Future excess changes in cold extremes (2070-2099 - 1950-1979)
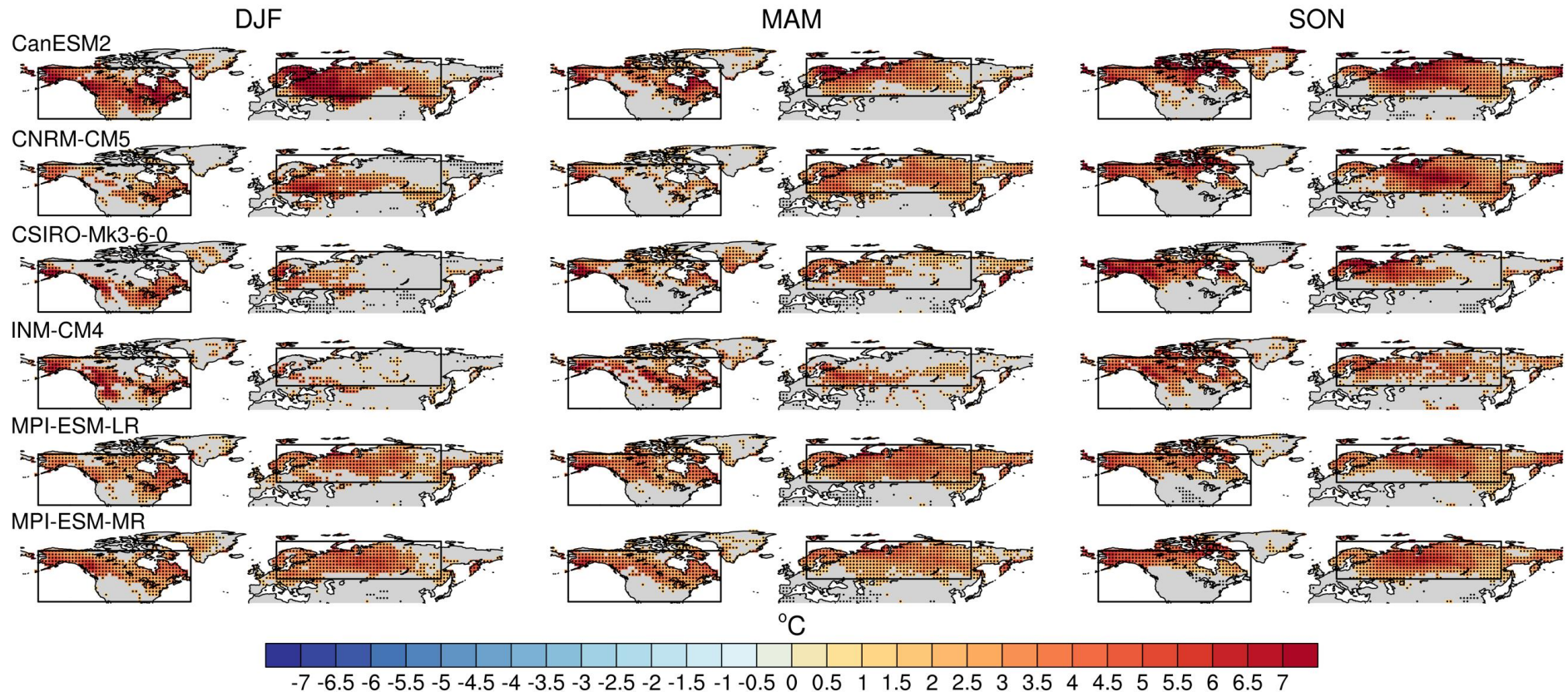

Figure S1: Boxed regions used for calculating area-averages for the scatter plots and correlations in Figs. 7-9. Two regions are used: North America and northern Eurasia. The criteria specifies to only include grid cells which are both significant and that have future excess changes exceeding 1°C.

Future changes in temperature advection (3 day average prior to day of extreme)
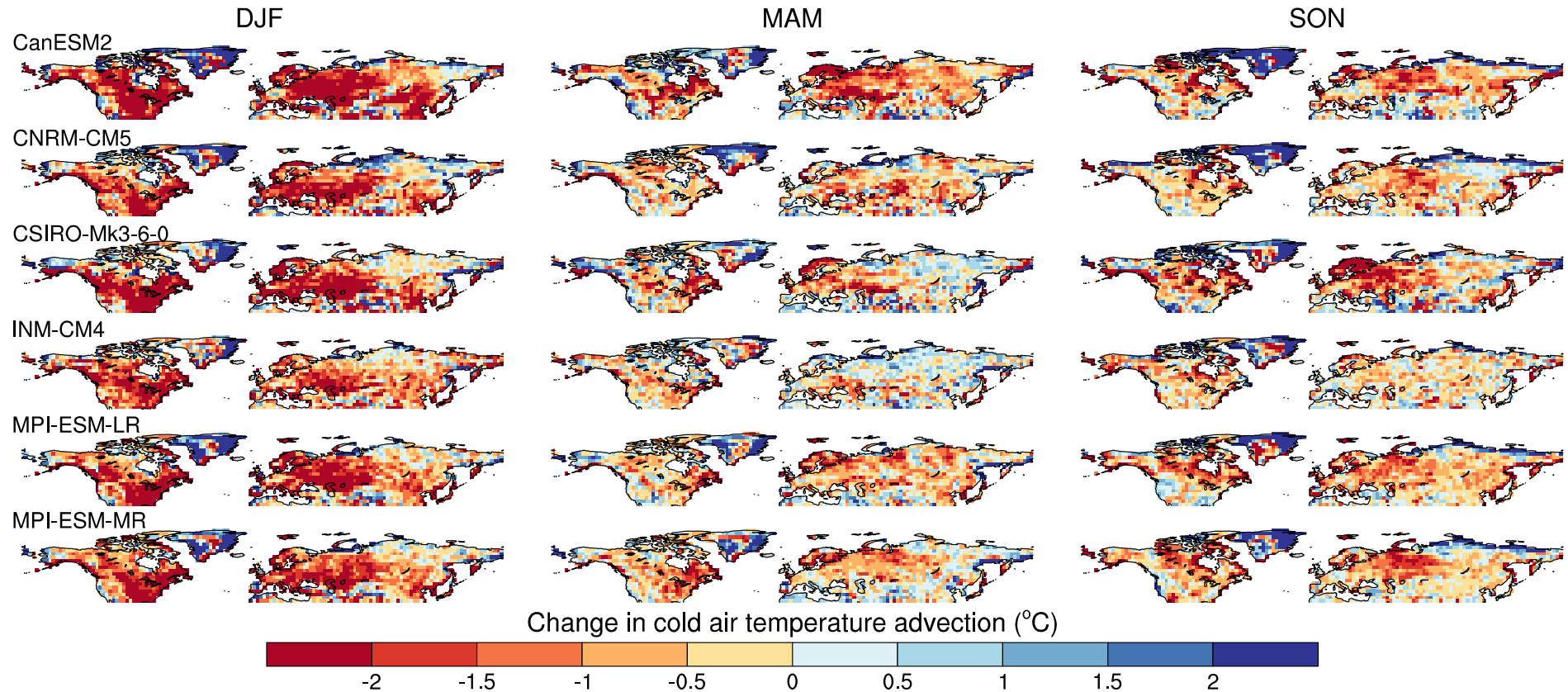

Figure S2: Future changes (2070-2099 – 1950-1979) in actual cold air temperature advection, calculated using the average values of for the three days prior to the day the annual seasonal minimum occurs.
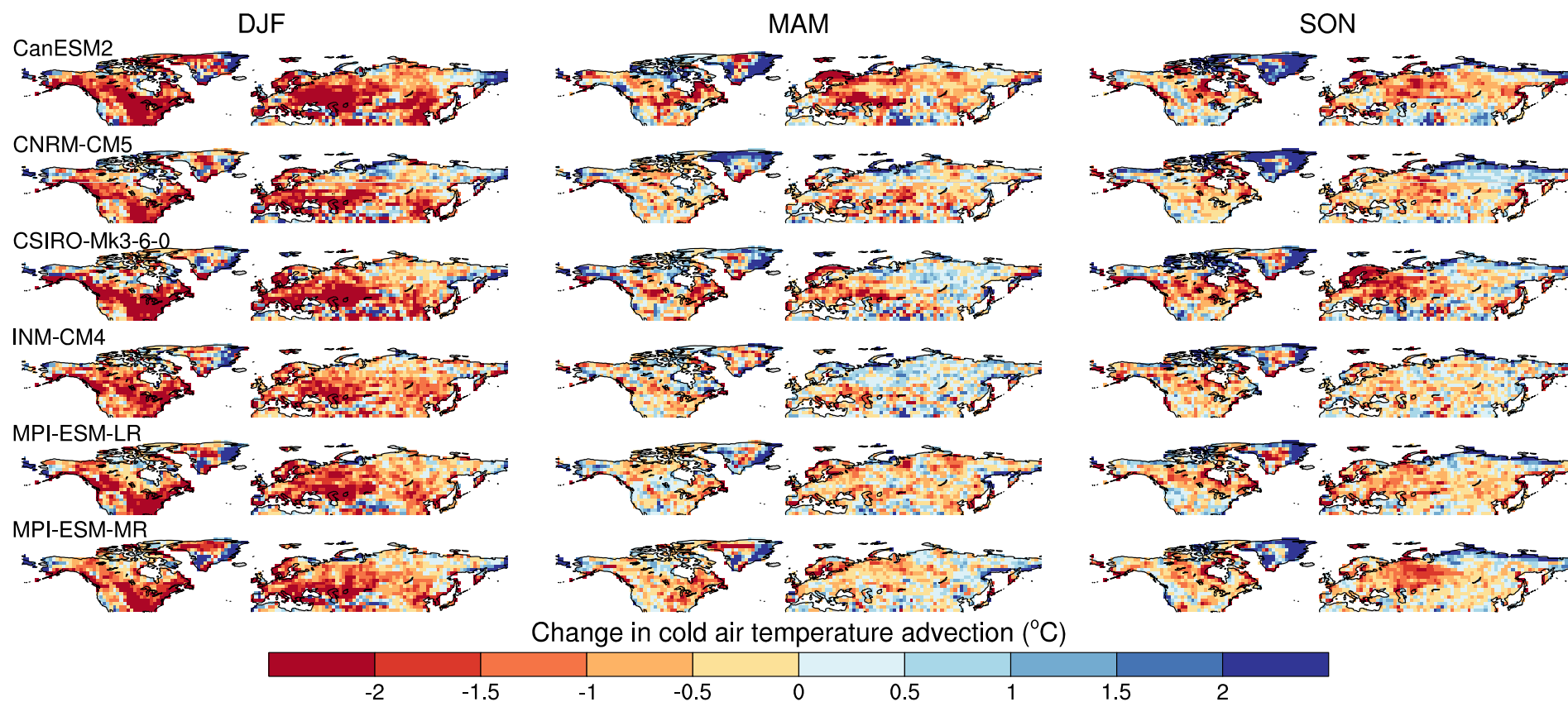
Figure S3: As Fig. S2, but for excess cold air temperature advection.

Future changes in snow cover (on day of extreme)

DJF   MAM   SON

CanESM2

CNRM-CM5

CSIRO-Mk3-6-0

INM-CM4

MPI-ESM-LR

MPI-ESM-MR

% of snow cover change

-48 -44 -40 -36 -32 -28 -24 -20 -16 -12 -8 -4 0 4 8 12 16 20 24 28 32 36 40 44 48
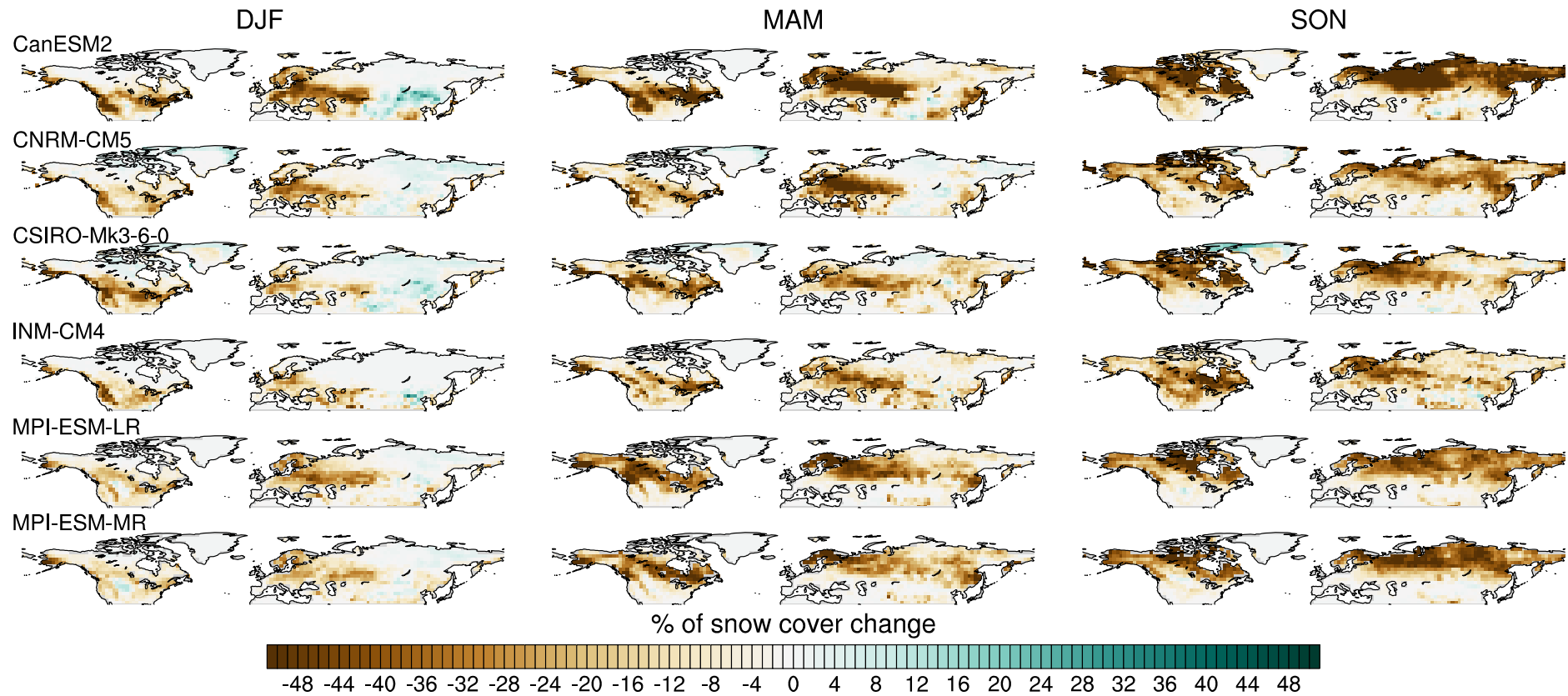
Figure S4: As Fig. S2, but for future changes in actual snow cover, calculated using values of snow cover for the day the annual seasonal minimum occurs only.

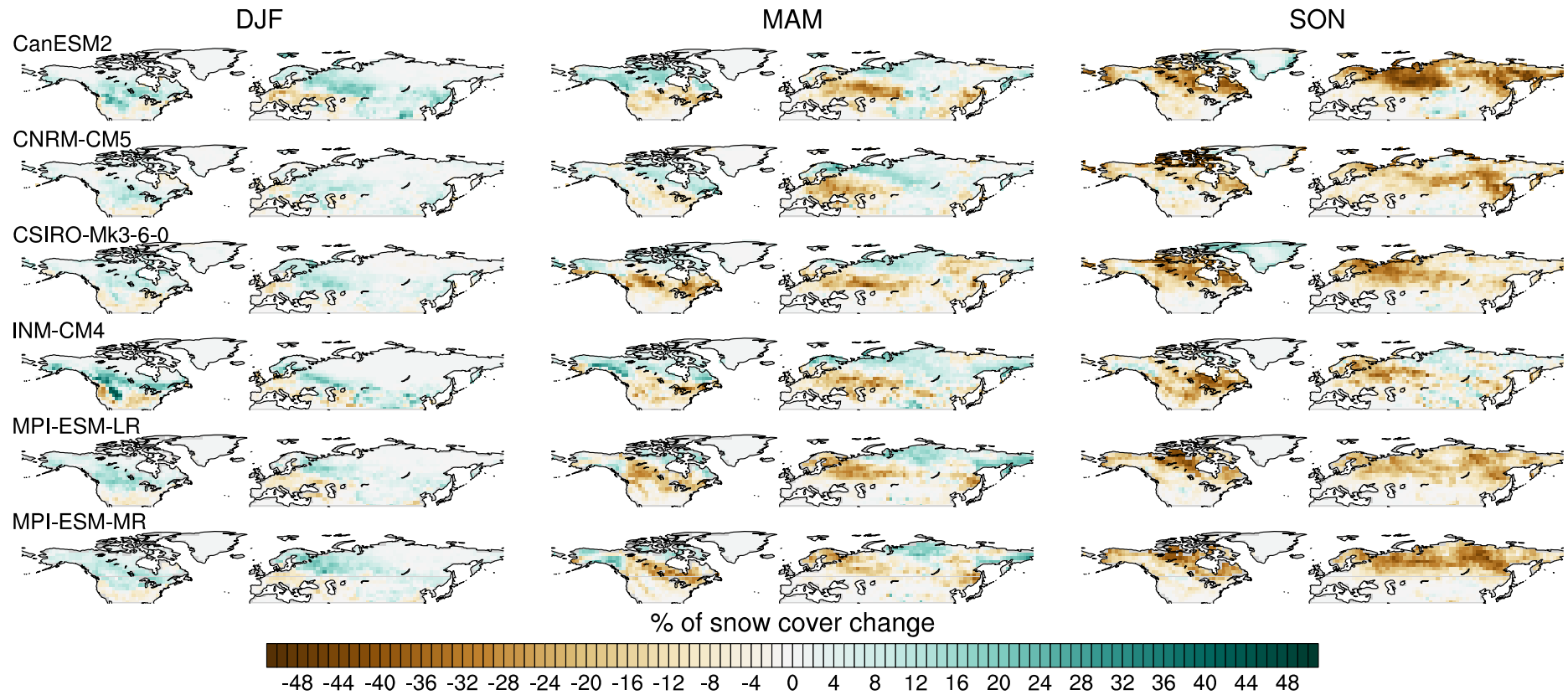# Future excess changes in snow cover (on day of extreme)

Figure S5: As Fig. S4, but for excess snow cover.
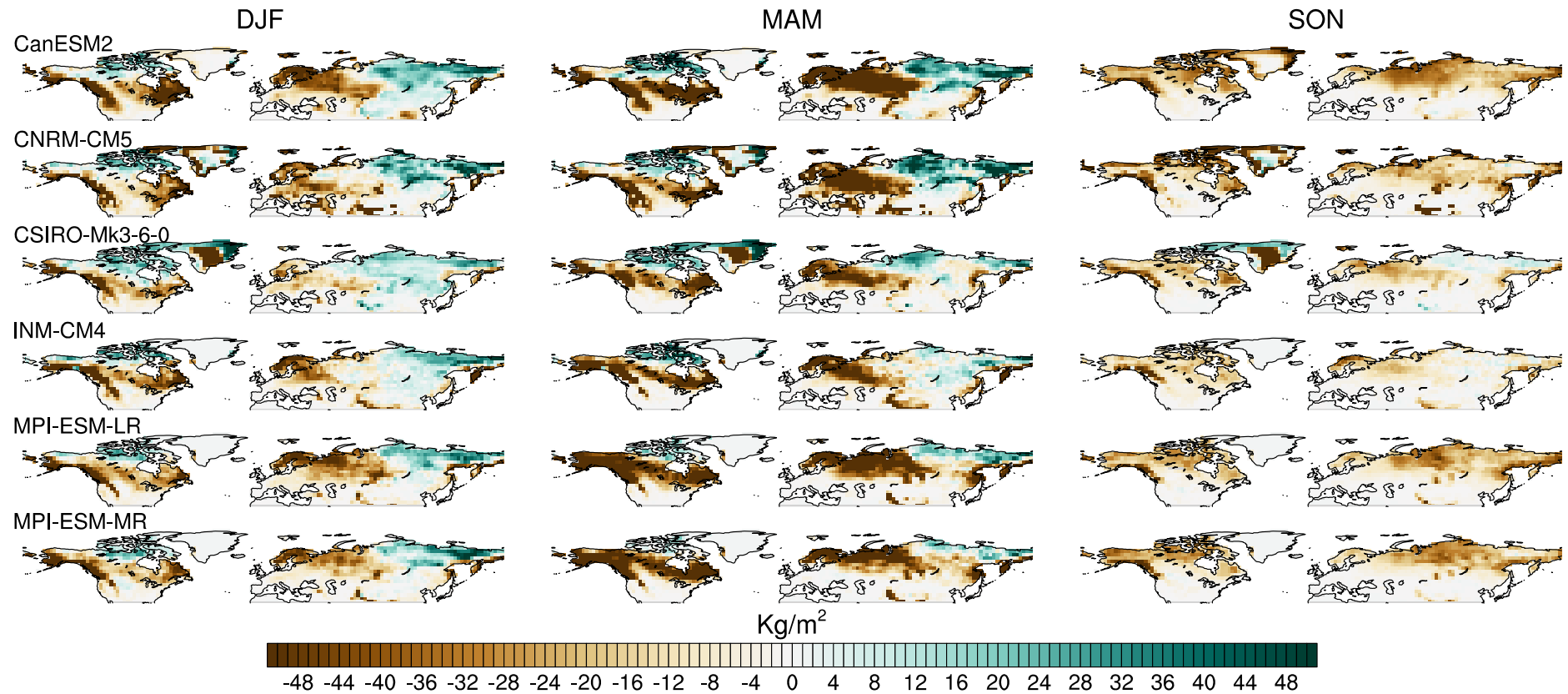
Future changes in snow amount (on day of extreme)

Figure S6: As Fig. S4, but for actual snow amount.

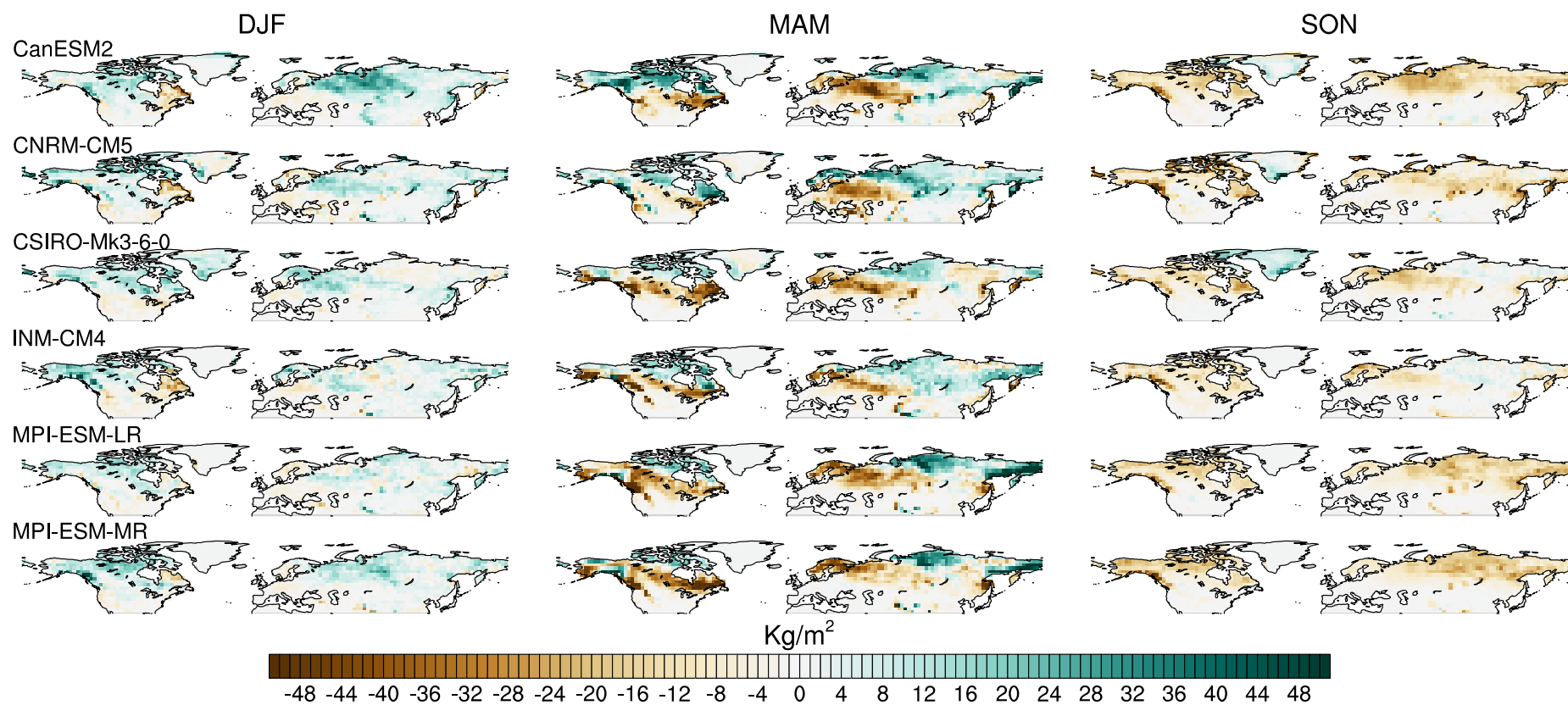# Future excess changes in snow amount (on day of extreme)

DJF　　　　　　　　　　　MAM　　　　　　　　　　　SON

CanESM2

CNRM-CM5

CSIRO-Mk3-6-0

INM-CM4

MPI-ESM-LR

MPI-ESM-MR

Kg/m^2

-48 -44 -40 -36 -32 -28 -24 -20 -16 -12 -8 -4 0 4 8 12 16 20 24 28 32 36 40 44 48

Figure S7: As Fig. S4, but for excess snow amount.

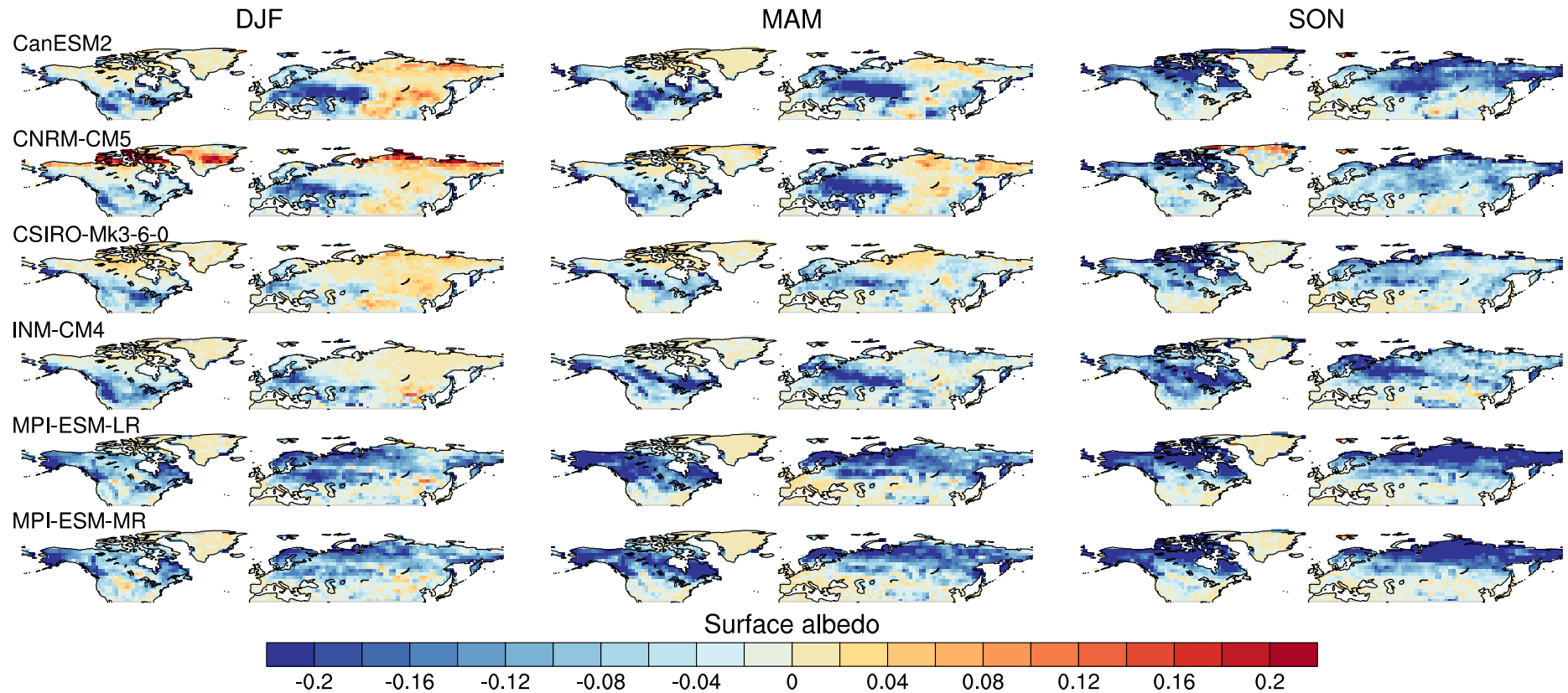# Future changes in albedo (on day of extreme)

Figure S8: As Fig. S4, but for actual surface albedo.
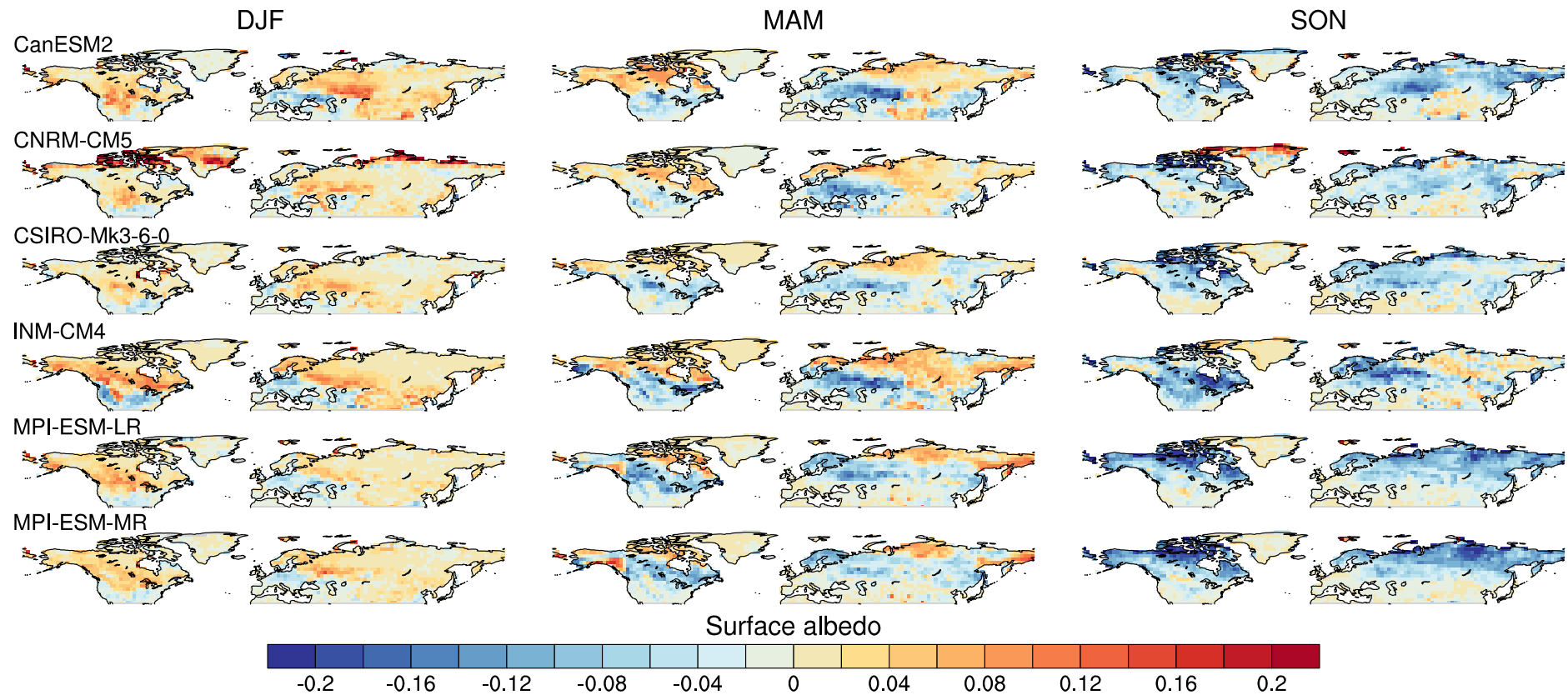
Future excess changes in albedo (on day of extreme)

Figure S9: As Fig. S4, but for excess surface albedo.

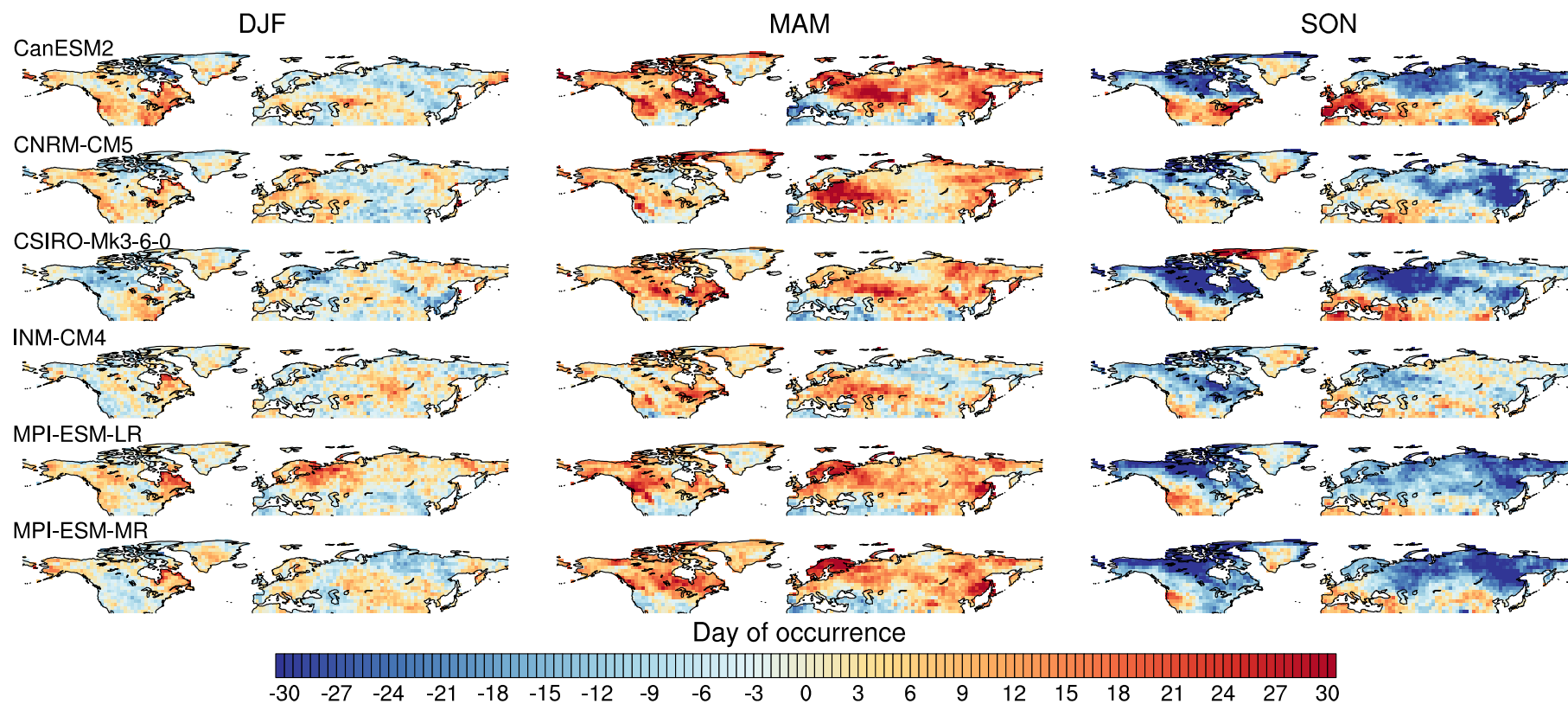# Future changes in the timing of cold extremes

Figure S10: Future changes in the timing of the anomalously coldest days in the season for December – February, March – May and September – November. Negative values indicate grid cells where the cold extremes are projected to occur earlier in the season, and positive values show where cold extremes are projected to occur later in the season.