Errata & Enhancements to PrMet

Stull: "***Practical Meteorology: An Algebra-based Survey of Atmospheric Science***", version 1.00 published 10 Nov 2015.
As you discover errors or have suggestions for improvement to the book version listed above, please email the details to me: rstull [at} eos (Dot] ubc {doT) ca . Be sure to locate them with chapter, page, column (right or left), paragraph, and line number, so that other readers and I can find it. Thanks.

(captured through 7 Apr 2016)

Chapter Titles

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1. Atmospheric Basics

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p. 10, just before equation 1.10, “Knowing that P = F/A, (the) previous two expressions are combined…” (the word “the” is missing from the text).

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2. Solar & Infrared Radiation

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pg 36, the sample application you have on red light you calculate the wavenumber. I believe the wavenumber is given by 2pi/lambda instead of 1/lambda.

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3. Thermodynamics

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p. 56, right under Table 3-2 there seems to be a referencing problem. It says “First Law of Thermo” where it should probably say “heat transferred”.

p69. very bottom of p. 69: I think the last sentence should say “The resulting turbulent heat fluxes decrease linearly with height AS shown” (currently says “was shown”).

p. 70: not enough whitespace above equation 3.40.

p. 71 of this chapter, the first sentence in the ‘Solar and IR Radiation’ section reads like it was a note that you wrote to remind yourself to divide the topic. Maybe that’s the case - otherwise I think it warrants re-wording.

p. 76: at the end of the first sentence, “breath” should be changed to “breathe”

p. 78: in first sentence of second paragraph under ‘Temperature Sensors’, I think you have misspelled “bimetallic” (you only have one ‘l’)

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4. Water Vapor

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p. 98 - second sentence after equation (4.32c) - get rid of “either or both” and keep “and/or”, or vice-versa

p. 102 - first sentence in section on ‘Moist Adiabats on a Thermo Diagram’ - replace “mean” with “means”

p. 105 - paragraph 4, sentence 2 - remove “and” before “plot these points on a thermo diagram”, or otherwise re-word

p. 108 - last sentence before section on ‘Moisture Flux at the Earth’s Surface' - may want to specify that the **liquid** precipitation rate at the ground is the rainfall rate

p. 111 - column 2, about half-way down page right after bolded text “krypton hygrometer” - change “generated by glow tube” to generated by **a** glow tube"

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5. Atmospheric Stability

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p. 121 - in ‘Info’ box, need comma after Skew-T Log P bullet point

p. 130 - last paragraph before ‘Precipitation’ section, sentence 2 - “Knowing …, then follow” - either remove “then”, or replace with “you can then”

p130, right column, 3rd to last line: "subsequent ascent or descent, the you must follow". Typo. Change "the" to "then."

p136, right column, 2nd line below eq.(5.3d), "then" should be "than".

p. 136 - 1st sentence in section on ‘Brunt Vaisala Frequency” - “…lapse rate (lambda) is less than” - the word “than” is missing from this sentence

p. 143 - 1st sentence of paragraph 3 - “Strong static stability can be found by locating/identifying regions…” - suggest adding “locating" or “identifying” here

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6. Clouds

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p. 161 - in the ‘Cumuliform’ section, last sentence of 1st paragraph - you say these clouds have an aspect ratio of approximately 1, and that cloud diameter is approximately equal to distance of cloud top above ground - is this correct? No. Instead, better to talk about how the aspect ratio is about 1 for the whole thermal circulation between the ground and cloud top, where the Cu itself is just a small visible top part of the whole circulation. Like the tip of an iceberg.

p164, right column (top), 4th line: "don't let the suffix 'cumulus' in fool you." Typo: omit the word "in" .

p. 177 - end of 3rd paragraph - you say that when Qak > 0, fog dissipates, assuming no fog initially. When I first read through the discussion of equation (6.12), I thought we were only talking about the dissipation of fog, but if we assume no fog initially, then this equation must describe both fog development and dissipation. This may warrant some clarification. For example, what happens when Qak < 0? Is fog increasing?

p171 - 172. The section on fractals and fractal dimension is interesting, but it’s not obvious why the reader should care about it. For example, (and I might be wrong here), you might want to say something about the predictability of meteorological phenomena with fractal geometry, such as turbulence, and how these can’t be modelled explicitly but are instead parameterized. Fractals are related to chaos, right?

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7. Precipitation Processes

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p. 185 - first and last sentences of paragraph 1 - typo “hydrometer” should be “hydrometeor” (maybe do a search in this chapter to see if there are any other instances of this error

p. 191 - last sentence of first full paragraph - replace “explodes” with “evaporates” (note from Stull: "explosively evaporates" might describe it better)

p. 195 - in last sentence of first paragraph - replaces “increases” with “increase”, i.e., “Colder temperatures and greater supersaturation increase deposition…”

p. 197 - below equation (7.25) you say that small droplets grow by diffusion faster than large droplets, but on p. 189 the curvature effect means that large particles grow faster than small ones - what is the net effect? Perhaps a few words of clarification would help to reconcile these seemingly opposing ideas.

p. 199 - Table 7A item 1d - replace “start-like” with “star-like”

p. 200 - paragraph 2, sentence 1 - “…thick plates have an aspect ratio of…” (word “an” is missing)

p. 202 - first sentence of section on ‘Terminal Velocity of Hydrometeors’ - replace “are” with “is”, i.e., "Everything including cloud and rain drops is pulled by gravity”

p. 207 - last sentence - “You have probably also experienced…” (add “have”)

p. 208 - in the list of world-record rainfall amounts, La Re Union should be La Réunion or just Réunion

p. 209 - Table 7-6, 4th entry - swap the first two words, i.e., replace “Compacted snow by…” with “Snow compacted by…”

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8. Satellites & Radar

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p. 227 - last sentence - “Satellites are also hurt…” - replace “hurt” with “damaged” (satellites don’t have feelings)

p. 238 - sentence 2 - replace “to retrieve” with “in retrieving”, i.e., “From Retrieval Corollary 1 there is little value in retrieving more altitudes…”

p. 239 - in ‘Higher Math’ box, there is inconsistency in the abbreviation of “Figure” - sometimes it reads “Fig.” and sometimes “Fig” without the period

p. 242 - the AVCS bulletpoint is missing a comma before the word “which”

p. 245 - first line of page - “clutter return at large range” - is this correct? Wouldn’t superrefraction cause a return at short range?

p. 248 - two lines below bolded “identify storms” text near bottom of page - concept of “echo-top height” is not defined - what is it?

p. 249 - second sentence of ‘Radial velocities’ section - beginning of sentence is a bit awkward - try “But after being scattered…” OR “But once scattered…” OR “But after scattering…”

p. 256 - under Co-polar Correlation Coefficient bulletpoint - remove period after “mix”?

p. 259 - paragraph above equation (8.42) is worded awkwardly - maybe the second sentence could begin “With this setup, the two radial…”, or rework the two sentences into one like “If we assume the same average U and W…, then the two radial…”

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9. Weather Reports & Map Analysis

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p. 268 - in the last sentence of the second paragraph from the top of the page, "observations" is spelled incorrectly, and there is no period at the end of the sentence.

p. 270 - 2nd sentence - remove “a” - i.e., “It contains a routine (hourly observations of…”

p. 271 - top left of page under ‘Supplementary’ - for NSW description, replace “nil” with “no” - i.e., “NSW = no significant weather”

p. 273 - paragraph 2 - remove “a” - i.e., “…on a polar -orbiting satellites…”

p. 274 - first sentence of paragraph 3 - remove second instance of “weather” - i.e., …”Scales of weather…that are called synoptic-scale weather”

p. 277 - Table 9-5 - in Altocumulus Castellanus entry, replace “tuffs” with “tufts”

p. 278 - for RR bulletpoint - is this always reported in mm in Canada? (it’s pretty obvious, but may be worth clarifying)

p. 281 - add Trowal to Fig 9.18?

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10. Atmospheric Forces & Winds

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p. 291 - info box, #5 - Why do some weather forecast models use pressure coordinate systems, and why do some modern models not?

p. 292 - very last sentence - inside the parentheses, maybe say “not necessarily that V=0”, since it is theoretically possible to have no wind

p. 294 - in ‘Advection of Horizontal Momentum’ section, last sentence of paragraph 2 - remove second instance of “is larger”, i.e., “The rate of increase of U at “O” is larger for faster advection (V), and when deltaU/deltaY is more negative”.

p. 303 - paragraph 1, last sentence - suggest changing to “In the N. (S.) hemisphere…low pressure is to the wind’s left (right)”.

p 306, left column. The info box on pg 313 should be moved to pg 306.

p. 309 - paragraph 1, last sentence - change “point” to “pointing”, i.e., “…such that it has a component pointing to low pressure.”

p. 315 - Fig 10.24 - define acronym MCS in caption

p. 318 - 2nd sentence below eq (10.65b) - change to “This forcing of a broad updraft region…” (remove ’s’ from region)

p320. An info box on the Rossby radius of deformation could be added on pg 320.

p320. You reuse eq 10.70 at eq 11.12 but also doesn't explain it was derived from 10.67 and 10.70. The explanation on the Sample Application on pg 344 right next to eq 11.12 is very good. A similar discussion should be added to the Sample Application on pg 320.

p. 321,322 - change all instances of "axel" to "axle" - apparently an axel is a figure skating jump

p. 322 - Sonic anemometer description - in order to measure both T and wind speed, does the anemometer require two sets of transmitters and receivers? That is, don't you need to know T to compute wind speed, and vice-versa?

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11. General Circulation

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p. 329 - first sentence of paragraph 3 - it is actually true that warm air rises and cold air sinks, it's just that it doesn't happen as a single cell. This should be clarified.

p330, left column, in Figure 11.2, along the equator: change "equitorial" to "equatorial".

p. 330 - last paragraph of Key terms feels out of place. I suggest moving this to p. 333 where the acronyms JJA and DJF are used (not used elsewhere)

p. 331-333 - in the description of the general circulation components, I found myself asking why the features exist and why they behave the way that they do. At the beginning of this section on p.330 you may want to mention that this is an overview and that the processes driving the described features are described in detail later in the chapter.

p. 331 - it may be worth noting that the surface low and upper high at ITCZ is caused by rising warm air, rather than the pressure gradient driving downward air movement. In the previous chapter we learned about how pressure gradients drive winds, so this may be confusing to readers.

p333, changes to the ITCZ description, based on the paper by Waliser & Gautier, 1993: J. Clim., 6, 2162-2174.
- left column, second paragraph, last sentence: change "10°N" to "9°N, but varies with longitude".
- left column, third paragraph, 3rd to last line: change "10°S" to "6°S, but varies with longitude".

p. 334 - caption of Figure 11.16 - "Annual average incoming solar radiation…and of outgoing infrared…" (remove "of")

p. 335 - under equations (11.1) and (11.2) - rewrite "40C = 40K" as "40C or 40K" or "40C (or K - units do not matter)" - but in equation 11.1, wouldn't b have to be in degrees C to be able to add the two terms of the equation? And then T would also be in degrees C.

p. 336 - Fig 11.9a (note this figure also appears on p. 41 Fig 2.11) - why isn't the plot symmetric about the equator (i.e., why is it different in each hemisphere?) For example, in the southern hemisphere, the 500 W/m2 contour extends to -30deg, but in the northern hemisphere it only extends to 75deg.

337 - below equation (11.6) - add note that absorption of solar radiation causes heating

p. 338 - beginning of last paragraph - “By definition, the meridional transport at the poles is zero.” What “definition” is this?

p. 339 - FIgure 11.14 - why isn’t ocean transport symmetric in the two hemispheres?

p. 340 - first bullet under ‘Pressure Profiles’ - replace “due to” with “caused by” or “generated by”

p. 344 - explanation of Figure 11.19b in text - wouldn’t the acceleration be accompanied by an immediate increase in the coriolis force such that there was actually no turning and no movement of air molecules weakening the pressure gradient? Wouldn’t the increased pressure gradient then just result in faster geostrophic winds?

p. 344 - paragraph above equation (11.12), first sentence - replace “Defined” with “define”, i.e., “Define a disturbance as…”

p. 344 - last paragraph - combine sentences 1+2 to something like “For a given size of wavelength of initial disturbance lambda, eq (11.12) can be used as follows: for large lambda, the wind field experiences the greatest adjustment.”

p344, right column, line 2, typo. Change "much" to "must".

p. 349 - first sentence of ‘Thermal Wind…- Part 2’ - should this be “As geostrophic winds adjust to **changes in** pressure gradients…”?

p. 350 - paragraph 5 - remove “But” from start of first sentence

p. 353 - paragraph 4 - I can see how barotropic/baroclinic instabilities would cause meandering following a disturbance, but what triggers the disturbance?

p. 353 - paragraph 5 - why is the subtropical jet steady?

p. 353 - paragraph 6 - replace “killing” with “destroying” in first sentence

p. 354-355 - why do the patterns shift poleward over the continents? explanation might fit nicely in p. 346.

p. 357 - paragraph 2 - Why does jet stream speed vary? What happens when the fast air over the Pacific converges with the slower air toward the Atlantic?

p. 359 - paragraph 2 sentence 2 - not clear why isobars cross isotherms - if pressure gradient is driven by temperature gradient, then wouldn’t they be parallel?

p. 359 - paragraph 5 sentence 1 - replace “causes” with “cause”, i.e., “…thickness changes between isobaric surfaces cause the meridional pressure gradient…”

p. 360 - paragraph above equation (11.18), first sentence - move the air how? Related to question about disturbance trigger on p. 353 paragraph 4.

p. 361 - last sentence - can one occurrence of the word “circulation” be changed?

p. 362 - above equation (11.21) - define M, e.g., “But in a river (or atmosphere), currents can have additional radial shear of the tangential velocity (M).”

p. 367 - paragraph 4 - again, what causes the initial disturbance?

p. 368 - in “Location d” paragraph - remove “But” from the beginning of the first sentence

p. 368 - Higher Math box, first sentence - missing word - “…oscillates north of south some distance y relative **to** an arbitrary…”

p. 368 - Higher Math box, under equation (c) - missing “)” in reference to equation 11.20

p. 369 - paragraph 1, last sentence - missing “)” at end of last sentence. Also suggest replacing second “where” with “and”, i.e., “…(where the circumference of a latitude circle is…, and phi is latitude).”

p. 369 - under equation (11.37) - replace “crest” with “crests”

p. 369 - end of page - mention that the net effect is that short waves move through long waves (this is described in exposition of the third sample application on p. 370

p371. Caption of Fig. 11.52, line 2. Typo. Change "at" to "an". Also, eliminate one of the two periods at the end of the caption.

p. 371 - at end of first paragraph of ‘Qualitative View’ section, mention why thickness was ignored for barotropic

p. 371 - second paragraph of ‘Qualitative View’, first sentence - wording is awkward, suggest “For baroclinic waves, follow the jet stream as was done before for barotropic waves…”

p. 371 - last sentence of Figure 11.52 has two periods

p. 373 - between equations (11.46) and (11.47) - replace “is indicated” with “as indicated” or just “indicated”

p. 375 - first sentence - suggest “This flux is positive (negative) in the N. (S.) Hemisphere.”

p. 376 - under equation (11.49) - similarly, suggest “…we infer that MG is negative (positive) in N. (S.) Hemisphere midlatitudes.”

p. 376 - Figure 11.58 caption “dot-circle” and “x-circle” inconsistent with Figure 11.53 caption which uses “Circle-dot” and “circle-X”

p. 379 - last paragraph above ‘Review’ - suggest “…transport by Ekman ocean processes is 90deg to the right (left) of the near-surface wind in the N. (S.) Hemisphere.

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12. Fronts & Airmasses

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p. 389 - paragraph 3 - mention here that Lows are covered in the next chapter. They are discussed in the previous paragraph and then abandoned with no explanation.

p. 392 - Table 12-1 - for rows “k” and “w”, capitalize first word and add period for consistency with above descriptions. Row “r” missing period from description.

p. 393 - first sentence of last paragraph, change “at rate 2C/day” to “at **a** rate **of** 2C/day”.

p. 396 - 3rd full paragraph - sentence 2 has two instances of “also” - remove one of these.

p. 399 - Figure 12.10 - suggest adding Trowal (I also made this suggestion in the chapter from which this figure is copied.

p. 403 - somewhere in paragraphs 1-5, clarify that this discussion applies both to warm and cold fronts

p. 408 - first sentence of Frontogenesis section - replace long dash with “, which is”, i.e., “Fronts are recognized by the change in temperature across the frontal zone, which is greatest at the surface.”

p. 408 - last sentence before “Kinematics” heading - suggest rewording as “Such processes can be classified as kinematic, thermodynamic, and dynamic.

p. 409 - throughout Confluence, Shear, and Tilting sections, replace “= -“ with “< 0” and “= +” with “> 0”.

p. 410 - paragraph 1 - can you explain the difference between confluence and convergence and between diffluence and divergence? Perhaps add an INFO box.

p. 416 - paragraph 2, sentence 2 - remove comma

p. 416 - paragraph 3 - why/how are convective clouds triggered along drylines?

p. 418 - last sentence - here you say that drylines form over sloping terrain - this is not clear from description on p. 416.

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13. Extratropical Cyclones

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p. 427 - paragraph 2 line 3 - line is very cramped, looks like one long word (i.e. spaces between words are not apparent). It should be "temperature change across a short horizontal distance."

p. 428 - Figs 13.3 b-e - is the far right side of the front still stationary?

p. 430 - line 7 - “… such as **those** associated with the El Nino/La nina cycle…” (missing word)

p. 442 - sentence 1 is a bit awkward - recommend “As recommended…, we start with”, or “we will start with” or “this discussion will start with”. Sentence 2 also a bit awkward.

p. 443 - above Lee Cyclogenesis - “Special thanks to **Dr.** Greg West…”?

p445, left column, 10th to last line: Typo. Change "is" to "its".

p. 445 and 447 - in discussions regarding vorticity and stretching, recommend mentioning the ice skater analogy (where ice skaters bring in their arms to spin faster)

p. 446 - in-text description of Fig 13.21- if column C has maximum vorticity, wouldn't the cyclone translate to the east, and not to the south?

p. 448 - extra (inconsistent) vertical space between paragraphs

p. 448 - paragraph 2 sentence 3 - "…the winds M **are** subgeostrophic…" (missing word)

p. 449 - end of paragraph 2 - "…and **the** ideal gas law…" (missing word)

p. 449 - first full paragraph below equation 13.12, first sentence - I think "for the following reasons" should end with a colon rather than a period. Consider re-wording, e.g., "The prefix quasi is used for reasons outlined below."

p. 450 - paragraph 3 of 'Application' section, last sentence - replace "spin-up" (noun) with "spin up" (verb)

p. 450 - last paragraph - would jet streak cause convergence east of the trough, or is it still slower than around the high? i.e., is the wind still "slow around the low"?

p451, left column, sentence before eq. (13.14): Change "hypsometric" to "hydrostatic".

p. 452 - paragraph 3 sentence 2 - replace "a" with "at" ("…most of this flow happens **at** mid-levels.")

p. 452 - under equation 13.17 - replace "mid tropospheric" with "mid-troposphere"

p. 457 - Fig 13.36 - shaded area extends outside of bounding N/E axes

p. 457 - Caption of Fig 13.36 - in last line, replace "support" with "supports", i.e., "…which supports cyclogenesis."

p. 459 - second full paragraph, sentence 3 - "…(PVA) by the thermal wind, so **we** anticipate…" (recommend adding bolded word)

p. 459 - sentence 1 of Info box - "Consider the entrance region **of** a jet streak." (missing word)

p. 460 - Sample Application box - Fig j overlaps with heading

p. 460 - Why is it "Q"? Why not some other letter?

p. 461 - second paragraph from end, last sentence. "A moderate convergence zone **extends** northwest toward Wisconsin". (need to add s to "extend")

p. 462 - sentence 3 of 'Paradox' section - "Due to mass continuity, **we can** expect an ageostrophic circulation…" (original wording is a bit awkward)

p. 461-462 - you assume readers know their US geography quite well, which is likely not the case…

p. 463 - paragraph 3 of 'Mass Budget' section - you have a question with no question mark - consider re-wording

p. 464 - under equation 13.34 - “where the column bottom surface **has** area (A)…” (replace “as” with “has”)

p. 467 - line 1 - replace “low-center” with “low-pressure center” or “low center”

p. 467 - second paragraph fron end, sentence 2 - replace “spins-down” with “spins down”

p. 467 - last paragraph - I think this is the first mention of a 3-day life cycle - is this always the case? (You mention it again in the Review section later on)

p. 468 - line 2 of ‘Temperature Advection’ section - replace “west from” with “west of”

p. 469 - sentence 2 of ‘Creation of Baroclinic Zones’ section - “as follows” should be followed by a colon. Consider replacing sentence with “This process is described below.”

p. 471 - line 3 - “vector, **we can** estimate the Q-vectors…” (a bit awkward)

p. 471 - last sentence before ‘Review’ section - does this imply that clouds exist only ahead of the cold front and the sky is clear behind it?

p. 471 - paragraph 2 of ‘Review’, sentence 1 - suggest changing to “Cyclones rotate counterclockwise (clockwise) in the Northern (Southern) Hemisphere…”.

p. 471 - paragraph 2 of Review, line 4 - replace “are” with “is” (i.e., "Bad weather (…) **is** often concentrated…”)

p. 471 - in Scientific Perspective box, suggest moving entire word “Uncertainty” to second line, rather than breaking it up

p. 472 - last paragraph of col 2, sentence 1 - suggest changing ordering of cities to “Vancouver, Victoria, Seattle region”, just so that they are ordered by country. It might also be more correct to replace commas with dashes - i.e. “Vancouver-Victoria-Seattle region”

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14. Thunderstorm Fundamentals

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p. 483 - last sentence of Fig 14.4b caption - it took a while to understand what you meant by “From the viewpoint you see Fig 14.4a.” because I didn’t notice the little ‘view point’ illustration. I suggest re-wording as “From the viewpoint illustrated at the lower right corner, you would see the storm as in Fig 14.4a.”

p. 486 - Bullet 3 (supercells) - hyphenate “low-precipitation” and “high-precipitation”

p. 486 - sentence 2 of ‘Multicell Thunderstorms’ subsection - replace “see” with “identify”, i.e. “…a weather radar can identify many…”

p. 488 - sentence 3 of Fig 14.13 caption - “Ahead **of** and behind this squall line…” (add missing word “of”)

p. 488 - paragraph 3 sentence 1 - replace “sublime” with “sublimate”

p. 490 - paragraph 2 sentence 1 - hyphenate “cross-section”

p. 490 - paragraph 3 sentence 1 - hyphenate “well-defined”

p. 491 - last sentence before ‘MCC’ sub-section - “...with wind speeds >= 26 m/s **and** gusts >= 33 m/s…” (replace second “with” with “and”)

p. 491 - sentence 2 of ‘MCC’ sub-section - …”must have a cold brightness temperature **of** <= -33C.” (remove hyphen from “brightness temperature” and add missing word “of”)

p. 491 - last sentence in left column - reword as “They can be triggered by weak warm frontal zones and weak mid-tropospheric short waves, and are often associated with low-level jets of wind.”

p. 492 - sentence 1 of last paragraph on page - hyphenate “medium-precipitation”

p. 493 - paragraph 5 sentence 1 - problem with verb tense - “all of these ice particles…melts while falling, and reach**es** the ground as rain.”

p. 500 - paragraph 4 last sentence - “Also in **the** Water Vapor chapter is…” (add missing word “the”)

p. 501 - paragraph 2 sentence 1 - “…within **the** bottom 1km of the atmosphere.” (add missing word “the”)

p. 501 - Fig 15.33 caption - add “th” superscript to percentile values, i.e., “25th”, “75th”, “10th”, 90th” - also for figures 14.42, 14.56 and 14.65

p. 502 - Info box paragraph 3 - the distinction between median and median value seems odd - also there are typos for the lower quartile and upper quartile equations r = (1/4).(n+1) and r = (3/4).(n+1), the “+1” is missing from the text

p. 502 - Info box last 2 paragraphs - in first sentence of each, remove “those”, i.e. “consider ~~those~~ data points ranked…”)

p. 503 - paragraph 1 last 2 sentences - are the left-side quotation marks correct? i.e., should they be angled the other way? If so, this problem likely exists throughout the book and I just happened to notice it here.

p. 503 - first paragraph of CAPE section, last sentence - “CAPE is proportional to the shaded area in Fig 14.34; namely, the area between **the** LFC and EL altitudes that is **bounded by** the environmental sounding and the moist adiabat of the rising air parcel.”

p. 503 - paragraph 2 of CAPE, sentence 1 - reword “To explain this, we **employ/make use of** the definition of…”

p. 503 - line above equation (14.1) - remove “is” after “Thus,”

p. 503 - Fig 14.34 caption - reword as “Surface-based Convective Available Potential Energy (CAPE) is given by the grey-shaded area for an afternoon pre-storm environment”. OR “The grey-shaded area gives the surface-based CAPE for an afternoon pre-storm environment.”

p. 506 - sentence 2 of right column - “Thus, the the initial conditions…represents the mean layer…” (problem with verb tense)

p. 506 - Fig 14.39 caption - “…you can use the foreacst maximum near-surface air temperature (max T) **and dew point temperature** (Td) for later…” (add bolded text)

p. 507 - Table 14-1 col 3 - punctuation is inconsistent in last 3 rows - either separate activities by semicolons or commas

p. 507 - paragraph 2 - should point out that MUCAPE is also not a sharp discriminator of thunderstorm intensity

p. 508 - paragraph 2 line 1 - replace period with colon, i.e. “A word of caution: CAPE gives…”

p. 508 - paragraph 2 last sentence - “It is a useful, but not perfect forecast tool, as **demonstrated** by the lack of sharpness…” (replace “evidenced” with “demonstrated”, and remove comma after “not perfect”)

p. 509 - end of paragraph 2 - “…depending on the output from **your calculator’s** “arctan” **function**.” (add bolded words)

p. 509 - under eq (14.12) replace “has units” with “have units”

p. 509 - Fig 14.46 caption - “Wind difference (black arrows) between two altitudes is **represented by** the vector difference between…” (add bolded words)

p. 510 - paragraph 2 sentence 1 - use either “15 minutes to 1 hour” or “15 min to 1 h” (i.e. abbreviate both or neither)

p. 513 - paragraph 1 last sentence - this is a bit repetitive - suggest rewording as “Using the “from” direction and the wind speed to specify points, the result is a hodograph that implies wind vectors pointing from the origin to the correct directions.”

p. 513 - Fig 14.52 caption - reword last sentence “Wind speeds are in ms-1.”

p. 514 - paragraph under equation (14.14) - reword last 2 sentences into “Equations (14.15) and (14.16) can be used to determine the magnitude and direction, respectively, of the mean shear vector.”

p. 515 - under equation (14.17) - “i and i-1 indicate **the** top and bottom of the ith layer**, respectively**” (add bolded words)

p. 516 - paragraph 1 last sentence - reword as “Fig 14.56 also illustrates that greater TSM values support supercells.”

p. 517 - below eq (14.19) underline “levels” and “layers” for emphasis

p. 517 - below eq (14.19) - “[CAUTION: Don’t confuse the mean wind with the mean shear **given by equations (14.13) and (14.14)**.]” (add bolded reference to relevant equations)

p. 518 - paragraph 3 - not clear why the cyclonic and anticyclonic mesocyclones move in different directions

p. 519 - paragraphs 1 and 2 - not clear how curvature determines dissipation

p. 519 - line 2 of left col - “right- and left-moving” (add hyphen to “right”) - also in caption of Fig. 14.62 and title of Fig. 14.62(a)

p. 519 - Fig 14.63 - indicate in caption that sub-figures a-c correspond to Fig 14.62 a-c

p. 521 - sentence 1 - reword “Thunderstorm type depends on the amounts of **both** instability and wind shear in the pre-storm environmental sounding.” (move the word “both” as indicated).

p. 521 - Fig 14.64 - I was a bit confused about why the dashed vector was rotated when moved to the origin. Maybe clarify that the rotation is not necessary and is just to make it easier to see the wind speed circle at the end of the vector.

p. 522 - Fig 14.65 - last line of text in the figure needs to shift left a bit - the right side of the ‘m’ is overlapping the figure border

p. 522 - 3rd line below eq (14.23) “…statistically shaper **(than MLCAPE, MUCAPE and ML LCL)** in its ability…” (add bolded text)

p. 522 - sentence 1 of ‘Triggering’ section - “The fourth (**and final**)…” (is it the final requirement?). Also suggest recapping first 3 requirements here, e.g., insert new sentence after sentence 1: “Recall that the first three requirements are: …”.

p. 523 - Fig 14.68 caption - “CIN based on max surface temperature **and dew point temperature** forecasts…” (add bolded text)

p. 523 - paragraph 1, last sentence - reword as “For the air parcel to rise above zi, the trigger process must do work against the buoyant forces within this cap region.”

p. 523 - paragraph 2 sentence 3 - “except for the limits of the sum (i.e., **zi to LFC vs. LFC to EL).**” (suggest adding bolded text)

p. 523 - paragraph 3 sentence 1 - reword “…the area between zi and **the** LFC **bounded by the dry adiabat and the environmental sounding.**” (add bolded text)

p. 524 - paragraph 2 sentence 3 - should that be -60 J/kg? (is negative sign missing?)

p. 525 - sentence 1 - suggest rewording “…for smaller values of z_cap, which is the difference between z_LFC and z_LCL (i.e., z_cap = z_LFC - z_LCL), and gives the depth of the nonlocally stable region at the bottom of the storm.”

p. 525 - first sentence of ‘Triggers’ section - change “the boundary-layer air parcels” to “a boundary-layer air parcel” or just “boundary-layer air parcels”

p. 525 - the trigger bullet points aren’t actions. A boundary between air masses won’t trigger lift, but the movement of the boundary will. Maybe change first bullet to “Movement of airmass boundaries”. Points under second bullet have similar issue, e.g. change “mountains” to “air flow over mountains”, etc. Punctuation of points under both bullets is also an inconsistent mix of commas, semicolons and periods

p. 525 - line 2 of last paragraph - change “meteorologist” to “meteorologists”

p. in Figure 14.72, you have labelled your states - I think I made a comment in the Chapter 13 errata email regarding labelling states on maps, and this is a great example of how you could do that

p. 526 - paragraph 2, sentence 2 - "…can persist or propagate (**by triggering** daughter storms…"

p. 526 - 2nd-to-last paragraph - first sentence talks about **when** Tstorms will start, and second is about **if** they will occur. Suggest changing second sentence to "Namely, determine if the forecast high temperature for the day will exceed the convective temperature, and at what time this criteria will be met."

p. 527 - sentence 2 of Tstorm section - Thunderstorms are nonlinear? Do you mean "Thunderstorm **processes** are very nonlinear…"?

p. 528 - paragraph 3 sentence 2 - "Thunderstorms usually form in **mid-to-late** afternoon…" (hyphenate as per bolded text)

p. 528 - Fig 14.76 caption - change line 3 "cooling **day and night,** for summer over land"

p. 528 - Fig 14.76 caption - line 5 change "heats Q_A" to "heat Q_A"

p. 528 - Fig 14.76 caption - line 7 change "Dash line" to "The dashed line"

p. 528 - Fig 14.76 caption - last 2 lines - reword as "most likely to form within a few hours of sunset" or "around sunset plus or minus a few hours".

p. 528 - Fig 14.77 - caption refers to shaded boxes - not clear what these are - do you mean the thick grey outlines?

p. 528 - line 6 of 'Outlooks' section - reword as "thunderstorm-caused or otherwise" (note addition of hyphen)

p. 528 - first line of 'watch' bullet point at bottom of page - "0.5 to 6 h forecast **indicating** that severe weather is…" (add bolded word)

p. 529 - first line of 'warning' bullet point - "0 to 1 h forecast indicating that severe weather…" (add bolded word)

p. 529 - in 'warning' bullet, "warning boxes" is not bolded, but "watch boxes" on previous page is - suggest bolding for consistency

p. 529 - paragraph 2 sentence 2 - "…what, where, and when **severe weather will occur or is occurring**…" (suggest adding bolded text)

p. 530 - Table 14-5 - suggest putting asterisks next to abbreviations that will be covered in next chapter and indicating this in the caption

p. 530 - Line 1 - remove "The", i.e., "Convective outlooks include…"

p. 530 - for all bullet points - is "wind event" defined as winds >= 25 m/s as per p. 528 (clarify)

p. 530 - line 3 of 'Stability Indices' section - change "existence" to "formation"

p. 530 - paragraph 3 of ‘Stability Indices’ section, last sentence - “…, and Table 14-7 **gives** the associated forecast guidelines.” (replace “give” with “gives”)

p. 531 - Table 14-6 caption - inconsistent arrangement of variable definitions (first few have their own lines separated by semicolons, then last couple are in paragraph separated by periods

p. 531 - suggest merging tables 14-6 and 14-7 - change 3rd col header of 14-6 to “Definition” and add fourth column “Values and Interpretation” from Table 14-7

p. 531 - last line in Table 14-7 col 3 - what about ‘tornado’ - is this ‘tornado likely’ or ‘tornado present’?

p. 532 - line 2 - remove hyphen from “severe-storm”

p. 532 - paragraph 2 sentence 2 - reword as “…ahead of a cold front that **spanned** from Illinois to Texas.”

p. 532 - paragraph 2, last sentence - reword as “Cold dry air aloft **coming** from the west…” or “Cold dry air aloft in the west…”

p. 533 - last sentence of ‘Review’ - reword “The explosive growth of thunderstorms, **their** relatively small diameters, and **their** sensitivity to initial conditions make it difficult to forecast thunderstorms."

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15. Thunderstorm Hazards

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p. 546 - paragraph 3 - suggest removing last sentence (“splat” isn’t a very academic word”)

p. 546 - paragraph 4 sentence 1 - reword as “Why do thunderstorms have scattered showers?”

p. 546 - paragraph 4 last sentence - remove “the original”

p. 546 - first bullet point (left column) - replace “is” with “are”, i.e. “…the upper portions of the Cb cloud **are** so high…”

p. 546 - “Third” bullet - hyphenate “long-lasting” in line 1

p. 546 - first full paragraph under bullets, sentence 3 - replace “past” with “passed”

p. 546 - line above eq (15.1) remove hyphen from “latent heat”

p 546 - 4 lines below eq (15.1) - “…assuming for simplicity **that** all **of** the…” (add bolded words)

p. 547 - end of paragraph 1 - why half of the water? Wouldn’t precipitable water be all of it? Note that if this number (61 mm) gets updated, it is used on p 548 in paragraph 2 sentence 2.

p. 547 - paragraph 2 sentence 2 - reword as “Most thunderstorms have approximately 50% efficiency.” The way it is written now suggests cherry-picking data to calculate the average.

p. 547 - paragraph 3 sentence 1 - reword as “Extreme precipitation producing rainfall rates over 100 mm/hr…”

p. 547 - paragraph 3 sentence 3 - remove “As for other natural disasters, the”, so that the sentence starts with “More intense rainfall events…”

p. 547 - Sample application exposition paragraph 2 line 3 - remove “number"

p. 547 - Sample application exposition paragraph 2 last sentence - replace “were extreme events” with “was an extreme event”

p. 547 - Sample application exposition last paragraph sentence 2 - replace “the gust front” with “gust fronts"

p547, right column, Solved Example, first sentence after "Find:".

Change from "First, use eq. (15.2):" to

"First, multiply H_{RR} in eq. (15.2) by Δt:".

Also, in the next line, multiply the left side by Δt. (The right side is already multiplied by Δt.)

p. 548 - paragraph 3 sentence 3 - add reference to the sample Application on the previous page so that people don’t miss the other reasons that subsequent storms are less likely near original thunderstorms

p. 548 - paragraph 2 sentence 2 of ‘Hail’ section - reword as “Hailstones are called giant hail (or large or severe hail) if their diameters are between 1.9 and 5cm, though this is rare.”

p. 549 - paragraph 2 sentence 3 - reword the portion in parantheses as “(average rho_ice is 900 kg/m3, but this varies depending on the amount of air bubbles)”

p. 549 - last paragraph sentence 1 - inconsistent punctuation in numbered list - replace the comma before (4) with a semicolon

p. 549 - last paragraph last sentence - replace “it is” with “they are”, i.e., “Regardless of how they are formed…”

p. 550 - paragraph 1 last sentence - remove “relatively”

p. 552 - 2 lines above the ‘Nowcasting’ paragraph - suggest changing the order of the inequality. SHIP >= 1.5 feels more natural

p. 553 - end of first paragraph of ‘Hail Mitigation’ section - change “precisely:" to “with precision:”

p. 553 - Fig 15.10 caption - second to last sentence - specify that “Isotherms are **the** thin **horizontal** solid lines.” because you also have thin solid lines around the hail section

p. 557 - end of line 3 - “…cools and loses...” (replace “looses” with “loses”)

p. 557 - first line of paragraph 4 - add hyphen to “precipitation-laden”

p. 558 - Info box line 3 - replace “while” with “whereas”, i.e., “…whereas CAPE is…”

p. 559 - last paragraph sentence 2 - “Term (B) includes **the role of** the added weight of cold air…” (add bolded text)

p. 561 - second full paragraph - regarding Table 15-2, do both criteria need to be met for a downburst to be classified as a certain intensity, or just one of them? Clarify.

p. 563 - Bullet 4 under the ‘Lightning and Thunder’ heading - what is the “C” in “CA”? Is it “clear air”?

p. 564 - paragraph 4 sentence 2 - replace “from” with “to”, i.e., “…attached to the thunderstorm anvil (Fig. 15.21) or to the extensive stratiform region…”

p. 564 - first bullet at bottom of page - replace “on to” with “onto”

p. 565 - paragraph 2 sentence 1 - reword as “These three conditions can occur in Cb clouds at aititudes where the temperature is between 0 degC and -40 degC.”

p. 565 - paragraph 3 sentence 1 - replace “glass” with “smooth sheet of clear ice”

p. 565 - paragraph 4 sentence 1 - replace “graupel” with “graupel particle”

p. 565 - paragraph 4 - why is the electron transfer in this direction? What would prevent the electron from moving from large to small particle?

p. 565 - Info box paragraph 2 sentence 1 - hyphenate “build-up”

p. 566 - paragraph 2 sentence 4 - change “adds or removes” OR “to/from” so they are consistent, e.g., “Ionization adds or removes electrons to or from the air…”

p. 567 - second from last paragraph, sentence 1 - change first instance of “has been” to “is”, i.e., “Ball lightning is difficult to study, but has been…”

p. 567 - second from last paragraph, sentence 2 - change “strike" to “stroke”?

p. 567 - Scientific perspective box 3e - change “and don’t be” to “and should not be”

p. 568 - Info box end of first paragraph - remove second instance of “strongest”, i.e., “First-stroke peak currents are strongest in winter and in northern Canada.” Also, is this because the breakdown potential is higher for dry air? Maybe mention this (covered on p. 566 paragraph 2).

p. p. 568 - Info box paragraph 2 - very repetetive - “have positive polarity” is repeated 3x in 3 sentences - consider rewording

p. 568 - paragraph 2 sentence 4 - replace “increases” with “increase”, i.e. “Elves are…with radii that increase at the speed of light.”

p. 568 - 'Lightning Detection’ section paragraph 2 - you use the word strike instead of stroke - how do you differentiate between these words?

p. 568 - line 2 of this same paragraph - remove “multiple” (this is implied by “array”)

p. 569 - paragraph 2 of ‘Lightning Hazards’ section - what is the impact on transmission and electronics?

p. 571 - sentence 2 of 'Thunder' section - define supersonic

p. 571 - in Fig 15.27 I don't understand what is meant by "radius if only sound wave". Radius of what? (both figure and caption)

p. 572 - line 1 of left column - "…(because **there is** no net change…" (add bolded words)

p. 572 - line 3 of left column - what is a "normal" shock? Should you replace "perpendicular" on line 4 with "normal" or "perpendicular (normal)"?

p. 572 - second sentence under eq (15.23) - replace "sound speed" with "speed of sound"

p. 572 - sentence above eq (15.28) - "…by the shock circle, **we can** use geometry…" (add bolded words)

p. 572 - paragraph below eq (15.28) last sentence - hyphenate "out-rush"

p. 573 - end of paragraph 3 - "…**you can** use eq. (15.30) to find the initial pressure…" (add bolded words)

p. 575 - below eq (15.33) - replace "Snell discovered" with "**Snelll's Law states**" and un-bold "Snell's Law" in next sentence. (The way it is currently written, I expect a citation for Snell)

p576. right column, near eq. (15.38). Remind the readers that T must be in Kelvin.

p. 576 - 2 lines above eq (15.38) - replace "can be" with "is", i.e., "…there **is** a max distance…"

p. 577 - first paragraph of 'Tangential Velocity' section, last 2 sentences - suggest removing "vehicles" from first, because "trucks,cars" occur in second

p. 577 - same paragraph, sentence 2 - why faster near the ground? Wouldn't drag slow them? This is touched on in p. 578 paragraph 3 and fully explained in last paragraph of 581, but some of the concepts might be worth briefly mentioning here)

p. 577 - paragraph above eq (15.40) sentence 2 - reword as "At Ro, the inner and outer tangential wind speeds and the inner and outer pressure deficits match."

p. 578 - sentence below eq (15.43) - "…and represent the wind relative **to that in** the center…" (add bolded words)

p. 578 - first full sentence below eq (15.44) has a typo and doesn't make any sense

p. 579 - column 1 bullet 1 - replace "If threshold of damage" with "If very little damage" or "If damage barely noticeable"

p. 579 - 3 lines above eq (15.46) - replace "range" with "value" (EF=4 is not a range)

p. 579 - Table 15-3 row 3 description - replace "frame houses" with "wood/metal-framed houses" or remove "frame". Replace "trailer houses" with "mobile homes". In next 3 rows, suggest removing "frame" or replacing with "wood/metal-framed" as for row 3.

p. 579 - Table 15-3 row 5 description - replace “cars and trains thrown some distance or rolled considerable distances” with “cars and trains thrown or rolled considerable distances”

p. 580 - above eq (15.47) - replace “range” with “value” (T7 is not a range)

p. 579-580 - Tables 15-3 and 15-4 have different punctuation in description column (Table 15-3 is separated by semicolons, Table 15-4 by periods) - change one for consistency. Also heading for column 5 in Table 15-3 should be centred.

p. 580 - Table 15-4 row 3 description - remove apostrophe from “Semis”.

p. 580 - Table 15-4 row 4 description - “Garages and weak outbuildings…”

p. 581 - line 1 - replace “processes” with “phenomena” or something else (water droplets are not a process)

p. 581 - sentence 2 - reword as “…bottom or top part of the tornado visible; rarely is the whole tornado invisible.”

p. 581 - paragraph 3 - is “funnel cloud” the same as “tornado condensation funnel” in Fig 15.35? Clarify.

p. 581 - below eq (15.48) - also specify that T and Td in numerator must be in same units

p. 581 - last paragraph sentence 1 - how do we know that P is the same in the condensation funnel and at cloud base?

p. 583 - paragraph 3 and Fig 15.38 - can tornadoes re-strengthen and go from e.g., stage 4 back to stage 3? This would be important for storm chasers to know.

p. 583 - Scientific Perspectives box - number 2) remove second comma (actually could remove both)

p. 583 - ‘Outbreaks’ section paragraph 1 last line - replace “every year” with “several years in a row”

p. 583 - bullet 5 - You’re probably trying to keep this whole bullet contained in one line, but “torn.” abbreviation is weird-looking to me

p. 584 - second bullet - could you say “41 tornadoes near the US-Canada border”?

p. 584 - bullet 5 - define “tornado alley”

p. 584 - bullet 6 - So these are not individual tornado outbreaks, but annual totals? This was not clear from sentence before first bullet on previous page. If annual totals, then maybe don’t change bullet 2 on this page.

p. 584 - paragraph after bullets, last sentence - reword as “The **result** is parallel…” OR “The aftermath **includes** parallel…”

p. 584 - Scientific Perspective box - #13 replace “all the debris” with “flying debris”
#15 - briefly explain why
#16 labelled as 14
#16a - reword as “Storm movement as broadcast on radio or TV cannot be trusted.” (the way it is written doesn’t fit with previous “Some difficulties include”

#16b - sentence is missing period
#16 above a - suggest replacing “Some difficulties include:” with “Keep in mind the following:” OR “Keep in mind the following challenges:”
#16e - line 2 remove hyphen from “cut off”, and remove “of your vehicle” from the end of the sentence (repetitive)

p. 584 - last line and into next page - reword “supercell is of concern, then a mean storm vector associated with the “R” in Fig. 14.61 of the previous chapter should be used (i.e., do not use teh “X”.” Also note that in this sentence you could refer readers to the figure in the Sample Application on p. 585 so that they don’t have to open another chapter.

p. 585 - Fig. 15.40 caption line 2 - hyphenate “fixed-coordinate”

p. 586 - first sentence - reword “…axis, this rotation can be expressed as a relative vertical vorticity psi_r.”

p. 586 - paragraph under eq (15.51), last line - remove “Z_TornBL” from parentheses, i.e., “…(roughly 100 m).”

p. 586 - next paragraph sentence 2 - hyphenate “cyclonically-rotating”. Note that this paragraph answers a question that I posed in my comments on Chapter 14 regarding why the right-moving storm is favoured.

p. 586 - last paragraph sentence 2 - “…exists in ambient (outside-of-the-storm) **air** due to..” (add missing bolded word)

p. 586 - last paragraph sentence 3 - reword as “Once this air **is pulled into the inflow region of** the thunderstorm…”

p. 587 - line 1 - “Another **theory** considers shears…” (add missing bolded word)

p. 587 - paragraph 2 line 4 - remove hyphen from “mesoscale base”

p. 587 - paragraph 3 sentence 1 - reword as “Yet another theory suggests that the large-scale rotation about a vertical axis (i.e., synoptic-scale cyclone) can cascade…”

p. 587 - Fig 15.42 b - why is ground green? Stands out quite a bit and I don’t think you used this convention in previous figures.

p. 588 - under eq (15.53) replace “Alternately” with “Alternatively”

p. 588 - 2 lines below eq (15.54) - replace "up- and downdrafts” with “up- and down-drafts”

p. 588 - 4 lines below eq (15.54) - rearrange parentheses like “in eqs. (15.53) and (15.54)”?

p. 588 - end of paragraph below eq (15.54) - replace “spawning” with “prone to spawning”

p. 588 - end of sentence below eq (15.55) - reword end of sentence as “…and V’avg **is calculated similarly**.”

p. 588 - above eq. (15.56) replace “times the” with “multiplied by the”

p. 588 - line below eq (15.57) - replace period with comma, i.e., "...where N is the number of layers, j = 0 is the bottom…". Note that in this sentence, you say that j=0 and j=N are winds at the bottom and top of the inflow region - this is not true, j is just an index - reword. Also, remove "of air" from the end of this sentence.

p. 588 - Fig 15.44 - not clear why two images (a and b) are needed here. They don't seem to tell us anything different.

p. 589 - line 2 - remove "might"

p. 589 - last sentence of paragraph - replace "works slightly better" with "is a slightly better indicator"

p. 590 - Fig 15.46 caption - add "th" superscript to percentile values

p. 590 - paragraph 3 - combine sentences 1 and 3, i.e., "eSRH better discriminates between non-tornadic and tornadic supercells than SRH, and works even if the residual-layer air ingested…". Follow up with sentence 2 as-is.

p. 590 - last paragraph sentence 2 - but the areas on the two images in Fig 15.44 look the same (i.e., image b area is not 2x image a area). Maybe I am misunderstanding something here.

p. 591 - paragraph 2 line 2 - replace "sounding" with "thermodiagram"

p. 591 - Fig 15.48 caption - add "th" superscript to percentile values

p. 592 - line above eq (15.60) - replace "cylinder" with "a cylinder" or "cylindrical"

p. 592 - 3 lines below eq (15.60) - replace "the z_i" with just "z_i"

p. 592 - Fig 15.50b - add the 'breakdown bubble'

p. 593 - end of paragraph 3 - reword "…increases from 2 **up to** 6."

p. 593 - Fig 15.52 - scale seems unnecessary

p. 593 - last paragraph before Review - maybe also mention pattern of blow-down by straight-line winds from strong low-pressure systems, for example the storm that knocked down lots of trees in Stanley Park (though this is a bit of an aside because it is not a thunderstorm hazard/effect)

p. 593 - column 2 line 3 of 'Review' - reword "…particles collide **within the thunderstorm updraft**…" (add bolded words)

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16. Tropical Cyclones

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- p. 603 paragraph 2 line 2 - re-order the bodies of water (the way it is currently worded suggests that the Caribbean is an ocean), i.e., "…over the Pacific and Atlantic Oceans, the Caribbean Sea, and the Gulf of Mexico."

p. 603 line 4 - remove "Also, the" so that sentence reads "Low-altitude winds **also** rotate cyclonically (counterclockwise in the N. Hemisphere) around **these storms** and spiral in towards **their centers**." (note changes to bolded words)

p. 603 paragraph 3 sentence 1 - replace second instance of "tropical cyclones" with "they" i.e., "…in that they do not have fronts."

p. 603 paragraph 3 line 3 - begin sentence with "Also, tropical cyclones have…"

p. 604 paragraph 3 line 1 - replace "the" with "this" i.e., "In the middle of the eyewall…"

p. 605 Fig 16.4 caption remove space before hyphen in "satellite-derived"

p. 606 categories 4+5 have same concise statement - is this correct?

p. 606 categories 1 and 2 descriptions, remove commas after "screened-in" about half-way through each description

category 3 description last line - should "water" be replaced with "potable water"?

category 5 description sentence half-way down - "Most unreinforced masonry walls will fail which can lead to the collapse of the buildings." - remove "the" as indicated, or possibly replace with "such"

p. 607 table 16-3 caption line 2 - "…during 10-minute **period**s." (add bolded word)

p. 607 third bullet point - suggest replacing with "France (**Meteo-France**, for S. Hemisphere west of 90E)." to be consistent with first two bullets. If this change is made, also remove "and by" from end of bullet 2

p. 607 last sentence and into p. 608 - suggest rewording as "The tracks of tropical cyclones and storms that have weaked from tropical cyclone status to tropical storms continue to turn toward the northeast…"

p. 609 last sentence of col 1 - reword as "…cannot continue to grow and organize into tropical cyclones."

p. 609 Fig 16.10 caption line 2 replace "during" with "on"

p. 609 Fig 16.10 caption line 5 replace "is the thin solid line." with "is indicated by the thin solid line."

p. 610 paragraph 2 line 4 remove hyphen from "less concentrated"

p. 610 info box, paragraph under Fig 16.a, after each (number), add "it", i.e., "…does three things: (1) it lowers…; (2) it causes…; and (3) it causes…"

p. 610 two lines above 'ITCZ' section - replace "Monsoon trough" with "Monsoon trough**s**"

p. 611 Fig 16.13 caption - sentence 2 says "Isoabars of sea-level pressure are solid lines with arrows." But aren't these streamlines, not isobars?

p. 612 third full paragraph, end of sentence 1 - "…a mid-tropospheric trough is often over a lower-tropospheric convergence **region**."

p. 612 third full paragraph, sentence 2 - "This mid-troposphe**ric** trough has ~~the~~ cyclonic vorticity that encourages…"

p. 612 sentence before 'Monsoon Trough' section - remove "the", i.e., "Roughly 85% of intense Atlantic hurricanes…"

p. 612 Fig. 16.14 caption - remove period before "C = convergence" and put if after instead

p. 612 Fig 16.15 (b) and in caption - TUTT is not defined until next page - might be worth defining it here as well

p. 613 sentence 1 of 'Tropical Disturbance' section - dashes surrounding text "generally 200 to 600 km in diameter" are different lengths

p. 613 paragraph 2 sentence 1 of same section - "…as consisting **of** distinct thunderstorms…" (add missing bolded word)

p. 613 last line of column 1 - remove "a" and remove hyphen from "high pressure", i.e., "Thus, synoptic-scale high pressure starts…"

p. 613 column 2 line 1 of 'TD' section - remove hyphen from "high pressure"

p. 613 'TD' section paragraph 2 last sentence - does this storm numbering begin at 1 for each region like how they have their own hurricane name lists?

p. 613 'TD' section paragraph 3 sentence 4 - superscript in units m/s is broken across two lines

p. 614 sentence before 'TS' section remove hyphen from "high pressure"

p. 615 paragraph 1 - specify that there are different name lists for different regions (e.g., this is why Figure 16.19 has two storms with 'J' names)

p. 615 'Movement' section paragraph 2 sentence 2 - change to "Winds rotate clockwise (counterclockwise) around these highs in the Northern (Southern) hemisphere."

p. 616 last paragraph sentence 1 - mid-latitude cyclones are more powerful than hurricanes?? This needs some explanation. The Stanley Park wind storm was a strong one, but it was no hurricane.

p. 616 last paragraph sentence 2 - remove second instance of "tropical cyclone", i.e. "Strong mid-latitude cold fronts can inject cold air into the tropical cyclone, causing it to die."

p. 617 Info box last paragraph sentence 1 - "Since 1887, there **have been** two hurricanes…"

p. 618 last sentence above Fig 16.25 (continuing into next page) - reword, e.g., "One important process is the rapid upward movement of air by the thunderstorm updrafts in the eyewall, which deposits enough air molecules at the top of the storm to contribute to high pressure there."

p. 619 line 2 - suggest replacing period with colon

p. 619 line 3 - hyphenate “cyclonically-moving”

p. 619 last sentence of paragraph 1 - acceleration by definition includes changes in direction - clarify, e.g., “…must change direction and speed up, and thus…” or “…must change direction and increase its speed, and thus…”

p. 619 paragraph 2 sentence 2-3 - replace with “But the thunderstorm updrafts help create such an excessive high pressure at storm top that the pressure-gradient force exceeds the compensating Coriolis force (Fig 16.15), resulting in a net…”

p. 619 higher math box last paragraph line 3 - the underlining under “gradient winds” extends across the space after the word

p. 619 higher math box last line - replace “anticyclone” with “anticyclonic”

p. 620 ‘Fuel Creation’ section paragraph 1 last line - replace “it” with “in”

p. 620 ‘Exhaust’ section sentence 2 - remove both hyphens

p. 621 Fig 16.28 caption last sentence - suggest rewording as “The black area at the bottom of the figure masks the very low pressures at sea level that do not correspond to the pressure scale along the left side of the figure.”

p. 621 ‘Warm Core’ section paragraph 3 end of line 8 - subscript in “P_T eye” is split across two lines

p. 622 Info box paragraph 3 last sentence - “This high **pressure** aloft…” (add bolded word)

p. 623 left-hand box paragraph 1 - punctuation in list is inconsistent, replace comma before “and (3)” with semicolon

p. 623 same box, under first equation - you divide by P, not the gas law - suggest rewording as “Then divide this by P, substituting the ideal gas law to simplify to:”

p. 623 second from last line - suggest replacing “Sorry” with “Note that”

p. 625 5 lines below eq (16.8) replace “e.g.:” with “e.g.,”

p. 625 7 lines below eq (16.8) - not clear if “atmospheric” should be replaced with “atmosphere” or if you are missing a word somewhere in the sentence

p. 625 last paragraph sentence 1 - hyphenate "cyclone-force”

p. 625 Info box last sentence - what is the category of this ‘typical’ Atlantic hurricane? (From Table 16-1, looks like Cat 3)

p. 626 line above eq (16.10) - insert “where” before P_inf

p. 626 last paragraph of ‘Pressure Distribution’ section sentence 2 - remove last word “radius"

p. 626 last paragraph of ‘Pressure Distribution’ section last sentence remove colon, i.e. “…critical radius of 30 < Ro < 60 km, with…”

p. 626 ‘Tangential Velocity’ section paragraph 1 last sentence - superscript “-1” is in wrong place - should be after “m s”, not after “range”

p. 626 Fig 16.32 - either cut off upper scale at edge of figure or move figure border and extend lower scale

p. 627 first paragraph - in the model of eq (16.11), Ro is approximately 2x eye radius - is that still the case for this model? May be worth mentioning

p. 627 paragraph 3 sentence 1 - “…are relative to **those in** the eye.” (add bolded words)

p. 627 paragraph 3 sentence 3 - beginning of sentence not capitalized

p. 627 paragraph 3 sentence 4 - replace “the tropical cyclone” with “tropical cyclones”

p. 627 ‘Radial Velocity’ section sentence 1 - suggest rewording as “For an idealized tropical cyclone, boundary-layer air is trapped below the top of the boundary layer as **it** converges horizontally…”

p. 627 line below equation (16.14) - “…is the radial velocity component, which is negative…”

p. 628 first full paragraph sentence 1 - suggest rewording as “As wind velocities increase **as they move** toward the eye wall…”

p. 628 Fig 16.36 caption line 2 - replace “motion inward” with “inward motion”

p. 629 paragraph 3 sentence 2 - “…dashed **green** line between X’s in…”

p. 629 ‘Temperature’ section line 1 - “Suppose that **the** pressure difference…”

p. 629 Fig 16.38 - hyphenate “15 km-thick”

p. 630 sentence 2 - “This is because the sun has been **at its** highest in the sky…”

p. 630 sentence 3 - “…of Atlantic Hurricanes, **by month**.”

p. 630 Fig 16.40 caption - “…and Major Hurricanes, by month.”

p. 630 Table 16-6 description - replace “major portion” with “most active period”, i.e., “Start and end dates are for the **most active period** of the storm season, but some storms occur outside o**f this peak season**.”

p. 630 Table 16-6 - row 5 put a period in “S. Indian” to be consistent with “N. Indian” above

p. 630 Table 16-6 - only the first two rows have specific start/end dates - is this because they have “official” seasons? If so, specify in table caption and/or in text above.

p. 630 Table 16-6 - in third column, replace “/“ with “ - “ for consistency between rows with different numbers of peaks

p. 631 end of paragraph 1 - “and better surfing further away).”

p. 631 paragraph 2 last sentence - “There **may** have been…”

p. 631 paragraph 3 sentence 2 - why is the ITCZ weak/nonexistent here?

p. 631 paragraph 6 last sentence - remove “the”, i.e., “Since the late 1990s and 2000s, hurricane power has increased again.”

p. 631 first sentence of paragraph 6 - “The El Nino/La Nina cycle also causes long time-scale variations in hurricane activity.”

p. 631 column 2 paragraph 1 sentence 2 reword as “With population growth, population density increases in coastal areas that are seen as desirable in spite of the threat of tropical cyclones.”

p. 631 column 2 paragraph 1 last sentence - replace “human impact” with “impact on humans”

p. 631 column 2 paragraph 3 - this discussion sounds like an opinion, rather than fact or concensus - you may consider re-wording

p. 631 column 2 paragraph 5 sentence 2 - remove “poor” i.e., "…sometimes the warning does not reach rural people…”

p. 631 column 2 paragraph 5 last sentence - these are large decreases - why? Is the warning system improving? Has there been more development (i.e., less rural)?

p. 631 column 2 last paragraph line 1 - remove hyphen from “tropical storm hazards” and re-word sentence as “These aspects of tropical storm hazards are therefore social (cultural, political, religious, etc.).

p. 631 column 2 last paragraph sentence 2 - replace “Do not assume” with “It cannot be assumed”

p. 631 Fig 16.41 - lines are surge and shading is what?

p. 632 paragraph 2 line 3 - “per **unit** area”

p. 633 end of first full paragraph - “…where it begins to pile up, **creating** a storm surge…”

p. 633 paragraph 2 sentence 1 - suggest replacing “sloshing” with “drainage”

p. 634 two sentences below the bullets - do you mean that the surge can work its way up rivers 10-15 km inland from the coast? Clarify.

p. 634 Fig 16.45 caption line 1 - replace “surface wind-generated waves” with “wind-generated surface waves”

p. 634 Fig 16.46 caption - what are the data points on the graph?

p. 635 paragraph 2 line 3 - “gives **a** historical description…”

p. 635 Table 16-8 caption - what do the terms “clean full” and “chase, full and by” mean?

p. 636 For B=4,5, what are “white horses”?

p. 637 paragraph 3 sentence 3 - “…Americus, Georgia, **where** 33 people died in 1994.”

p. 637 paragraph 4 line 2 - “…deaths h**ave been** caused by…”

p. 637 paragraph 4 sentence 2 - “many find it hard to believe that t**hese/they** can become impassable.”

p. 637 ‘Thunderstorms’ section paragraph 1 last sentence - is there less lightning because the precipitation is warm? i.e, the graupel charge-swapping process does not occur as often?

p. 637 ‘Prediction’ section paragraph 1 sentence 3 - remove hyphen from “tropical cyclone position”

p. 637 ‘Prediction’ section last paragraph sentence 1 - replace “and has lots of error.” with “and is prone to error.”

p. 638 column 1 first full sentence - “But different models yield different forecasts due to the way they handle…” (i.e., add some indication of why they differ)

p. 638 sentence 2 - Don’t start sentence with “So” - suggest “Human forecasters **therefore** consider all **available** NWP model forecasts…”

p. 638 Fig 16.49 caption - make a note here that uncertainty is greater inland because of the greater forecast horizon associated with this travel distance

p. 638 paragraph 2 sentence 2 - “Advances have been made based on **measurements of** sea-surface temperatures…”

p. 638 ‘Safety’ bullet 2 - “…safest areas may not be **in** your home…”

p. 638 last paragraph sentence 3 - “**It is best to** get an early start…”

p. 638 last paragraph sentence 4 - remove hyphen from “board up”

p. 639 ‘Review’ paragraph 2 sentence 2 - “…which ultimately drives **a** circulation similar to…”

p. 639 ‘Review’ paragraph 4 last sentence “temperatures, and pressures” need to be pluralized

p. 639 last line - “…reduced atmospheric pressure head **within the eye**.”

p. 639 Graffito box paragraph 4 line 1 - suggest inserting comma after “vibrating"

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17. Regional Winds

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p. 645 - paragraph 1 - font size is smaller than other text

p. 645 - 2 lines above eq (17.1) “The probability distribution of mean wind speeds M **at any location** is described by…” (suggest adding bolded text)

p. 646 - 3rd full paragraph - reword to passive voice and remove hyphen from “electrical power", i.e. “Wind speed distributions are used to estimate electrical power generation, and when designing buildings and bridges to withstand extreme winds.”

p. 647 - ‘Wind Turbine’ section paragraph 1- how is KE related to power?

p. 647 - on third line of same paragraph, replace “equals” with “is” or “is simply", i.e., “The rate at which this energy is blown through a wind turbine **is simply** the wind speed.”

p. 647 - ‘Wind Turbine’ section paragraph 2 line 1 - replace “larger radii turbines” with “larger-radius turbines” or “turbines of larger radii”

p. 647 - Fig 17.4 caption would it be more correct to say “Grey region shows the air that transfers/**has transferred** some of its energy to the wind turbine.”? i.e., is the grey area downstream still transferring KE to the turbine, or has it already done so, and now it is just air that has been modified by the turbine? Clarify.

p. 648 - 2 sentences above ‘Thermally-Driven Circulations’ section - how is cut-out achieved? Are there brakes or a locking mechanism that is applied?

p. 649 - 2 lines below eq (17.3) - “C_w ~ 5 is **the** vertical drag coefficient…T_ve is **the** average absolute virtual temperature…g = 9.8 m/s2 is **the magnitude of** gravitational acceleration…” (add bolded text)

p. 649 - 4 lines below eq (17.4) “synoptic- and meso-scales” (add hyphens)

p. 650 - end of paragraph below eq (17.5) - In this chapter, you start using the term ‘absolute temperature’ to describe temperature measured in Kelvin - I actually had to check that this is what this meant (i.e., a glossary would have helped), because I was not familiar with this name. Suggest re-wording sentence as “Use absolute temperature (i.e., temperature measured in degrees Kelvin) in the denominator of the equation above.”, OR stop using the term ‘absolute temperature’ in this chapter (it is inconsistent with earlier chapters anyway)

p. 651 - 2 lines above eq (2) - clarify that exp can be represented by the infinite series 1-y+y^2/2+… i.e. “But exp(-y) can be represented by the infinite series exp(-y) ~ 1-y+…. Also indicate where the series is truncated.

p. 652 , right column, first paragraph. Replace the phrase "use the approximation above" with "use eq. (17.6), which gives:".

p. 652 - under eq (17.7) - “delta-theta_v is **the** virtual potential temperature difference between…” (add bolded word)

p. 652 - 3 lines from bottom - replace “and” with “of”, i.e. “…and durations **of** many days.”

p. 653 - line 2 replace “the V-wind” with something more description such as “the across-slope flow, V”

p. 653 - 2 lines below eq (17.9) remove second instance of “against”, i.e.”…against both the ground and the slower air aloft,…”

p. 653 - ‘Night’ sub-section paragraph 1 sentence 4 - Under what conditions would the katabatic winds end in a turbulent eddy higher above the valley floor?

p. 653 - Fig 17.10 caption end of first sentence - hyphenate “down-valley” or write as “down the valley”

p. 655 - second full paragraph - I am having a hard time picturing this "feeder" of onshore cool flow that is half as thick as the SBH - can it be added to Fig 17.12? The cool air portion in Fig 17.12 is not half as thick as the SBH, so I am confused.

p. 655 - last paragraph sentence 1 - suggesting changing first instance of "progresses" i.e., "…but **advances** further over land and water as the day progresses."

p. 656 - above eq (17.13) - is "≠ 30 deg" a typo? Why would the relationship not work at 30 deg? Can a sea breeze not exist at this latitude?

p. 657 - Fig 17.15 caption - need period before "(a) and (b) are two ways…"

p. 657 - Fig 17.15 caption - next sentence is a bit ambiguous (sounds like you are saying c and d are different from each other). Consider rewording as "In contrast, (c) and (d) both show a linear change of T with height…"

p. 658 - end of paragraph 1 - you define "Absolute", but it it isn't used anywhere around here. Remove this sentence.

p. 658 - paragraph 2 sentence 1 - wouldn't cold air lead to increased gravity rather than reduced, because it is more dense? This may need further explanation.

p. 658 5 lines below eq (17.16) remove hyphen from "statically stable"

p. 658 - paragraph 3 - a figure illustrating group speed and contrasting it with wave speed would be very helpful

p. 660 - 'Hydraulic Jump' section paragraph 1 sentence 3 - replace "an" with "a", i.e. "…a hydraulic jump…"

p. 661 - end of paragraph 1 (second to last sentence) same change ("A hydraulic jump…")

p. 661 - paragraph 1 - in description of hydraulic jump, add a brief mention of hydraulic jumps in streams, which people will have seen, and will be able to picture

p. 661 - Fig 17.20 is referenced in the text before Fig 17.19 - swap their order. Note that the Fig 17.21 caption refers to "previous figure", so this will need to be edited as well.

p. 661 - 'Short Gaps' section sentence 1 - reword as "For short gaps, open-channel hydraulics can be used, while neglecting Coriolis force."

p. 662 - end of first sentence - suggest adding bolded text "…regions due to irregularities in the valley shape, or by obstacles, **just like the hydraulic jumps you can see in irregular stream channels**."

p. 664 - line 1 is very cramped and looks like one long word - need to impose some spacing

p. 665 - third full paragraph, sentence 2 - "The jet core height is centered **vertically** about 1/3 of the distance…" (suggest adding bolded word to be a bit more clear)

p. 655 - third full paragraph, sentence 3 - you say the altitude is 50-300 m along the west coast of N. America, but up to 1 km west of the Sierra Nevada in California. Is this because the sierra nevada are higher than coastal mountain ranges? Is the jet along the Sierra Nevada over land rather than water? Is the 50-300 m altitude valid along the entire coast?

p. 667 - second to last paragraph, last sentence - “The cavity and rotor circulations are driven by the wind **shear** like a bike chain turning a gear.” (suggest adding bolded word)

p. 668 - first sentence under eq (17.33) - clarify that this is due to convergence and divergence of the streamlines as illustrated in Fig 17.31

p. 668 - third sentence under eq (17.33) - this is first use of term “skin drag” - define term or just say “surface friction” or “surface drag”

p. 668 - last sentence before ‘Streamlines’ section - “…not just the bottom of this layer that touches the mountain.” (remove “of this”)

p. 670 - first full paragraph, sentence 4 - “potential energy per **unit** mass.” (add bolded word)

p. 670 - end of paragraph 2 - it still seems like this should be increased gravity…

p. 670 - higher math box Fig 17.d caption - “Forces **acting on** an air parcel following a streamline.” (add bolded words)

p. 670 - higher math box paragraph 1 - replace colon after “streamline s” with a period

p. 671 - bullet 1- “anywhere **that** the flow is turbulent” (suggest adding bolded word, though it is technically grammatically correct as-is)

p. 671 - bullet 2 - change “which” to “that”, i.e., “behind obstacles that create turbulent wakes or **that** cause sudden changes in the flow”

p. 672 - above eq (17.44) what factors influence SW? i.e., it is proportional to…?

p. 672 - last paragraph, sentence 1 - suggest rewording as “As air nears the stagnation point, wind speed decreases, and pressure increases as air molecules pile up. This leads to an increase in temperature as described by the ideal gas law.” (or something like that)

p. 673 - first full paragraph below eq (17.47), sentence 1 - suggest rewording as “This effect is called dynamic warming or dynamic heating - an effect that should be considered when deploying thermometers in the wind, because winds will stagnate when they hit the thermometer.”

p. 673 - last sentence - “Fig 17.35 shows stagnation-pressure increase **with increasing flow speed.**” (suggest adding bolded text)

p. 674 - paragraph 2 sentence 1 - replace “3” with “three”

p. 674 - info box line 3 - remind readers how Cp and Cv differ

p. 675 - end paragraph 2 - how is “foehn” pronounced?

p. 676 - ‘Foehn and Chinook’ section paragraph 2 sentence 3 - “austru (Romania), **and** aspre (France).” (add bolded word)

p. 676 - ‘Foehn and Chinook’ section paragraph 2 sentence 4 - replace “with” with “by”, i.e., “…can be accompanied **by** a very rapid temperature increase…”

p. 676 - ‘Foehn and Chinook’ section paragraph 2 sentence 5 - replace “sublimes” with “sublimates”, i.e., “…rapidly melts and **sublimates** the snow…”

p. 677 - paragraph 2 of ‘Canopy’ section - this is just one long sentence. Suggest breaking it up.

p. 677 - 6 lines from bottom of page - suggest putting “(4)” after “Finally”, i.e., “Finally (4), pick any point…” Also, in this section, refer readers to the sample application on the next page for an example.

p. 677 - 3 lines from bottom of page - remove period after “calcualte u*”

p. 678 - second sentence below eq (17.54), punctuation in list of attenuation coefficient values is inconsistent (some commas, some semicolons)

p. 679 - below eq (17.55) - careful, H/W is only dimensionless if the units are the same. Maybe specify this somewhere.

p. 679 - ‘Review’ section sentence 1 - “The probability of any wind speed **at a particular location** can be described…” (suggest adding bolded text)

p. 679 - ‘Review’ section sentence 2 - perhaps mention that winds can be too strong for wind power (cut-out)

p. 679 - ‘Review’ section paragraph 4 sentence 1 - remove the dash and hyphenate “ synoptic-scale, i.e., “The Bora is a cold downslope wind driven dynamically by the synoptic-scale flow."

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18. Atmospheric Boundary Layer

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p. 687 - sentence 2 - suggest rewording as “The daily cycle of radiative heating causes a daily cycle of sensible and latent heat fluxes between the land surface and the air during clear skies.”

p. 687 - sentence 3 - suggest rewording - it seems a bit obvious/redundant to point out that the bottom of the troposphere is in contact with the ground

p. 687 - ‘Stability’ section paragraph 1 sentence 1 - “Static stability controls the formation of the ABL…” (add missing bolded word)

p. 688 - second full paragraph sentence 2 - reword for clarify - “When moved from its initial capture altitude, the parcel temperature could differ from that of the surrounding environment, thereby causing buoyant forces.”

p. 688 - 3rd full paragraph sentence 2 - would it be more correct to say that “air flow is laminar”? i.e. “…air flow in a statically stable environment is laminar.”

p. 688 - 3rd paragraph from bottom, line 2 - “…and is then is forcibly lifted…” (remove second “is”)

p. 688 - second paragraph from bottom, sentence 2 - change first word, add comma, and fix problem with verb conjugation - “Conversely, if displaced downward from its initial height, the parcel would be warmer…and would feel…”

p. 690 - 4th full paragraph - you say that “there is always a strong stable layer or temperature inversion capping the ABL”, but on p. 691, second full paragraph says “…synoptic forcings…so powerful that they easily lift the capping inversion or eliminate it altogether.” Is this contradictory? Maybe re-word or add to the end of p. 691 paragraph 2 sentence 2 “…or eliminate it altogether such that the ABL spans the entire troposphere and is capped by the temperature inversion at the tropopause.”

p. 691 - line 1 - hyphenate “large-diameter”

p. 691- second full paragraph - replace first word with “Conversely” or “In contrast”

p. 691 - second full paragraph last sentence - replace “and as it is” with “or”, i.e., “…as it is diluted with cleaner air aloft or washed out by rain.”

p. 691 - 3rd full paragraph sentence 3 - replace “and was discussed in” with “as discussed in”

p. 691 - 3rd full paragraph sentence 4 - text suggests that lows move highs together - maybe reword as “When the ABLs or airmasses that were previously formed under different high-pressure centers are drawn toward each other…”

p. 691 - would it be possible to not have Fig 18.7 split across two pages?

p. 692 - ‘ABL Structure’ section line 3 - remove hyphen from “statically unstable”

p. 692 - ‘ABL Structure’ paragraph 1 last sentence - “..pollutants and moisture from the previous day’s mixed layer…” (add bolded word)

p. 692 - ‘ABL Structure’ paragraph 4 - use “(a)” and "(b)” to refer to Figs 18.9, rather than just “Day” and “Night”

p. 692 - ‘ABL Structure’ paragraph 4 sentence 1 - is “humidity mixing ratio” redundant? Suggest rewording as “humidity (mixing ratio)” or “mixing ratio (humidity)”

p. 692 - last sentence - “Next, we will look at…” (add bolded text)

p. 693 - paragraph 1 sentence 2 - replace “during day” with “during the day” or “during daytime”

p. 693 - paragraph 1 sentence 3 - replace “during night” with “at night” or “overnight”

p. 693 - paragraph 2 sentence 1 - rearrange as “The cumulative effect of surface heating and cooling on ABL evolution is more important than the instantaneous heat flux.”

p. 693 - ‘Nighttime’ sub-section paragraph 1 sentence 1 - why is heat flux from air to ground approximately constant?

p. 694 - paragraph under eq (18.2b), last sentence - “…(bottom 5 - 10% of the ABL).” (add bolded word)

p. 694 - second paragraph under eq (18.2b) sentence 1 - remove first comma "…create strong turbulence and cause pollutants, potential temperature…"

p. 694 - Fig 18.11 and Fig 18.12 captions - replace "left" and "right" with "(a)" and "(b)"

p. 694 - Fig 18.11 and Fir 18.12 captions sentence 2 - reword as "The dashed line indicates the adiabatic lapse rate."

p. 695 - paragraph 2 sentence 1 - are days not longer than nights over water or during cloudy weather? Suggest rewording as "During summer at mid- and high-latitudes, days are longer than nights, leading to net heating during fair weather over land."

p. 695 - paragraph 2 sentence 2 - suggest rewording as "The temperature sounding taken at the end of a 24-hour period of such conditions is warmer than a sounding taken at the start of that period."

p. 695 - Fig 18.13 caption - remove hyphen from "fair weather"

p. 695 - Fig 18.13 caption - replace "18 local time" with "18:00 local time" or "18 h local time"

p. 695 - Fig 18.13 caption - replace "ending sounding" with "final sounding"

p. 695 - first paragraph in right-side column sentence 1 - wouldn't this be true over water too?

p. 695 - first paragraph in right-side column, sentence 2 - sounds like temperature is decreasing consistently during the 24-hr period - maybe replace "over 24 hours" with "after 24 hours"

p. 695 - Fig 18.14 caption - last sentence is inconsistent - suggest rewording as "…white = unstable, light grey = neutral (as in the RL), and darker greys = stronger static stabilities."

p. 696 - remove hyphen from 'Stable ABL Temperature' heading

p. 696 - paragraph 2 of 'Stable ABL' section, line 1 - incorrect usage of word "contiguously" - suggest either "For a simplified case of a turbulent, stable ABL…" or "For a simplified case of a uniformly turbulent, stable ABL…"

p. 696 - second to last sentence - replace "as the square root of time" with "with the square root of time"

p. 696 - last sentence - replace "growth" with "growth rate" i.e., "Thus, the fast growth rate of the SBL early in the evening decreases to a much slower growth rate by the end of the night." (and add/replace bolded words) - alternately, "Thus, the rapid growth of the SBL…much slower growth rate…"

p. 697 - paragraph 3 last sentence - rearrange, i.e. "..so that the area under the curve (hatched in Fig. 18.16a) equals the cumulative heating."

p. 698 - 2 lines below eq (18.7) could the notation "theta(just above z_i)", "theta(just below z_i)" be changed? e.g. "theta_z<zi", "theta_z>zi" (using subscripts)

p. 698 - second full sentence under eq (18.7) - "…as a function of the jumps in humidity…or wind speed that occur at the top of the ML, respectively." (change/add bolded text)

p. 698 - second to last paragraph, last sentence - replace “thermodynamic methods” with “thermodynamic method” or say “The flux-ratio and thermodynamic methods usually…”

p. 699 paragraph 2 last sentence - reword as “The actual wind speed over a large central region of the ABL is nearly equal to this theoretical M_BL wind speed.”

p. 699 - last full paragraph, last sentence - suggest rewording as “Then, after sunrise, turbulence begins mixing the jet with slower wind speeds closer to the ground, and the jet disappears.”

p. 699 - Fig 18.19 caption - not clear that the contour labels are heights unless you happen to look at the “z=500 m” line first - clarify in caption

p. 700 - first full paragraph sentence 1 - “found empirically” = “measured”? Perhaps simplify this sentence.

p. 700 - ‘Drag’ section paragraph 2 sentence 3 - suggest rewording as “The amount of friction force per unit surface contact area is called stress, tau, and acts parallel to the surface.”

p. 700 - ‘Drag’ section paragraph 2 sentence 4 - replace “area” with “surface” (more correct, as pressure acts isotropically on a volume’s bounding surface)

p. 700 - ‘Drag’ section paragraph 2 last sentence - add “(see Appendix A).” to end of sentence

p. 700 - last sentence - clarify, i.e., “…without moving the top book relative to the table, you must”, or “while keeping the top book stationary relative to the unmoving table, you must…”

p. 700 - Table 18-1 row 7 change “large size obstacles” with “large-sized obstacles”

p. 701 - sentence 4 - asphalt doesn’t get “pushed along by the wind” - suggest rewording, e.g., “In turn, the surface feels a stress due to air drag.”

p. 701 - paragraph 2 sentence 1 - suggest figure or example to compare and contrast/define turbulent motion and molecular viscosity

p. 701 - eq (18.10) - when I read this, I had already forgotten what tau is - suggest defining above, e.g., “Because air is a fluid, it is often easier to study the stress (tau) per unit density (rho) of air.”

p. 701 - paragraph above eq (18.11) combine sentences 1 and 2 - “For fluid flow, turbulent stress is proportional to wind speed squared, and also increases with surface roughness.”

p. 702 - first full sentence - “The drag coefficient decreases as the air becomes more statically stable and turbulent drag decreases.” (suggest adding bolded text)

p. 702 - second full sentence - suggest clarifying i.e., “For unstable air, turbulence dominates, and roughness is less important, so alternative approaches…” (add/change bolded words)

p. 702 - Fig 18.21 caption - remove hyphen from “statically neutral”

p. 702 - ‘Log Profile’ section paragraph 1 sentence 2 - remove hyphen from “statically neutral”

p. 702 - ‘Log-Linear Profile’ section - after first sentence, add another sentence, i.e., “This is because turbulence is unable to cause mixing that would lead to more uniform wind speeds such as seen in the neutral SL and unstable RxL in Fig. 18.20.”

p. 704 - last full paragraph last sentence - reword, i.e., “However, differences in feedback lead to difference between the radix layer and surface layer.”

p. 705 - first full sentence - “However, such feedback is broken for convective turbulence (Fig 18.22b), because it is generated…” (remove second instance of “turbulence” with “it” as indicated)

p. 705 - Fig 18.23 caption - “…wind speed U is shown by the zigzag line.” (add missing bolded word)

p. 705 - under ‘Mean and Turbulent Parts’ heading, suggest using bullets for ‘mean wind’, ‘waves’, and ‘turbulence’ and/or add semicolons to end of first two

p. 705 - move the sentence below equations (18.20a-e) to end of paragraph above these equations, i.e., right after “This mean wind can be subtracted…(Fig 18.23).”

p. 706 - ‘Variance’ section, first sentence - too specific - suggest rewriting as “The variance sigma^2 of wind speed (vertical is used in this example) is an overall statistic of gustiness:”

p. 707 - eq (18.24) - why is it stronger in the V direction than the U direction?

p. 707 - equation (18.27) has equalities, but above, you say turbulence is isotropic if variances are nearly equal - either remove “nearly”, or replace “=“ with “≈”

p. 708 - first sentence - replace “or constant entropy” with “or of constant entropy” or “or conserving entropy”

p. 708 - I have always seen “Turbulent” KE, not “Turbulence” KE - and review section (p. 717 paragraph 5), you switch to “turbulent” - check for consistency

p. 708 - first sentence after eq (18.28) - does this mean that TKE is greater if the BL depth is greater? Clarify.

p. 708 - second sentence after (18.28) - replace “made” with “carried out” or “done”, i.e., “The production is done mechanically by wind shear and…”

p. 708 - Graffito box - does the original text you are quoting use the word “whirls” or “whorls”? I have seen both used in text referencing this rhyme.

p. 709 - right above equation (18.34a), put small space between R_f and the following colon (the f and colon overlap a bit)

p. 709 - Higher math box, last sentence - the way it is worded sounds like k and z depend on the value of C_D - suggest rewording as “For C_D ≈ 1, k = 0.4 (von Karman’s constant), and z = 10 m, the result is…”

p. 710 - Fig 18.24 caption sentence 2 - “Shapes and rates of plume dispersion are indicated by dark spots or waves.” (change bolded text)

p. 710 - Fig 18.24 caption sentence 4 - “Isopleths of TKE intensity are given by the dark diagonal lines.” (change bolded text)

p. 710 - Fig 18.24 - in figure, move left-side “Rf=inf” up a bit so it is in line with “Rf=-inf” on right side. Also check the vertical spacing in the lines of “S Shear Generation Rate” - spacing looks larger than in other text on figure

p. 710 - ‘Free and Forced’ section sentence 2 - put variables in parentheses, i.e. “the shear (S) and buoyancy (B) terms.”

p. 710 - ‘Free and Forced’ section paragraph 5 sentence 1 - replace “For B negative” with “For B < 0” or “When B is negative”

p. 710 - last sentence - “…is used in the Air Pollution chapter to help…” (add missing bolded word)

p. 711 - first full paragraph below eq (18.36), sentence 2 - “It is positive where both variables increase and/or decrease together.” (replace and with and/or as indicated to cover cases where not monotonically increasing/decreasing)

p. 711 - second full paragraph below eq (18.36) sentence 1 - remove “a and b” from end of sentence (repetitive)

p. 711 - move the first sentence below eq (18.37) to above, just after sentence 1 of that paragraph, i.e. “The correlation coefficient, r_a,b is defined as the covariance between a and b normalized by the standard deviations of the two variables. By normalized, we mean that…”

p. 711 - last 2 paragraphs and in Fig 18.25 - replace all “= +” with “> 0” and “= -“ with “< 0”

p. 712 - first word - change to “Conversely” or “In contrast”

p. 712 - paragraph 1 sentence 2 - replace “warmness” with “warmth” (warmness is a word, but it seems odd to use in a scientific text)

p. 712 - end of paragraph 1 - replace “= -“ with “< 0”

p. 712 - end of paragraph 2 - replace “that is” with “of”, i.e., “…horizontal area of 1 m^2.”

p. 712 - paragraph under eq (18.38b) - combine sentences 4+5, i.e., “Therefore, momentum flux…would have units of … (see Appendix A).”

p. 714 - higher math box - under second to last equation - “…are averages of averages, and can be rewritten as just the original averages.” (need pluralization of first “averages” and replace “rewritten by” with “rewritten as” as indicated by bolded text)

p. 714 - higher math box - last paragraph sentence 2 - replace “has already been” with “was”, i.e., “the turbulence flux divergence term was already parameterized…”

p. 714 - ‘Turbulence Closure’ section paragraph 1 last sentence add hyphens and change “size” to “sized”, i.e., “Medium- and large-sized turbulent eddies…”

p. 714 - ‘K-Theory’ section line 4 - change “analogous to” to “analogously to” or “in a way analogous to”

p. 714 - last sentence in this page ends abruptly - I expected it to continue on next page - consider rewriting as “For example, heat flux F_H can be modelled as:”

p. 715 - paragraph above eq (18.43) sentence 1 - “When K-theory is used…” (add missing bolded word)

p. 715 - paragraph below eq (18.43), last sentence - replace “r or U,V” with “r, U, or V”

p. 715 - Fig 18.26 - what are the thin black lines and arrows in Fig 18.26a? Clarify in caption or in text

p. 715 - scientific perspective box paragraph 2 - “…one or more ‘fudge factors’ are often included in the substitute term to give it the correct behavior or order-of-magnitude.” (put quotation marks around first use of “fudge factor” and replace “to make it have” with “to give it” as indicated by bolded text)

p. 715 - scientific perspective box - at end of list item (6), add “, and”

p. 715 - scientific perspective box, second to last paragraph sentence 2 - add appropriate equation number(s) for w_T equation

p. 716 - sentence 1 - rewrite as “K-theory is not suitable for convective ABLs…” or “K-theory has difficulty with convective ABLs…”

p. 716 - paragraph 1 sentence 2 - replace “backed out” with “calculated” or “computed”

p. 716 - Fig 18.27 caption - “…(a) the observed potential temperature (theta) profile over a forest…” (add missing bolded word and put theta in parentheses)

p. 716 - ‘Nonlocal Closure’ section sentence 1- replace “all ranges of” with “the full range of” and replace “during turbulence” with “under turbulent conditions”, i.e., “…you can look at the full range of distances across which air parcels move under turbulent conditions (Fig 18.28).”

p. 716 - ‘Nonlocal Closure’ section paragraph 2 last sentence - rewrite as “This could partially or completely counteract the negative contribution…”

p. 716 - last paragraph before ‘Review’, sentence 1 - “As you can probably anticipate, a better approach would be to consider eddies of all sizes in addition to nonlocal air-parcel movement.” (replace original text with bolded)

p. 716 - Fig 18.28 caption - very long sentence - suggest trying to break it up, also put theta in parentheses

p. 716 - Review sentence 1 - replace comma with dash, or add bolded text as in “We live in a part of the atmosphere known as the boundary layer (ABL), which occupies the bottom 200 m to 4 km…”

p. 716 - Review section - suggest swapping paragraphs 2 and 3 - if you do, first sentence on p 717 should begin with “In the ABL during daytime…” to specify that you are talking about ABL again

p. 717 - paragraph 1 sentence 1 - “under fair weather conditions (i.e., in anticyclonic or high-pressure regions), vigorous turbulence mixes potential temperature, humidity, wind speed, and pollutants such that they are nearly uniform...” (add/replace bolded text)

p. 717 - paragraph 1 sentence 2 - hyphenate “free-atmosphere”

p. 717 - “Heat fluxes, moisture fluxes, and momentum fluxes (stress) can be expressed…” (suggest making changes as per bolded text)

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19. Pollutant Dispersion

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p. 723 - paragraph 1 sentence 3 - would it be more correct to say that “The reaction by-products are waste or pollution.”? i.e., “growth or motion” is the product.

p723, left column, Third item under Contents. The "T" is missing from the section title "Turbulence Statistics".

p. 723 - suggest removing paragraph 2

p. 723 - info box last paragraph sentence 1 - missing units “M_s = 46.01 g/mol”

p. 724 - bullet 1 in paragraph 3 add comma to end

p. 725 - second to last paragraph, last sentence - change “emission” to “emissions”, i.e., “…from known emissions and weather conditions.”

p725, right column, Table 19-1. PM10 is not typically referred to as 'Fine Particulates'. The fine fraction begins at < 2.5 um. So re-label in the table as:
PM10: coarse + fine particulates and
PM2.5: fine particulates p. 726 - paragraph 1 sentence 4 - change “acts” to “act”, i.e., “…turbulent gusts act to spread…”

p. 727 - Fig 19.3 - same corrections/suggestions for figure and caption as I made in previous chapter

p. 727 - Eq (19.7) - in previous chapter, you defined isotropic using the words “nearly equal”, but then used equality in the equation, and I recommended either removing “nearly”, or replacing the “=“ with the wavy equals sign to indicate approximate equality. If you replaced the symbols in that equation, I would recommend doing the same here for consistency.

p727, left column, second paragraph, first sentence. Clarification: The x-axis points in the downwind direction away from the source. Namely, the x-axis points in the same direction that the wind vector points. Example: For a southwest wind (i.e., a wind FROM 225 degrees), the x-axis will point toward the northeast (i.e., it will point towards 45 degrees).

p728, right column, last sentence. Change from "Table 18-1" to "Table 19-1" .

p. 729 - under Eq (19.8) - remove “and” after first comma, i.e., “…total number of heights, k is the height index, and the overbar…”

p. 730 - Eq (19.11) - "delta-z is the height interval" - but could we use the Gaussian for horizontal concentrations as well? If so, consider rewording to be less specific to the vertical. This also applies to equation (19.10) and text immediately after. The reference to “depth” above equation (19.12) is okay, because it is provided as an example.

p. 731 - higher math box paragraph 2 line 1 - remove comma between “conservative” and “passive"

p. 731 - higher math box paragraph 2 - “…if greater tracer flux F_c enters the volume than leaves.” (replace “a” with “the” as indicated)

p. 731 - higher math box under eq (a) - "…then the turbulent flux of tracer…” (add missing bolded word)

p. 731 - higher math box above eq (c) - “…and assume constant K, to obtain the 1-D diffusion equation:” (suggest rewording like this - the way it is written suggests that “constant K” gives the 1-D diffusion equation)

p. 731 - in ‘Passive Conservative’ section, paragraph 2 sentence 2 - the text “but otherwise they might not be lost” is confusing - do you mean that if they don’t absorb sunlight they are lost? Could you reword this as “Dark soot particles can absorb sunlight to heat the air. Thus, they are active because they alter turbulence by adding buoyancy. This buoyancy can prevent the soot particles from settling and being lost from the air. Under these conditions, soot can be considered a conservative tracer.”

p. 731 - in ‘Passive Conservative’ section, paragraph 2 sentence 2 - note above that I changed “adsorb” to “absorb” (check definitions)

p. 732 - above eq (19.14) - change “small times” to “small delta-t”

p. 733 - end of paragraph 1 - remove comma from “windy overcast days or nights.”

p734, right column, line before eq. (19.20): Change "3-D" to "2-D", because the Gaussian curve applies to a 2-D cross section through the smoke plume at some downwind distance x.

p. 734 - paragraph 1 sentence 2 - “modeled” should be followed by an adverb, not an adjective - replace “analogous” with “analogously” or reword as “modelled in a way analogous to molecular diffusion.”

p. 734 - 3 lines below eq (19.20) - “in the crosswind and vertical directions,…” (add bolded word)

p. 734 - 5-7 lines below eq (19.20) - you use “above ground” and “above the ground” - pick one, for consistency

p. 734 - second to last paragraph, sentence 2 - “Next, plume spread (sigma_y and sigma_z) is found from…” (add parentheses around sigmas)

p. 734 - second to last paragraph, sentence 3 - “…are found from equations in the previous sub-section” (add bolded text)

p. 735 - Fig 19.6 caption - hyphenate “Crosswind-integrated”

p. 735 - paragraph 1 last sentence - replace “causes” with “cause”

p. 735 - paragraph 3 sentence 2 - is there an equation reference for the Deardorff velocity w*? (looks like eq 19.22 on next page)

p. 735 - paragraph 3 sentence 3 - remove comma in “height and downwind receptor distance”

p. 735 - paragraph 5 last sentence - what are these scaling variables? Are they the ones at bottom of right column?

p. 735 - this whole discussion is very abstract - could you add a sample application to help with understanding and putting the pieces together?

p. 735 - second variable cy in right column - need spaces around "=" for consistency, replace hyphen in "long-thin" with comma

p. 735 - second to last variable Fh in right column - remove period from end

p. 735-736 - recommend putting these variables/equations into a box or table that can be referenced in the text on p. 735

p. 736 - many equation numbers in left column are very cramped

p. 736 - first equation w* - remove period

p. 736 - equations under 'Dimensionless Scales' heading - hanging indent is inconsistent

p. 736 - paragraph 2 of right column - hyphenate "crosswind-integrated" in section heading and first sentence

p. 736 - first full sentence under eq (19.34) - "…between the ground and the top of the mixed layer." (replace "to" and "and" as indicated)

p. 736 - last line in right column - hyphenate "crosswind-integrated"

p. 737 - paragraph below eq (19.38), sentence 1 - hyphenate "crosswind-integrated"

p. 737 - 'Review' section sentence 2 - "…pollutants at ground level can become…" (suggest adding bolded word)

p. 737 - 'Review' paragraph 2 - sentences 1 and 2 refer to measurements, whereas last sentence seems to be talking about models that might be used in designing to meet aq standards - clarify

p. 737 - Fig 19.8 - title "(at right)" - what does this mean?

p. 737 - Fig 19.8 caption - line 3 - hyphenate "crosswind-integrated"

p. 738 - line 1 - "overcast skies and strong winds" (add bolded word)

p. 738 - paragraph 2 sentence 1 - would it be correct to say "…appropriate characteristics of turbulence and dispersion"? Otherwise "turbulence and dispersion characteristics of ___"?

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20. Numerical Weather Prediction (NWP)

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21. Natural Climate Processes

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22. Atmospheric Optics

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Appendices

Appendix A: Scientific Tools .

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Appendix B: Geophysical Constants & Conversion Factors

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Index

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p881. aeolian tones, 560

p897. howling sounds (aeolian sounds), 560

p912. saltation, 562

p912, under sand, add sub-item: saltation, 562.

p913, singing wires, 560

p913, under sound, add sub-item: howling in storms, 560

p915, under storm, under sand, add: sounds, 560

p923, whistling through trees and wires, 560

p924, under wind, add: noise, 560

p924, under wind, add: sounds, 560

p924, under wind, add: whistling wires (aeolian noise), 560

p924, wires, sounds from (aeolian noise), 560

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