Specific comments

RC2: P8, L223: Why is the number concentration of the activated particles the difference of the number concentration of the observed total and interstitial aerosol particles? Are only particles larger than 1μm assumed to be activated particles?

AC: The particles measured via the heated total inlet contain both the inactivated and activated (i.e., cloud droplets or ice crystals) aerosol particles whereas the activated particles are removed by the PM1 impactor at the interstitial inlet. Thus, the difference in the particle number concentrations between the inlets equals the concentration of the activated particles. In the calculations, we considered only particles larger than 70 nm to minimize errors due to measurement inaccuracy of the small particles. We assumed that particles larger than 70 nm can be activated, regarding their size, and that most of the smallest particles remain non-activated. It is common practice to use a wet diameter of 1 μm as size limit for activated droplets during measurements (e.g. Väisänen et al. 2016; Schmale et al. 2017).

AC: We have modified the manuscript text as follows (from line 220):

AC: In the interstitial inlet, a PM1 impactor (Digitel DPM10 with a PM1 nozzle plate) was used to remove aerosol particles and hydrometeors larger than 1.0 μm in diameter leaving only the interstitial particles into the sample. The difference between the aerosol particle number concentrations in the total and interstitial sampling lines equals to the number concentration of the activated particles (N_{act}). In the calculation, the concentrations of particles larger than 70 nm in dry diameter were only considered ($N_{act} = N_{70\_tot} - N_{70\_int}$). The 70 nm size limit was chosen because most particles below this size remain non-activated and therefore their contributions to N_{act} cancel out and can be neglected for simplicity and possible inaccuracies in the lower ends of the spectra of the individual instruments.

RC2: P15, L417: It is written that the mutual correlation among the different data sets increases significantly when the criteria of isoaxial sampling of the FM-120 is met. First of all what is a significant change?

AC: The term “significant” was overly strong word and used unintentionally without clear justification to describe the increment in mutual correlation coefficients for the isoaxial sampling. We have removed it from the sentence and hope that now reflects properly the research finding. We have also added more information about this in the next comment.

AC: L416-417: When the criteria of isoaxial sampling (IAS) for the FM-120 is incorporated, mutual correlation coefficients among different data sets increased reaching values of 0.78, 0.71, and 0.64 for N_d, LWC, and MVD, respectively (Table 2).

RC2: Second of all, there is a similar increasement in the correlation between N_{act} and $N_{d,IM}$. What is the explanation for that?

AC: The mean effective diameter values in the IAS datasets from the ICEMET and FM-120 were 8.7 μm ± 1.5 μm and 7.4 μm ± 1.2 μm, respectively. The majority of the observed droplet sizes was within the common observational range of all the applied instruments, that is 5 μm - 40 μm (DMPS: 1 μm - 40 μm , FM-120: 2 μm - 50 μm, ICEMET: 5 μm - 200 μm), and therefore all the instruments captured well the droplet size variation.

We calculated an overlapping index value (OVL) for the observed droplet size distributions (Inman & Bradley Jr, 1989) between ICEMET and FM-120. The OVL measures similarity

between two distributions showing limiting an upper limit of one when probability values are completely equal for all size bins.

The average OVL for the droplet size distributions in the IAS dataset was 0.76 ± 0.09 whereas it was 0.69 ± 0.15 for the total dataset. We did not include this information in the corrected manuscript in order to keep it simple and closer to the revised version.

AC: We have modified the manuscript text as follows

AC: L423: When only the isoaxial sampling criteria is considered, both mutual and Pearson correlation coefficients confirm the good correlation between data sets (Table 2). Correlations were increased for all cases, not only for of the isoaxial sampling but also because there were more droplets in the overlapping measuring ranges of instruments in the period of eastern winds.

Technical comments

RC2:P5, L144: Make sure that the names of the variables in the text fit the ones in the equations, e.g., it is ∆t in the equation and Dt in the text, furthermore all variables are italic in the equations while they are not in the text.

AC, L144,205: We have changed Dt to Δt.

RC2: P6, Figure 3: Incorrect sentence: "… and thus have no uncertainty value was defined (black crosses)."

AC: We have improved the sentence as follows.

Figure 3 caption: "The 5 μm particles were not certified and therefore the uncertainty value was not defined (black cross)"

RC2: P7, L218: Typing error: 1 um = 1 μm

We corrected the unit

AC: L218: "..below 1 μm are measured.."

RC2: P9, L258: If the mutual correlation is the same as the mutual information, why not using the same abbreviation, i.e., either MC or MI?

We thank the reviewer for noticing this detail. This indeed can confuse the reader. MC for mutual correlation has been applied along the text in the corrected manuscript.

L21: "..confirmed by mutual correlation and Pearson.."
L80: "We also use mutual correlation analysis.."
L250: "**2.5 The mutual correlation analysis"**
L251: "The mutual correlation (MC) between two.."
L258: "Therefore, the mutual correlation MC(X,Y) can be expressed as.."
L263: "The MC is a robust statistical.."
L274: "We performed a MC analysis.."
L387: "**3.2.2 The mutual correlation analysis"**
L397: "Results of the mutual correlation analysis..**"**
L402: "..from the MC by each instrument with the Twin-inlet system."
L419: "While mutual correlation analysis can detect any kind of dependence,.."
L427: "In summary, it is expected to have MC below 1 due to.."
L432: "..and the MC between the three-data sets increases."
L457: "This agreement was also confirmed by mutual correlation analysis and Pearson correlation coefficients."

RC2: P9, L282: Incorrect sentence: "The criteria for the occurrence and intensity of cloud, a typically on… "

We simplified the sentence as follows

AC: L282: "The criteria for the occurrence and intensity of cloud are typically visibility, N_d, LWC, or N_d and LWC together (Portin et al., 2009, Ragno and Hobbs, 2005, Hoyle et al., 2016, Li et al., 2020)."

RC2: P10, Figure 5a: A color bar missing.

AC: A color bar was added

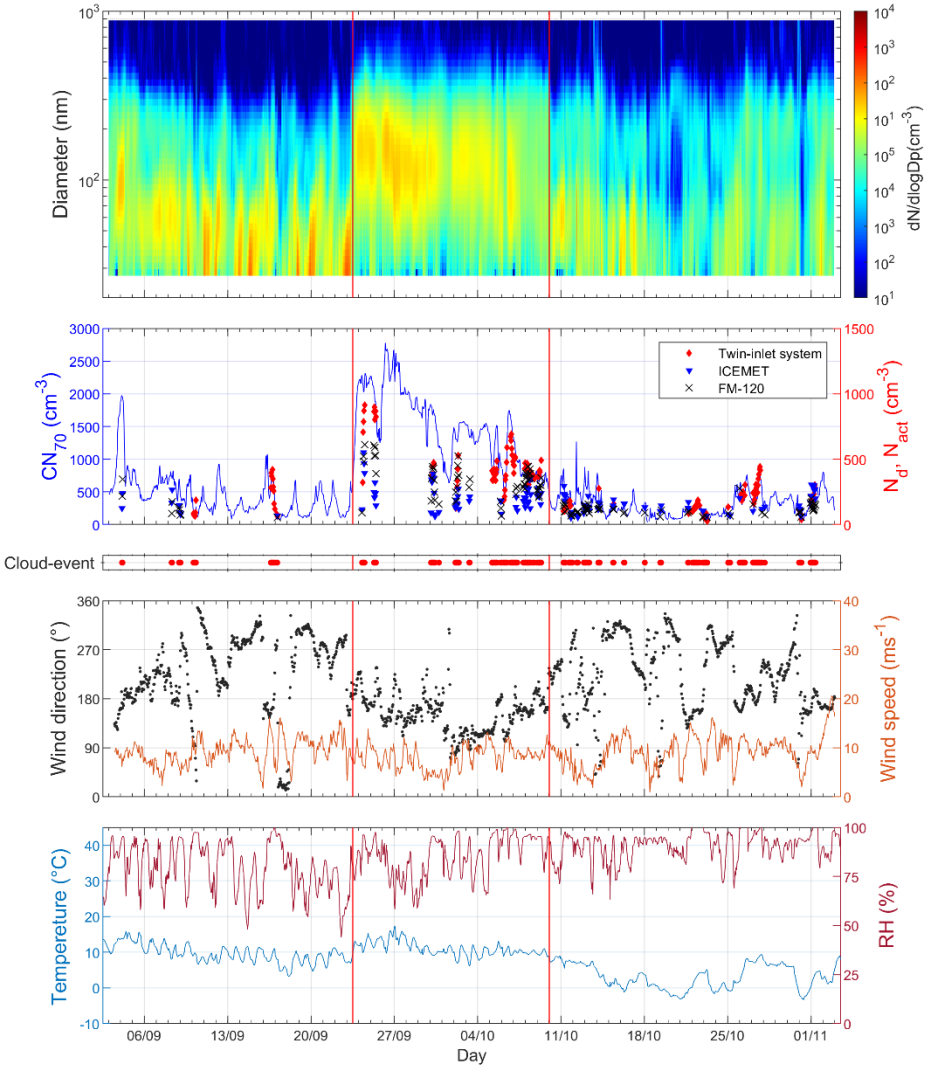

Figure 5

RC2: P13, L373 (Figure 8): Incorrect sentence: "Only data points where a fraction of $N_{d,FM2-5} < 0.2$ are presented."

AC: We corrected the sentence as follows

L373:" Only the data points where the fraction of the smallest bins is low ($N_{d,FM2-5} < 0.2$) are presented."

RC2: P13, L374: Incorrect sentence: "In order to look more detail a representative…"

AC: We simplified the sentence as follows

AC, L374: "An in-cloud period on 2 November 2020 was chosen to intercompare the ICEMET and the FM-120 in detail (Fig. 9)."

RC2: P13, L378: Incorrect sentence"As expected, larger the cut-off size of…"

AC: We simplified the sentence as follows

AC, L378: “Increasing the cut-off size from 2 µm to 5 µm for FM-120 (marked as green) improved the agreement in terms of amplitude (values)”

RC2: P14, Figure 9a: I think it would make sense to also add the symbols to legend.

AC: Symbols were added to Fig. 9a.

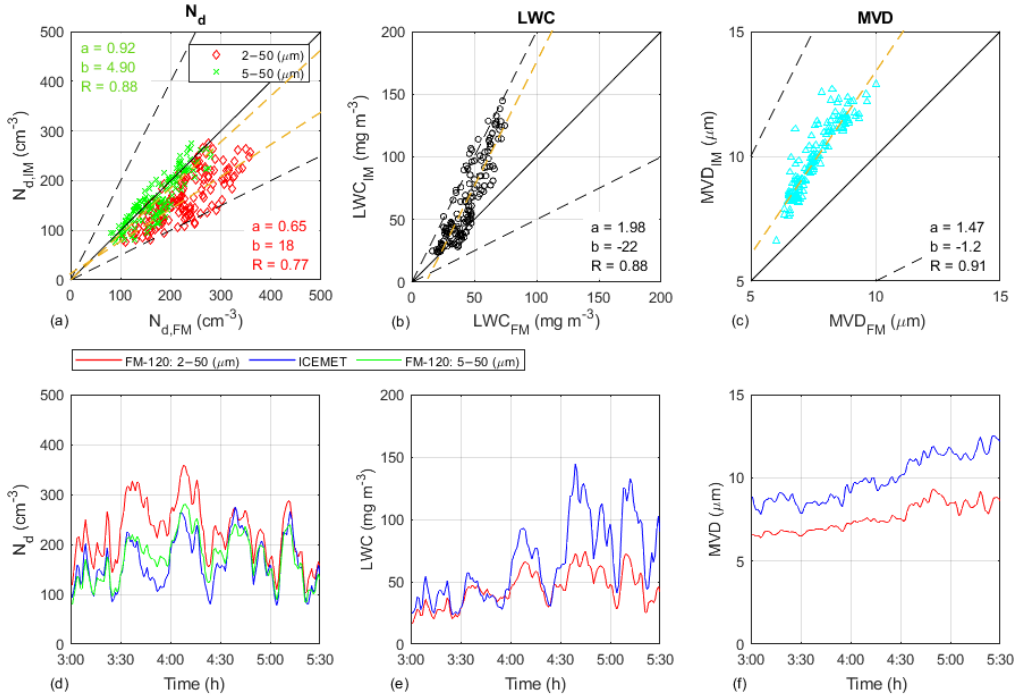

Figure 9

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