Supporting Information for "H_2O windows and CO_2 radiator fins: a clear-sky explanation for the peak in ECS"

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1. Figures S1 to S2

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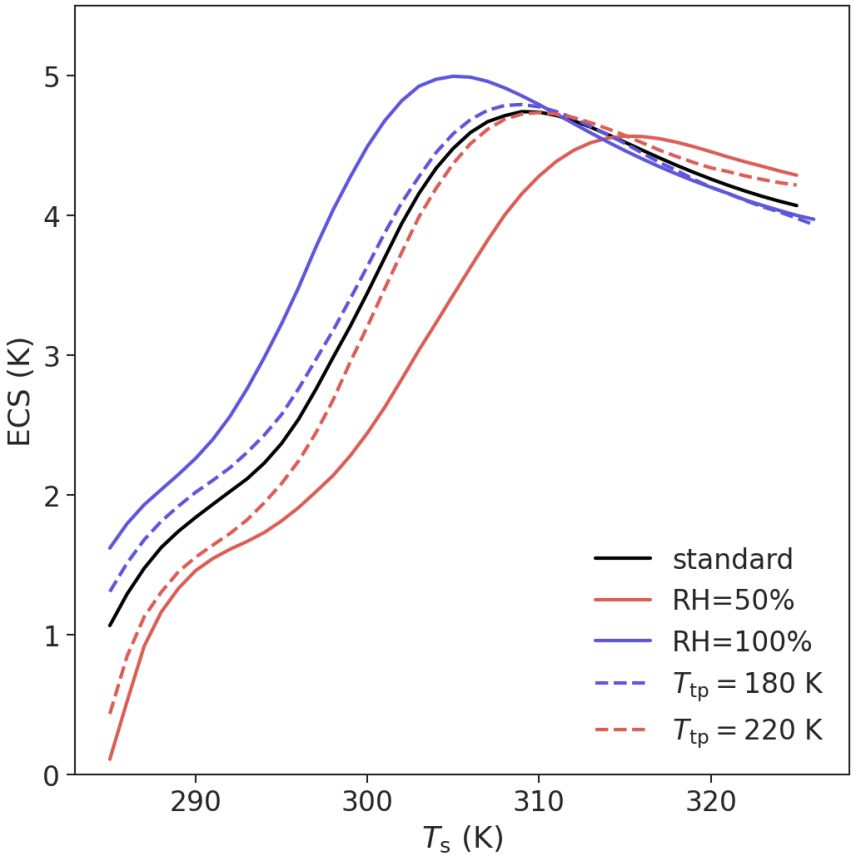

Figure S1. ECS as a function of T_s from our simple climate model for varied tropospheric RH and tropopause temperature T_{tp}.

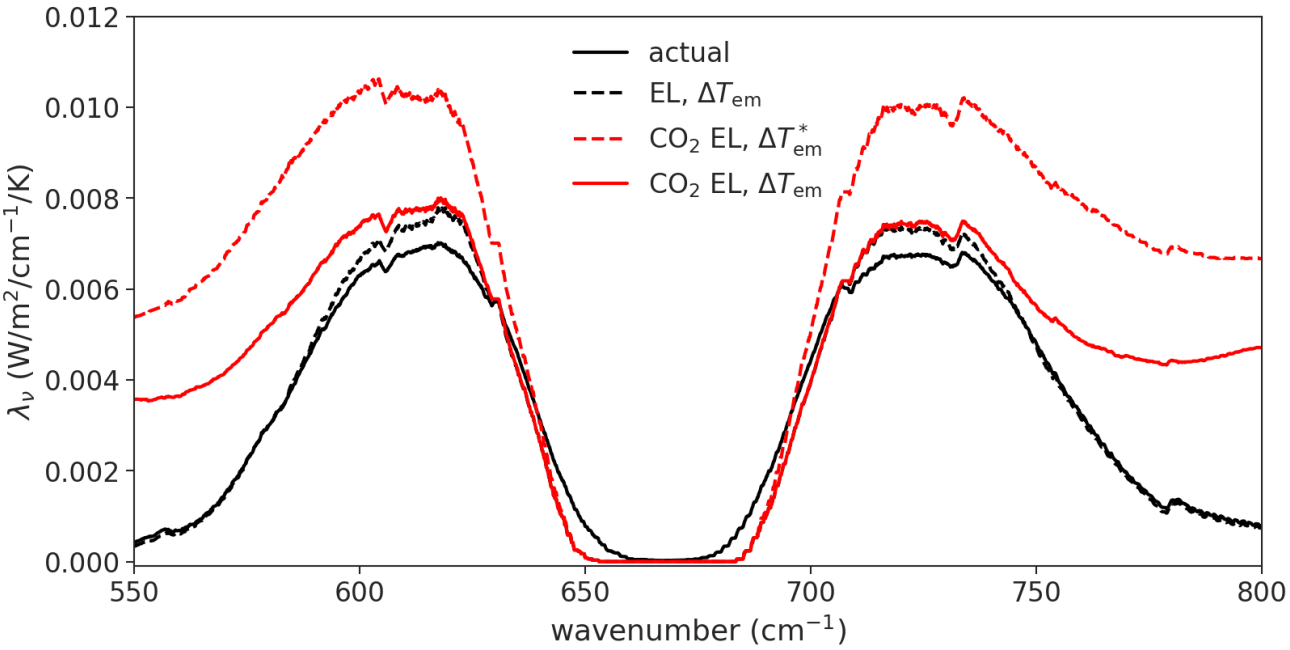

Figure S2. For $T_s = 305$ K, a comparison of the smoothed λ_ν in the vicinity of 15 μm (solid black line) to that predicted by the emission-level approximation (eqn. 7 of main text; dashed black line). The solid red line is the estimate of λ_ν provided by calculating emission levels using CO_2 optical depths only; this leads to a significant overestimate of λ_ν at the edge of the CO_2 radiator fins, where overlap with H_2O opacity damps the warming (i.e., the spectral feedback is transitioning to Simpsonian behavior). The dashed red line shows the estimate of λ_ν provided by calculating emission levels from CO_2 optical depths only and also assuming that emission levels are fixed in pressure (i.e., assuming that ΔT_{em} is governed by moist-adiabatic warming at fixed p, which we denote in the figure as ΔT^*_{em}); this shows that the explicit temperature-scaling of CO_2 absorption coefficients damps the warming of emission levels even in the CO_2-dominated portions of the radiator fins.