Referee 2:

We would like to thank the referee for taking the time to review our manuscript and the valuable feedback. We have corrected our manuscript according to the referee’s comments and think it is now significantly improved.

The manuscript "Measurement report: In situ observations of deep convection without lightning during the tropical cyclone Florence 2018." by Nussbaumer et al. describes HALO aircraft observations (3 flights during CAFE campaign) of atmospheric trace gases in a tropical storm and discusses the evidence of (or the lack of) lightning occurrance during this event. The manuscript, while very synthetic and somewhat lacking detailed discussion, is very well written, clear and, in my opinion, useful and pertinent for the ACP readers. The lack of deep discussion might be due to the fact that this is a "Measurement Report" manuscript type. I wonder if, with a bit more committment in drawing conclusions, this might as well be a "Letter"/"Short Communication" manuscript. I leave these considerations up to the Editor and Authors. In any case, I recomment this paper for publication in ACP after these minor issues are clarified.

1) I agree with the other Reviewer that references are lacking for other previous aircraft campaigns. I add, for the observation of the UTLS composition in deep convection area, the StratoClim campaign; maybe this reference is a good pick, with respect to StratoClim:
Bucci et al.: Deep-convective influence on the upper troposphere–lower stratosphere composition in the Asian monsoon anticyclone region: 2017 StratoClim campaign results, Atmos. Chem. Phys., 20, 12193–12210, https://doi.org/10.5194/acp-20-12193-2020, 2020.

We have extended our literature discussion of previous aircraft campaigns regarding (1) deep convection where we have included the referee’s literature suggestion and (2) in-situ observations in tropical cyclones.

(1) Lines 33 ff.: Deep convection can affect trace gas concentrations in the upper troposphere which was for example shown by Dickerson et al. (1987) who reported increased concentrations of NO, CO, O3 and other reactive species in a thunderstorm outflow over the Midwestern United Stated in 1985 and Barth et al. (2015), the latter based on observations during the DC3 (Deep Convective Clouds and Chemistry) field campaign. Similar observations were made by Bucci et al. (2020) who reported convective uplift in the upper troposphere / lower stratosphere based on the StratoClim aircraft campaign over Nepal in 2017.

(2) Lines 89 ff.: Some studies have investigated trace gas concentrations and convective uplift in the upper troposphere through aircraft observations. Newell et al. (1996) reported in-situ observations of deep convection in the Typhoon Mireille in 1991 which they found to be strongest in the wall cloud region. Roux et al. (2020) found the convective uplift of boundary layer air as well as the inflow of lower stratospheric air to the upper troposphere based on measurements of CO, O_3 and H_2O during aircraft typhoon observations over Taipei in 2016. In contrast, studies of lightning activity within convective systems over the ocean and in tropical cyclones are predominantly based on satellite data and ground-based observations from the WWLLN (University of Washington; Abreu et al., 2010; Bürgesser, 2017; Hutchins et al., 2012b; Bucsela et al., 2019). Generally, data from in situ chemical measurements in the upper troposphere are sparse and to our knowledge, the in situ aircraft observation of deep convection in

tropical cyclones accompanied by and in the absence of lightning depending on the stage of development has not been reported before.

2) L20-21: Maybe add a sentence to very briefly explain mechanisms of formation of tropical cyclones from tropical disturbances

We have added text on the formation of tropical cyclones from tropical disturbances which is not fully understood today.

Lines 22 ff.: Wu et al. suggested that simultaneous occurring of convection and vorticity in disturbances favors tropical cyclone formation. However, the exact formation mechanism of tropical cyclones from tropical waves is not fully understood today (Wu and Takahashi), 2019; Frank and Roundy, 2006).

3) L24: "...within about 5° of the equator..."

We have corrected this.

Lines 26 f.: (…) while rotating systems do not develop within around 5° of the equator (…).

4) L37: add the year of the publication "Zipser" in the text

We have added the year (1994) of the Zipser publication in the text.

Line 43: Zipser (1994) reported significantly reduced lightning activity (…).

5) L50-51: "Over the ocean...aircraft": to link with the previous sentence, you might probably very quickly cite NO source over land.

We have added text and references on NO sources over land – with particular focus on West Africa.

Lines 58 ff.: NO sources over land are more versatile including anthropogenic emissions from industry, vehicles and biomass burning (partly natural) as well as natural sources from lightning and soil, the latter dominating over West Africa (Pacifico et al., 2019; Knippert et al., 2015).

6) L58-60: "Another possible...iodide": you could add a few words on how methyl iodide is formed from dust

We have added a short explanation of the mechanism of CH3I formation from dust and seawater as suggested by Williams et al., 2007 based on data from two field campaigns in Tenerife (MINATROC) and in the Tropical Atlantic (Ship campaign Meteor 55). Please note that the mechanism is not yet fully understood.

Lines 68 ff.: One possible explanation for the formation of CH3I is a substitution reaction of methoxy group containing species and iodide from seawater under the presence of iron ions from dust. However, the mechanism is not yet finally understood (Williams et al., 2007).

7) L61-62: "Its lifetime depends on the abundance of OH and NO3 which oxidize DMS and ranges from 1 to 2 days" please rephrase (it sounds like "OH and NO3" or "DMS" range from 1 to 2 days...)

We have rephrased the sentence.

Lines 72 f.: Its lifetime ranges from 1 to 2 days and depends on the atmospheric abundance of OH and NO_3 which oxidize DMS (Breider et al., 2010).

8) L61: "abundance" --> "atmospheric abundance"

We have changed this (see response to 7)).

9) L78: "WWLLN": what is the meaning of this acronym?

“WWLLN” is the acronym for World Wide Lightning Location Network. We decided to define the acronym when it is first used in line 49.

10) L89: "...satellite images...": what are exactly these satellite images and from which instrument? NASA Worldview is just a data repository and visualisation tool but the exact type and origin of data should be mentioned.

Thank you for noting this. We have added text about type and origin of the images.

Lines 108 ff.: The images were taken by the VIIRS (Visible Infrared Imaging Radiometer Suite) instrument carried by the NASA/NOAA satellite Suomi NPP (National Polar orbiting Partnership) based on a daily resolution (NASA Worldview, 2020).

11) L92: "...compare Figure 1...": compare with what? You mean "...compare panels b and c of Figure 1..."?

We meant to refer to Figure 1a for showing which parts of MF10 are in geographic proximity of MF14. We have clarified this in the text.

Lines 111 f.: We have restricted our analysis to data from MF10 which were obtained in these parts in a similar geographical area and altitude range as MF14 (as shown in Figure 1a).

12) L116: "GEOS": please define acronym

We have added the definition of the acronym “GEOS”.

Lines 135 f.: The satellite images are colored according to the temperature deduced from IR emissions of cloud tops in °C as measured by the satellite GEOS-16 (Geostationary Operational Environmental Satellite).

13) L123: "The colored IR images show that the research aircraft was above, but close to cloud top at both occasions.": It rather looks like you were flying under clouds tops (flight altitude in light green: ~-50°C, corresponding cloud top temperature in dark green: ~-60°C).

We politely disagree with the reviewer as the current position of the research aircraft is marked with a black triangle. The cloud top color at the flight track of the respective current position is mainly blue suggesting an IR temperature between -40 and -50°C while the flight track is green: below -50°C. We have added text for clarification.

Lines 144 ff.: The flight altitude for MF14 at 12:00 UTC and at 18:00 UTC as shown in Figures 2b and 2c was 13.2 km and the temperature was - 58±1 °C. The colored IR images show an IR temperature between -40 and -50 °C at the current aircraft position (black triangle) which indicates that the research aircraft was above, but close to cloud top at both occasions.

14) L127: "bars": is it "shadowed areas in the plot" or something like this?

We have corrected this.

Lines 150 f.: Blue and green shadowed plot areas show the time intervals when the research aircraft had passed areas of high cloud tops as shown in Figure 2.

15) Fig. 3: this is hardly visible, maybe this figure would be better organised as a 2 rows 1 column?

We have increased the size of the subfigures according to the suggestion of the referee.