

Interactive comment on “Selective measurements of NO, NO₂ and NO_y in the free troposphere using quantum cascade laser spectroscopy” by B. Tuzson et al.

Anonymous Referee #2

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General comments:

This paper describes the performance of a NO_x measurement system based on an infrared, laser spectroscopic method. The main focus of the paper is to describe some instrumental improvements to previously reported, QCL based mid-IR detectors for NO and NO₂, and to assess the performance of the system in the field at a free tropospheric site (Jungfraujoch), where standard chemiluminescence NO_x systems operate continuously. Due to the relatively low NO_x mixing ratios in free tropospheric air, this represents a stringent test. The ultimate goal is the development of more accurate

C3624

NO_x instruments for routine monitoring applications.

The paper is quite clearly written and was easy to review. There are no obvious errors that I can identify, and my recommendations for revisions are quite limited. While this paper follows numerous others in the literature describing the development and intercomparison of NO_x measurement methods, the authors state clearly that this is the first in-field description of instrument performance for a dual QCL, mid-IR detector simultaneously and independently measuring both NO and NO₂. This together with the described advances in the spectroscopic approach make the paper easily suitable for AMT.

Perhaps the only general comment is that the instrument description lacks a specification of the QCL instrument's size, weight and power requirements. Since one aim of the paper is to establish the advantages (or disadvantages) of this approach relative to others, some description of these parameters is warranted. Otherwise, my comments are very minor, and the paper could easily be published as it is.

Specific comments:

Page 8971, line 7-8: Although I largely agree with the author's statement, it is also fair to say that chemiluminescence instruments can be considered routine tools, at least for NO. The paragraph that follows says as much.

Page 8974, line 10: “cells” rather than “cell's”

Page 8975, lines 14-16: Minor comment: Do the authors have a quantitative measurement of the relative humidity change through the NO_x scrubber? Presumably it could introduce some time lag in situations where relative humidity changes rapidly.

Page 8979, line 4: Absolute humidity is given as a volume mixing ration – it would be useful to the reader to know the corresponding relative humidity at this site. Presumably these effects would be larger at lower elevation, higher absolute humidity sites.

As a closing comment only, the authors may wish to point out that the NO_y comparison

C3625

highlights the need for development of more robust conversion schemes or measurement techniques for NO_y.

Interactive comment on Atmos. Meas. Tech. Discuss., 5, 8969, 2012.

C3626