Thank you for your review. Your comments have been very helpful. My response is given below each of your italicized comments.

The authors present new results on how small ice layers formed by percolating superficial melt water affect air permeability of polar firn. I am in favor of concise articles, and this one complies with that criterion. The method and results are clearly presented. However the interpretations are kept a bit too simplistic. The mixing of air in the firn is clearly a 3-dimensional issue. I realize that the authors are aware of this, but the difference between a sample-size effect of an ice layer and the effect on the overall firn air profile and the composition of the air that is finally recorded in the ice should be discussed more extensively. For example, melt layers of about 1 cm thickness do not extend over large horizontal distances and thus do generally not substantially affect the firn air profile. Then the bias induced by bubbles in the melt-layers on the age of the air should be discussed by taking into account that the air in those bubbles has not atmospheric composition, but is affected by the melt refreezing process, thus being somewhere between atmospheric and equilibrium composition of air dissolved in water at the melting point.
We have added another discussion section (3.4 Effect on Gas Transport), as suggested by Reviewer #3, to bring together all three of the main ways ice layers affect gas transport in the firn layer. In this discussion section, we also included the two points Reviewer #1 raises here.

Specific comments:
p. 1100, l. 6: "Adolph et al., 2014" is "Adolph and Albert, 2014" in references.
Fixed.

p. 1101, l. 18-21: "under steady state conditions": What is meant here? Is it e.g. the gravitational effect on 15N? Generally all gases are affected in a similar way by anomalies in permeability/diffusivity, whether steady state or time-varying. It is rather a question on the size of the signal one aims to discern, whether an effect is judged important or not. I advise the authors to be more specific.
We removed the statements about “steady state” vs. “time-varying” and instead added a general discussion about how ice layer affect permeability (bulk air) and diffusivity (specific gas species) to section 3.4.

p. 1101, l. 19: " a laterally-extensive ice layer at 27m may be expected to cause some variation within the concentration profile " As this is a very important issue for the whole ice core community this discussion should not be left with such simple statement.
Of course it is correct but without any quantitative information this statement remains purely academic: Is there a relation between melt-layer thickness and its lateral extension? How does lateral extension quantitatively affect the firn air profile?
In the present-day firn column, there are only two laterally extensive ice layers dating to 1889 and 2012. With only two layers to compare, we cannot comment on a relationship between ice layer thickness and the lateral extension. A further modeling study would be needed to test how ice layer lateral extent quantitatively effects the firn air profile, which

is out of the scope of this study.

p. 1102, l. 5: "..few pores in the both ..": delete "the"
Fixed.

p. 1102, l. 10: ".. the refreezing process that layer .." -> " the refreezing process of that layer"
Fixed.

p. 1102, l. 12: ".. much older than bubbles .." This is correct, but the composition in those bubbles should be considered (see general comment above).
We have adjusted the discussion to reflect this point. Please see our response to the similar point in the general comments section above.

p. 1103, l. 7-11: As 1 cm = 10 mm, CFA analysis would see the full signal and thus be significantly affected!
We corrected this statement, as well as at p. 1103, l. 20-22.

p. 1103, l. 19: "These air bubbles probably contain .. ". The air IS older but of different composition. See comments above.
We have adjusted the discussion to reflect this point. Please see our response to the similar point in the general comments section above.

p. 1103, l. 20-22: "and significantly biasing the ice core record at that depth. Nevertheless, these ice layers were relatively thin and are therefore not expected to significantly alter the gas record because of the spatial resolution of current gas records." See comment p. 1103, l. 7-11.
We have adjusted the discussion to reflect this point. Please see our response to the similar point from the p. 1103, l. 7-11 comment above.