2. Page 215. When describing the performance of the gas extraction module as being dependent on the pressure gradient over the hydrophobic membrane, it is not entirely clear from the text as to how this was achieved. Down-stream pressure control within the cavity is explained, but (unless I missed it), not within the micro-module. For example, do pressure pulses from the peristaltic pump interfere with the pressure regime in the gas extraction system, or is that not a problem? A brief explanation would help.
3. Referee # 2 questions the 300 ppmv moisture level achieved with the Nafion drying system, which was measured by the WS-CRDS analyzer. It might be explained by the fact the analyzer may simply not be that well calibrated at this low end?
4. Page 216, lines 17-18, typo/wording. “To prevent air reaches the gas extraction module. . .” should read “To prevent air from reaching the gas extraction module. . .”.
5. Page 223, lines 4-5. To improve resolution, the pressure in the cavity was reduced from 225 mbar to 60 mbar. No mention is made if any tests were made to determine the optimum modified pressure. Could lower pressure work, or is this the practical limit. This might be useful to readers.
6. The plots in Figure 4 need labels for A & B. It would also help to explain that the green lines are the ice core measurements in 4A. Could better results be obtained by using a suite of CH<sub>4</sub> concentration standards so that the calibration sequence could end with air that would be closer to the value of samples (as determined from the most recently analyzed core)? Less ice might be lost to memory of the system?
7. Figure 7C could be improved by giving the two different transfer functions different symbols or colors so the reader could readily discern between original and modified analyzer.

C193

