

Interactive comment on “Characteristics and performance of vertical winds as observed by the radar wind profiler network of China” by Boming Liu et al.

Anonymous Referee #2

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General

I found the manuscript interesting and reasonably well written, but it needs major revision in my opinion - both to improve clarity and to improve the English. There are also serious questions about the availability outside China of the data described.

Data availability

It is good to know that there is a Chinese wind profiler network. As the authors say on page 4 "the dataset of nationwide profiler network in China has never been revealed". On page 13 they say that the data were provided via <http://data.cma.cn/en/>. I have looked at that web site and failed to find any mention of wind profilers - more infor-

mation on data access should be provided. Does one need to register to see wind profiler data? A Chinese colleague looked at the Chinese version and couldn't find wind profilers mentioned there.

The other issue is real-time availability via the Global Telecommunications System (GTS). The abstract recommends the data for global numerical weather prediction - which rather assumes real-time usage. The other wind profiler networks mentioned all provide (or provided) reports via the GTS. As with other comments in this review I expect to see a change in the main manuscript not just a note in the response to reviewers. In this case I want to see a statement as to if and when the data will be available via the GTS. Please contact CMA senior management as appropriate to find out.

The fate of the NPN and profiles from aircraft

The manuscript mentions the NOAA Profiler Network (NPN) and provides three references to it - this is fine. However it should also mention that the NPN largely ceased to operate in 2014 and the last stations closed in 2017. See https://madis.ncep.noaa.gov/madis_npn.shtml As I understand it the profilers were reaching the end of their useful lives and it was decided not to replace them. One factor in their non-replacement was the growing number of profiles (wind and temperature) available from aircraft. On a smaller scale most of the UK profiler network has shut in recent years for similar reasons. I am not saying this to imply that the Chinese profiler network should close, but to provide a rounded picture to readers the closure of the NPN and the availability of aircraft profiles should be mentioned.

Operational monitoring of the Chinese network

The results in this manuscript, whilst useful, seem to be an isolated study. To get the most out of such a network there should be near-real-time monitoring (daily, weekly or monthly) perhaps by comparison to CMA forecast fields. If one of the profilers seems to be performing badly then it should be checked out and perhaps subject to extra

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maintenance. Is there any such monitoring and feedback to the network managers?
Was there any follow-up about the 17 "unrecommended" stations found by this study?

Manuscript title: The web page gives this as "Characteristics and performance of vertical winds as observed by the radar wind profiler network of China" the manuscript as "A vertical wind profile dataset in China based on the operational radar wind profiler network" - they should be consistent. I have a slight preference for the first ("Characteristics ...") but "vertical winds" (suggests w component) should be replaced by "wind profiles".

Detailed comments

page 1, line 10: 'are the foundation' - 'are a foundation'

1,12: 'JMA, NOAA, EUMETNET, and AGBoM' - unexplained acronyms. Particularly as 'countries' are mentioned earlier in the sentence it seems better to use 'Japan, USA, various European countries and Australia'.

1,13-14 'was presented, which consisted' - 'is presented, consisting' (improved English, like some of the other comments)

1,15 'at various altitudes' add 'but mainly in the boundary layer' or 'about 60% of them have a height range between 3 and 5 km' (my estimate from Figure 5a, the authors could be more precise)

1,22 'unrecommended' should be 'not recommended' here and later in the text

2,4 'Nash et al' - 'Nash and Oakley'

2.1-14 There are a lot of references here, perhaps more than necessary.

2,17 'Nash et al' - 'Nash and Oakley'

2,19 'vertical winds' - 'wind profiles'

2,20 'much' - delete

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2,22-25 'Since 2018 ... use.' There have been satellite winds before (from cloud tracking and scatterometers), what is new is that Aeolus provides wind profiles (strictly speaking only line-of-sight winds, ~ only one component). The text needs to be modified a bit.

'its dataset still not released for the public access and use' I understand that CMA is involved in the calibration/validation phase and has access to the Aeolus data. Significant work has been needed on bias correction of the winds, see <https://www.ecmwf.int/en/about/media-centre/news/2020/ecmwf-starts-assimilating-aeolus-wind-data> (reference this or not as you wish). It is a proof of concept satellite and I don't think I would expect public release of the data at this point.

3,6 'vertical wind over regional scale' - 'regional scale wind fields'

3,6-7 'and to fill the data gap left by field campaign' - delete this. NAWDEX and other field campaigns were never operational

3,20 'Nash et al., 2000' - 'Nash and Oakley, 2001'

3,24 'Government' - delete

3,25 'produced' - 'produces'

4,2 'the vertical' - 'vertical'

4,17 'be' - 'been'

4,21 'reference' - too strong, perhaps 'data source'

5,4... suggestion 'The operational Chinese radar wind profiler network started in 2008 with 5 sites transmitting wind profiles to the headquarters ...' The note about 106 stations in March 2019 should be put in chronological order.

Page 5 general - more information about the various instruments should be given including height range and manufacturer. This might be best presented as a table which

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could include the number of instruments and the dates for which they operated.

5,18 'was' - 'is'

5,22 'wind profiler network: one is raw data and the other product data' - 'wind profiler network: raw data and product data'

6,3 "one's" - delete

6,15 'generated for each observation site'

6,16 suggestion 'A few sites use a low level detection mode with high sampling rate - these provide a vertical resolution of 60 m.'

6,18 'the Fig.' - 'Fig.'

6,19 'selected' - 'were selected'

7,3 'tropospheric type I, tropospheric type II' - what does this mean? better covered in section 2

7,5 'are inhomogeneous'

7,10 'ECMWF wind data' - be more specific. From the mention of the Copernicus web site on page 13 I suspect that ERA5 reanalysis data has been used. This should be clearly stated and a reference given (unfortunately I don't think there is a journal paper yet, but there are short articles in the ECMWF newsletter).

7,11 'verify the accuracy' verify is too strong, perhaps 'estimate'

8,5 "100% confidence" I wish I could be 100% confident about any observation! However if that is how the data are labelled it may be best to stick with this.

Page 8 general: are there any features in common between the 'substandard' sites? Any pattern emerging?

8,24 'inversion algorithm' - 'processing algorithm' better?

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8,24 'verify' - 'check'

9,1 'applying these observation data' - 'using these observations'

9,2 'Haseler, 2004' seems an odd reference in this context

9,5 'mean bias' - 'mean speed difference'? Either here or in the figure caption it should be made clear if this is 'RWP-ECMWF' or 'ECMWF-RWP' 'RMSE' - not explained, better to refer to 'RMSD - root-mean-square difference' Neither the profiler or ECMWF/ERA winds are error-free. I assume that it is the vector difference - should be explicitly stated.

9,13 'mean absolute bias' - is this in wind speed? or u-, v- wind components? 'magnitude of the speed bias' would be clearer. 'RMSE' - is this on the vector difference?

9,23 'The large difference ... is mostly related to flaws in the algorithm' What sort of flaws? What is the evidence for this? Is it that bad data has not been screened out? (I think that some wind profilers deteriorate gradually over time, and regular maintenance, replacement of aging components is important. I'm not sure if this is as true of boundary layer profiles.)

10,1 'performance can also be compared to the corresponding radiosonde' Has this been done? How well do the results match those vs ECMWF?

10,18 'mean maximum wind speed within the 24 h' Is this the maximum of the hourly speeds or the half-hourly speeds mentioned earlier? In either case I presume that it is an average over the whole 60 or 30 minutes. (Or perhaps 6-minute winds, Fig 2.) Please clarify.

10,22 'morning ... early morning' 6-12 and 0-6 Beijing time. Clarify these and also 'afternoon', 'evening'

10,15 'Extreme weather detection' - 'Daily maximum winds' better Extreme weather usually means very rare events (say once a year) not daily maxima.

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10,16 'extreme weather' - 'diurnal cycle'

10,23 'have an afternoon peak', 'have an evening peak' (not 'the')

11,2 'heights'

11,4 'is inconsistent' (sounds as if they are wrong), 'show a different pattern' better

11,5 'twice' - 'two'

11,5 'indicative that' (not 'of')

11,12 'were selected'

11,19 'Western China' (delete 'The')

11,21 'western China' (delete 'the')

11,23 'both the' - delete

11,25 'the 30%' - delete 'the'; 'over the whole study period'

12,1 'measurements'

12,3 'wind turbines' - perhaps mention that winds from turbine height (60-100 m?) would be useful for NWP (more useful than a 10 m wind from Synop stations)

12,9 'Wind profiles are of great ...'

12,13 'consisted' - 'consists'

12,18 'mean absolute bias' - see note on page 9, also state what is being used in the comparison.

12,21 'extreme weather'? I expect they could be used for this, but this hasn't been shown, see discussion on page 10.

13,20-21 two closing brackets ")" without opening ones "(".

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Table 1. The caption should mention Figure 10, which is the closest to a definition of the ROIs. Perhaps a table of all stations, (identifier, latitude, longitude, altitude, ROI, type of profiler, land cover, quality flags) could be provided as an appendix or supplemental information. Column 2 of table 1 should I think be 'Number of sites'.

Figure 3. This could be quite interesting, but the panels are too small for readers to see clearly. My suggestion would be just to show four levels as in Figure 9 (probably the same four levels) and not bother with the stacked plot e).

Figure 4 caption 'detection'

Figure 6 'mean bias' - 'mean speed difference'?

Figure 7 'mean absolute bias' (whatever that means) and 'RMSE'. In this figure the values seem to have been averaged over levels (all levels, or levels up to 3 km?), clarification is needed. See discussion on page 9.

Figure 8. The histogram 8b) is superfluous, I would remove it. Suggestion for caption: 'The blue dots represent the 89 recommended sites and red dots the 17 non-recommended sites.'

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