Reviewer 3 comments (in red) and Authors responses (black).

p.3725, l.12: You could state for which parameters new retrievals were developed.
Added: "develop new retrievals of precipitable water vapor and liquid water path."

p.3728, l.15: I would suggest adding a few words that the temperature sensitivity is due to the oxygen absorption.
Added: "Frequencies between 22 and 52 GHz are mostly sensitive to atmospheric water in vapor and liquid phase, frequencies between 51 and 60 GHz are sensitive to atmospheric temperature due to the absorption of atmospheric oxygen."

p. 3732, l.5-9: You should mention that the model calculations are based on radiosonde soundings. How many soundings were made per day? Are the MWR data averaged over the duration of the radiosonde ascent? Please comment on that!
Same for Fig. 12 (text on p. 3737) and Fig. 15!
Added: "Input for the model computations is provided by radiosondes soundings (4/day at the SGP). In this and following figures the radiometer data were averaged during the first 5 minutes of radiosonde ascent."

p. 3739, l.6: You should add that the degrees of freedom for water vapor profiles also strongly depend on the total amount of water vapor (IWV). In mid-latitudes the average is <2, in the Arctic probably very close to 1.
Added: "The degrees of freedom for water vapor profiles vary with the integrated water vapor, being slightly higher in the mid-latitudes and lower in the Arctic."

Figure 13, also p. 3737, l.17-18: The figure caption as well as the explanations within the text are very short. Please provide more details on what the different comparisons represent!
Added: "Fig. 12 shows a comparison of LWP retrievals from the MWR and the MWR3C at the SGP during August 2012. The figure shows that the new 3-channel radiometers and associated new retrievals are providing data in good agreement with the existing 2-channel MWRs."

Fig. 13 (now Fig.12) caption added explanation: "In the x-axis is the LWP retrieved with a linear statistical retrieval from the 2-channel radiometer MWR-STAT. In the y-axis is the LWP retrieved from the 3-channel radiometer using a neural network (MWR3C-NN, brown point) and a physical retrieval (MWRRET, black points). Data were collected at the SGP in August 2012, N=39910."

Fig. 13 (now Fig. 12) changed y-axis label for better clarification

Technical corrections:
p. 3731, l.12: I would add a new paragraph here, starting with "The ARM program (: : :)"
Done

p. 3732, l.17-21 (from "Red crosses (: : :)" to "(: : :) MWR3C sensor") - > this part should be in the figure caption
Done

p. 3736, l.21, 22 : "above and below the -40 C level" might lead to confusions. Better say something like "in levels warmer/colder than -40 C"
Done

p.3737, l.13: Replace "On the right panel" by "In Fig. 12b"
Done

Figure 3: This diagram is already available in Caddedu, 2011 and does not need to bepresented here again.
Done-re-numbered remaining figures

Figure 8: The grey points representing the MWR rain flag are very faint and only barely visible. Maybe you could improve that?
Done changed to brown color