Supplement of The Cryosphere, 17, 3309–3328, 2023
https://doi.org/10.5194/tc-17-3309-2023-supplement

The Cryosphere Open Access EGU

Supplement of

Modelling the development and decay of cryoconite holes in northwestern Greenland

Yukihiko Onuma et al.

Correspondence to: Yukihiko Onuma (onuma.yukihiko@jaxa.jp, yonuma613@gmail.com) and Koji Fujita (cozy@nagoya-u.jp)

SUPPLEMENTARY MATERIAL

Contents of this file

Table S1

Figures S1 to S2

Table S1 shows approximation equation parameters for clear and cloudy sky conditions derived from spectral flux extinction coefficient observed by Cooper et al. (2021). Figures S1 and S2 show spectral solar radiation under clear and cloudy skies simulated with a radiative transfer model for the atmosphere–snow/ice system (Aoki et al., 1999; 2000), and broadband flux extinction coefficient of bare ice as a function of solar zenith angle, respectively.

Table S1: Approximation equation parameters fitted by a power regression equation $\overline{k_e}(x) = ax^b$ for clear and cloudy sky conditions and employed data sets of $k_e(\lambda)$ for Layer A and Layer B reported by Cooper et al. (2021). R^2 is the determination coefficient.

Sky condition	Ice layer	*a*	*b*	R^2
Clear sky	Layer-A	1.9167	-0.61328	0.995
Cloudy sky	Layer-A	1.6203	-0.51923	0.991
Clear sky	Layer-B	1.8322	-0.62486	0.996
Cloudy sky	Layer-B	1.529	-0.53297	0.993

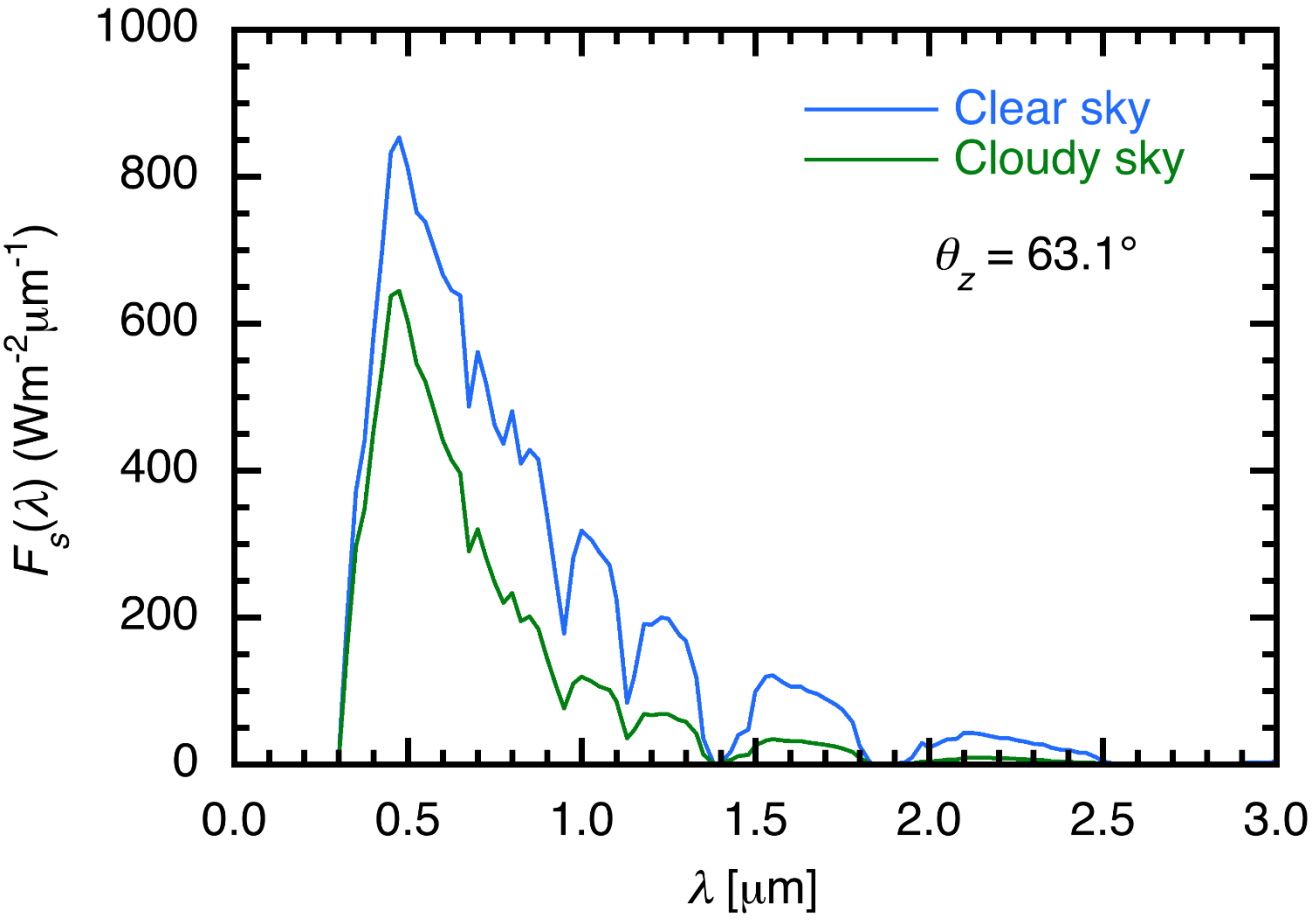

Figure S1: Spectral solar radiation $F_s(\lambda)$ in $\lambda = 0.2 - 3.0$ μm under clear and cloudy skies at $\theta_z = 63.1°$, simulated with a radiative transfer model for the atmosphere–snow/ice system over the bare ice surface with a spectral resolution of 0.025 μm. In the calculation of $\overline{k_e}(x)$, $F_s(\lambda)$ in $\lambda = 0.2 - 4.0$ μm is used.

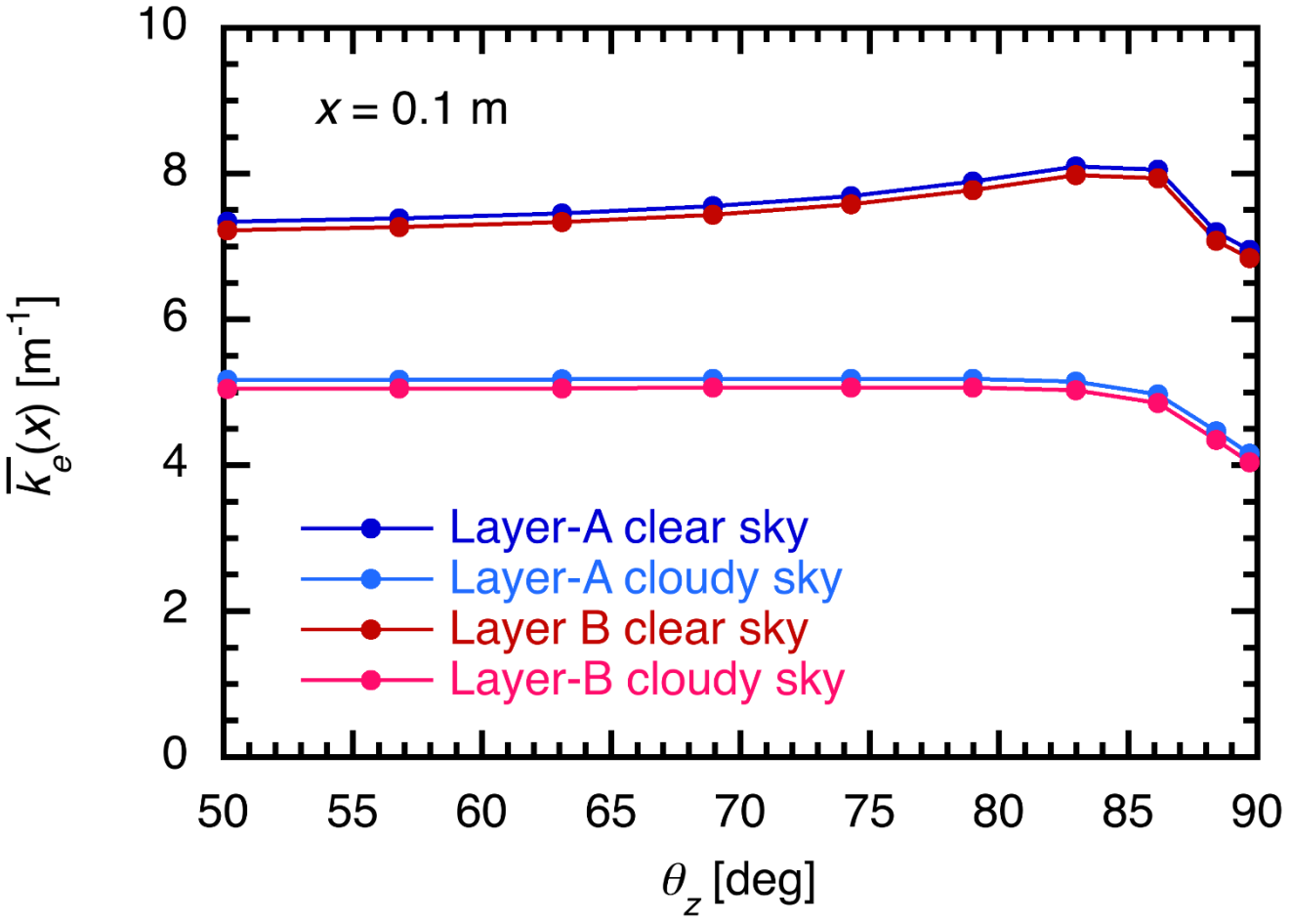

Figure S2: Broadband flux extinction coefficient $\overline{k_e}(x)$ of bare ice as a function of θ_z in the case of $x = 0.1$ m for clear and cloudy sky conditions and employed data sets of $k_e(\lambda)$ for Layer A and Layer B reported by Cooper et al. (2021).