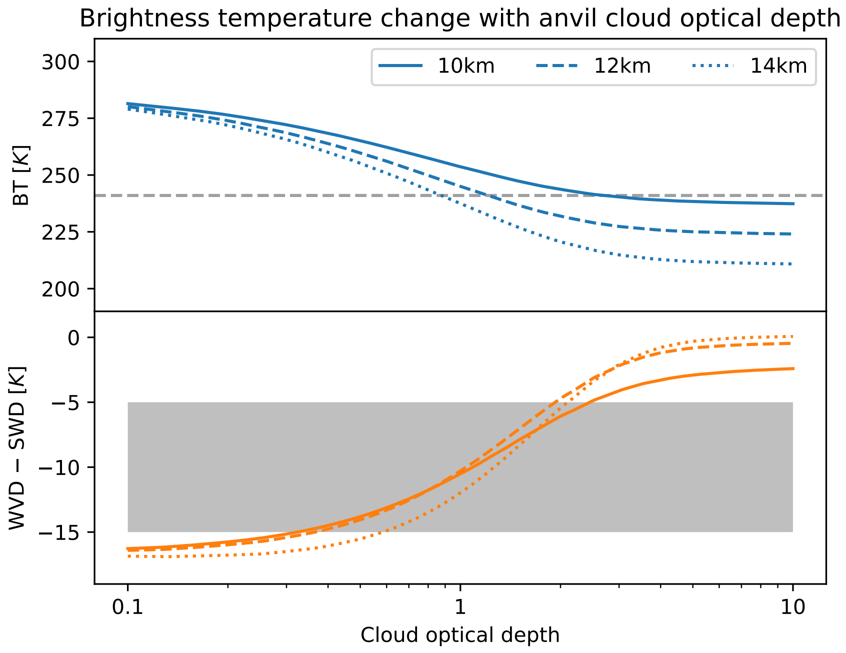

Figure S1. Simulated sensitivity of the SEVIRI 10.8 µm BT (top) and WVD minus SWD (bottom) to anvil clouds of varying optical thickness (at 550 nm) at heights of 10, 12 and 14 km. The LibRadTran model was used to estimate the observed radiances, and all simulations used ice clouds with cloud top particle effective radius of 20 µm. The grey dashed line shows the 241 K BT, which, although commonly used as a threshold for anvil detection in satellite imagery, shows large sensitivity of the minimum optical thickness detected with the height of the anvil cloud. The grey region in the lower plot shows the range of temperatures in which the edge of the anvil is detected, as described in Jones et al. (2023). Similar sensitivity is found for all three cloud heights, with the optical depths of around 1–1.5 seen in the middle of the hysteresis region. The median minimum retrieved optical depth of all tracked anvils in our dataset is found to be 1.45, although this value is biased high by the inability to retrieve optical depth accurately at night-time.

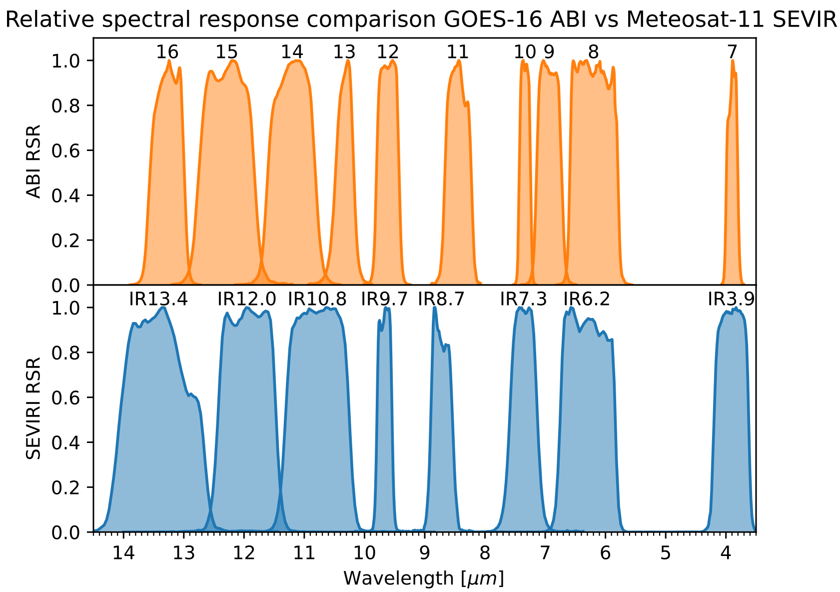

Figure S2. Comparison of the relative spectral response (RSR) functions for the GOES-16 ABI and Meteosat-11 SEVIRI thermal IR channels. The LW window channels on ABI (channels 13 and 15) have a wider spacing than those of SEVIRI (channels IR10.8 and IR12.0). This wider spacing allows ABI to be more sensitive to the emissivity difference of ice clouds at wavelengths between 10 and 12 mum, and so it is better able to detect thin cirrus clouds.

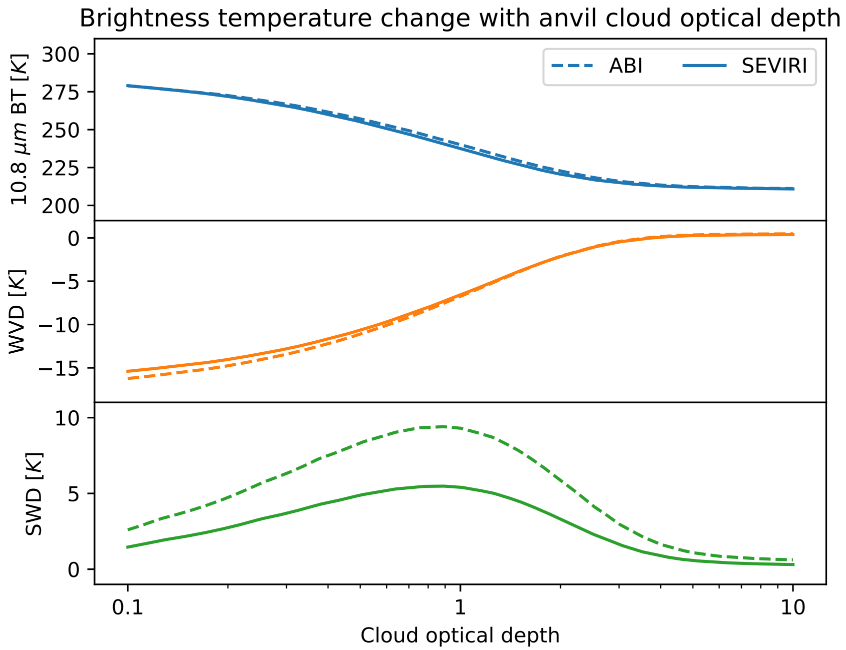

Figure S3. Comparison of the sensitivities of ABI (dashed lines) and SEVIRI (solid lines) to anvil clouds of different cloud optical thicknesses (at 550 nm), using the LibRadTran simulation of an anvil at 14 km as used in fig. S1. The 10.8 µm BT (top panel) and WVD (middle panel) show very similar values for both instruments. The simulations of the SWD (bottom panel) show that SEVIRI is only about half as sensitive as ABI to thin ice clouds.

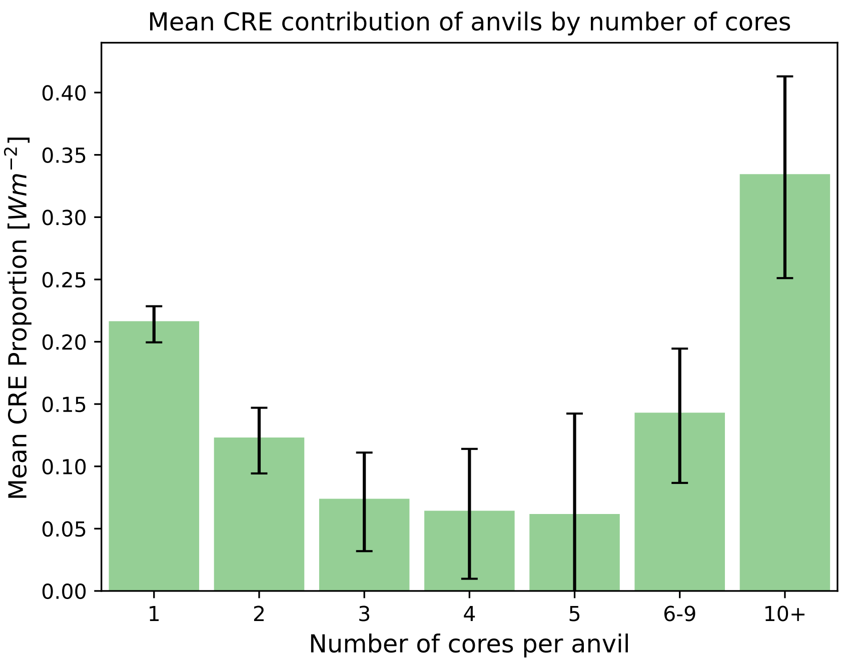

Figure S4. The contribution to the net CRE for anvils with differing numbers of cores, which is defined as the sum of the absolute CRE multiplied by anvil area for all anvils with that number of cores, divided by the total for all anvils. Due to the large variance and magnitude of the CRE of isolated DCCs, they have a large impact on the net CRE balance despite their small area.