

Greve and Blatter (2009), Dynamics of Ice Sheets and Glaciers: Errata

We have tried to do a thorough job of finding and correcting errors before submitting the manuscript. Nevertheless, the printed edition needs some corrections. We will update this document occasionally as problems are identified.

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Last update: November 20, 2015

Chapter 3

- Page 22, Eq. (3.23):

In the last term of the second line, the differential operator d/dt should be $\partial/\partial t$. So the correct form of the equation is

$$\begin{aligned}\frac{d\psi}{dt} &= \frac{d}{dt}\psi(\mathbf{x}(\mathbf{X}, t), t) \\ &= \frac{\partial\psi(\mathbf{x}, t)}{\partial t} + \text{grad } \psi(\mathbf{x}, t) \cdot \frac{\partial\mathbf{x}(\mathbf{X}, t)}{\partial t} \\ &= \frac{\partial\psi}{\partial t} + (\text{grad } \psi) \cdot \mathbf{v}.\end{aligned}$$

Chapter 5

- Page 67, Eqs. (5.26), (5.27) etc., Page 69, Eqs. (5.34), (5.35) etc.:

Confusing double use of the symbol N_b . In Eqs. (5.26), (5.27) etc. it denotes the norm of the gradient of the function F_b (implicit representation of the ice base), whereas in Eqs. (5.34), (5.35) etc. it means the basal normal stress.

- Page 93, Eqs. (5.132)₅₋₇: All subscripts “ η ” should be subscripts “ φ ”.

- Page 96, Eq. (5.144):

The two instances of H should be H^{n+1} . So the correct form is

$$C = \begin{cases} 2(\rho g)^n \left| \frac{\partial h}{\partial \xi} \right|^{n-1} H^{n+1} \int_0^\zeta A(T') (1 - \zeta')^n d\zeta', & \text{if } T_b < T_m, \\ C_b (\rho g H)^{p-q} \left| \frac{\partial h}{\partial \xi} \right|^{p-1} \\ + 2(\rho g)^n \left| \frac{\partial h}{\partial \xi} \right|^{n-1} H^{n+1} \int_0^\zeta A(T') (1 - \zeta')^n d\zeta', & \text{if } T_b = T_m. \end{cases}$$

Chapter 6

- Page 117, second line above Eq. (6.32):

“(Morland 1987)” should be “(Morland 1987, MacAyeal 1989)”.

- Page 121, Eqs. (6.46) and (6.47):

In the second (y -component) of each of these equations, $t_{xx}|_{z=b}$ and $t_{yy}|_{z=b}$ should be $t_{xx}^D|_{z=b}$ and $t_{yy}^D|_{z=b}$, respectively. So the correct form of Eq. (6.46) is

$$\begin{aligned} 2t_{xx}^D|_{z=b} \frac{\partial b}{\partial x} + t_{yy}^D|_{z=b} \frac{\partial b}{\partial x} - \rho g H \frac{\partial b}{\partial x} + t_{xy}|_{z=b} \frac{\partial b}{\partial y} - t_{xz}|_{z=b} \\ = -\rho_{sw} g (z_{sl} - b) \frac{\partial b}{\partial x}, \\ 2t_{yy}^D|_{z=b} \frac{\partial b}{\partial y} + t_{xx}^D|_{z=b} \frac{\partial b}{\partial y} - \rho g H \frac{\partial b}{\partial y} + t_{xy}|_{z=b} \frac{\partial b}{\partial x} - t_{yz}|_{z=b} \\ = -\rho_{sw} g (z_{sl} - b) \frac{\partial b}{\partial y}, \end{aligned}$$

and the correct form of Eq. (6.47) is

$$\begin{aligned} 2t_{xx}^D|_{z=b} \frac{\partial b}{\partial x} + t_{yy}^D|_{z=b} \frac{\partial b}{\partial x} + t_{xy}|_{z=b} \frac{\partial b}{\partial y} - t_{xz}|_{z=b} &= 0, \\ 2t_{yy}^D|_{z=b} \frac{\partial b}{\partial y} + t_{xx}^D|_{z=b} \frac{\partial b}{\partial y} + t_{xy}|_{z=b} \frac{\partial b}{\partial x} - t_{yz}|_{z=b} &= 0. \end{aligned}$$

- Page 126, third line below the heading “6.4 Ice Shelf Ramp”:

“... problem:” should be “... problem (Weis 2001, slightly modified and extended):”.

Chapter 7

- Page 154, caption of Fig. 7.5:

The passage “dashed lines for $\Lambda = 0.25$, solid lines for $\Lambda = 1$, dash-dotted lines for $\Lambda = 100$ ” should be “dash-dotted lines for $\Lambda = 0.25$, solid lines for $\Lambda = 1$, dashed lines for $\Lambda = 10$ ”.

- Page 159, Eq. (7.50):

The third column (under η) of the dimensional matrix contains a sign error. The correct form is

$$\begin{array}{ccc} \dots & \eta & \dots \\ \hline \dots & -1 & \dots \\ \dots & -1 & \dots \\ \dots & 1 & \dots \end{array}$$

- Page 161, third line above Eq. (7.62): “where p is” should be “where p_b is”.
- Page 161, Eq. (7.62): The right hand side $\frac{p_{\text{eff}}}{p}$ should be $\frac{p_{\text{eff}}}{p_b}$.
- Page 181, second line above Eq. (7.120): “ $\delta(\Delta\bar{u})$ ” should be “ $\delta(\Delta\bar{v}_x)$ ”.

Chapter 8

- Page 187, first line of subsection 8.2:

“From seismic studies” should be “From seismological studies”.

- Page 191, Eq. (8.12):

The arguments of H should be \tilde{x}, \tilde{y} rather than x, y . So the correct form is

$$w_{\text{ss}}(x, y) = \int_{A_{\text{ice}}} \rho g H(\tilde{x}, \tilde{y}) G(x, \tilde{x}, y, \tilde{y}) d\tilde{x} d\tilde{y}.$$

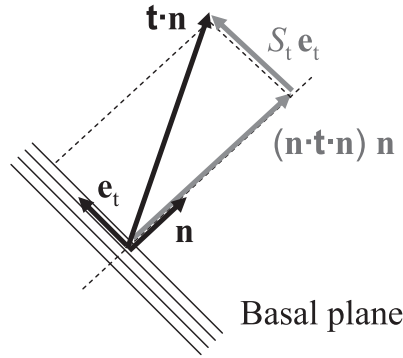
Chapter 9

- Page 204, second paragraph, second/third line:

“Placidi et al. (2009)” should be “Placidi et al. (2010)”.

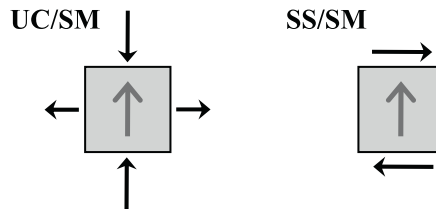
- Page 205, Fig. 9.1:

In some early copies of the book, this figure was rendered incorrectly. It should appear as follows:



- Page 207, Fig. 9.2:

In some early copies of the book, this figure was rendered incorrectly. It should appear as follows:



- Page 246, Eq. (9.159), Page 247, Fig. 9.23, Page 248, Eqs. (9.165), (9.166), (9.169)_{3,4}: All instances of γ should be α (inclination angle).
- Page 251, caption of Fig. 9.24: The caption should be “... $H = 200 \text{ m}$, $\alpha = 4^\circ$, $T_s = -3^\circ\text{C}$, $a_s^\perp = a_m^\perp = 0.2 \text{ m a}^{-1}$, $v_{bx} = 5 \text{ m a}^{-1}$, $n = 3$, $A = 5.3 \times 10^{-24} \text{ s}^{-1} \text{ Pa}^{-3}$, $\rho = 910 \text{ kg m}^{-3}$, $\kappa = 2.1 \text{ W m}^{-1} \text{ K}^{-1}$, $c = 2009 \text{ J kg}^{-1} \text{ K}^{-1}$, $L = 3.35 \times 10^5 \text{ J kg}^{-1}$ and $g = 9.81 \text{ m s}^{-2}$.”
- Page 252, caption of Fig. 9.25: The caption should be “... $H = 200 \text{ m}$, $\alpha = 4^\circ$, $T_s = -10^\circ\text{C}$, $a_s^\perp = a_m^\perp = -0.2 \text{ m a}^{-1}$, $v_{bx} = 5 \text{ m a}^{-1}$, $n = 3$, $A = 5.3 \times 10^{-24} \text{ s}^{-1} \text{ Pa}^{-3}$, $\rho = 910 \text{ kg m}^{-3}$, $\kappa = 2.1 \text{ W m}^{-1} \text{ K}^{-1}$, $c = 2009 \text{ J kg}^{-1} \text{ K}^{-1}$, $L = 3.35 \times 10^5 \text{ J kg}^{-1}$ and $g = 9.81 \text{ m s}^{-2}$.”
- Pages 255-259, subsection 9.3.8:
In this subsection (“Enthalpy Formulation”), it has tacitly been assumed that the specific heat of ice is a constant (not temperature-dependent).

References Cited or Recommended

- Page 265, reference to Calov and Greve (2006):
“<http://www.pik-potsdam.de/~calov/heino.html>” should be

“<http://www.pik-potsdam.de/~calov/heino.html>”.

- Page 265, reference to Durand, Gagliardini, Zwinger and Le Meur (2009):
The list of authors should be “Durand, G., O. Gagliardini, T. Zwinger, E. Le Meur and R. C. A. Hindmarsh”. The bibliographical information should be “*Annals of Glaciology*, **50** (52), 109–114”.
- Page 266, reference to Gagliardini, Gillet-Chaulet and Montagnat (2009):
The bibliographical information should be “*Low Temperature Science*, **68** (Supplement Issue ‘Physics of Ice Core Records II’, Ed. T. Hondoh), 149–166”.
- Page 266, reference to Greve, Placidi and Seddik (2009):
The bibliographical information should be “*Low Temperature Science*, **68** (Supplement Issue ‘Physics of Ice Core Records II’, Ed. T. Hondoh), 137–148”.
- Page 268, reference to MacAyeal (1989) should be added:
“MacAyeal, D. R. 1989. Large-scale ice flow over a viscous basal sediment: theory and application to ice stream B, Antarctica. *Journal of Geophysical Research*, **94** (B4), 4071–4087”.
- Page 270, reference to Placidi, Greve, Seddik and Faria (2009):
The reference should be “Placidi, L., R. Greve, H. Seddik and S. H. Faria. 2010. Continuum-mechanical, Anisotropic Flow model for polar ice masses, based on an anisotropic Flow Enhancement factor. *Continuum Mechanics and Thermodynamics*, **22** (3), 221–237. doi:10.1007/s00161-009-0126-0.”