**Request for editor approval, egusphere-2025-1717**

**Firstly, regarding the Supplement:**

**Motivation**:

1. We noticed a couple of errors in our original definition of Equation (S8) and have corrected these. Specifically, we have corrected the definition of and removed one instance of from the definition of A as it already appears in the parentheses.
2. We noticed an error in our original definition of Equation (S7) and have corrected this and provided a reference.
3. Request to introduce the updated version of the reference that has been updated in the manuscript.
4. As in TS11, we have noticed that we missed the “d” in the differential element d*r*0.

**Changes**:

1. Equation (S8) in the Supplement:

(S8)

1. Lines 118 – 124 in the Supplement (added reference and modified equation for clarity):

where is the latent heat of evaporation of water. Parameters and represent the modified diffusivity () and thermal conductivity (), respectively, accounting for non-continuum effects **as (Pruppacher and Klett, 2010),**

**,** (S6)

; (S7)

where we have introduced the heat capacity and the thermal accommodation and condensation coefficients, and respectively **(*P*0 = 101325 Pa)**. And, for the purposes of this work, we assume fixed coefficients .

1. References in the Supplement:

Introduction of the updated Pruppacher and Klett reference and updated Seinfeld and Pandis reference.

1. Equation (S19) in the Supplement:

Replacement of *r*0 in the outer integral with ***d****r*0*.*

**Changes in the main text:**

* **Motivation**:

In the original manuscript we mistakenly used *T*SAC to describe both (a) the temperature at which *p*liq contacts *p*w, M (i.e., the temperature at which the linear mixing line tangentially contacts the saturation vapour pressure above water) and (b) the *ambient* temperature at which *p*liq contacts *p*v, M, which is estimated by back-projecting along the contrail mixing line to *p*v, A. To differentiate between these temperatures, we introduce the temperature for (a), in line with Kärcher et al., 2015. Then, *T*SAC is clearly defined as the threshold *ambient* temperature for contrail formation under the Schmidt-Appleman framework. We have also clarified Figure. 1 to illustrate the difference between and *T*SAC ( is the temperature of tangential intersection between *p*liq contacts *p*w, M and *T*SAC is the ambient temperature at which this takes place).

**Changes**:

1. From Equation (6) onwards:

, (6)

where **is** ~~the Schmidt-Appleman threshold temperature () as~~ the temperature at which the contrail mixing line tangentially intersects . Under this definition, represents the highest temperature at which contrail formation can occur in a water-saturated plume. **For ambient relative humidities below water saturation (*p*v,A < *p*liq), this corresponds to a projected ambient temperature known as the Schmidt-Appleman threshold temperature () (Schumann et al., 1996).** **Accordingly, represents the highest *ambient* temperature at which contrail formation can occur.**

1. Figure 1:

A diagram of a function

AI-generated content may be incorrect.

* **Motivation**:

Generally, we would prefer that when variables are shown as products in the main body of the text (see those below), these are separated by “·”, which removes any ambiguity about whether we are illustrating a functional dependence or a product of two variables. We understand that this may not be standard practice but believe it is particularly important for the below as otherwise *G* may be misinterpreted as a function of *T*E minus *T*SAC.

**Corrections**:

1. Page 6, line 5:

Please revise with *G* **·** (*T*E *– T*SAC)

* **Motivation**: we find that the ordering of the variables suggested below looks clearer than the original ordering.

**Change**:

* Equation (15)

Please re-order and *p*v, M to clarify that these are multiplied together. The numerator in the brackets should then read: ***p*v, M**.

* **Motivation**:

1. We have noticed the use of different symbols for describing the saturation vapour pressure above a plane surface of water, therefore, we have replaced with *p*liq to be consistent throughout the paper.
2. We have noticed that we missed the “d” in the differential element d*r*0.

**Changes**:

1. Equation (24):

Please replace with ***p*liq**

1. Equation (25):

Please could you replace *r*0 after the first integral sign with ***d****r*0

* **Motivation**: we have decided to remove this excerpt of text as we were recently able to introduce the K15 model into a global model simulation directly (without the need for a lookup table). Therefore, our original statement is out of date and we would like to remove it.

**Change**:

* Page 15, lines 64 – 69:

~~while the extended K15 and modified pyrcel models are both too computationally demanding to be directly integrated into global contrail simulations, we suggest that either model could be incorporated in these simulations by preparing multidimensional lookup tables.~~

* **Motivation**: here, we provide an upper bound for the water vapour mixing ratio in the contrail plume to justify the statement: . According to Equation (3), the partial pressure of water vapour in the contrail plume is largest for engine exit conditions (*T* = *T*E) provided that the ambient environment is cool (anomalously-low *T*A) and humid (assume ice-saturated). Previously we mistakenly used *T*SAC instead of *T*A.

**Change**:

* Page 6, line 5 – page 7, line 1:

Assuming that the ambient environment is ice-*saturated*, we also know that *p*v,M is bounded by (*p*v,M)max = *p*ice(***T*A***~~T~~*~~SAC~~) + *G* **·** (*T*E – ***T*A***~~T~~*~~SAC~~)**, provided we prescribe an anomalously-low *T*A of 200 K**. Rearranging Eq. (10), we can therefore bound as

* **Motivation**: previously, this excerpt referred to the molecular volume of water (), which was present in the prefactor in Equation (25) (as in Kärcher et al., 2015). However, we later chose to re-express this prefactor so that it was consistent with the prefactor in Equation (24). In doing so we removed in Equation (25) but failed to update the main text. Therefore, this change reflects an update to the main text that is consistent with Equation (25).

**Change**:

* Page 7, lines 24 – 28 (removed reference to , which is absent in the previous equation):

where is the number density of aerosol particles that activate between times and *t +* d, is **related to** the volumetric flux of water towards water droplets at time *t*, that first formed at time < *t*, and is the growth rate of these droplets at time *t* (Kärcher and Lohmann, 2002a).

* **Motivation**: following our description in TS3 – TS4, we request that is introduced into the notation section.

**Change**:

1. Appendix A: Notation:

Please could you add in the variable , with the corresponding definition: **threshold contrail formation temperature at *p*liq**.