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Interactive comment on "Intercomparison of FY-3 and AIRS Gravity Wave Parameter Extraction Based on Three Methods" *by* Shujie Chang et al.

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Referee #1 We thank Referee #1 for his/her comments and useful remarks. In the following we include our answers point-by-point.

1. AIRS as a nadir sounder can only observe gravity waves with long vertical wavelengths. Hoffmann and Alexander (2009) found that the minimum vertical wavelength of their high-resolution AIRS retrieval is about 10-15 km in the stratosphere. The authors need to further indicate that AIRS Level 2 product can be used to extract gravity wave. Yes, you are right. In this manuscript we have discussed this point according to the article (Hoffmann and Alexander, 2009) (L106-L123). The AIRS operational Level 2 data is used in this paper which has been analyzed in Section 2 (L139-L149). In order

to further indicate that AIRS Level 2 product can be used to extract gravity wave, the missing reference has been added to this part. It can be seen as follows: "AIRS operational Level-2 data provides stratospheric temperature profiles. For validation AIRS operational Level-2 data are compared with results from the ERA-Interim meteorological reanalysis. The comparisons show that AIRS operational Level-2 temperature data are in good agreement with the validation data sets, and are considered optimal for gravity wave studies (Meyer and Hoffmann, 2014)." (L144-L149) "Meyer, C. I., and Hoffmann, L.: Validation of AIRS high-resolution stratospheric temperature retrievals, Proc. SPIE 9242, Remote Sensing of Clouds and the Atmosphere XIX; and Optics in Atmospheric Propagation and Adaptive Systems XVII, 92420L, https://doi.org/10.1117/12.2066967, 2014." (L606-L608) Thanks.

2. Many proper nouns are abbreviated when they first appear. Please check. Sorry for my carelessness. In abstract: "Abstract. Two types of temperature profile products from the FY-3 (FengYun-3) satellite system, using GNOS and VASS, together with AIRS operational Level 2 data, are used to compare and analyze gravity wave parameters." This has been modified to "Abstract. Two types of temperature profile products from the FY-3 (FengYun-3) satellite system, using GNOS (The Global Navigation Occultation Sounder) and VASS (The Vertical Atmospheric Sounder System), together with AIRS (The Atmospheric Infrared Sounder) operational Level 2 data, are used to compare and analyze gravity wave parameters." (L 15-L 18)

"Subsequently, the global distribution characteristics of stratospheric gravity waves in a given year have been studied by using GPS/MET occultation data (Tsuda et al., 2000), CHAMP GPS occultation data (Ratnam et al., 2004; Torre et al., 2006), Aura satellite MLS (Microwave Limb Sounder) observations (Wu and Eckermann, 2008) and COSMIC GPS occultation data (Xiao and Hu, 2010)." This has been modified to "Subsequently, the global distribution characteristics of stratospheric gravity waves in a given year have been studied by using GPS/MET (The Global Positioning System/Meteorology) occultation data (Tsuda et al., 2000), CHAMP (The Challenging Min-

isatellite Payload) GPS occultation data (Ratnam et al., 2004; Torre et al., 2006), Aura satellite MLS (Microwave Limb Sounder) observations (Wu and Eckermann, 2008) and COSMIC (Constellation Observation System for Meteorology, Ionosphere and Climate) GPS occultation data (Xiao and Hu, 2010)." (L 71-L 76)

"In order to construct a more systematic and reliable gravity wave model, Ern et al. (2014) used SABER's 11-year observation data and HIRDLS (High Resolution Dynamics Limb Sounder) two-year observation data to study the contribution of gravity waves to the equatorial quasi-biennial oscillation (QBO)." This has been modified to "In order to construct a more systematic and reliable gravity wave model, Ern et al. (2014) used SABER (Sounding of the Atmosphere Using Broadband Emission Radiometry) 11-year observation data and HIRDLS (High Resolution Dynamics Limb Sounder) two-year observation data to study the contribution of gravity waves to the equatorial quasi-biennial oscillation (QBO)." (L 78-L 81)

"The two types of FY-3 temperature profile products, with GNOS and VASS, together with AIRS operational Level 2 data, are used to compare and analyze gravity wave parameters." This has been modified to "The two types of FY-3 temperature profile products, with GNOS (The Global Navigation Occultation Sounder) and VASS (The Vertical Atmospheric Sounder System), together with AIRS operational Level 2 data, are used to compare and analyze gravity wave parameters." (L 136-L 139)

"The Level 2 data of FY-3 include atmospheric temperature profiles from the Global Navigation Occultation Sounder (GNOS) and the Vertical Atmospheric Sounder System (VASS) (Liao et al., 2016; Yao et al., 2019)." This has been modified to "The Level 2 data of FY-3 include atmospheric temperature profiles from GNOS and VASS (Liao et al., 2016; Yao et al., 2019)." (L 161-L 162) Thanks.

3. L53: prediction mode-> prediction model Yes, you are right. This has been modified. (L 54) Thanks.

4. L98: which showed-> which showed. An extra blank. Yes, you are right. This has

been modified. (L 102) Thanks.

5. L122: "...between 1100 and .016 mb" What's the meaning of ".016 mb"? Please make it clear. Sorry about this. This has been modified to "...between 1100 and 0.016 mb" (L126) Thanks.

6. L211-L213: "In fact, some planetary scale disturbances, such as Kelvin waves, have vertical wavelengths of the same scale as gravity waves, so using these filtering methods means that the gravity wave disturbances obtained actually include a contribution from these other waves." "in fact" and "actually" are completely repetitive. Yes, we agree with you. This has been modified to "In fact, some planetary scale disturbances, such as Kelvin waves, have vertical wavelengths of the same scale as gravity waves, so using these filtering methods means that the gravity wave disturbances obtained include a contribution from these other waves." (L 218-L 220) Thanks.

7. L296-L297: From 20 km to 35 km, the difference is gradually becomes larger. -> From 20 to 35 km, the difference gradually becomes larger. Yes, we agree with you. This has been modified. (L 304) Thanks.

8. L362: with vertical wavelength less than 2 km ->with a vertical wavelength less than 2 km. Sorry about this. The corresponding sentences have been modified as follows: "...with vertical wavelengths greater than 10 km" (L 366) "...with vertical wavelengths less than 2 km" (L 368) Thanks.

9. Note that the figures of GW properties would be compared with the previous literatures. Yes, you are right. The comparisons to the previous literature have been made. It can be seen as follows: Wang et al., 2019 (L 268). Liao et al., 2016 (L 282). Liao et al., 2016; Wang et al., 2019 (L382-383; L455).

Thanks again for your careful review. Hopefully our response can enable a further review of the manuscript. We will fix all these points in the final version following your suggestions. Many thanks for your work so far and best regards, Shujie Chang and

Co-authors. Please also note the supplement to this comment.

Please also note the supplement to this comment:
https://www.ann-geophys-discuss.net/angeo-2019-130/angeo-2019-130-AC1-supplement.zip

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