

***Interactive comment on “Springtime Arctic ground-based spectroscopy of O<sub>3</sub> and related trace gases at Eureka, Canada – Part 1: Evaluation of the analysis method and comparison with infrared measurements” by E. Farahani et al.***

**Anonymous Referee #3**

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General Comments

This paper introduces important measurements of O<sub>3</sub>, NO<sub>2</sub> and OCIO obtained during springtime in 1999–2003 in the Canadian high Arctic. It is certain that such a database will serve as part of an important baseline for comparison with future measurements of atmospheric chemistry changes associated with climate change in the Arctic. The paper is generally clear and well written.

The comparison between the DOAS models and the two spectrometer measurements

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is interesting and well validated; however, it is not clear that this is sufficient for a stand-alone paper. Essentially I feel there is very little new science in this paper, and I believe that this analysis could be easily incorporated in an expanded 'Results' section of the companion paper, but I would leave this to the discretion of the editor.

In the Introduction, it is mentioned that the presented dataset is part of a larger 10-year dataset. Is there a reason that the complete dataset is not presented/compared in this paper?

### Specific Comments

(1) It is not clear how the UT-GBS data from 1999 and 2000 were corrected for bias in view of the fact that it was later discovered that the bias was variable. Was an attempt made to correct the 1999/2000 measurements? If not, what impact is expected on the determination of the vertical column densities?

(2) The authors should at least show what potential impact may result from incorporating the line parameters from the 2004 HITRAN database in the retrieval of column amounts with the FTS. Many updates in the O<sub>3</sub> and NO<sub>2</sub> IR lines have occurred since 1992. Perhaps one or two examples could be illustrated to determine whether there is a significant difference from using the updated line parameters. If so, then the FTS analysis should be repeated with the 2004 database.

(3) A reference concerning the 0.7 albedo should be added on page 351, line 12.

(4) A reference for the sub-arctic atmosphere should be given on page 352, line 19.

### Technical Corrections

Abstract -line 13 - insert 'the' after 'Also' (i.e., Also, the first four years....) -line 14 - insert 's' at end of Canada (i.e., Canada's Fourier-transform...) -line 15 - I am unaware of 'Canada's Department of Environment'. I think it has a different name.

Page 345 -line 24 - insert 'a' between 'with more' (i.e., with a more thorough...)

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Page 346 -line 22 - insert 'the' between 'that bias' (i.e., recognized that the bias was...)

Page 347 -line2/3 - Mercury Cadmium Telluride does not require capital letters and InSb should be spelled out for the first time.

Page 348 -line 12 - insert 'the' between 'of retrieval' (i.e., middle of the retrieval region)

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Interactive comment on Atmos. Meas. Tech. Discuss., 2, 343, 2009.

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