Physics of the Earth IV – Errata in the first printing

The following amendments include minor typos as well as significant scientific errors in the first printing of the text. These errors will be corrected in the second, and subsequent, future printings.

P11 RHS line -12: $(v/c)^2$, the ^{2} needs to be closer

P12 LHS line -5: 'on albedo' not 'of albedo'

P46 Table 2.9: In the second footnote 0.13 should be 0.24

P46 LHS line 14: 7 parts per million should be 136 parts per million

P66 LHS line -9: 16.9×10^6 not 10^9

P68 RHS line 11: 'clue to the origin' delete 'a'

P74 RHS line -4: Move the line 'Total…' to the left. It does not start a new paragraph

P81 LHS line 8 of text: angular momentum not moment

P96 RHS line -14: square root sign displaced from the line

P98 LHS line -8 of text: replace 'almost 10%' with 'about 25%'

P101 RHS line 8 of final paragraph: $(\omega/R^3)/\omega^3$ not $(\omega R^3)/\omega^3$

P114 RHS line 21: delete the second 'that' at the end of the line

P124 Fig. 9.6a: The central column should have a height of 6 km not 5 km

P129 Fig. 9.7 caption: delete the words "at a boundary"

P129 Fig. 9.8: In the lower left hand corner the dimension H is indicated by arrows up and down, but with the head missing from the down arrow

P130 Eq. (9.26): in the middle expression the integrand should be $v\mathrm{d}h$ not $v\mathrm{d}h/\eta$

P133 Eq. (9.42): There should be no dot over the I on the left hand side

P134 LHS line 5: the first word should be 'would'

P142 LHS line -7: φ should be ϕ

P146 Eq. (10.28): There should be a dot over ε not a prime

P166 Fig 12.3: There are 3 double-headed arrows at the base of the mantle that should all be pointing just downwards

P167 LHS lines -18 and -13: kg m^{-2} not kg m^2

P176 RHS line 4: Fig. 12.12, not 12.11

P181 LHS line 3 of Section 13.1: Add G H Darwin to read 'In the 1800s G. H. Darwin and Kelvin noted that the…'

P184 RHS line -3: Eq. (9.35) should be Eq. (9.34)

P186 Item (v): Start with 'By the numbers in Table 21.3…'
[This should not increase the number of lines required for the paragraph].

P195 Fig. 13.6a: The dimension 0-C shown at the bottom of the figure should have a + sign, that is $(\sigma_{xx}^* + \sigma_{zz}^*)/2$

P196 LHS line-7: all the subscripts in this line (but only this line should be 'b' not'w'

P197 RHS line 14: gives (add s)

P213 RHS line -3: Richter magnitude (not plural)

P219 3 lines above Eq (14.53): full stop after wavelength

P271 LHS line after Eq (17.11): Replace this line with the following:
'so that, multiplying the first of Eqs (17.10) by r_1 and the second'

P277 RHS line-14: The subscript $_S$ should be italic

P280 LHS line 11: delete comma after 'coefficient'

P295 RHS line -7: comma needed after V_S

P301 Eq. (18.26): the *f* in this equation should be ς (Greek zeta, as occurs also in the exponential term)

P304 LHS Eq. (18.39): The first term on the RHS should be K_∞' not K_0'

P304 LHS line -3 of text: comma after 'occasionally'

P307 RHS line -8: comma after (Eq. (10.12))

P311 LHS line-6: delete 'a' to read '…without changing…'

P313 LHS lines 5-7: correct to 'has been studied in detail in (Mg,Fe)O, but may not affect perovskite.'

P328 LHS line -5: A comma between 'dislocated' and 'liquid-type'

P330 LHS line 16: space between 'for' and 'δ_S'

P331 Table 19.1, headings for columns 3 and 4: The subscript P inside the brackets should not be italic. (The subscripts outside the brackets remain italic)

P334 Eq. (19.81): The first solidus should be an = sign, so that the equation reads $E = Aa^2[\ldots$

P341 RHS line -6: 'more slowly' not 'less slowly'

P343 Eq. (20.13): q_0 in this equation should have a dot over it

P345 RHS line 1: add brackets '92K/(5.1K/km) = 18 km'

P345 RHS line -8: replace 'youthful' with 'older'

P351 LHS: Delete the sentence starting on line 7: 'More recent work…infall of cosmic dust' and add the following to the end of the paragraph:
'By the numbers in Table 21.3, the crust contains 56% of the total K. This is consistent with the conclusion of Wänke *et al*. (1984) that "more than 50% of the total inventory of highly incompatible elements (K, Rb, Cs, Ba) reside in the crust".

P351 RHS: In the paragraph beginning 'Uranium and thorium…', delete all but the last 5 lines on p 351, that is retain 'equal concentrations…' and replace the deleted material with the following:

By settling on global ratios of Th/U and K/U, we reduce the problem of radiogenic heat to estimation of the U content. McDonough and Sun (1995) documented the conventional argument that U and Th are non-volatiles that occur in the Earth in the same proportions, relative to other non-volatiles, as in carbonaceous chondrites, assigning 20 parts per billion (ppb) of U to the mantle-plus-crust. But even major non-volatiles are variable between terrestrial planets and meteorites so this argument is insecure. Wänke *et al*. (1984) present alternative evidence for 29 ppb, which is close to the estimate adopted in Table 21.3, on the basis of Ar and He in glassy (rapidly cooled) submarine basalts combined with the atmospheric content of Ar. In Fig. 21.1, materials having

P353 LHS part paragraph at the top: Delete all material from 'Geochemical estimates…' in line 4 to the end of the paragraph and replace with the following;

Although the present radiogenic heating of the mantle, 20×10^{12} W by the composition in Table 21.3, is seriously uncertain, the uncertainty has only a minor effect on thermal history calculations. Fig. 23.3 shows that the geothermal flux is almost independent of assumed radiogenic heat for the last 4 billion years. An important reason for this is that radioactivity contributes only small fraction of the global energy as listed in Table 21.1.

P367 RHS line -15: E should have a dot over it

P369 RHS line 12 of text: delete comma after 'phases'

P370 Eq. (22.27): equalise bracket sizes

P372 RHS line -9: delete comma at end of line
line -8: comma after 'is'

P381 LHS line -2: (23.16) not ((23.16))

P382: Substitute revised Fig. 23.1. Revise the last three lines of the caption to read: 'for compositions by Wänke *et al*. (1984), McDonough and Sun (1995) and Turcotte and Schubert (2002).'

P383 RHS lines 20-31: Delete all material starting with 'Geochemical arguments…' in line 20 to the end of the paragraph and replace with the following:

Our preferred thermal model assumes 20×10^{12} W of radiogenic heat in the mantle at the present time, as in Tables 21.3 and 21.4, but in view of the serious uncertainty, discussed in Section 21.2, we report also calculations for 12×10^{12} W, 24×10^{12} W and 29.5×10^{12} W. The significance of the 24×10^{12} W alternative is that it appears to be the highest value allowed by the requirement that the mantle cools faster than the core. The others are all derived from various geochemical ideas.

P383 RHS line -5: Replace 'Neither' with 'None'
lines -3 to -1: Replace 'which is….24×10^{12} W' with the following
'but they cover the complete range that must be considered'

P384: Substitute revised Figs. 23.2 and 23.3. In the caption for Fig. 23.3, replace the word 'three' with 'alternative'.

P385 LHS line -10: Replace the whole line with
'but a 50% uncertainty must be allowed. If we'

P390 RHS line 14: 'earth' not 'Earth' in this line, being a quotation

P440 Table 26.3: In the entry for Tectonics replace 8.0 with 7.7

P441 LHS lines 8-9: Replace 'phase lag between' with 'response time of'

P448 Table A1: For the gas constant the first entry should have units J mol^{-1} K^{-1}, not J^{-1} K^{-1}.

P451 Table A4: The entry for mass of the Earth should be $5.9722(6)\times10^{24}$ kg, not $5.9723(1)\times10^{24}$ kg

P453 Table A7: The last line of this table has been omitted. Across the table it should read: Mu μ M Omega ω Ω

P466 Table E2: In the entry for ∂U in the H column the bracketed factor on the second line should be preceded by a multiply sign: $\times(1 + 1/\gamma)$

Pp469-470: The broken lines in the left hand column of this table should be moved half a space down, so that they come between entries in the table

P474: The entry for ^{238}U should read $8\alpha + 6\beta$ not $6\alpha + 4\beta$

P475 Table H2: Add 'years' to the ^{10}Be entry to read 1.5×10^6 years

P475 Table H3: For the ^{236}U entry the half life is 2.4×10^7 years not 8.3×10^7 years

P480 RHS line 1 of 6.7(b): φ should be ϕ

P484 line 4 of problem 12.3: 'If' (capital I)

P490 problem 19.4 (a) (ii): Delete the opening bracket

P492 problem 23.3: The denominator of the first term in the square bracket should be (n+3) not 3(n+1)

P493 line 8 of problem 23.5: Delete the word 'three'

P496 Archer and Jacobson reference: Replace d12110 with D12110

P506 McSween reference: add 'second edn.'

P509 Roberts and Gubbins reference: the word 'dynamics' should be 'kinematics'

P511 Turcotte and Schubert reference: add 'second edn.'

P512: Add the following reference between Vondrák and Wasson:
Wänke, H., Dreibus, G. and Jagoutz, E., 1984, Mantle chemistry and accretion history of the Earth. In Kröner, A., Hanson, G. N and Goodwin, A. M. (eds.), 1984, *Archean geochemistry*. Berlin: Springer.

[This will displace the Woodhouse 1983 reference from p 512 to p 513, but the only other consequence is the p 520 correction].

P515: for the Eymin entry add 500

P517 McDonough: Add 351, delete 383

P518 Schubert: delete 383

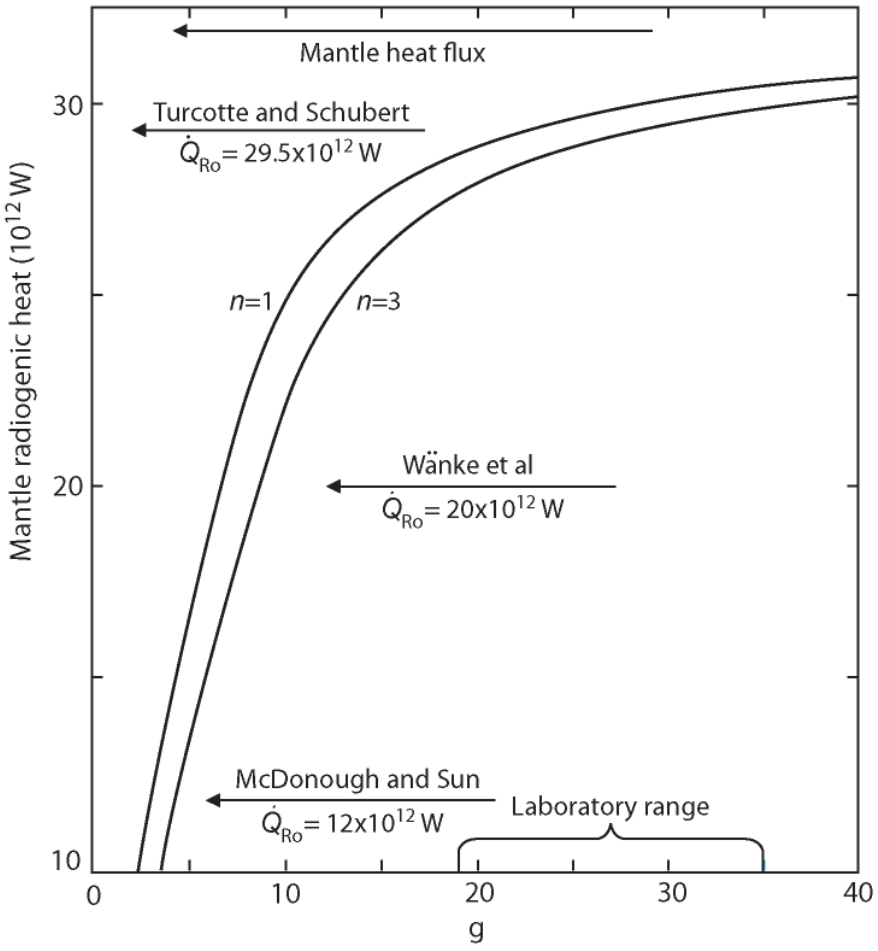
P519 Sun: Add 351, delete 383

P519 Turcotte: delete 383

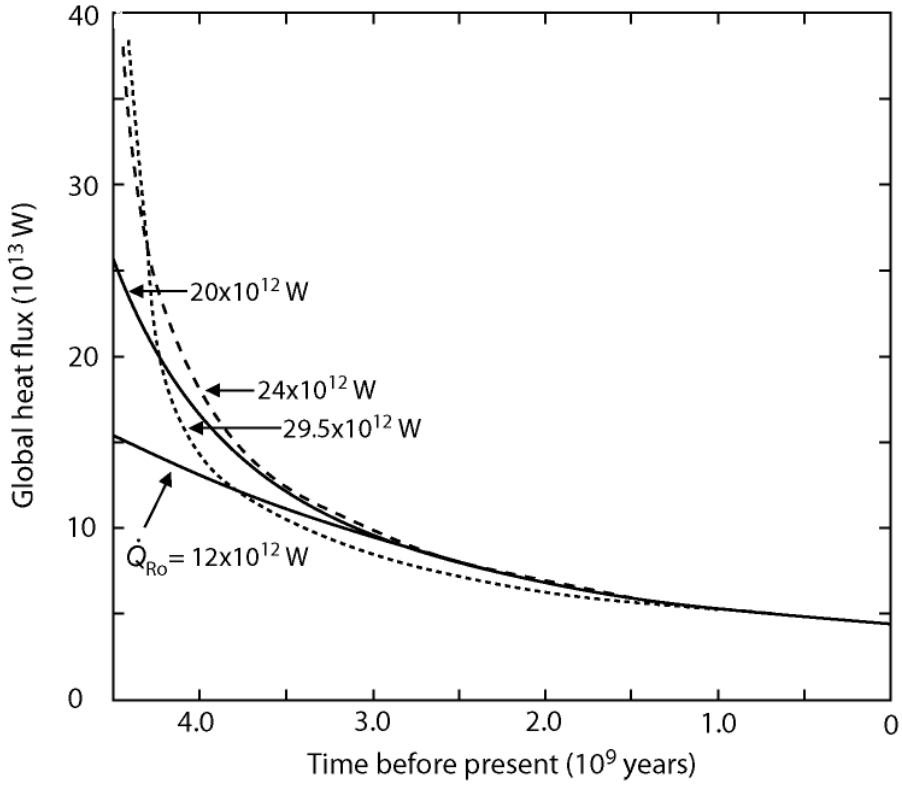
P519: Add to the index between Wang and Wasserburg:
Wänke, H., 351, 352
[This will displace Weiss to p520, with no other consequence]

P520: For the Woodhouse entry, delete ‘512

Revised Fig. 23.1



Revised Fig. 23.2



Revised Fig. 23.3