

Interactive comment on “High resolution measurements of carbon monoxide along a late Holocene Greenland ice core: evidence for in-situ production” by X. Faïn et al.

Anonymous Referee #2

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This paper introduces OF-CEAS measurements of CO from the NEEM ice core. It is a well written, thorough analysis of the laboratory measurements. The conclusion is that CO measurements from this core are contaminated and that the source of contamination is likely to be complicated. This is disappointing, however it is also a very useful scientific result.

Firstly, the measurements are really neat. The system described here is a work in progress but it's very promising. The investigators would likely benefit from diagnostic tests using CO-free synthetic air, but even without this, based on the spread shown in Table 2, it appears some of the contamination is due to a leak of room air into the system.

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The actual reported values of CO are unrealistically high in all cases, as the authors point out, and it's going to be impossible to deconvolute the true CO signal from this data set. And this points to a big question regarding all similar measurements from Greenland; how will we know if other measurements are robust, or subject to contamination? This is a real concern that is addressed here.

The sources of CO contamination are not known. The authors discuss a link between CO and biomass burning markers, and total carbon. But sometimes the CO contamination does not correlate with these species. Drilling fluid is discussed as a source of contamination, and it is likely to be such, for sure. But again, not all samples were similarly affected, so clearly there is something more going on.

I don't know that I agree that spikes of elevated CO serve as a useful tracer of biomass burning, or any other geophysical process. In the end, if one sees a spike of CO, it would mean nothing without corroboration with other tracers of, say, biomass burning. So at best, elevated CO would be an indicator. However it is rather interesting, the frequency of the large CO spikes.

Measurement of the stable isotopes of CO might provide insight into the sources of elevated CO. Then again, they might not.

Why are the reported values of CO so high and variable? We can only speculate. The authors do a good job in covering the most likely causal effects, but in the end, the results are inconclusive.

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