

Appendix D : difference between fully-coupled and atmosphere-only simulations – TOA imbalance

April 27, 2020

1 Introduction

We show here maps of TOA imbalance (net, SW, and LW) (all downward) and near-surface (2 m) air temperature. The plots show fields for the annual mean, but also for the separate seasons December-January-February (DJF), March-April-May (MAM), June-July-August (JJA), and September-October-November (JJA).

We show results for the experiments for which both a fully-coupled and atmosphere-only simulation exists : piControl/piClim-control on $2^\circ \times 2^\circ$, piControl/piClim-control on $1^\circ \times 1^\circ$, historical/histSST on $2^\circ \times 2^\circ$, and ssp370/ssp370SST on $2^\circ \times 2^\circ$.

2 Results

Figure 1 shows TOA net fluxes (SW+LW, SW, LW) and near-surface (2 m) temperature for piControl/piClim-control on $2^\circ \times 2^\circ$. The main finding is that in the Arctic the negative temperature bias in DJF seems to be related to the positive downward TOA LW bias, whereas in JJA the positive temperature bias seems to be related with a positive downward SW bias.

The Figures 2, 3 and 4 seem to show the same features.

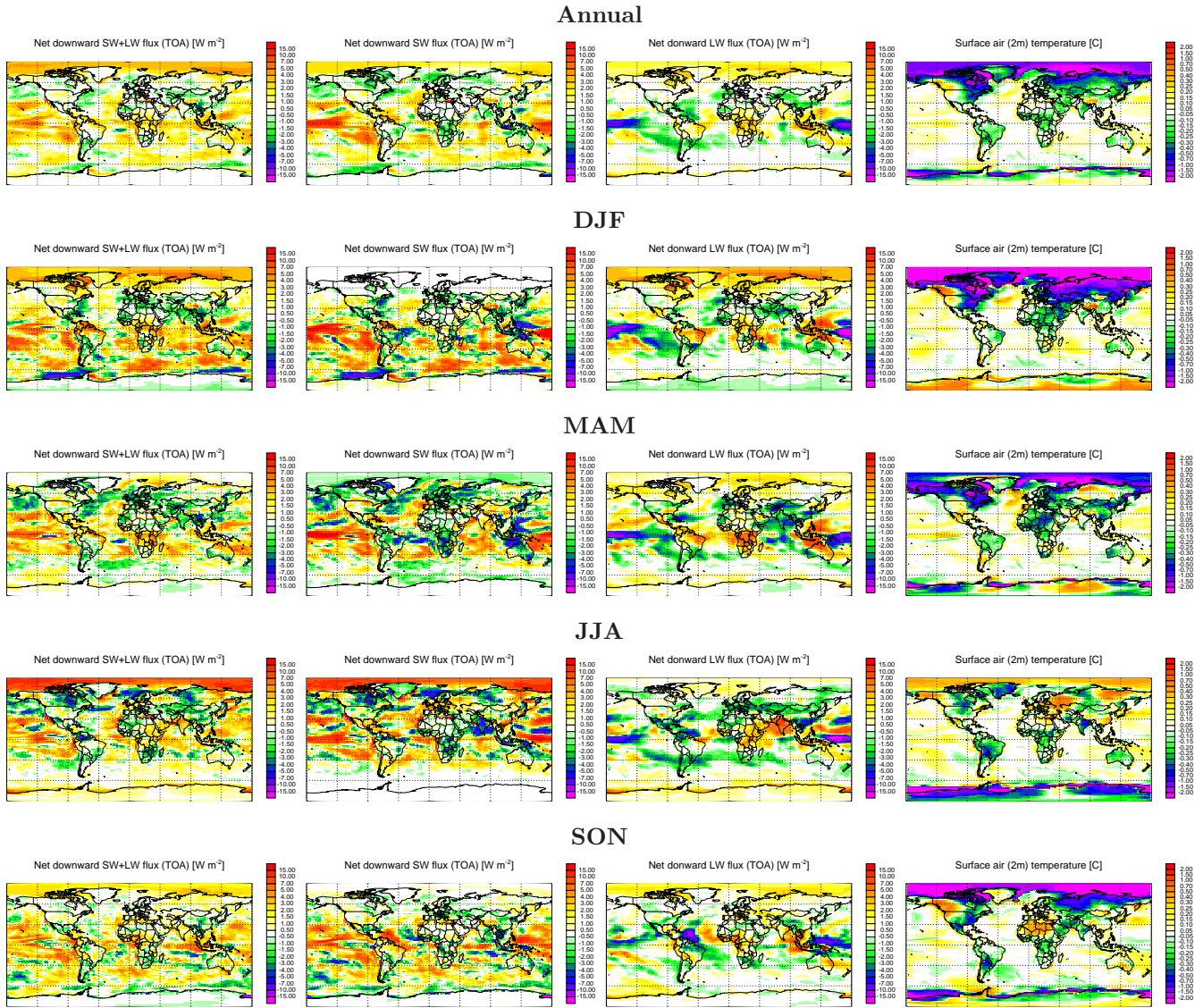


Figure 1: TOA imbalance for SW+LW (left column), SW (middle column), and LW (right column) averaged over whole year (upper row), DJF (second row), MAM (third row), JJA (fourth row), and SON (bottom row). Shown are 30-year averaged difference between piClim-control (fixed-SST) and piControl (fully-coupled) in 2x2.

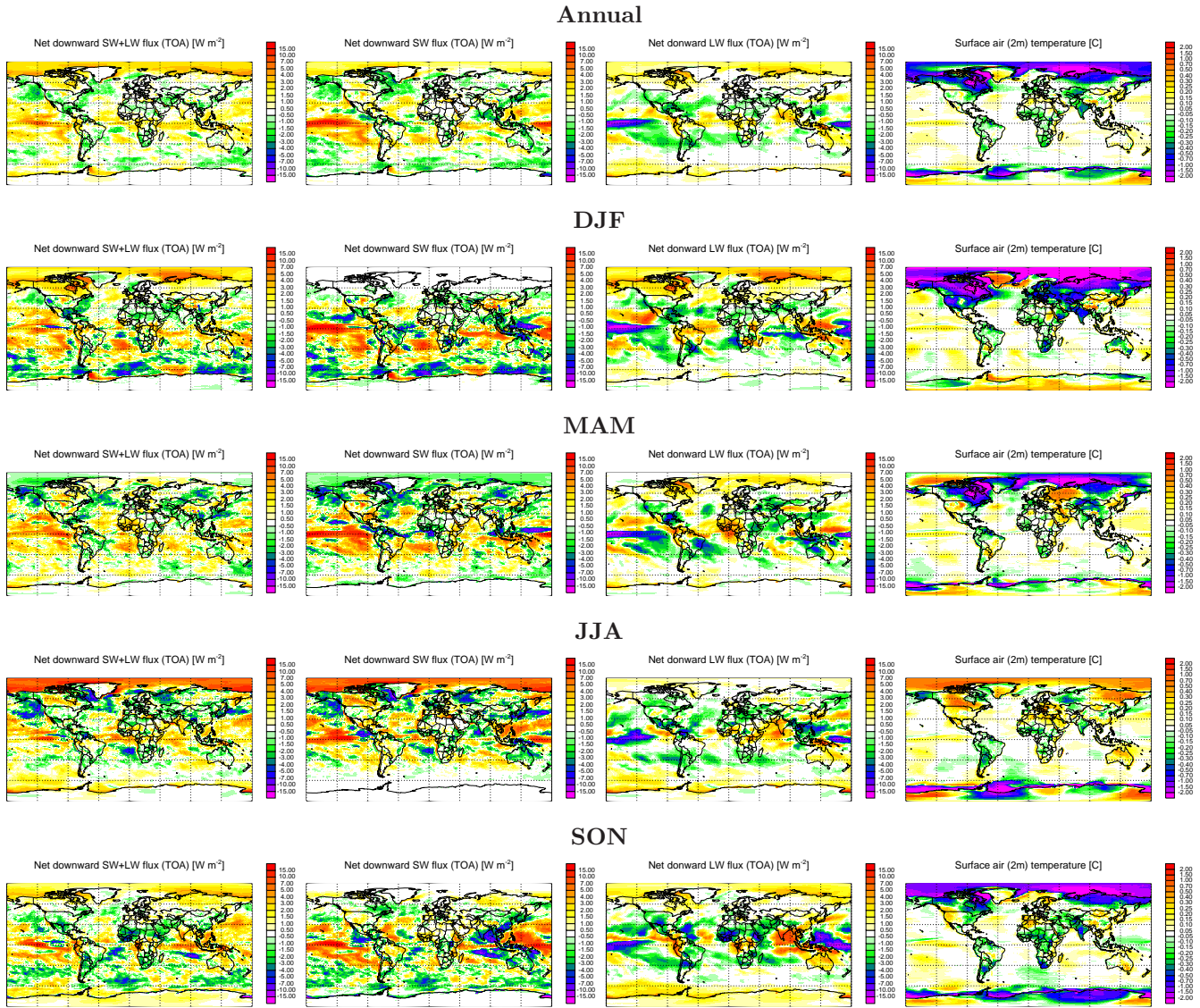


Figure 2: TOA imbalance for SW+LW (left column), SW (middle column), and LW (right column) averaged over whole year (upper row), DJF (second row), MAM (third row), JJA (fourth row), and SON (bottom row). Shown are 30-year averaged difference between piClim-control (fixed-SST) and piControl (fully-coupled) in 1x1.

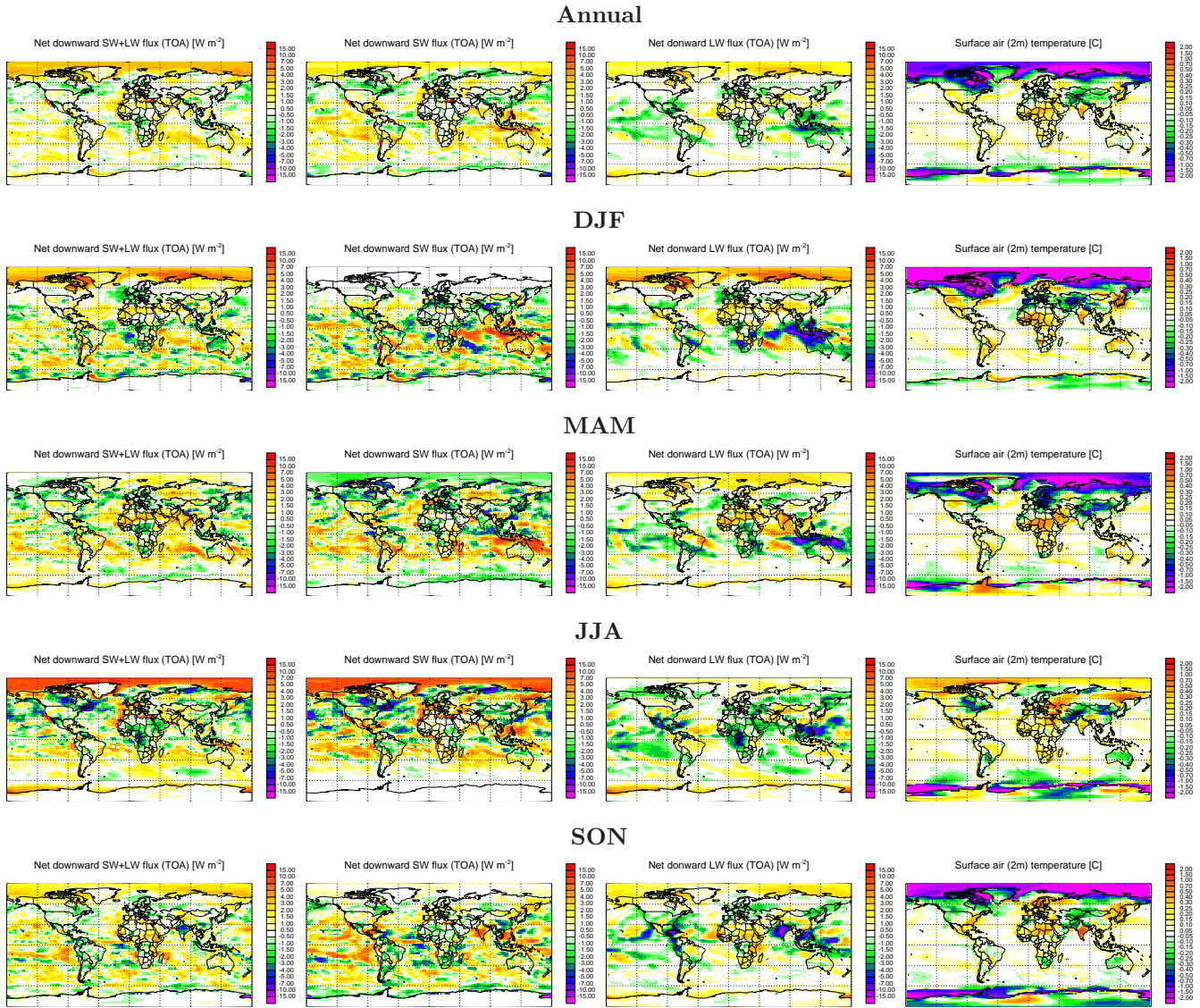


Figure 3: TOA imbalance for SW+LW (left column), SW (middle column), and LW (right column) averaged over whole year (upper row), DJF (second row), MAM (third row), JJA (fourth row), and SON (bottom row). Shown are 30-year averaged difference (period 1850–1879) between histSST (fixed-SST) and historical (fully-coupled) in 2x2.

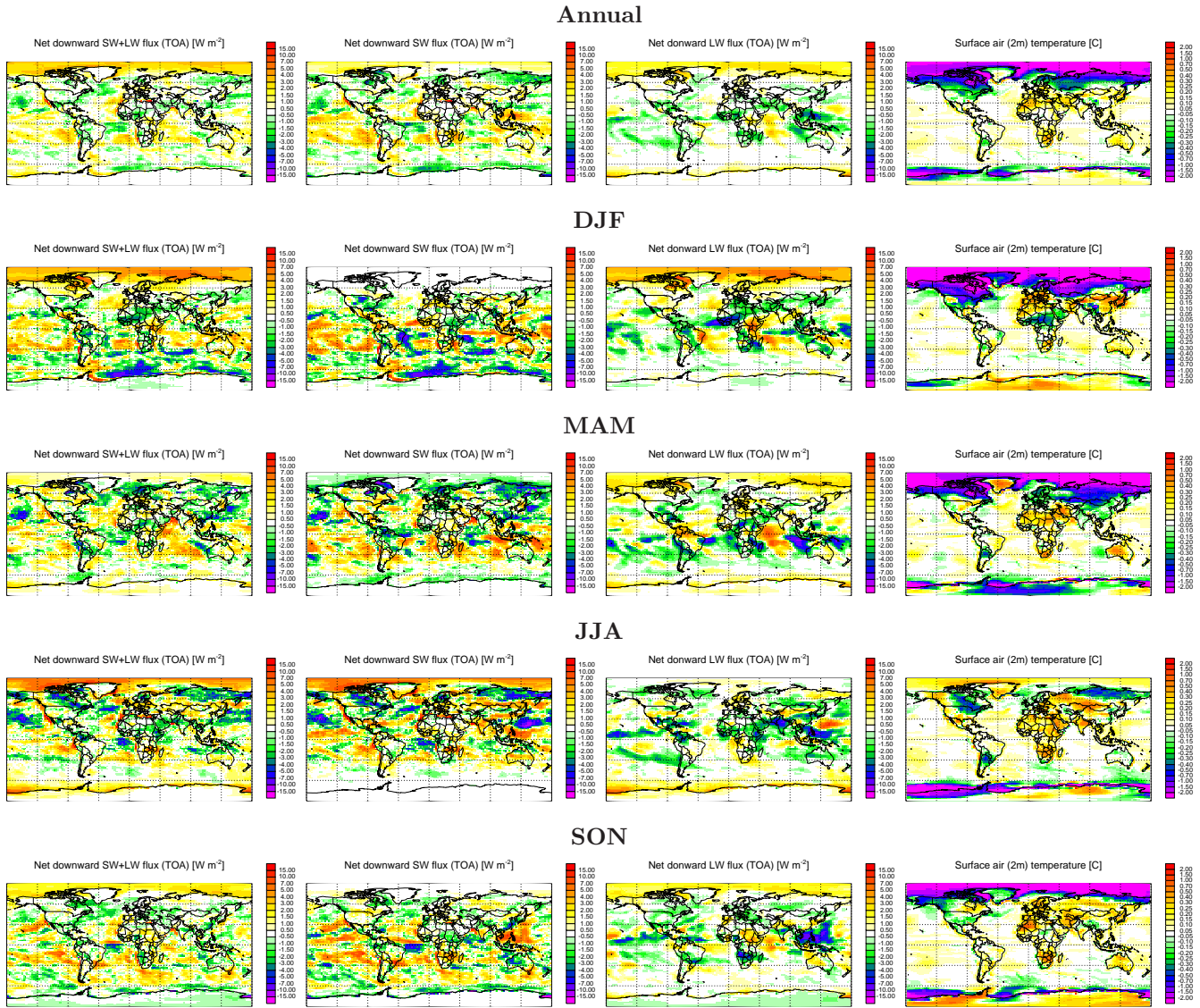


Figure 4: TOA imbalance for SW+LW (left column), SW (middle column), and LW (right column) averaged over whole year (upper row), DJF (second row), MAM (third row), JJA (fourth row), and SON (bottom row). Shown are 30-year averaged difference (period 1985–2014) between histSST (fixed-SST) and historical (fully-coupled) in 2x2.