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Atmospheric Measurement Techniques Discussions

Interactive comment on "Wuhan MST radar: Technical features and Validation of wind observations" *by* Lei Qiao et al.

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General Comments:

(1)I suggest that the authors also discuss the difference of turbulence scales in the lower and higher atmosphere, referring to Hocking (Radio Science, 20, p1410, 1985) or others.

Answer: Dear reviewer, radars with wide band are usually used to study the turbulence scales in the atmosphere. The Wuhan MST radar operates at fixed frequency, and it can provide only limited information about the turbulence scales. Therefore, we will not discuss the turbulence scales in the paper. I hope to get your understanding.

(2)In discussion of Fig. 12, the stratospheric sudden warming (SSW) event has been

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considered to be significant factor of some discrepancies between radar wind and HWM-07 model wind. Since the radar system works in low to high modes for 5 min in sequence, is it possible to examine the occurrence and prevailing rate of SSW events with the data of the low and middle modes or other information?Could this evidence be included in this paper?

Answer: Thank you for your suggestion. Fig. 1(a) shows the time-altitude evolution of the daily mean zonal wind observed by the Wuhan MST radar from 66 to 86 km during 2016 SSW winter (Jan to Feb). The 2016 Feb SSW is a minor SSW, and the day of peak warming on Feb 5 is marked by the dotted vertical line. The wind weakening is observed around Feb 5. Note that the westward wind form 68 to 78 km during Jan 10 to Jan 14 is a reversal of the climatological mean zonal wind, which has nothing to do with the SSW. Fig. 1(b) shows the time-altitude evolution of the daily mean zonal wind observed by the Wuhan MST radar from 66 to 86 km during 2017 SSW winter (Jan to Feb). Two minor warming events happened during the winter of 2017, with two days of peak warming on Feb 2 and 26, marked by dotted vertical lines in the figure. The wind reversal is observed around Feb 2, and the wind weakening is observed around Feb 26 (not obvious). This is a preliminary analysis. Considering the discussion of SSW is not the gist of the paper, the figure will be used as a supplementary material.

(3)HWM-14 module can be employed instead of HWM-07.

Answer: Thank you for your suggestion. We have employed HWM-14 instead of HWM-07. ActuallyïijŇthe predicted winds from HWM-14 is closer to the observations.

Other comments and suggestions:

(1)Fig. 1 is the schematic block of the radar system, and several paragraphs are written for this part. I suggest that the text for Fig. 1 can be section 2.1 (with suitable title). Section 2.1 becomes section 2.2, and so on.

Answer: Thank you for your suggestion. We modified the section titles in the revised

paper.

(2)L33-38: Many MST radars are mentioned here, and some of them have been upgraded, for example, the MU radar and Chung-li radar. Therefore, it is better to update some references.

Answer: Thank you for your suggestion. We updated the references in the revised paper.

(3)L314: the southward jet occurs from April to October at almost the whole height, except in summer below ∼12 km. Q: Do you mean"the southward jet occurs from April to October, and extends down to the low height in April and May." ?

Answer: Yes, that is what we mean. We modified the sentence in the revised paper.

(4)L364-365: northward jet occurred above ∼75 km in the period from August to April. . .during the SSW events. L378-379: . . .due to the influence of SSW events. Q: In fact, there is no evidence of SSW event shown in this paper to support the conclusion. Could this evidence be included in this paper?

Answer: Dear reviewer, the evidence of SSW event is shown in figure 1 of the response, and related references have been listed in the revised paper.

(5)L380: . . .is an effective tool to measure the three-dimensional wind fields. . . Q: The vertical wind is not shown in this paper. Do you also record the vertical wind velocity?

Answer: Dear reviewer, the main objective of the paper is validating its measurements. The vertical wind velocity is very small, and there is no appropriate data to verify its effectiveness. Therefore, we didn't discuss the vertical wind in this paper.

Some wording problems:

(1)L13: The radar system is . . .

Answer: Thank you for your suggestion. We modified it in the revised paper.

(2)192 kW or 172 kW?

Answer: Thank you for your suggestion. We modified it in the revised paper.

(3)L18, L40, L46, L59, L60,. . .: . . .paper paper.

Answer: Thank you for your suggestion. We modified them in the revised paper.

(4)L44: we plan to wright write a new article. . .

Answer: Thank you for your suggestion. We modified it in the revised paper.

(5)L48: The location is far away from. . . (Do you mean this?)

Answer: Thank you for your suggestion. We modified it in the revised paper.

(6)L69: The shortest width of the subpulse width. . .

Answer: Thank you for your suggestion. We modified it in the revised paper.

(7)L70: The radar system. . .

Answer: Thank you for your suggestion. We modified it in the revised paper.

(8)L88: . . .consists of the DDS (Direct Digital Synthesizer) module.

Answer: We have explained the DDS in L85.

(9)L96: wind filed field. . .

Answer: Thank you for your suggestion. We modified it in the revised paper.

(10)L100: . . .wave radio ratio (VSWM). . .

Answer: Thank you for your suggestion. We modified it in the revised paper.

(11)L101: . . .Fig. 2 for e.g. S0101, there are . . .

Answer: Thank you for your suggestion. We modified it in the revised paper.

(12)L114: . . ., which respects the first. . . Q: Is the word “respects” proper here?

Answer: Thank you for your suggestion. We modified it in the revised paper.

(13)L117: By that analogy,. . .

Answer: Thank you for your suggestion. We modified it in the revised paper.

(14)L211: orthogonal phase (Q). . .I think the term “quadrature phase” is used commonly.

Answer: Thank you for your suggestion. We modified it in the revised paper.

(15)L221: . . .i.e. e.g. the 10 m. . .

Answer: Thank you for your suggestion. We modified it in the revised paper.

(16)L227: . . .Fig. 6(b), Aafter . . .

Answer: Thank you for your suggestion. We modified it in the revised paper.

(17)L267: . . . 17%, which is much lower. . ..middle modes.

Answer: Thank you for your suggestion. We modified it in the revised paper.

(18)L288: but the measurement winds observed . . .

Answer: Thank you for your suggestion. We modified it in the revised paper.

(19)L290: heights may could be attributed to. . .

Answer: Thank you for your suggestion. We modified it in the revised paper.

(20)L300: . . .generation of European. . .

Answer: Thank you for your suggestion. We modified it in the revised paper.

(21)L336: Two reasons might be resulting in the . . .

Answer: Thank you for your suggestion. We modified it in the revised paper.

(22)Fig. 12, caption: MST radar during Jan 2016-Dec 20176 and . . .

Answer: Thank you for your suggestion. We modified it in the revised paper.

(23)L353: . . .westward winds are happened after the. . .

Answer: Thank you for your suggestion. We modified it in the revised paper.

Please also note the supplement to this comment:
https://www.atmos-meas-tech-discuss.net/amt-2020-17/amt-2020-17-AC3-supplement.pdf

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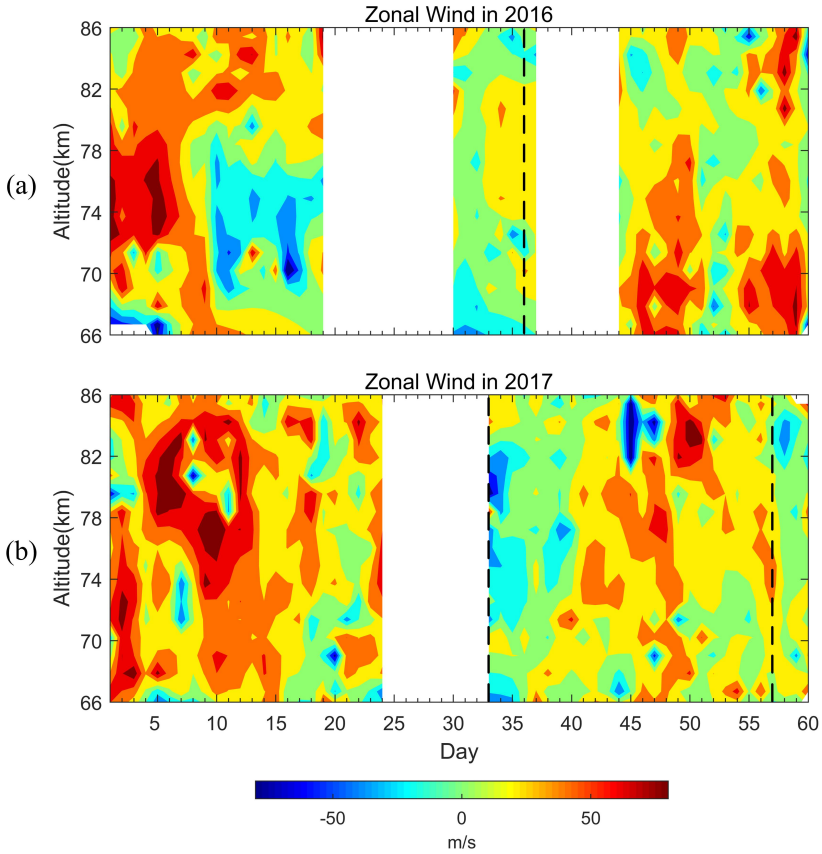

Fig. 1. Time-altitude evolution of the daily mean zonal winds observed by the Wuhan MST radar from 66 to 86 km during Jan to Feb in 2016 (a) and 2017 (b). The dotted vertical lines indicate peak warming.

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