Referee Report

The review presents substantial improvements compared to the original submission. Before accepting the paper, I would like that the authors seriously address the clathrate case. I strongly disagree with the fact that the clathrate case can be neglected because, according to them, only a small fraction of CO or N2 would be trapped in these ices. There are two papers recently published in Science Advances and in ApJL who show that 67P could be made of clathrate ices in which essentially all CO is trapped:

http://adsabs.harvard.edu/abs/2016SciA....201781L
http://adsabs.harvard.edu/abs/2016ApJ...819L..33M

These recent findings cannot be ruled out, as the authors claim. The implication of these works is that the amorphous ice case may not be relevant to the formation of ices in the protosolar nebula. At least, these issues should be discussed even if the clathrate case is not addressed in the model.

We thank the referee for the comment, and we added a brief discussion of the clathrate case to section 3.1: *"In our simple model, we ignore the effects of CO and N2 entrapment in water ice through clathrate formation or other processes. Theoretical models aimed at explaining the composition of comet 67P/Churyumov-Gerasimenko suggest that a small fraction of the total CO and N2 reservoir may be trapped in clathrates, and only released upon water sublimation (Lectez et al. 2015, Mousis et al. 2016). The importance of this process for CO and N2 is not clear (Luspay-Kuti et al. 2016), however, but would in either case not change the locations of the CO and N2 snowlines, i.e. the locations where CO and N2 transitions from being mainly present as ice to being mainly present as vapor."* We note that the results of Luspay-Kuti et al. (2016) suggest that the CH4 content of 67P is likely to have originated from clathrates, but there is no similar constraint for CO. For the case of N2, both Lectez et al. (2015) and Mousis et al. (2016) find that N2 is much less likely to be trapped in clathrates than CO. Due to these uncertainties, we don't believe it is necessary to explore the clathrate case in further detail.