Referee #2

The original text of the comment is black, the answers are blue.

The paper by Dittmann et al. is presenting the precipitation conditions and their influence on the water stable isotopes taking advantage of a 1-year data set of collected precipitation at the inland Antarctic site of Dome F where two deep ice cores have been retrieved in the past. The authors analysed the synoptic situation causing precipitation at Dome F using the AMPS model. The results thus obtained coupled with a back trajectory study allow them to constrain the moisture source regions. The obtained results suggest a more southerly origin for the precipitation than previously reported. Moreover, at least for the considered year, no relationship is found between deuterium excess and moisture source SST and relative humidity.

These two main conclusions point to the importance of long-term monitoring of precipitation in Antarctica in order to achieve a better interpretation of the meteorological factors affecting the variability of snowfall isotopic composition. A better understanding of present-day processes will also, hopefully, improve the climate interpretation of the isotopic records obtained from deep ice cores. The paper is interesting, well presented and accurate and I have found the reading very smooth. I recommend its publication after minor revisions listed below.

We thank the referee for the helpful comments and the positive review.

There is one point that could be questionable if considering or not the end point of the 5 days trajectories as moisture source regions (although the authors at page 13 are claiming that the end point of the 5 days was not automatically assumed as moisture source area). The approach of Sodemann and Stohl (2009) was pointing to a more northern origin for moisture sources and as such how the relationships between deuterium excess and SST/h should be considered?

We stress in the paper that we do not automatically assume the end point of the 5-day trajectories to be the moisture sourc area. Also, we cannot exactly DETERMINE the moisture sourece, it is just an estimate. However, it is possible to clearly distinguish between a moisture source in the polar ocean and one at lower latitudes. We do not think that trajectories over longer time spans as used in the approach of Sodemann and Stohl (2009) would change the result that no relationship between deuterium excess and SST/RH can be found. In the comparison of the average d for two weather situations with clearly different source regions (Table 1) no signal of the source latitude in the deuterium excess of snow could be found. Even if the exact position of the source regions might be questionable (see above), the synoptic difference between the two situations (amplified ridge and shallow ridge) clearly points to a more northern source region for the amplified ridge. SST mostly depends on the latitude. RH, however, shows stronger spatial and temporal fluctuations and a weaker dependence on latitude. Thus the uncertainty of the source RH and its relationship with deuterium excess is certainly higher. We agree that more detailed studies over a longer time span, including measurements of water vapour isotope ratios, are necessary to further investigate the relationship between deuterium excess and the source conditions.

Page 2, line 5: delete “ice”.

We changed this to “snow (and thus ice)” in the revised manuscript. It is true that in the mentioned studies snow was analysed but the same mechanism are relevant for ice.

Page 2, line 19: the deuterium excess should be defined here adding also the citation (Dansgaard, 1964).

After “deuterium excess” we added the definition : (d = δD−8·δ 18 O, Dansgaard (1964))) and deleted the definition on p.4 l. 24.

Page 2, line 20: add also wind speed in parenthesis.

We added “wind speed” in the revised manuscript.

Page 2, 27-28: change into (Noone et al., 1999).

We corrected this in the revised manuscript.

Page 6, line 2: I would change the sentence “Dome F is . . ... in Anatrctica.” into something like “Dome F is one of the places where very old ice can be found”.

We changed the sentence into: Dome F is one of the places in Antarctica where very old ice can be found.

Page 6, line 3: may you add the depth of the first ice core drilling?

We added the depth (2503 m).

Page 6, line 5: may you add that the EPICA Dome C is covering the past 800,000 years (Jouzel et al., 2007)?

We added this in the revised manuscript.

Page 6, line 8: the sentence that Fujita and Abe were the first to perform direct precipitation measurements is not completely true: there have been also other two cases: one is Ekaykin et al. (2004) presenting 1-year precipitation data from Vostok and then a quite old paper by Aldaz e Deutsch (1967) (Aldaz L. & Deutsch S., 1967. On a relationship between air temperature and oxygen isotope ratio of snow and firn in the South Pole region. Earth Planet. Sci. Lett., 3, 267-274).

To our knowledge, Ekaykin et al. 2004 did not perform direct precipitation measurements but analysed data from snow pits. With direct precipitation measurements we mean sampling and determining the amount of fresh snow immediately after the snowfall.

Thanks a lot for the advice. We are usually careful not to overlook the work of the early researchers. We mentioned the work of Aldaz and Deutsch and added the reference in the revised version.

We added the following sentences on P.4, L.4:

Few studies have performed direct precipitation measurements on the Antarctic Plateau. Aldaz and Deutsch (1967) sampled fresh snow for isotope analysis already in 1964/65 at the South Pole, without measuring precipitation amounts, though. Additionally, they used radiosonde data to determine the lifting condensation level to be able to relate the temperature at this level to the stable isotope ratios of precipitation. At Dome C, direct daily precipitation samples have been analysed since 2006 (Schlosser et al.,2015). The measurements include the precipitation amount, analysis of stable water isotopes and crystal structure analysis.

Furthermore, we changed the sentence: Fujita and Abe (2006) were the first to perform direct precipitation measurements and sampling for isotopic measurements on the Antarctic Plateau. (P. 6, L. 8) to … in Central Antarctica.

Page 6, line 14: I am not completely convinced that sublimation processes could be ruled out especially in summer and probably explaining the negative values of deuterium excess.

We agree that sublimation may play a role when the sampling took place several hours after the snowfall (and maybe even during the snowfall), but we can exclude the reoccurring cycle of sublimation and deposition that is very poorly understood by investigating fresh snow samples. We

changed the text to "….. alterations through wind scouring and sublimation after the snowfall are reduced to a minimum."

The deuterium excess is usually anti-correlated with 18O/temperature and thus negative values occur in summer, even without sublimation, the latter could only explain part of it.

Page 6, line 28: add a dot after ". . ..2009)".

We corrected this in the revised manuscript.

Page 8, line 27-28: please, check here the English.

We changed it to: In ECHAM5, additionally to H_2O^{16}, water containing ^{18}O and D has been implemented in the water cycle. For each phase change, fractionation processes are considered.

Page 11, line 17: change from August to November.

We corrected this in the revised manuscript.

Page 13, line 1: add a dot after ". . . source area".

We used the colon since the following sentence explains the "not automatically assumed".

Page 14, line 28: correct "cantered" into centred.

We corrected this in the revised manuscript.

Page 22, figure 2: the orange dash line is not clear at all. May you improve? In the caption: bottom line: add respectively after percentile.

We added "respectively".

We agree that the line did not come out well in the pdf –file. We have changed this in the revised version.

Page 23, figure 4 caption: correct "read" into red.

We corrected this in the revised manuscript.