Comments and Errata on Atmospheric and Oceanic Fluid Dynamics (2nd and later Printings)

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The following errata and comments apply to the *second and later printings* of the book, available from October 2007. (These printings say 'Reprinted 2007' or similar on the copyright page.) If you have the first printing of the book, please see the corresponding errata sheet. Errors that occur in both printings are (or should be) listed in both errata sheets. Most of the errors should not, I hope, cause too much frustration to either the careful reader (who will figure them out independently) or the casual reader (who won't notice them). If you find other errors, or if you think something is poorly explained, please contact the author at 'gkv-at-princeton-dot-edu'.

1. Page 21, first line of last paragraph. $(\partial h/\partial t)_p$ should be $(\partial h/\partial T)_p$.

2. Page 24, eq. (F.2). Second term in left equation should be plus, not minus. See eq. (1.93).

3. Page 27, expression for $Q[\rho]$ on line 3. The second term on the right-hand side should be $+(\partial\rho/\partial S)_{\eta,p}$ and not $-(\partial\rho/\partial S)_{\rho,p}$.

4. Page 34, line before (1.148). Should be $\alpha = (\partial G/\partial p)_{T,S}$ and not $\alpha = (\partial G/\partial p)_{T,p}$.

5. Page 64, eq. (2.62). There should be no ρ in the first fraction on the right-hand side.

6. Page 64, eq. (2.68). The term $\partial(\rho m w)/\partial z$ should be $r^{-2}\partial(\rho m w r^2)/\partial r$.

7. Page 70, expression following (2.98). Should be minus sign in front of $c_p/(T\rho_0\beta_T)$. [Note the use of the equation of state (1.59).]

8. Page 74, eq. (2.122). For notational consistency, ρ' should be $\delta\rho$, and similarly in the sentence immediately following.

9. Page 80. Should be upper case Z in the line after (2.158b).

10. Page 81. The line before (2.164) should state 'the inviscid f–plane vertical momentum equation becomes, without approximation,'.

11. Pages 81–82, Eqs. (2.167) and (2.174). On right-hand sides $-b$ should be $+b$ and, for more clarity, $\nabla\phi$ should be $\nabla_z\phi$ (it is a horizontal derivative).

12. Page 83, after (2.179). The material derivative lacks a $\hat{w}$ after the ϵ. Similarly, on p. 91 after (2.214), the material derivative lacks a $\hat{w}$ after the $\hat{\beta}$.

13. Page 83, eq. (2.180) should read $W = Fr^2 UH/L$ (missing square on Fr).

14. Page 91, eq. (2.213). Scaling for t should be L/U, not U/L.

15. Page 111, fourth line from bottom. Molecular *viscosity,* not molecular velocity.

16. Page 130, eq. (3.33). Extraneous minus sign on rhs.

17. Page 136–137, section 3.6.1. It should probably be stated explicitly that we are considering the $f = 0$ case, especially as (3.68) only follows from (3.8) if $f = 0$. The rotating case follows on page 138.

18. Page 147, line before (3.134). In fact, the condition that is imposed is that the *derivative* of streamfunction (i.e., the velocity) goes to zero, not streamfunction itself.

19. Page 154, eq. (3.171). $\mathrm{D}\boldsymbol{v}/\mathrm{D}t$ should be $\mathrm{D}\boldsymbol{u}/\mathrm{D}t$. Also, Section 3.9.3 is hard to follow as written.

20. Page 175. Just after (4.60), should be $\boldsymbol{v}_r = \boldsymbol{v}_a - \boldsymbol{\Omega} \times \boldsymbol{r}$ (no factor of 2).

21. Page 185, eq. (4.101). Second v should be a u.
Regarding (4.102), the second equation is not clear since we are comparing two infinitesimals. Best to simply ignore it, as the derivation still goes through. A better explanation will be provided in the second edition.

22. Page 204, eq. (5.43). Should be $\boldsymbol{u} = \mathbf{k} \times \nabla\psi$ (no minus sign).

23. Page 212. After (5.81), there is a g missing in the definition of g'.

24. Page 219, eq. (5.122). $\partial\psi/\partial z$ should be multiplied by f_0.

25. Page 221, eq. (5.131). ψ should be $\partial\psi/\partial Z$ in advection term.

26. Page 225, eq. (5.151d) should read: $\sigma' = -f_0 \partial/\partial\theta \left(\tilde{\rho}\theta \, \partial\psi'/\partial\theta\right)$.

27. Page 228. Equations (5.167) have typos and may be ignored. In (5.168) we need $k_d^2/2$, not k_d^2 in the third term. Eq. (5.170) is correct.

28. Page 258. This explanation (the informal mechanism) is a little brief and may be hard to follow, and (6.48) is not transparent without more algebra. A clearer version may be provided in the second edition.

29. Page 237–238 on phase speed. Some sources define the 'phase velocity' to be given by $\boldsymbol{c}_p \equiv \omega\boldsymbol{k}/K^2$, where $\boldsymbol{k}$ is the wavevector. The components of the phase velocity are then given by $c_p^x = \omega k^x/K^2$, etc. Defined this way, the phase velocity is a true velocity. However, its components do *not* represent the speed at which wave crests travel along the coordinate axes. This definition is not common, but be aware of it. Also, at the bottom on page 240, the explanation of group velocity is rather terse, and note that $\omega' = \omega(k + k') - \omega(k)$.

30. Page 256. The determinant is 4×4, which suggests a quartic equation, but the dispersion relation appears to be quadratic. An explanation is needed as to why this is so, but you will have to wait for the second edition for it.

31. Page 327 eq. (7.159). The L_d should be L_d^{-1}, and 'wavenumbers larger than the deformation radius are stable in the Eady problem' should read 'wavenumbers larger than the reciprocal of the deformation radius are stable in the Eady problem'. One must of course be careful of factors of 2π in any actual calculation.

32. Page 343, eq. (8.17). $\widetilde{u}(\boldsymbol{k})$ should be $\widetilde{u}(\boldsymbol{k}, t)$ on the rhs.

33. Page 456, eq. . (11.3). The signs on the right-hand sides of both equations such be flipped in order to be consistent with figure (11.3) and eq. (11.68). Note, though, that there is no a priori correct definition of the sign of a streamfunction.

34. Page 536–537. The appendix discusses the computation of the EP fluxes in log-pressure coordinates. However, the computations were actually carried out in pressure coordinates, with the scaling as indicated at the bottom of page 537, and then the results transformed to log-pressure coordinates for plotting purposes only.

35. Page 594, grey box, point (iii). The frictional time should be $1/20\ \text{days}^{-1}$, or even $(20\ \text{days})^{-1}$, not $20\ \text{days}^{-1}$.