This is an interesting paper that addresses two major questions:

(1) What is the temperature (and emissivity) of the blue ice?

(2) Why is the ice clear (and therefore blue)?

I have comments on both questions. "Major revision" is required for writing the discussion, conclusions, and abstract, but the figures probably do not need editing.

Major comments:

(1) *What is the temperature (and emissivity) of the blue ice?*

The analyses apparently assumed emissivity of 0.98 (Figure 3 legends to parts *g* and *h*). It could be that the ice is temperate (i.e. at 0°C), and that the low brightness-temperatures are caused by emissivity lower than 0.98, which is to be expected anyway for an oblique viewing angle. For example, at l=9mm, Figure 8e of Hori et al. (2006) shows the emissivity of bare ice to be 0.98 for viewing angles 0°-30°, but lower emissivity at more-oblique angles: 0.97 at 45°, 0.95 at 60°, and 0.82 at 75°.

(2) *Why is the ice clear (and therefore blue)?*

Clean glacier ice is normally white or gray because it contains numerous bubbles. But the blue ice in these icebergs is dark, indicating that it is mostly devoid of bubbles. This could be explained by melting of the glacier ice, allowing the bubbles to escape, then refreezing of the meltwater. But if the ice went through a melting process, what then caused the meltwater to refreeze?

The increase of albedo after 2, 3, and 12 days, shown in Figure 4a, indicates development of something that can cause refraction: either bubbles or cracks, or both.

I suggest a different explanation for the lack of bubbles in the dark-blue ice: The thickness of the ice stream is 2500 m, which means the pressure at the bed is 223 bars. At pressures in excess of 150 bars, the air-bubbles dissolve in ice to form clathrates (Figure 1 of Kuhs et al., 2000), resulting in clear ice, so the lowest 33% of the ice thickness would be at sufficiently high pressure to form clathrates. This is consistent with the estimate of Zaninetti et al. that only "the bottom-most quarter" of the ice thickness is dark blue. When the pressure is released, i.e. after the iceberg rises to the ocean surface and the blue ice is exposed to the atmosphere, the bubbles will re-form and the ice will turn gray and then white, as observed in Figure 5, consequently raising the albedo as shown in the dashed blue lines of Figure 4a after 2, 3, and 12 days.

Additional comments

Line 111, also the black curve in Figure 4a. The lake-reflectance of 0.01 for visible wavelengths is not representative of the lake's albedo. This low value of reflectance is probably a directional reflectance under clear sky, where the measurement does not include the specular reflection (sunglint). The hemispheric albedo would be 0.07 for diffuse incidence (under cloud).

→ I used the reflectance of a lake in the vicinity to be coherent with the local conditions but I will also mention the hemispheric albedo of 0.07.

Figure 4 caption, line 3. Change "Lake reflectance" to "The reflectance of a land-based lake". **→ done**

Line 149. What is meant by "concave shape"? Do you mean concave-upward or concave-downward? And over what spectral region?

→without altering the concave-downward shape of the spectra in the VIS and NIR

Lines 154-158. This paragraph about supraglacial lakes is muddled. The brilliant blue color of supraglacial lakes can be explained in the same way as the brilliant blue color of shallow water over white sand on Caribbean beaches: The submerged white sand, or the submerged white ice, has high reflectance for all visible wavelengths, but the overlying water acts as a filter, absorbing the red light but transmitting the blue. The absorption length (the mean-free-path of a photon before absorption; the reciprocal of the absorption coefficient) is ~2 m for red light but ~200 m for blue light.

→ paragraph removed, ponds are only mentioned

Line 163. "highly absorbing substance". Water is not "highly absorbing". The absorption spectrum of liquid water across the visible wavelengths is similar to that of ice (Figure 1 of Dozier 1989; Figure 3 of Warren 2019). Both water and ice are nearly transparent for visible light.

Misuse absorption/reflection

→ Water, unless it contains large amounts of sediments, reflects little light at all wavelengths.

Lines 208-209. Microwave emissivities are irrelevant for this work. Cite instead the thermal-infrared emissivities (Hori et al. 2006)

→citation corrected

→As an example, icebergs generally exposed flat surfaces and were seen with large viewing angles as a result of the small height-to-distance ratio. In the thermal infrared the directional ice emissivity drops to 0.82 with a viewing angle of 75° \citep{HORI2006486}.

Grammar and spelling:

Line 21. Change “were” to “is”. →**done**

Line 23. Change boreholes to borehole. →**done**

Line 25. Change stream to streams. →**done**

Line 34. Change through to trough. →**done**

Line 69. Change “allowed to” to “allowed us to”. →**done**

Lines 70-71. Change “spaced by 240 m” to “spaced 240 m apart”. →**done**

Line 133. Change occured to occurred. →**done**

Line 216. Change “revert” to “invert”. →**done**

Line 295. Change Scambo to Scambos. →**done**

References:

Dozier J., 1989: Estimation of properties of alpine snow from Landsat Thematic Mapper. *Adv. Space Res.* **9(1)**, 207-215.

Hori M, Aoki T, Tanikawa T, Motoyoshi H, Hachikubo A, Sugiura K, Yasunari TJ, Eide H, Storvold R, Nakajima Y, Takahashi F., 2006: In-situ measured spectral direcitonal emissivity of snow and ice in the 8-14 mm atmospheric window. *Rem. Sens. Environ.* **100**, 486-502.

Kuhs, W.F., A. Klapproth, and B. Chazallon, 2000: Chemical physics of air clathrate hydrates. In *Physics of Ice Core Records* (T. Hondon, Ed.), 373-392.

Warren, S.G., 2019: Optical properties of ice and snow. *Phil. Trans. Royal Soc. A, 377,* doi:10.1098/rsta.2018.016