Errata for
An Introduction to Clouds - From the Microscale to Climate

Last updated: December 7, 2021

We are highly interested in continuously improve our book. In case you spot anything unclear or wrong, please do not hesitate to contact Ulrike Lohmann:
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Page		**Erratum**
xv	Acknowledgment	We are very sorry for Anna Possner, who unfortunately is by mistake missing in the acknowledgment.
xx	r_{Earth}	The correct value of the Earth radius should read $r_{Earth} = 6.371 \cdot 10^6$ m.
xxii	Chemical potential μ	The units should correctly read [$\mathrm{J\,mol^{-1}}$].
19	Tab. 1.3	The typical updraft velocity for St, Sc clouds should read 0.1 $\mathrm{cm\,s^{-1}}$.
33	Eq. (2.6)	There is a minus sign missing here and the equation should read: $dW = \vec{F}\vec{ds} = -Fds = -pAds = -pdV$.
34	Eq. (2.14)	This equation holds true at constant volume ($dV = 0$), where q in eq. (2.8) may be replaced by the change in internal energy (du). The entire paragraph around Eq. (2.14) should be corrected as follows: "In general, neither the pressure nor the volume are constant, and there are contributions to both the internal energy and to the work exerted by the system. When adding a total amount of heat, dq, to a system the amount that goes into the internal energy is given by: $du = c_v dT$ (2.14). The remainder of the added heat goes into the work term, in order for the total energy of the system to be conserved. We can then rewrite the first law of thermodynamics by replacing dw and du with eqs. (2.7) and (2.14) and obtain: $dq = c_v dT + pd\alpha$ (2.15)."
51	Eq. (2.72)	The are brackets missing on the right hand side. The whole term needs to be devided by M_w, in order to get correct L_v values in $\mathrm{J\,kg^{-1}}$. $$L_v = (56579 - 42.212T + \exp(0.1149(281.6 - T)))\,\frac{1}{M_w}$$
51	below Eq. (2.72)	... with L_v in $\mathrm{J\,kg^{-1}}$ ... **not** in $\mathrm{J\,kg^{-1}\,K^{-1}}$

51	Eq. (2.74)	The are brackets missing on the right hand side. The whole term needs to be devided by M_w, in order to get correct L_s values in $\mathrm{J\,kg^{-1}}$. $$L_s = \left(46782.5 + 35.8925T - 0.07414T^2 + 541.5\exp\left\{-\left(\frac{T}{123.75}\right)\right\}^2\right)\frac{1}{M_w}.$$
58	q_s	q_s is a function of temperature and pressure, hence the sentence should read: "q_s, which is an intrinsic property of water vapor depending on temperature and pressure."
60	Eq. (2.94)	In a more general form "dq_v" instead of "dq_s" should be used in Eq. (2.94), as "dq_s applies to a process where saturation is reached and condensation takes place. In order to make this clearer Eq. (2.94) should read: "In a process where saturation is reached and that involves condensation, the expression (2.19) for dq has to be modified to $dq = c_pR + L_v dq_v - \alpha dp$, where $q_v = q_s$, denotes the saturation specific humidity in case of a wet adiabatic (saturated) ascent."
60	bottom	A factor $1/T$ is missing. The sentence should read: "It was shown in Section 2.2.6 that $\frac{1}{T}\cdot(c_p\mathrm{d}T - \alpha\mathrm{d}p) = c_p\frac{\mathrm{d}\theta}{\theta}$, so that..." Please see also Eq. (2.34).
63	Exercise 1 (b)	It should read: $dW = -pdV$
63	Exercise 1 (c)	It should read: $dW = pdV$
86	Fig. 3.7	The arrows (vectors) of the Coriolis force should be of the same length at a given latitude. i.e. the 4th and 6th dotted arrow from the left hand side should be of the same length as the 1st dotted arrow from the left hand side.
95	Fig. 4.2	The y-axis label shoud be "e [hPa]" and not the saturation vapor pressure $e_{s,w}$, which only describes the dotted curve.
95	CH 4.1.1.	The title of this chapter should read "Isobaric and adiabatic mixing". The formation of "mixing fog" occurs when two air parcels mix isobarically ($dp = 0$) AND adiabatically ($dq = 0$). Accordingly, the first sentence should read: "Mixing of two initially unsaturated air parcels isobarically and adiabatically provides one possibility...".
97	Eq. (4.7)	The mixing of the two air parcels takes places isobarically ($dp = 0$) AND adiabatically ($dq = 0$), i.e., the air parcels exchange energy among each other, but not with the surrounding. In order to make this clearer, the sentence should read: "...accounting for latent heat release (eq. 2.94), noting that $dp = 0$ in an isobaric process and that the air parcels do not exchange energy with the environment ($dq = 0$): ...
99	CH 4.2.2. bottom page (c)	It should read: Instead of reaching the **LCL** by forced mechanical lifting as discussed above, an air parcel can also reach the **LCL** if it has sufficient positive buoyancy. The **LCL** reached in ...
106	4.2.4.2	... It can be obtained by following the moist adiabat (i.e. constant θ_w!) down to the surface starting from the minimum value of θ_w (not θ_e) found...
119	Fig. 5.2	Soot TEM should cover both Aitken and accumulation mode, as depicted in Fig. 5.18.
121	Eq. $\tilde{\sigma} = ...$	add number to eq.

130	Fig. 5.7	The discription in the upper left part of the figure should read "Cluster formation".
159	Above Eq. 6.5	Change to: "...in the new bulk phase, (ii)..."
159	Below Eq. 6.5	Change to: "...difference from THE outside increases..."
170	Eq. (6.22)	The value of the b term should read: $b = 4.3 \times 10^{-6}\,\mathrm{m^3 mol^{-1}}$
184	Exercise 2 (b)	Clarification: Assuming a bubble of pure water vapor, the equilibrium vapor pressure is given as $p_b = e_{s,w}(T)K$, where $K < 1$. Determine whether the bubble could exist under equilibrium conditions.
224	Fig. 8.4a	Nu_{dep} should have no superscript "CD", as no liquid water phase is assumed to be involved in the deposition nucleation process.
235	Fig. 8.12	Caption should read: Observed **ice crystal** number concentration...
236	Fig. 8.13a	The arrow denoting the basal face is misleading. The basal face corresponds to the dark grey area in Fig. 8.13a.
237	line 11	The sentence "If growth of the hexagon..." should read: "If the growth (by mass/vapor deposition) of the hexagon preferentially takes place on the prism face, it results in a plate (Figures 8.13b and 8.14d,e). If growth of the basal face prevails (growth along the z-axis), this leads to a column (Figures 8.13b and 8.14f,g)."
249	Excercise 5 (c)	There are commas missing here: In an environment of high supercooling, large INP concentration, and low updraft velocities, very ...
255	Eq. (9.5)	The number of c_N is missing; it should read $c_N = 0.038\,\mathrm{cm^{-4}}(\mathrm{mm\,h^{-1}})^{0.87}$.
262	Fig. 9.6	Fig. caption should read: Examples of atmospheric processes or phenomena that occur...
269	Fig. 9.12	$0\,^\circ$C isotherm at t_3 should be tilted upwards inside cloud as for e.g. at t_4 and not flat due to latent heat release.
271	Fig. 9.14 (a)	Half circles at surface warm front should be facing the other direction, i.e. out of the warm sector.
282	Table 9.3	The number concentration of hydrometeors should read: $n_N(r_h)$.
286	Fig. 10.1	The arrows indicating the horizontal extent of the mature stage in panel (b) are missleading and should span the entire horizontal dimension of the thunderstorm cloud.
287	Fig. 10.2	The wind barbs are vertically displaced and should only start with the sounding, i.e. the profiles of T_{env} and T_d.
306	Fig. 10.16	The wind barbs are vertically displaced and should only start with the sounding, i.e. the profiles of T_{env} and T_d.
321	Exercise 4 (b)	In the formula of the buoyancy it should read F_B for the buoyancy force, not T_B.
327	Eq. (11.7)	The 4 in front of the root seems slightly shifted towards the root. It should read $\sqrt[4]{\ldots}$.
327	T_s	The value of T_s below eq. (11.7) should read: $T_s = 289$ K (see p. 325)
329	bottom	"...is absorbed by other air molecules...". This statment is imprecise and only applies to greenhouse gases, but not to non-absorbing molecules such as N_2 or O_2.
330	line 2	"the cloud greenhouse effect is *mostly* important for..."

330	line 17	"... re-emitted by *greenhouse gases, clouds and absorbing aerosol particles* and will not..."
330	line 18	"... presence of low-level clouds is *almost* not noticable..."
334	Exercise 3	The numbering of the sub-exercises should read (a), (b), (c), (d).
336	Section 12.1.1	the reference to Section 5.2 should be deleted: "...of radiation, as discussed in Section 5.2."
339	BC AOD value	"Black carbon also contributes to ERFari. Despite its small AOD, of only **0.004**, BC..." The AOD value indicated for BC should read 0.004 and not 0.04.
347	Exercise 4 (c)	The buoyancy should read: $F_B = g(T - T_{env})/T_{env}$.
367	Exercise 5 (a)	The units of the cloud liquid water content M_l need to read $0.3\,\mathrm{kg\,kg^{-1}}$.
367	Exercise 5/6	Exercise 5 should be labeled Exercise 6.

Table 1: Errata found within the textbook.

Figure	**Correction/Comment**
ULRIKE_LOHMANN_fig.2.17.jpg	Fig. 2.17 of Web Resources: The Saturated adiabats are missing in this figure. Note that the figure is correct as in the printed version of the book.