

## ***Interactive comment on “The De-Icing Comparison Experiment (D-ICE): A study of broadband radiometric measurements under icing conditions in the Arctic” by Christopher J. Cox et al.***

### **Anonymous Referee #1**

Received and published: 17 November 2020

This manuscript describes and analyzes results from the De-Icing Comparison Experiment (D-ICE), which aims to provide information to mitigate the long-lasting issue of radiation measurements in polar regions, ice on sensor domes. By comparing 20 pyranometers and 5 pyrgeometers side-by-side during one cold season of the Arctic, the authors present biases in shortwave and longwave radiation measurements caused by icing under different environmental conditions and find that ventilation alone is an effective way to mitigate the issue. They further explain the physical processes of how ventilation reduces icing and provide “the best estimates” (icing free) of radiation measurements for developing quality control procedures to improve retrospective data. The experiment design is appropriate; the findings are novel and practical; the flow and

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languages are clear. I recommend publishing on AMT with minor revisions.

Line 102: semi-colon → colon? Line 104: it is not clear if “The operational stations” refer to D-ICE stations or ARM stations or all stations used in this study. Line 193: Did you guys try any machine learning methods to help detect icing situations? Line 226: repeating section numbering Line 291: why the latter data set is “verifiably ice-free”? Line 297: it is not clear whether this “ $1\sigma$ ” is over time or over different instruments Line 309: “When this occurs” meaning  $> 1$  cm or  $\leq 1$  cm? Line 319 and 320: panel a → Panel a; panel b → Panel b Line 320: it shows 14-15 April in Fig. 4. Which is it? Line 378: it would be nice to have a mini-summary of shortwave biases here, something similar to Line 344-345 in the longwave section

S1: Since some of the sensors are heated, will this extra heat affect the longwave measurements of surrounding sensors? S1: Does icing ever occur on the camera lenses? How often? How much could it affect your results? S1: the color of model details (shortwave as blue and longwave as red). The number 17 is red but the 17th model name is blue. S2: To confirm, is there any human interference other than in Jan 2018?

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Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2020-397, 2020.

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