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.

– Ralf Greve, Heinz Blatter

Last update: November 20, 2015

Chapter 3

- Page 22, Eq. (3.23):
  In the last term of the second line, the differential operator $\mathrm{d}/\mathrm{d}t$ should be $\partial/\partial t$. So the correct form of the equation is

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

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

$$
C = \begin{cases}
2(\rho g)^n \left| \dfrac{\partial h}{\partial \xi} \right|^{n-1} H^{n+1} \displaystyle\int_0^\zeta A(T')\,(1-\zeta')^n \,\mathrm{d}\zeta'\,, & \text{if } T_\mathrm{b} < T_\mathrm{m}\,, \\[2em]
C_\mathrm{b}(\rho g H)^{p-q} \left| \dfrac{\partial h}{\partial \xi} \right|^{p-1} \\[1.5em]
\quad +2(\rho g)^n \left| \dfrac{\partial h}{\partial \xi} \right|^{n-1} H^{n+1} \displaystyle\int_0^\zeta A(T')\,(1-\zeta')^n \,\mathrm{d}\zeta'\,, & \text{if } T_\mathrm{b} = T_\mathrm{m}\,.
\end{cases}
$$

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 $t^\mathrm{D}_{xx}|_{z=b}$ and $t^\mathrm{D}_{yy}|_{z=b}$, respectively. So the correct form of Eq. (6.46) is

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

  and the correct form of Eq. (6.47) is

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

- 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 $\dfrac{p_\mathrm{eff}}{p}$ should be $\dfrac{p_\mathrm{eff}}{p_\mathrm{b}}$.

- 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 $\check{x}, \check{y}$ rather than x, y. So the correct form is

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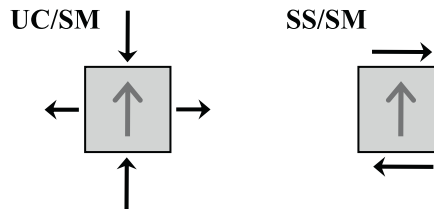$$

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:

Basal plane
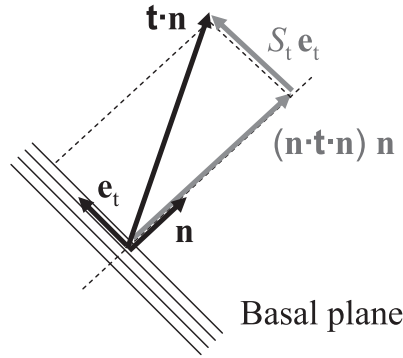
- Page 207, Fig. 9.2:
  In some early copies of the book, this figure was rendered incorrectly. It should appear as follows:

- 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
  "... $H = 200\,\text{m}$, $\alpha = 4°$, $T_{\text{s}} = -3°\text{C}$, $a_{\text{s}}^{\perp} = a_{\text{m}}^{\perp} = 0.2\,\text{m\,a}^{-1}$, $v_{\text{b}x} = 5\,\text{m\,a}^{-1}$, $n = 3$, $A = 5.3 \times 10^{-24}\,\text{s}^{-1}\,\text{Pa}^{-3}$, $\rho = 910\,\text{kg\,m}^{-3}$, $\kappa = 2.1\,\text{W\,m}^{-1}\,\text{K}^{-1}$, $c = 2009\,\text{J\,kg}^{-1}\,\text{K}^{-1}$, $L = 3.35 \times 10^5\,\text{J\,kg}^{-1}$ and $g = 9.81\,\text{m\,s}^{-2}$."

- Page 252, caption of Fig. 9.25: The caption should be
  "... $H = 200\,\text{m}$, $\alpha = 4°$, $T_{\text{s}} = -10°\text{C}$, $a_{\text{s}}^{\perp} = a_{\text{m}}^{\perp} = -0.2\,\text{m\,a}^{-1}$, $v_{\text{b}x} = 5\,\text{m\,a}^{-1}$, $n = 3$, $A = 5.3 \times 10^{-24}\,\text{s}^{-1}\,\text{Pa}^{-3}$, $\rho = 910\,\text{kg\,m}^{-3}$, $\kappa = 2.1\,\text{W\,m}^{-1}\,\text{K}^{-1}$, $c = 2009\,\text{J\,kg}^{-1}\,\text{K}^{-1}$, $L = 3.35 \times 10^5\,\text{J\,kg}^{-1}$ 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."