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Atmospheric Measurement Techniques Discussions

Interactive comment on "Rugged optical mirrors for Fourier-Transform Spectrometers operated in harsh environments" *by* D. G. Feist et al.

Anonymous Referee #1

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Review: Mirrors degradation inevitably occurs in harsh environment, so the authors express the possibility of using rugged mirrors to measure atmospheric trace gases from solar spectra in such environment. After reviewing the commonly used mirrors, and listing the effects that they may be encountered, the capacity of rugged mirrors is assessing at MPI-BGC's TCCON site on Ascension Island. The paper is well written, well-structured and the subject is valuable for the measurements community in order to know the limitation of certain kind of mirrors. However, the paper lacks of analysis about the effect of the mirror reflectivity on atmospheric spectra and/or atmospheric retrievals.

Major revision: In general, the paper need more deepen details. The main effects of the signal loss due to mirror degradations on atmospheric spectra and retrievals is

not addressed at all. Could you comment on the effect of the signal degradation on atmospheric spectra? Are the degradation seen with wavelength dependency? What is the impact on measurements errors, signal to noise ratios, precision of the solar pointing, other spectral parameters? Could you show and comment spectra measured by the different mirrors, and at different states of the reflectivity reduction? Also you mentioned TCCON and NDACC networks and their ability to measure gases in the atmosphere. However effect of mirror degradation and/or mirror types on atmospheric retrievals is not shown. Could you address this issue? Fig 9, you show reflectivity for one mirror but measuring solar absorption spectra require two mirrors. What is the total reflectivity for two mirrors? What is a spectrum look like with steel mirrors? How is this spectrum compared to a spectrum measured with other type of mirrors? What is the effect on retrieved concentrations?

Minor revision: Abstract, line 10: MPI-BGC is an acronym not defined. Section 3.1, p 10718, line 4: miss the ":" at the end of the sentence. Section 3.1, p 10718, line 15: the type number is not defined before here. Clarify it by mentioning figure 6? Section 3.1, p 10718, line 1: "PREN>32 are considered to be seawater resistant." Is there any reference for this? Section 3.1, p 10718, line 11: labeled as 1.xxxx. Are you sure this is not a problem?

Interactive comment on Atmos. Meas. Tech. Discuss., 8, 10711, 2015.