#Reviewer 2

We thank Reviewer#2 for their careful review and positive assessment of our manuscript. Please find below our answers to each comment.

The article is generally well written and informative. A strong point of this article is the application of the results to real data of the measurement network.

The success could even be made clearer. In this context the last sentence of the abstract and also the conclusions could provide more facts on the benefit of applying the transfer function to Spanish Network data.

We have rewritten the last sentence of the abstract as follows:

"The implications of precipitation underestimation for areas in Northern Spain are discussed within the context of the present analysis, by applying the transfer function developed at the Formigal-Sarrios, and results from previous studies"

In the discussion we have included the following paragraphs:

"This underestimation could affect to numerous studies of precipitation, especially if the period of time used was associated with significant winter precipitation extremes (López-Moreno et al., 2011, Vicente-Serrano et al., 2011, Añel et al., 2014, Cortesi et al., 2014, Buisan et al., 2016)"

"Also the observed measurements of snow depth and liquid water equivalent recorded by observers in selected AEMET stations (i.e. Cubillo de Ebro, Cantabria; Mosqueruela, Teruel; Lalastra, Alava; and Sargentes de Lora, Burgos) during snowfall episodes agreed well with derived precipitation when the transfer functions were applied. For example, based on manual snow depth measurements at the Lalastra station, the total liquid water equivalent for 3-6 February 2015 blizzard was estimated to be between 150 – 250 mm. The gauge only measured 81.8 mm at this station, but after adjustment the corrected precipitation was 233.4 mm."

I don't repeat the excellent points from the previous, thorough revision comment on the revision:

p.2, l.9: the statement in the article seems to be ok for me, as it states that updraft at the gauge orifice is the main factor (not the only one) for
undercatch

OK

p.4, l.32-34: Needs to be clarified. As I understood it, you wanted filter out a dataset of snow-only events. For this purpose the selected temperature threshold of 0_C seems to be adequate. Of course you loose a lot of snow events at positive temperatures. Didn't you have any other indications of the precipitation type? What about the disdrometer? You should make clear why you chose this criteria.

In this part of the work we use data from Automatic Weather Stations in the operational network that are not equipped (unfortunately) with disdrometers. Thus, the only filter possible is the use of temperature threshold of 0_C. We have rewritten the sentence as follows:

"Automatic weather stations were not equipped with disdrometers, and thus we used temperature data to select snowfall events. For the purpose of this analysis, snowfall events were defined as precipitation events that occurred when the average maximum temperature was colder than 0ºC and the total accumulation was greater than 0 mm during a 1 h time period. We consider these criteria to be adequate for the scope of this work, despite the fact that mixed precipitation can be observed at temperatures colder than 0ºC and that snow can fall at air temperatures warmer than 0ºC (e.g., Fassnacht et al., 2013 IAHS 360, 65-70)"

p.5, l.19: same point as above and the sentence should be improved. In the phrase "precipitation as snow and not rain" I interpreted the "and" as a logical AND, but the sentence doesn't make it clear enough.

We have rewritten the paragraph as follows:

Our results showed that for precipitation events at temperatures below 0 ºC, snow was almost always detected with only rare occurrences of mixed precipitation. The number of cases where snow was detected above 0 ºC was still very high, which indicates that the threshold temperature of 0 ºC was suitable for classifying the precipitation as snow. The number of cases of rain at temperatures between 0 and 2°C was very low. Finally, at temperatures warmer than 2 °C almost all precipitation events were in the form of rain.

We added in the conclusions the following paragraph:

Despite the difficulty of discriminating rain from snow (Harder and Pomeroy, 2014) the upper threshold temperature of 0 ºC was suitable for classifying the precipitation as snow. This was also supported by the high number of snow occurrences detected at temperatures warmer than 0 ºC and its consistency with previous work (Fassnacht et al., 2013)

p.8,l.3-6: The conclusions are not evident in figures 3a and 3b. the main differences in wind speed occur when the precipitation intensities are low or when the event seems to be over. At the steep slope of the accumulation curve the wind speeds seems to be comparable. I suggest not to use single events as an example for average undercatch percentages. Fig. 6 is more suitable for this purpose.

We have modified the figures, also based on suggestions of reviewer 1, and we consider that now they are more clear and representative to illustrate the effect of undercatch under different weather conditions.

Comments on tables: Should table captions appear above the tables? Depends on formatting rules of the journal.

Yes, they should appear above the tables. This has been changed.

table 2: Contingency table needs good explanation, because normally just the frequencies are displayed. Here you add the accumulated snowfall attributed to these numberswhich was unsusual to me. Describe it in the caption.

We have rewritten as follows:

Table 2. Contingency tables of cases detected by each instrument over 1 h (top table) and 3 h (bottom table) accumulation periods. In sum of total accumulation measured by each instrument is provided in parentheses. Note that the amount provided for the YES/YES case represents the precipitation amount measured by the reference.

table 3: Normally these equations could appear in the text. Formatting them in this table is very compact, but you have no space to give explanations. I suggest to add a 3rd column for explanations OR alternatively writing the formulae in the text with explaining words before each equation.

We have provided a more detailed explanation in the caption of the table:

Table 3. Derived transfer functions, where each step adds a new variable. Top table is for 1 h period and bottom table is for 3 h period. The value of the coefficient of determination (R^2) increases with more variables and longer periods. The number of data points used in the analysis were 214 and 87, for 1 h period and 3 h period respectively. Equation 4 and 8 were used to correct the data as explained in section 3.1.

Variables: CR=Catch Ratio, T=Temperature (°C), W=Wind speed (m/s), Acc=Accumulation (mm)

Some comments on figures:

Figure 1: I suggest to avoid the Expression "pluvio" for the tipping bucket, as it is also the type name of the OTT Pluvio2 gauge. I would use "tipping bucket gauge" instead. Decription "Pluvio OTT2" should rather be "OTT Pluvio2".

OK. Done.

Figure 2: wind speed can't be read very well, but (as mentioned above) the conditions seem to be comparable with respect to temperature and wind speed, but the results for catch are different. Why?

In one case the wind speed was high, the temperature was well below ºC, and the undercatch was high. In the other episode wind speed was low, the temperature was close to ºC, and the undercatch was low.

We have modified these plots based on the suggestions of reviewer 1

Figure 5: has little extra information beyond the description in the text and could be ommitted.

We have modified these plots based on the suggestions of reviewer 1.