Supporting Information (SI) for

Assessing global and local radiative feedbacks based on AGCM simulations for 1980-2014/2017

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Table S1. A list of the 13 AMIP6 models analyzed in this study, in which 4 models (bold) provide the necessary diagnostics for ERF as of February 2020.

| Model               | Institution                                                                 |
|---------------------|-----------------------------------------------------------------------------|
| BCC-ESM1            | Beijing Climate Center (BCC), China Meteorological Administration, China     |
| CanESM5             | Canadian Centre for Climate Modelling and Analysis (CCCma), Canada           |
| CESM2               | National Center for Atmospheric Research (NCAR), United States               |
| E3SM-1-0            | Energy Exascale Earth System Model (E3SM), the U.S. Department of Energy’s (DOE’s) Office of Biological and Environmental Research (BER), United States |
| EC-Earth3-Veg       | European community Earth-System Model                                      |
| FGOALS-f3-L         | The State Key Laboratory of Numerical Modeling for Atmospheric Sciences and Geophysical Fluid Dynamics (LASG), China |
| GFDL-AM4            | Geophysical Fluid Dynamics Laboratory (GFDL), United States                  |
| GFDL-CM4            | Geophysical Fluid Dynamics Laboratory (GFDL), United States                  |
| IPSL-CM6A-LR        | L’Institut Pierre-Simon Laplace (IPSL), France                             |
| MIROC6              | Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Atmosphere and Ocean Research Institute (The University of Tokyo), and National Institute for Environmental Studies, Japan |
| MRI-ESM2-0          | Meteorological Research Institute (MRI), Japan                              |
| NorESM2-LM          | Norwegian Climate Centre (NCC), Norway                                      |
| SAM0-UNICON         | Seoul National University (SNU), South Korea                                 |
Table S2. The numerical values for Figure 4a.

|          | P    | LR   | WV   | LR+WV | A    | C    | C_SW | C_LW | Res  | NET  |
|----------|------|------|------|-------|------|------|------|------|------|------|
| CMIP5 mean | -3.266 | -0.483 | 1.808 | 1.324 | 0.455 | 0.343 | -0.026 | 0.370 | 0.063 | -1.083 |
| CMIP6 mean | -3.283 | -0.500 | 1.834 | 1.334 | 0.454 | 0.417 | 0.099 | 0.319 | 0.080 | -1.000 |
| CESM-LE   | -3.186 | -0.541 | 1.616 | 1.076 | 0.533 | 0.521 | 0.576 | -0.055 | -0.003 | -1.059 |
| CAM5FF    | -3.226 | -0.791 | 1.750 | 0.959 | 0.337 | 0.032 | 0.117 | -0.086 | -0.128 | -2.027 |
| AMIP6 mean| -3.247 | -0.981 | 1.779 | 0.798 | 0.208 | -0.023 | -0.309 | 0.286 | 0.061 | -2.262 |

Table S3. The numerical values for Figures 4b-4g from CAM5FF. \( \Delta P \) is Planck feedback deviation from its global mean.

|          | \( \Delta P \) | LR   | WV   | LR+WV | A    | C    | Res |
|----------|----------------|------|------|-------|------|------|-----|
| Arctic   | 0.514          | 1.505| 0.299| 1.803 | 1.129| -0.241| -0.136|
| Antarctic| 0.594          | 1.419| 0.243| 1.662 | 2.163| -0.266| -0.145|
| HTP      | 0.109          | 0.777| 0.621| 1.398 | 1.442| 0.309 | -0.040|
| Tropics  | -0.302         | -1.328| 2.619| 1.291 | -0.013| 0.349| -0.209|

Table S4. Same as Table S3, but for the 13 AMIP6 models ensemble mean.

|          | \( \Delta P \) | LR   | WV   | LR+WV | A    | C    | Res   |
|----------|----------------|------|------|-------|------|------|-------|
| Arctic   | 0.559          | 1.348| 0.417| 1.764 | 1.093| 0.259| -0.456|
| Antarctic| 0.755          | 1.158| 0.206| 1.364 | 1.723| -0.035| -0.079|
| HTP      | 0.112          | 0.872| 0.808| 1.680 | 1.842| 0.112| -0.281|
| Tropics  | -0.297         | -0.957| 2.644| 1.687 | -0.015| -0.066| -0.527|
Figure S1. Same as Figures 2b1-2b6 but for contour plots as a function of season and latitude.

Figure S2. Zonal-mean patterns of the sum of lapse rate feedback and water vapor feedback for shortwave (SW), longwave (LW) and net (NET=SW+LW) radiation.
Figure S3. Time series (red dots) of (a) total-cloud fraction over the tropics (30°S–30°N) and (b) low-cloud fraction over the Arctic (60°N–90°N) based on area average of annual-mean cloud fraction (%) from the CAM5FF simulation. The linear least-square regression trends (black lines) are calculated for each time series of annual mean values from 1980 to 2017.
**Figure S4.** The linear trends (K decade$^{-1}$) of surface air temperature (SAT) over the tropics, the Arctic, the Antarctic and the HTP (Himalayas-Tibetan Plateau) based on area average of 1980-2017 annual mean SAT from the CAM5FF simulation.