

## ***Interactive comment on “Derivation of horizontal and vertical wavelengths using a scanning OH(3-1) airglow spectrometer” by Sabine Wüst et al.***

**Anonymous Referee #1**

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This manuscript describes the investigation of medium and long period gravity waves (GWs) observed at mesospheric altitude using a spectrometer instrument. Though this instrument only measures temperature variations within a limited field-of-view, it is possible to assess GW horizontal parameters by looking in 3 or 4 different directions. This technique has been previously published. The authors analysed 22 nights of data obtained from a mid-latitude site between July and November 2015. Using meteor wind radar data, they calculated the vertical wavelengths and compared their results with SABER observations. This paper is clear and well-written, nevertheless, I would suggest that the authors address the following comments: - The title should be changed to: "Derivation of mesospheric gravity waves horizontal and vertical wavelengths using..." - The error on the very long horizontal wavelengths must be really large. Wachter et al.,

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2015 give  $L_x$  up to  $\sim 1300$  km and obtain already large uncertainties. I don't think values  $>1500$  km make any sense. You should limit your study to the events with  $L_x < 1500$  km. - Many papers using airglow imagers to measure medium scale GWs are not mentioned in this paper: Takahashi et al., 2009; Paulino et al., 2011; 2012; Suzuki et al., 2013; Liu et al., 2015. Chen et al., 2013, and 2016 also investigated mesospheric large scale waves or inertial GWs using Fe lidar and radar data. The authors might not cite all these references (some of them only concern individual cases), but at least they should be aware of them. - What is the largest time difference between SABER measurements and GRIPS measurements? - Maybe you should have an extra figure to show the geometry of the observations. Something similar to Wachter et al., Figure 1, but for the configuration used in this study. - Table 2 should include the other parameters:  $L_h$  and  $c$  (and maybe also direction of propagation and wind speed in the GW direction).

Minor points: p. 1: l. 18: mesopause level or altitude l. 20: frequencies l. 21: remove "afterwards" l. 22: ...Oberpfaffenhofen, by a meteor radar. p. 2: l. 2: "is observed" or "is monitored" instead of "is addressed" l. 9: something wrong with this sentence l. 14: a few 100s km l. 15: of a few 10s km l. 31: constructed p. 3: l. 2: "operates" instead of "measures" p. 4: l. 27: "um" has to be changed with micron character (maybe it's just a problem of conversion to pdf format) p. 5: l. 24: 2-element l. 33: that applied p. 6: l. 3: components p. 7: l. 11: the maximum measurable period should be half the measurement time l. 21: 3600km is huge!!!! p. 8: l. 6: For medium and low-frequency waves, you always have  $N \gg \sigma$ , so it works for your approximation, but maybe you don't need to talk about  $f$  since you don't use its relation with  $\sigma$  or  $N$ . You should also explain why you can get rid of  $1/4H^2$  l. 14: monthly basis p. 10: l. 2: change subtitle to 4.1 Horizontal parameters l. 20: the night p. 11: l. 6: the value for the scale height is surprising, usually at this altitude it's 6-7 km l. 8: investigated p. 12: l. 2: remove "," after only l. 3: ... and subsequently of the vertical... p. 13: l. 3: (1-10h, 100-1000s km)

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The authors should use other expressions for "ca." (about, approximately, ~). It's a little bit repetitive!

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and upper atmosphere at McMurdo (77.83°S, 166.67°E), *J. Geophys. Res.*, 121, 2, 1483–1502, DOI: 10.1002/2015JA022127, 2016.

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Interactive comment on *Atmos. Meas. Tech. Discuss.*, doi:10.5194/amt-2017-350, 2017.

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