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Comment

# ***Interactive comment on “Middle-atmospheric zonal and meridional wind profiles from polar, tropical and mid latitudes with the ground-based microwave Doppler wind radiometer WIRA” by R. Rüfenacht et al.***

## **Anonymous Referee #2**

Received and published: 8 September 2014

The paper by Rüfenacht presents an improved set-up and retrieval of the ground-based wind radiometer WIRA. The paper is well written and I only have some minor comments for improvements.

### **Specific comments:**

P7718, I1: Is WIRA an abbreviation? If yes, what is it standing for?

P7718, I6: Please add the information what has been changed in the set-up.

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P7718, l10ff: Please add the locations where the measurements have been performed.

P7718, l26ff: Wind measurements in the stratosphere/mesosphere can also be derived from microwave limb sounding measurements. Please add the reference to the paper by Baron et al., Observation of horizontal winds in the middle-atmosphere between 30°S and 55°N during the northern winter 2009–2010, Atmos. Chem. Phys., 13, 6049–6064, 2013 in the introduction.

P7725, l3: What is the abbreviation ARTS standing for? Please add.

P7725, l26: “...go into this term....” I would suggest to revise the wording.

P7728, l24ff: What is the purpose of the comparison shown in Fig. 8 and 9. This is not clearly stated, e.g. it would be worth to clearly state that you are comparing the performance of the old and new set-up.

P7729, l15: What does this mean? Which set-up is better? This should be clearly stated. It would be further worth to quantify the improvement.

P7729, l18: “.....significantly improved the quality of the data.....”. This becomes not clear from the previous sections. Some more clear statements in this sections would be helpful.

P7729, l21-23: To which set-up are referring? The one sided or double side-band receiver?

P7729, l21: “...thus meridional wind was not measured...”. Is that a drawback? What does one gain from measuring both zonal and meridional wind? Be more

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precise.

P7729, I24ff: Please add during which time periods the measurements were performed (dates, season etc.).

P7730, I26-P7732,I2: Where from did you get the information that a warming had occurred? Add references.

P7731, 115: “Westward?”. The wind changes from west to east during a warming. Eastward winds are prevalent during the summer.

P7731, I19: Doesn't to which part of the atmosphere the wind reversal is confined depend on the strength of the warming?

P7731, I23: Where is the discrepancy between model and measurements coming from? Due to measurements uncertainties by WIRA or model uncertainties by ECMWF. You discuss this later, but it should also be discussed here or one should refer to the later coming discussion.

P7731: Description/discussion of Fig 13? What information does one gain from the meridional wind?

P7732, I6: How accurate is ECMWF in the mesosphere?

P7733, I17-18: It is not clear what you try to say here. Do you mean that ECMWF could be inaccurate because there are not enough data available to be assimilated to the model? Problems of the model simulating correctly processes in the stratosphere/troposphere could surely affect the model performance in the mesosphere, but what exactly causes the discrepancies? I am sure that there have been some studies

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already published performing comparisons in the mesosphere discussing the accuracy of the ECWMF model in the mesosphere which could be helpful for the discussion of your results.

P7733, l20ff: What is the major improvement? The new set-up or the new retrieval algorithm? This becomes not clear. At some places it sounds like the one way and at other places in the text the other way round.

P7734, l4: “...displacement events in the polar vortex.....” How can the displacement of the vortex be seen in the wind? The SSWs change the wind direction. Isn't the vortex displacement just a cause of the SSW?

P7734, l10: no input of what? No input of measured data? That does not necessarily mean that the model is not able to reproduce the wind in the mesosphere.

#### **Technical corrections:**

P7718.. l23: “.....the the.....”, one “the” is obsolete.

P7732, l4: skip “already”.

P7732, l5: skip “data”.

P7733, l18: “mesoshperic” should read “mesospheric”.

P7734, l8: “averages of” or “averaged”.

#### **Figures:**

Figure 2: What exactly is new compared to the previous set-up of WIRA? Mark this in the figure or name it in the figure caption.

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Figure 6: Add to the figure caption the lowest and highest level that is considered, so that the text reads “.....altitude levels from 32.4-72.4 km.....”.

Figure 8: Add to the caption of the figure what is shown in the left figure and what in the right. It should become clear that you are comparing here the old and new set-up of the instrument.

Figure 9: Same as for figure 8.

Figure 11: Add to the figure caption what the dashed lines are. Add also to the caption what is shown by the red and blue lines.

Figure 12: Grey lines? I don't see any grey lines. Only the grey areas that mark the data gaps. The larger gaps in figure 12d have been explained, but not the smaller on in figure 12 a,b, c.

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Interactive comment on Atmos. Meas. Tech. Discuss., 7, 7717, 2014.

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