Supplementary material of "Evaluation of multiple empirical, density-dependent snow conductivity relationships at Dome A, Antarctica"

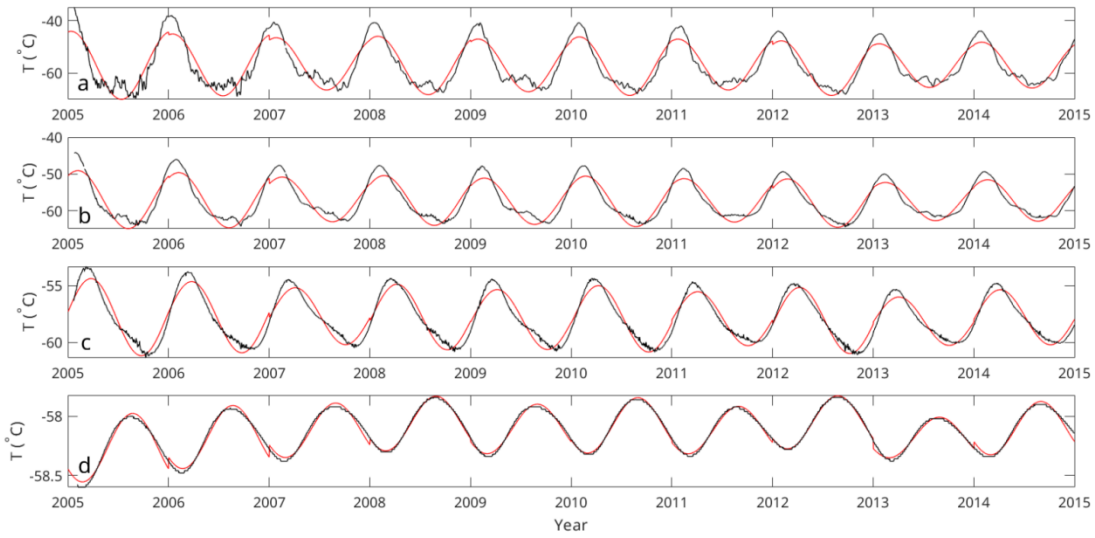

Figure S1: The annual cycles of firn temperatures (black curves) and their sinusoidal best-fit (red curves) at the nominal depth of 0.1 m (a),1 m (b), 3 m (c) and10 m (d) for 2005—2014 at the Dome A station.

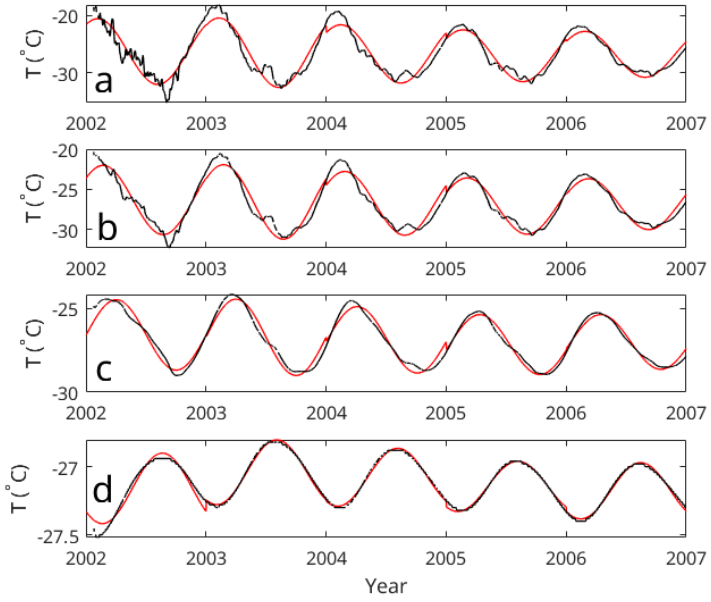

Figure S2: The annual cycles of firn temperatures (black curves) and their sinusoidal best-fit (red curves) at the nominal depth of 0.1 m (a),1 m (b), 3 m (c) and10 m (d) for 2002—2007 at the LGB 69 station.

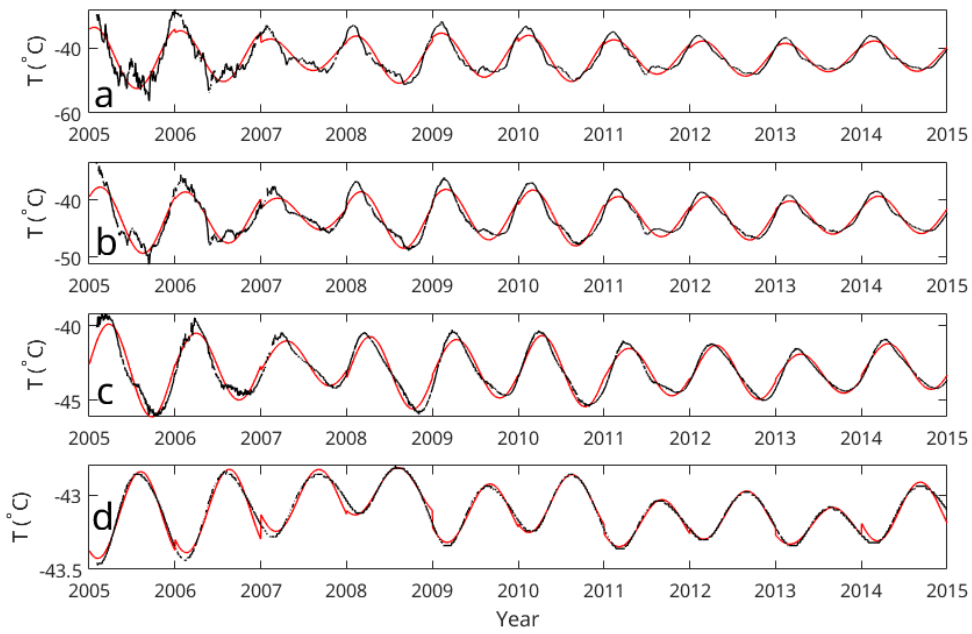

Figure S3: The annual cycles of firn temperatures (black curves) and their sinusoidal best-fit (red curves) at the nominal depth of 0.1 m (a),1 m (b), 3 m (c) and10 m (d) for 2005—2015 at the Eagle station.

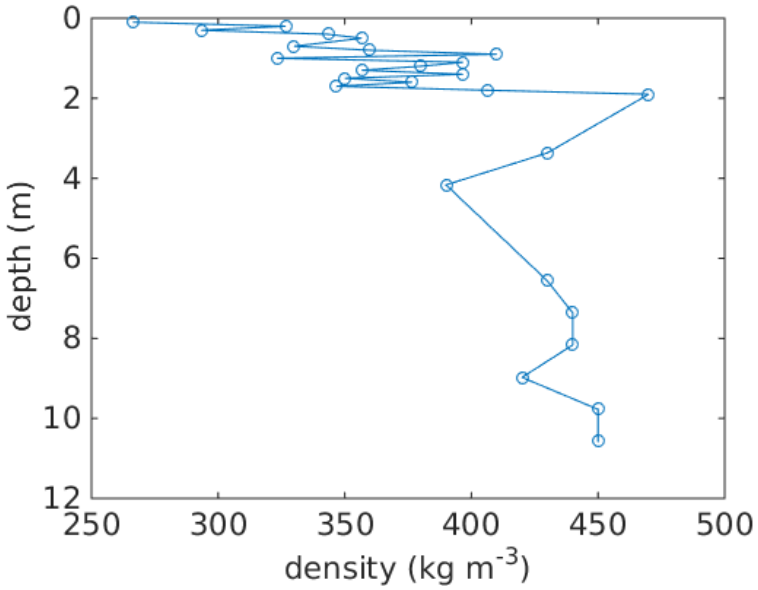

Figure. S4 The firn depth-density profile at Dome A

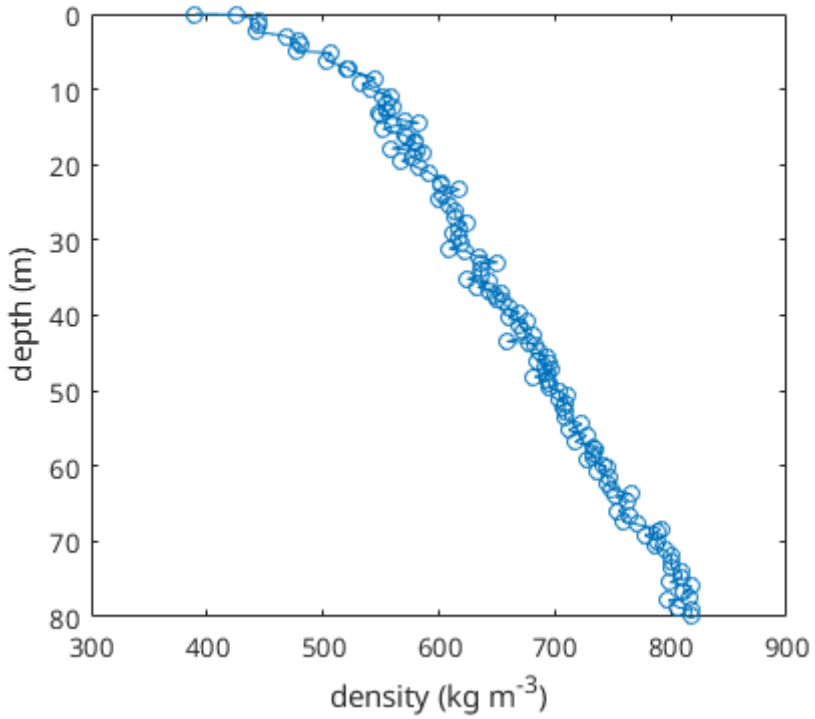

Figure. S5 The firn depth-density profile at Eagle

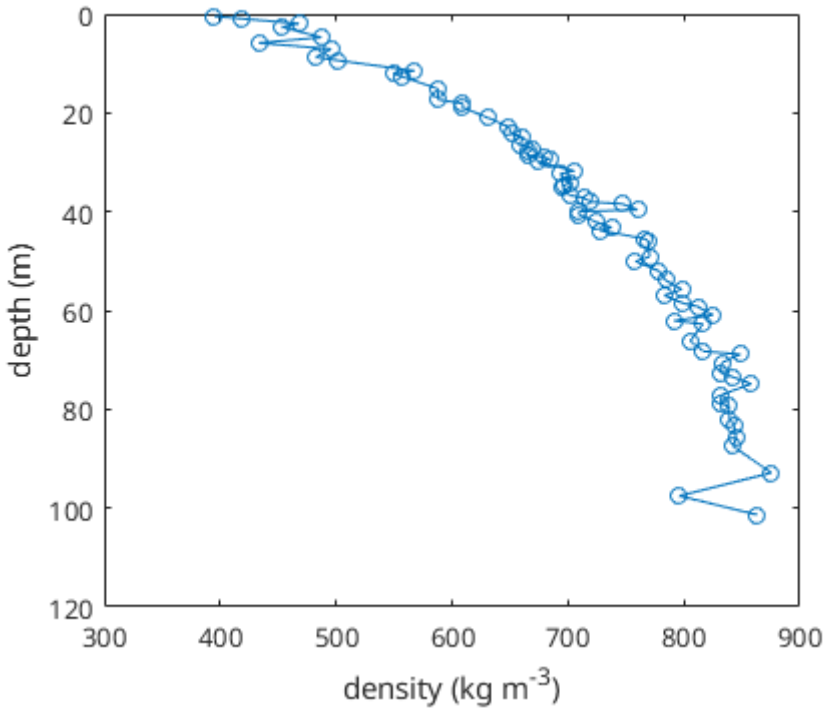

Figure. S6 The firn depth-density profile at LGB69

Table S1. Brief introductions of the density-dependent relationships used in this study

Code	formula	density (kg m-3)	temperature (℃)	description	reference
Jor	$k = k_a + (7.75e^{-5}\rho/1000 + 1.105e^{-6}(\rho/1000)^2)(k_i - k_a)$	376-472	-17 to -7	Experimental measurements	Jordan (1991)
Ca1	$k = 0.024 - 1.23e^{-4}\rho + 2.5e^{-6}\rho^2$	100-550	-3	3D images-based computations	Calonne et al., (2011)
Ca2	$k = 2.107 + 0.003618(\rho - \rho_i)$	550–917	-3	3D images-based computations	Calonne et al., (2019)
Stu	$k = 10^{(2.650\rho - 1.652)}$	70-560	-1 to -77	needle probe measurements	Sturm et al., (1997)
Yen	$k = 2.22362(\frac{\rho}{1000})^{1.885}$	80-600	-	Experimental measurements	Yen (1981)
And	$k = 0.021 + 2.5(\frac{\rho}{1000})^2$	-	-	Experimental measurements	Anderson (1976)
Van	$k = 2.1e^{-2} + 4.2e^{-4}\rho + 2.2e^{-9}\rho^3$	-	0 to -30	Experimental measurements	Van Dusen and Washburn (1929)
Sch	$k = k_i(\frac{\rho}{\rho_i})^{2-0.5\frac{\rho}{\rho_i}}$	-	-	Experimental measurements	Schwander et al., (1997)
Lan	$k = 10^{6.8\rho - 3.0}$	230 to 480	-4.4 to -19.5	Experimental measurements	Lange (1985)