

## ***Interactive comment on “Ten-year trends of atmospheric mercury in the high Arctic compared to Canadian sub-Arctic and mid-latitude sites” by A. S. Cole et al.***

### **Anonymous Referee #2**

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The authors present long term mercury measurements at two Arctic, one sub-Arctic and three mid-latitude sites and find a pronounced difference in trends at the Arctic and mid-latitude sites. They discuss the difference in term of changing chemistry, AMDE frequency, ice cover, and transport patterns, but cannot find a convincing explanation for the difference. Nevertheless, the work is important for two reasons: it shows a) that the Arctic stations behave differently from mid-latitude stations, and b) that the trend at mid-latitude stations in Canada is consistent with that observed at Mace Head. I recommend its publication with modifications detailed below.

Methods: The precision of the individual GEM, RGM, and TPM measurements should

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be given. Problems with RGM and TPM measurements should be mentioned perhaps using a reference to the published technique intercomparison studies.

Results and discussion: Fig. 4 shows that Alert data are substantially more influenced by AMDEs than the Zeppelin data. This might be because of the altitude of the Zeppelin Mountain which places the Zeppelin station frequently over the boundary layer where the AMDEs are predominantly located. This might have already been discussed elsewhere, and if so, a reference should be added. The similarity of the trends at both stations, one frequently and one less frequently influenced by AMDEs, thus provides another evidence for AMDEs not being the major reason for the difference between the Arctic and mid-latitude trends.

Page 20213, line 17-18: “..second Teflon filter at the back of the instrument”. The filter is probably upstream of the instrument, but that is not clear from this wording. Please specify.

Page 20214, last line: The sentence “In lieu of RGM and TPM standards, rigorous procedures. . .” still leaves the reader at a loss, how the RGM and TPM measurements were calibrated.

Page 20125, line 28: Detection limits are mentioned but not specified.

Page 20126, last sentence: The sentence “. . .monthly trends at Alert are the same as or higher than. . . .suggesting that the overall trend at Alert is most likely less negative than . . .” is not wrong but confusing for the reader because “higher” is on absolute scale whereas “less negative” on relative one, the latter related to zero.

Fig. 3 displays the trend data from Table 1 in graphical form and is thus redundant.

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