First of all we would like to thank the reviewer for the detailed and helpful review to further improve the quality of our paper. Below you can find the answers to the reviewing comments.

Change to data analysis:

COSMOS data have been corrected for temporally-variable atmospheric water content in the revised version of the paper which also included the recalculated of the whole statistic part of the investigation.

Acronyms:

The number of acronyms has been reduced in the text, especially the ones just used in Fig.3.

Minor corrections:

All of them have been considered in the reviewed version of the paper.

Fig. 1:

We kept Fig. 1 mainly for two reasons: First to show the reader the region of interest for our investigations and second to demonstrate and point out the low station density for verification, which was remarked as a major drawback of this study by another reviewer.

First of all we would like to thank the reviewer for the detailed and helpful review to further improve the quality of our paper. Below you can find the answers to the reviewing comments.

Validation strategy & L9 P14793:

We agree that the number of stations for verification is very limited. As there are no more stations available according to our knowledge for the target region (= the region where we have ASCAT-ASAR downscaling factors) we were interested in, we see no possibility to overcome this problem although we agree that from the statistical point of view the results are of low significance. It is also true that the two stations are not within the same pixel. Again, this is a problem that cannot be solved due to the low number of in-situ measurements on the one hand and the given model grid on the other hand. Anyway, the lack of a large verification data set (usually due to financial constraints) should not prevent us from testing new approaches.

Lack of in-situ data is also the reason why there is no spatial comparison within this study as it is supposed that the investigation of spatial structures with just two verification stations is of low significance. Investigating the spatial component is interesting due to the ensemble approach: The factor which is applied during the downscaling is temporally constant, but due to the several forecast realizations for each time step, the mean value (which has been used for verification) is temporally not constant, which is evident when comparing Fig. 2 f and g.

Results for the two stations are not consistent:

COSMOS stations have been corrected for atmospheric water vapor content. Now the results are consistent for both stations: the downscaling is improving both RMSE and PCC for both stations.

Innovative aspect & L1 P14784:

In the revised version of the paper, the focus is on the downscaling of global model output with satellite information. CDF matching is a necessary requirement to apply the downscaling factors to model fields.

The validation strategy is indeed weak from the statistical point of view; the reasons are already discussed in the answer to the validation strategy.

Downscaling method in Wagner et al., 2008 & L22 P14790:

Scatterplots comparing ASAR and ASCAT data for the target region have been created. Instead of including these figures to the paper, the output of this investigation was included in the text. This is due to the fact that the differences between adjacent 1km grid points surrounding the COSMOS stations are small and therefore no striking signal is visible in the scatterplots.

L21 P14784:

The temporal stability assumption is described on P14790, L5-10. Soil moisture is varying in time, but the variations are usually very similar across wide ranges of scales as they are often influenced by the same parameters (e.g. precipitation). This is now mentioned in the text.

Fig. 2:

The intention of Fig. 2 is to demonstrate the effect of the calibration and downscaling on the data set. For this purpose, one station (and one forecast run) seems to be enough from our point of view.

L23 P14793:

This statement has been reformulated.

L5 P14784:

This statement has been reformulated.

L3 P14787 & L18 P14788:

In principle the approach proposed by the reviewer is the preferred one. The problem with adding a new source of error (unknown soil porosity) to the investigation due to this approach is now described in the text.

The title has changed.

The abstract has been revised.

Chapter 1 has been changed due to suggestions by one of the reviewers.

Chapter 2.1 includes a new paragraph on the conversion of soil moisture to soil water index.

Chapter 2.4 has been partly rephrased due to the correction for atmospheric water vapor.

Chapter 4 has been revised completely due to the changes in statistics (caused by the COSMOS atmospheric water vapor correction).

Fig.2 and Fig.3 have been revised due to the changes in statistics (caused by the COSMOS atmospheric water vapor correction).