Supplement of

Re-evaluating the Frankfurt isothermal static diffusion chamber for ice nucleation

J. Schrod et al.

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1 Repeated wafer tests

In the table below the raw data and calculated relative and weighted errors for repetitious tests of wafers are presented. Eighteen wafers were measured with between two and ten repetitions at eight temperature and saturation conditions ($T$, RH$_i = -15^\circ$C, 110%; $-20^\circ$C, 120%; $-25^\circ$C, 119%; $-25^\circ$C, 126%; $-30^\circ$C, 130%; $-30^\circ$C, 132%; $-32^\circ$C, 127%; $-32^\circ$C, 134%). This series of measurements resulted in 226 individual measurements, representing 87 wafer–saturation condition subsets. One wafer, saturation condition subset represents a single wafer repeatedly measured at a single saturation condition. For example, the measurement of wafer #1 at $-15^\circ$C and RH$_i$=110% was repeated three times (see table below).

Relative error $E_R$ is the percentage represented by the standard deviation $\sigma_i$ of the mean INP counts $\overline{INP}_i$ per subset $i$. Thus for $n$ repetitions per wafer within a subset

$$\overline{INP}_i = \frac{\sum^n_{i=1} INP}{n}, \quad (1)$$

where $INP$ is the number of counts for an individual repetition and,

$$E_R = \frac{\sigma_i}{\overline{INP}_i} \times 100. \quad (2)$$

The weighted error $E_W$ is the relative error normalized by the mean INP counts relative to the total INP counts for all subsets $\overline{INP}_{all}$, where

$$\overline{INP}_{all} = \sum_{i=1}^{87} \overline{INP}_i \quad \text{and} \quad (3)$$

$$E_W = \frac{\overline{INP}_i}{\overline{INP}_{all}} E_R. \quad (4)$$

A total weighted error is calculated and presented at the conclusion of the table and within the text by summing the contributions from all of the individual subsets. In this case we have treated all of the available data and made no attempt to eliminate outliers, etc. We have chosen this approach in an attempt to maintain the broadest interpretation of reproducibility and to ensure wafers with low total counts cannot skew the error to be very large given small changes in absolute count. However, in other measurement contexts (e.g., a subset of the analyzed thermodynamic conditions) it may be valuable to re-examine and/or use some subset of the data. Thus we provide the entirety of the data set below.

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2 Saharan dust event

On April 16, 2015 a Saharan dust event was observed at the Taunus Observatory, Mt. Kleiner Feldberg (826 m msl, 50.221879° N, 8.446297° E). Figures 1 and 2 show the temporal evolution of the dust transport event in six hour increments. In Fig. 1(a) and (b) the dust layer is primarily west of the Spanish and French coast and by 00 UTC on April 16 (Fig. 1(c)) dust begins to pervade wide areas of central Europe. Figures 2(d), (e) and (f) confirm that dust is present throughout the entire day, albeit within the RGB product the dust layer is superimposed with cold thick high-level clouds (red) and low-level clouds (yellow) and thus is not always clearly visible.

Figure 3 is the BSC-DREAM8b (vid BSC-DREAM8b ref., and Basart et al. 2012) modeled vertical profile of dust on April 16, 2015 above Taunus Observatory. It highlights that dust was present throughout the day, even in the lowest kilometer of the atmosphere. Thus it is reasonable to conclude that atmospheric samples taken at Taunus Observatory on April 16, 2015 included Saharan dust. Back trajectories from 12 UTC April 16, 2015 computed using HYSPLIT (Draxler and Rolph 2015; Rolph 2015) and arriving at the Taunus Observatory, confirm the observation that the local air mass advanced from the Saharan region (Fig. 4).
Figure 1. Temporal evolution of the Saharan dust event from (a) 12 UTC April 15, 2015 to (c) 00 UTC April 16, 2015. The left-hand panels show the dust load (g/m$^2$), calculated using BSC-DREAM8b, while the right-hand panels show the EUMETSAT RGB dust product, with the intensity of the magenta corresponding to dust intensity.
Figure 2. Continuation of Fig. 1’s temporal evolution of the Saharan dust event from (d) 06 UTC April 1, 2015 to (f) 18 UTC April 16, 2015. Again the left-hand panels show the dust load (g/m²), calculated using BSC-DREAM8b, while the right-hand panels show the EUMETSAT RGB dust product, with the intensity of the magenta corresponding to dust intensity.
Figure 3. Vertical profile of dust concentration above Taunus Observatory on April 16, 2015 calculated using [BSC-DREAM8b](#).

Figure 4. Back trajectories originating from Taunus Observatory at 1000 m (red), 2000 m (blue) and 3000 m (green) amsl. Trajectories were initiated at 12 UTC April 16 2015 and run for 240 hours.
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