

Response of the authors:

The authors would like to thank the reviewers for their supportive and valuable feedback, questions, and comments. In the following, we are giving answers and explanations to their questions and comments. The text in the paper is adapted in different places according to the reviewer notes.

Referee #1	Response of the authors
1. You compare WRF simulated data with MERIS data. For the WRF simulations ERAInterim were applied as boundary conditions. As there are various sources of satellite data assimilated in ERA Interim, there is definitely a need to explain them and potential relationships to the applied MERIS dataset.	We agree that a large number of datasets is assimilated with the ERA-INTERIM reanalysis and that this should be mentioned in the manuscript. However, MERIS water vapor retrievals are not used in the INTERIM assimilation approach and thus the MERIS data is independent from the WRF results. Text is added to section 2.2.
2. You should tell at least some words about MERIS water vapor retrieval: what are the basics and are there any consequences for your method (e.g. is MERIS able to retrieve water vapor for the complete column in case of clouds or only above the clouds?)	Text is added to section 2.1 (Comment#5)
3. As units for water vapor you use 'wet delay'. In the satellite community, PWV is the vertically integrated water vapor, where no negative values appear. It would be favorable to distinguish more clear between these units.	Wet delay has a unit of mm as distance. The PWV also has the unit of mm as the height of the condensed water column for unit area. In absolute values both quantities have to be positive. However, the long wavelength signal is subtracted from the data, hence negative values appear.
4. On page 373 you talk about the aspects of 'isotropy' and 'anisotropy'. Thinking about the 'regionalized variable' of Matheron and examing PWV maps from satellite (with very sharp edges due to frontal systems), I would like you to elaborate (if possible) more on this issue. Are there e.g. situations (due to data from remote sensing) where only the atmospheric model can capture these 'gradient' due to atmospheric fronts and so becomes invaluable for the method ?	We added another example that shows the significant influence of the model on the output prediction map. In regions where no remote sensing data are available the model has the larger effect on the output PWV map. Also, when remote sensing data show inconsistency in the spatial variations or some noisy areas, the effect of the model increases as shown by Fig. 11/12. (Comment#10)
5. In Figure 11 (and related text), you nicely contrast the influence of the atmospheric model in two cross sections. Is it possible	This comment is addressed together with 4. The corresponding text is modified.

<p>to provide a map depicting directly the influence of the different data sources. Up to now, my feeling is that the influence of the atmospheric model is rather low overall.</p> <p>6. page 364 line 6: What means 'accurate' here ? Depends on subsequent application of the grids!</p> <p>7. page 364 line 17: 'single' - better 'individual' ?</p> <p>8. page 365 line 1: better skip 'deluge' from your list</p> <p>9. page 365 line 4: You talk about water vapor along the path, but what you get is precipitable water vapor, which is vertically integrated, isn't it ?</p> <p>10. page 366 line 4: 'arbitrary temporal and spatial': even if you include LES, there is a limit concerning the spatial domain due to the need for parametrization. You are e.g. not able to model water variability explicitly in the spatial scale needed for evolution within drop size distributions.</p>	<p>The text is modified; accurate refers to the water vapor values and not the grids.</p> <p>modified</p> <p>'deluge' is removed</p> <p>Yes, we estimate the wet delay from the observations, and map it to the vertical direction to obtain the precipitable water vapor. We kept the text unchanged.</p> <p>We completely agree with this statement. Our intention was more to state that with atmospheric modeling systems, as compared to point observations, quasi-continuous representations of atmospheric variables can be computed for space and time. However, at any scale, there are physical processes that need to be parameterized whether it is due to computational restrictions, the lack of data or insufficient knowledge about the nature of the underlying processes. We propose to change the word "arbitrary" to "various"</p>
<p><u>Other Comments</u></p>	
<p>page 366 line 20: 'which' instead of 'that'</p>	<p>Done</p>
<p>page 367 line 5: 'levels' instead of 'level'</p>	<p>Done</p>
<p>page 368 line 5: As you compare your retrieval to MERIS, you should provide at least a broad idea, how PWV is derived from MERIS data (are there any issues / problems / drawbacks the reader should know about this data ?)</p>	<p>Text is added to section 2.1 (Comment#5)</p>
<p>page 368 line 15: please indicate if it is a 'oneside' or 'twoside' nest (with</p>	<p>The simulation was performed as onside, no feedback from the nests to their parent</p>

respect to feedbacks)	domains. A sentence is added for clarification in section 2.2 (Comment#7)
page 369 line 8: 'shows' instead of 'show'	Done
page 369 line 10: 'discontinuity' or better 'difference'	discontinuity is preferred because it better reflects the sudden change of PWV.
page 369 line 10: Because WRF needs water vapor as input, the question arises if differences are due to the ERA-Interim data ?	This is indeed an interesting question. However, for an answer a comprehensive study of the water budget, especially the moisture convergence would be needed. It is very conceivable that both, the ERA-INTERIM boundaries and the WRF model contribute to the mismatch. The analysis of the weather situation for the two dates shows a better agreement for the June analysis where the conditions were quite calm and stable. The mismatch for the September date coincides with the passing of an Atlantic frontal system. We propose to add text to section 2.2. (Comment#8)
page 373 line 9: 'the the ' skip one 'the'	Done
page 373 line 9/10: not feasible anymore	Done
page 379 there are numerous aspects described in the 'results and discussion section' which should be better found in a 'methods' section as they do not include any results.	Done Section 5.2: Application to the data followed by the Results
page 380 line 11: maybe it is better to indicate the area you mean in figure 11.	Done
page 386 line 16: 'straight' instead of 'strait'	Done
page 403 The individual parts of the graphic should better be labeled with a), b), ... and these labels should be referenced in the text. Introduction of cross sections 'A' and 'B' should be found in the caption below.	Done
page 393: a coefficient has no unit (%); it would be nice to add a note what the whiten patches mean (no retrieval) and why they exist (clouds ?)	Modified Text is added to section 2.1 (Comment#6)
page 394: there is something wrong with your scale bar (a 'minus' missing ?)	This is the common way to display scale bar in e.g., ArcGIS. Therefore, we kept it unchanged.