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Supplement of

Biogeophysical impacts of forestation in Europe: first results from the LUCAS (Land Use and Climate Across Scales) regional climate model intercomparison

Edouard L. Davin et al.

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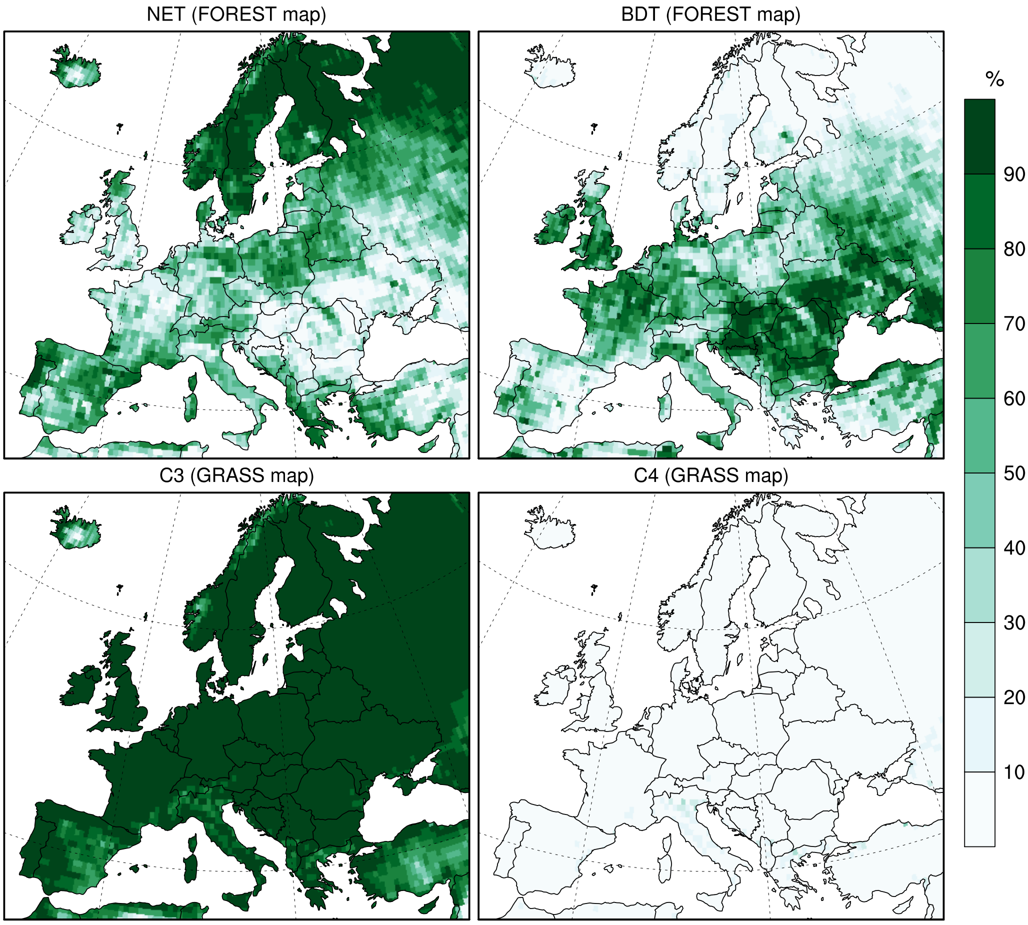
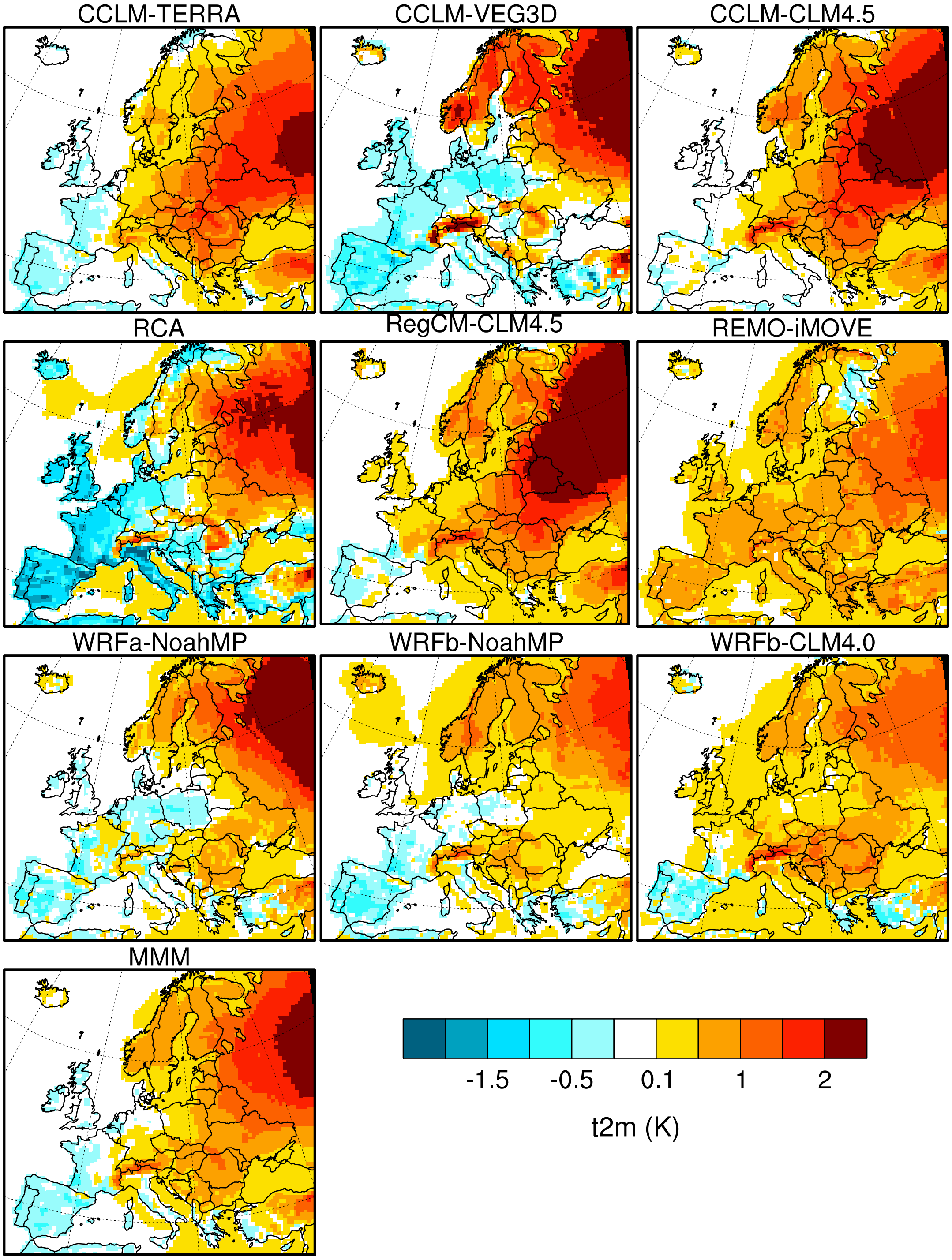
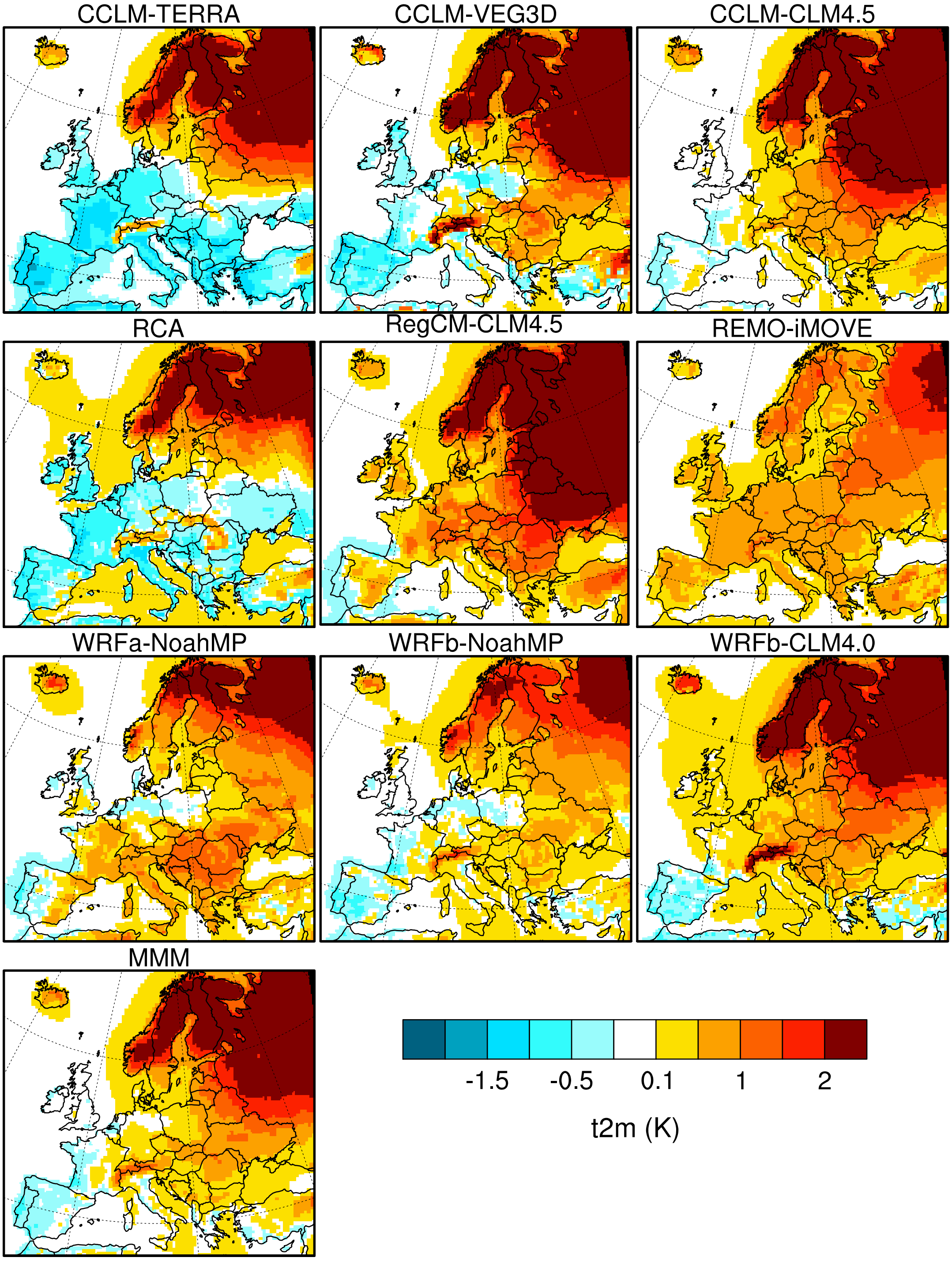


Figure S1. Vegetation maps used in the GRASS and FOREST simulations. NET = needleleaf evergreen trees; BDT = broadleaf deciduous trees.



DJF

Figure S2. 2-metre temperature (FOREST minus GRASS). Here for DJF; next pages for MAM, JJA and SON.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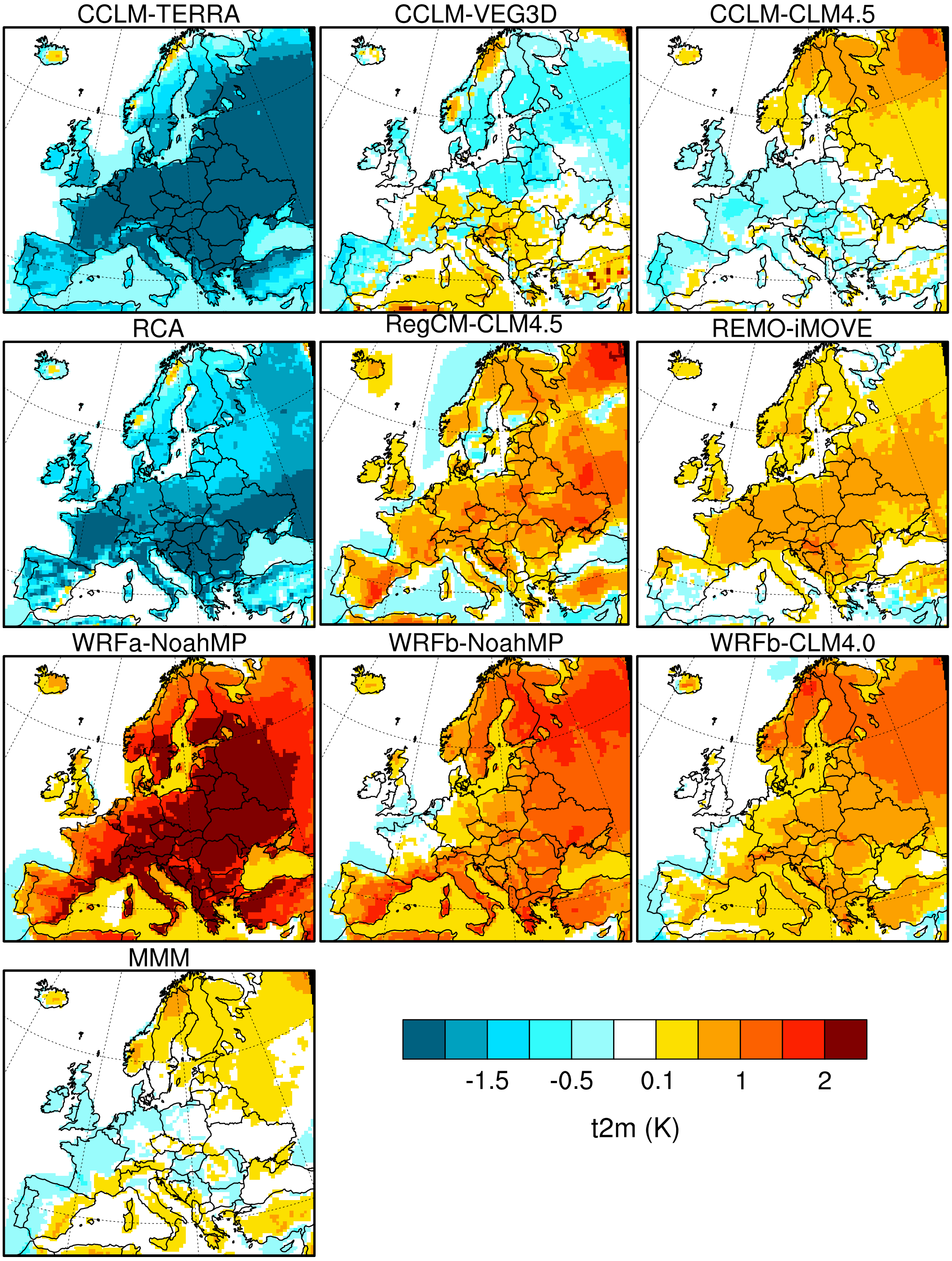
WRFb-CLM4.0
MMM
-1.5
-0.5
0.1
1
2
t2m (K)

MAM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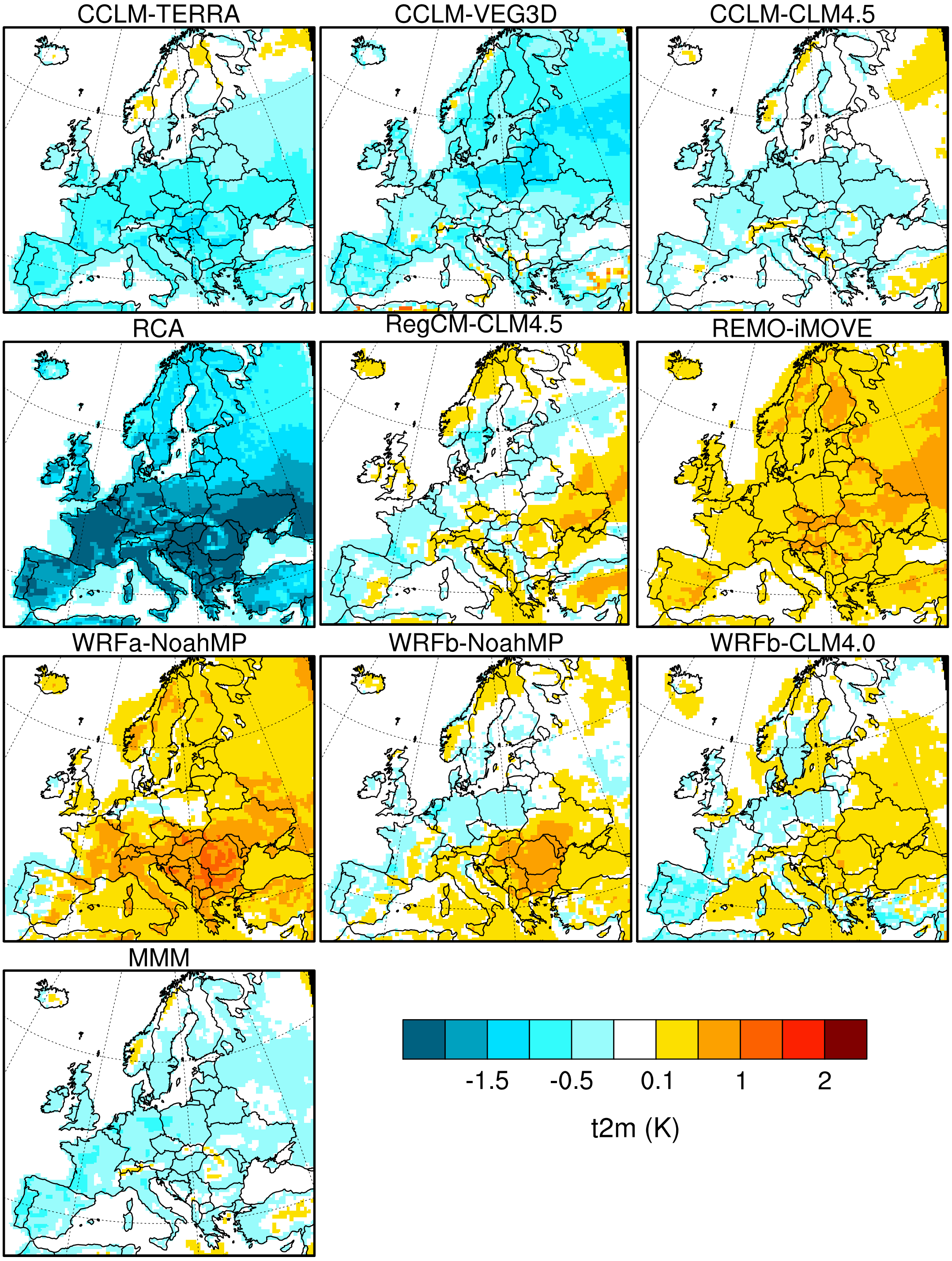
MMM
-1.5
-0.5
0.1
1
2
t2m (K)

JJA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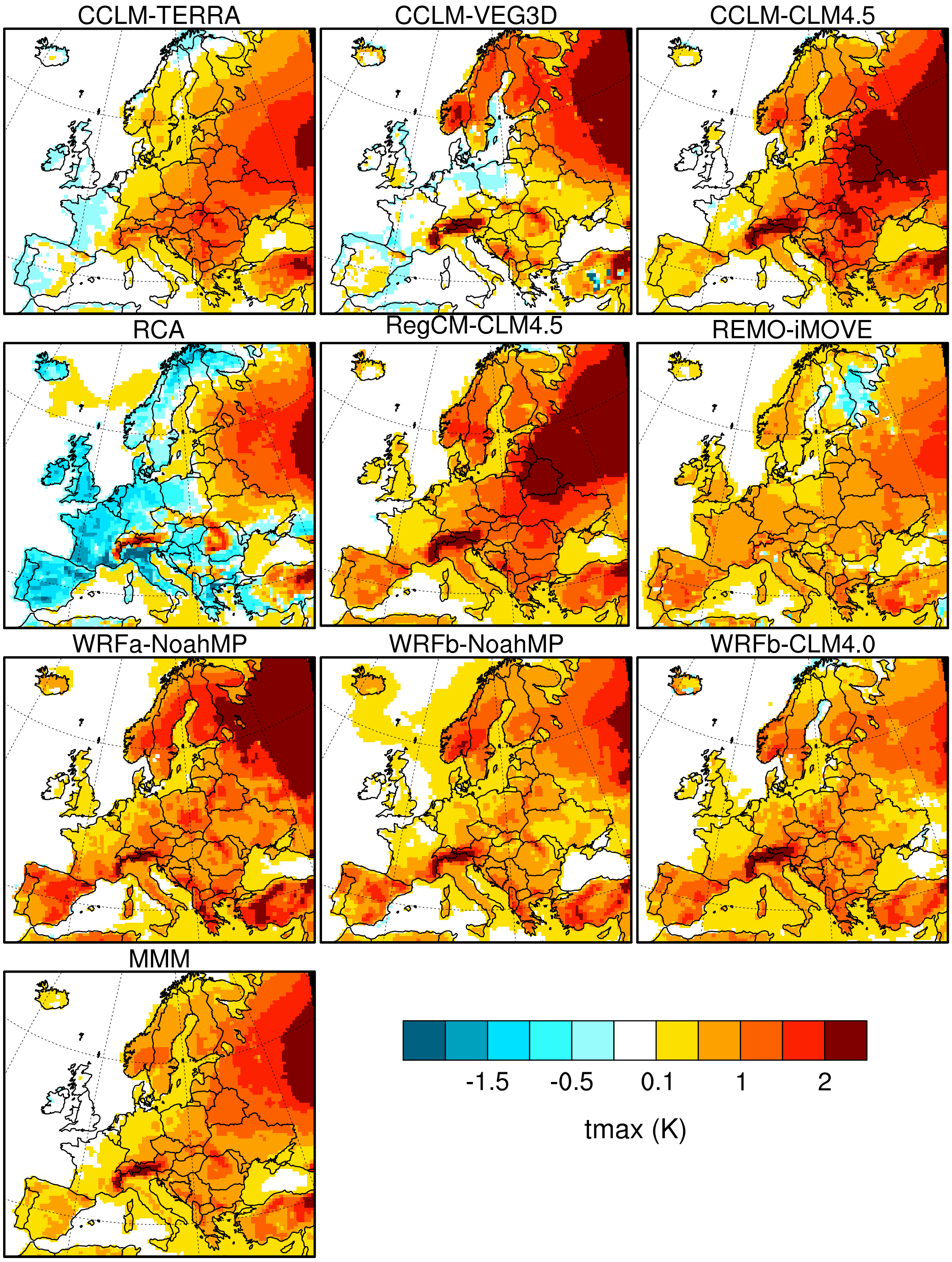
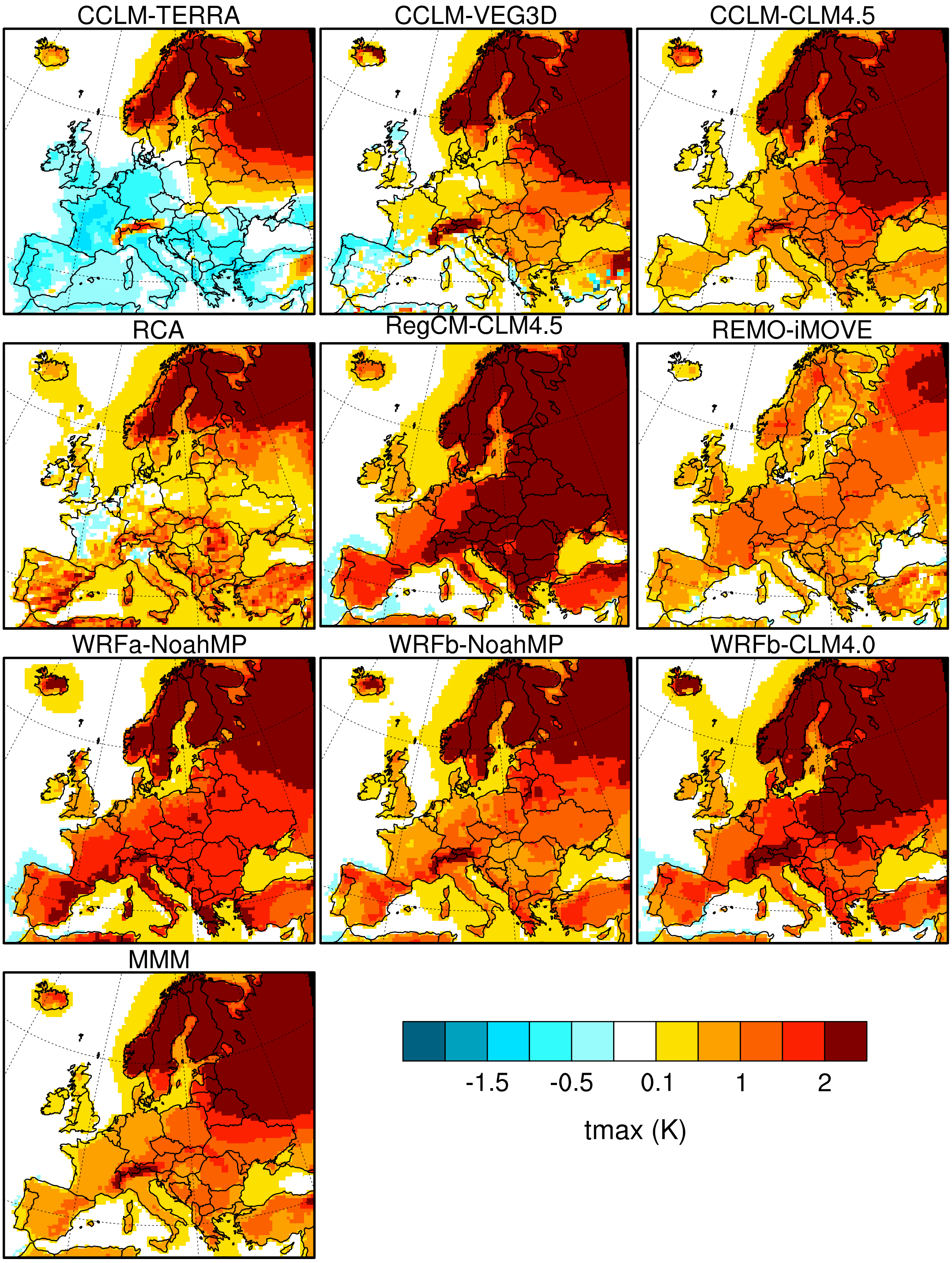
MMM
-1.5
-0.5
0.1
1
2
t2m (K)

SON



DJF

Figure S3. Daily maximum 2-metre temperature (FOREST minus GRASS). Here for DJF; next pages for MAM, JJA and SON.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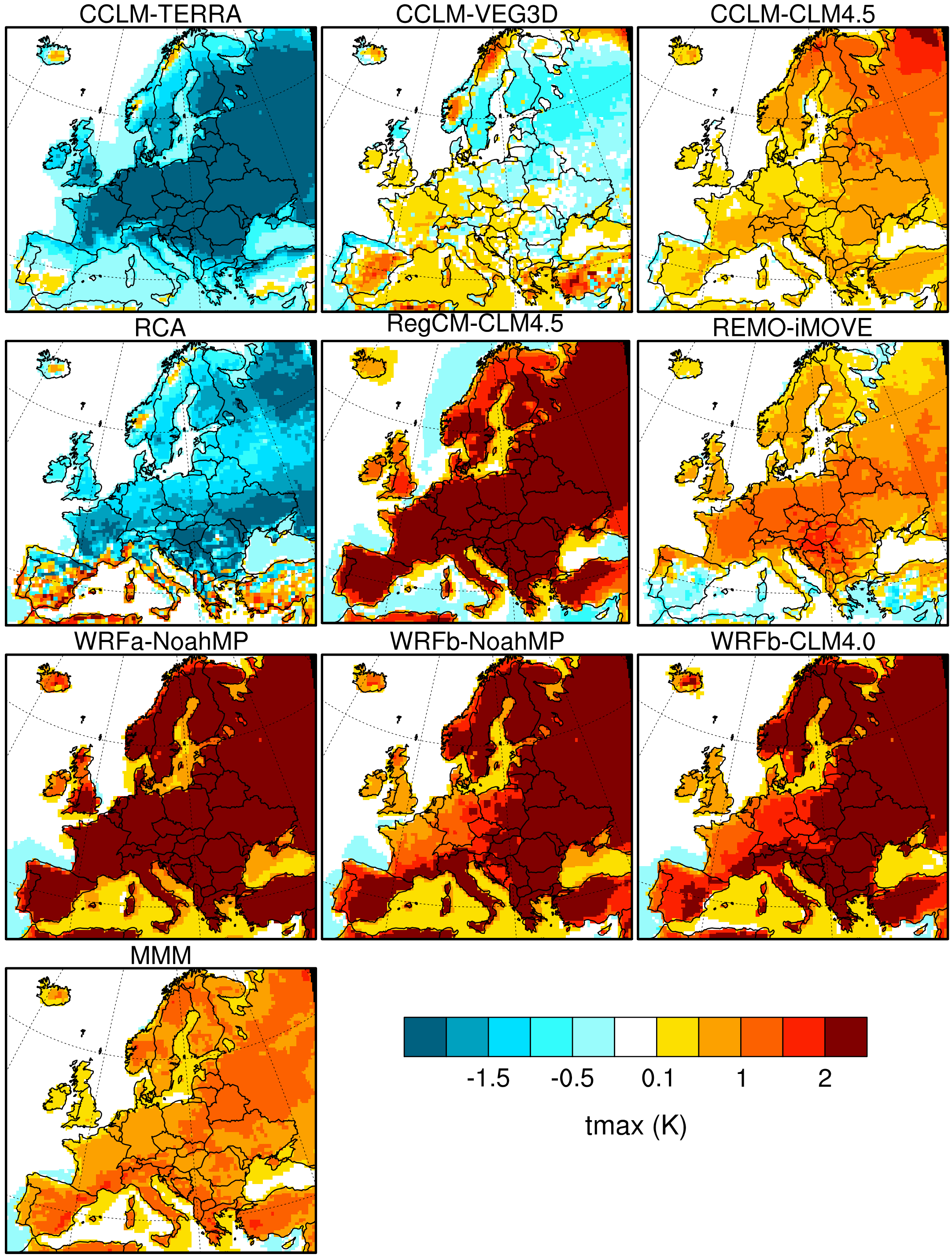
MMM
-1.5
-0.5
0.1
1
2
tmax (K)

MAM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WRFa-NoahMP
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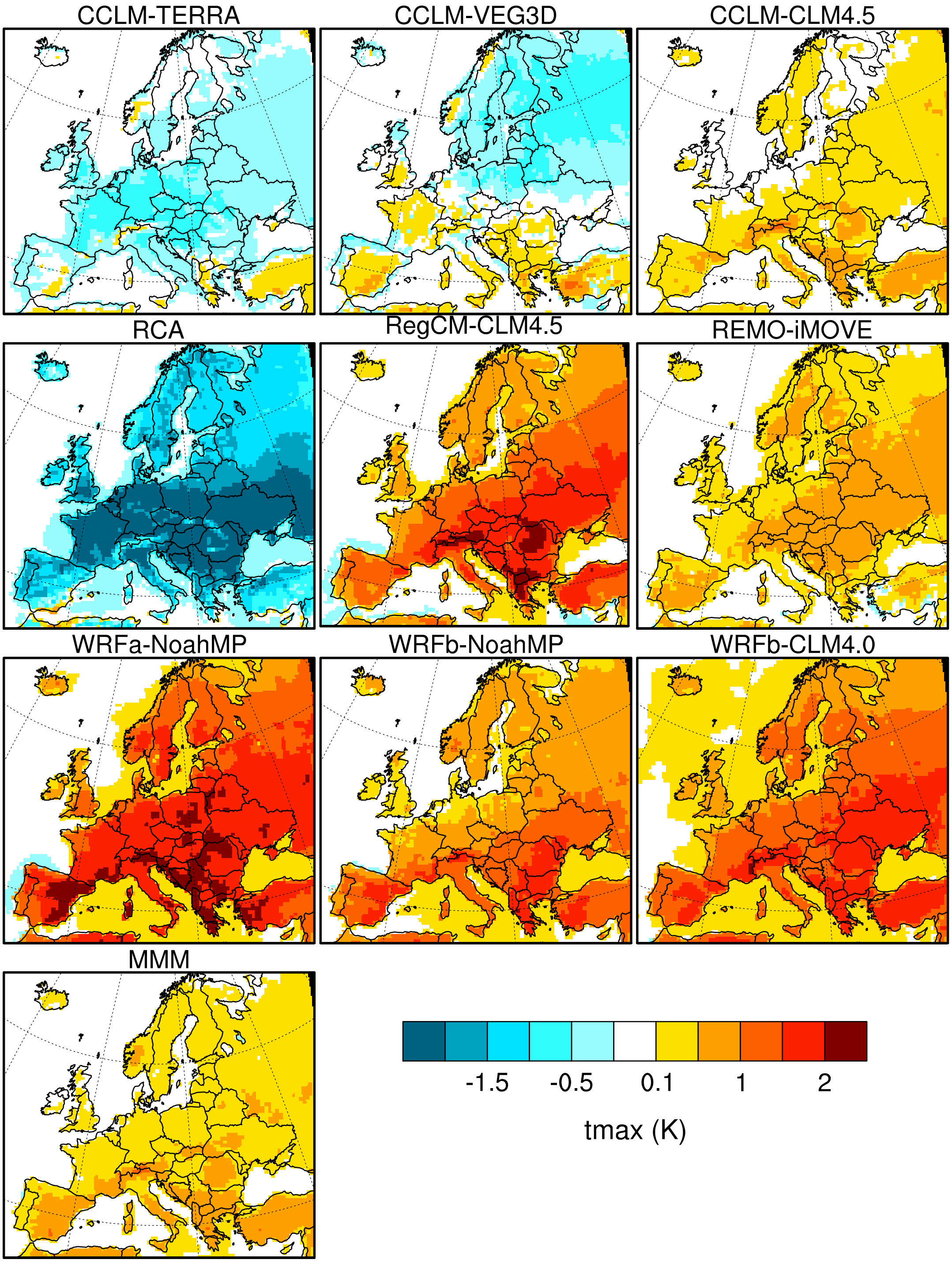
WRFb-CLM4.0
MMM
-1.5
-0.5
0.1
1
2
tmax (K)

JJA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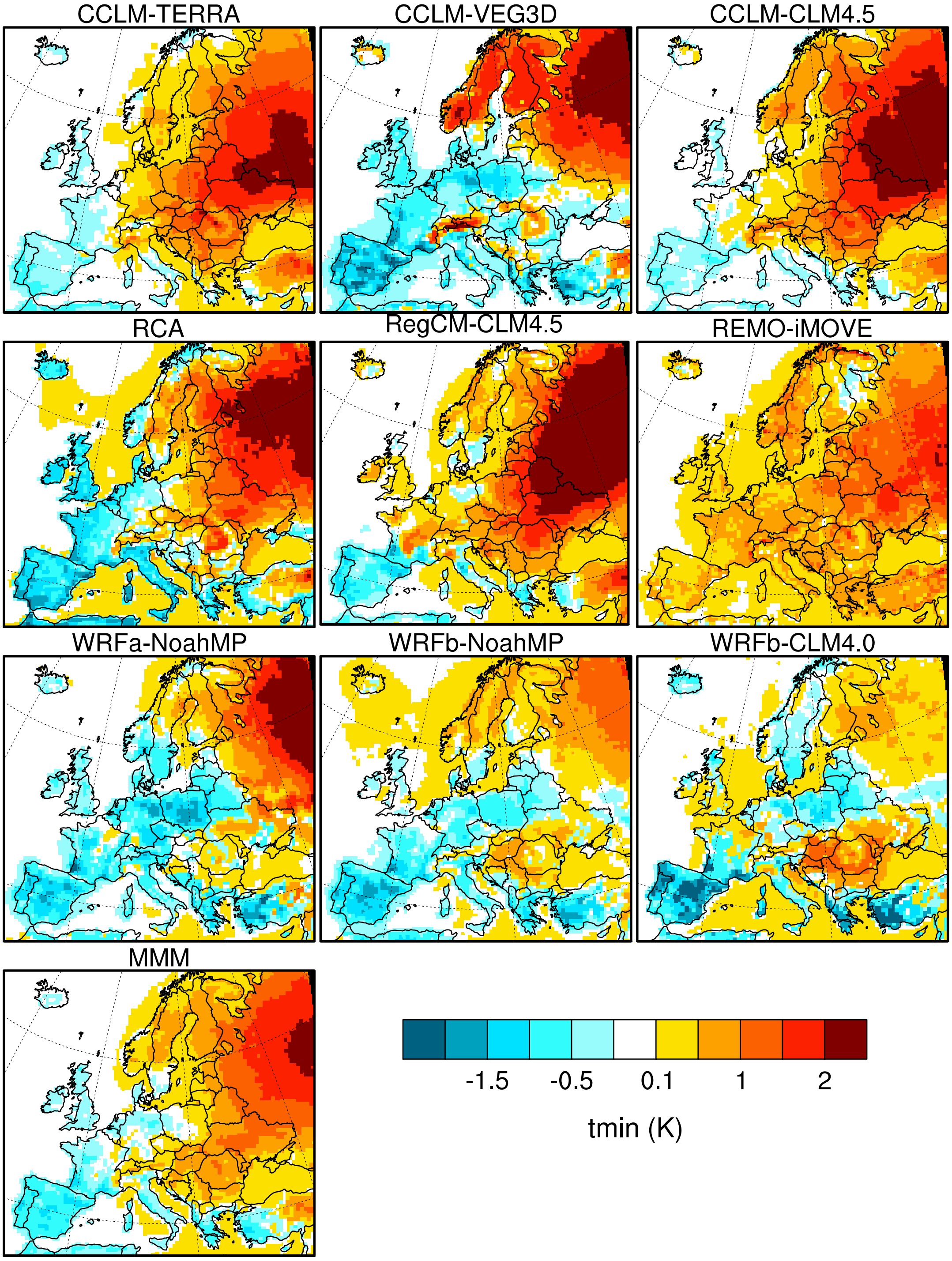
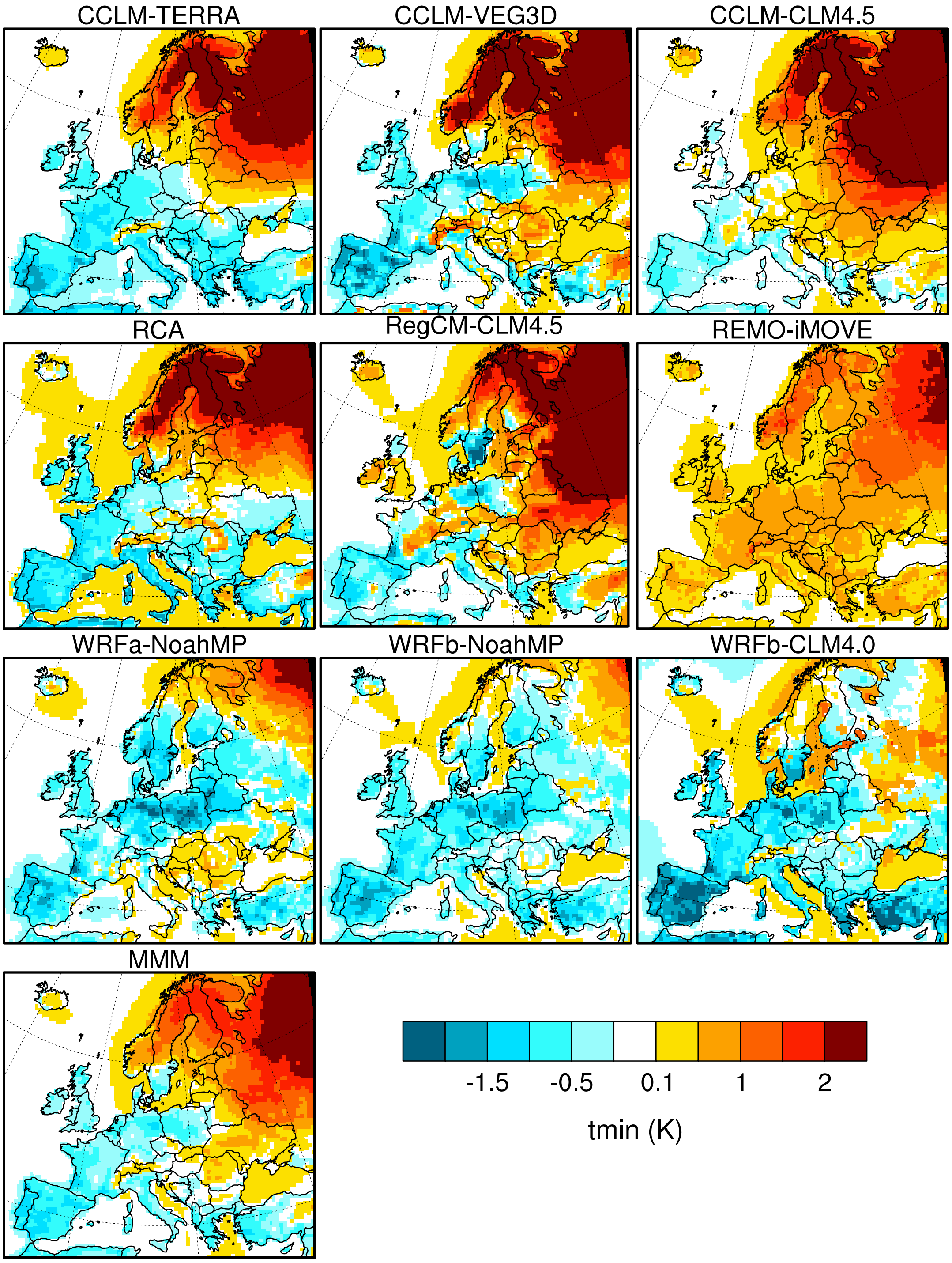
MMM
-1.5
-0.5
0.1
1
2
tmax (K)

SON



DJF

Figure S4. Daily minimum 2-metre temperature (FOREST minus GRASS). Here for DJF; next pages for MAM, JJA and SON.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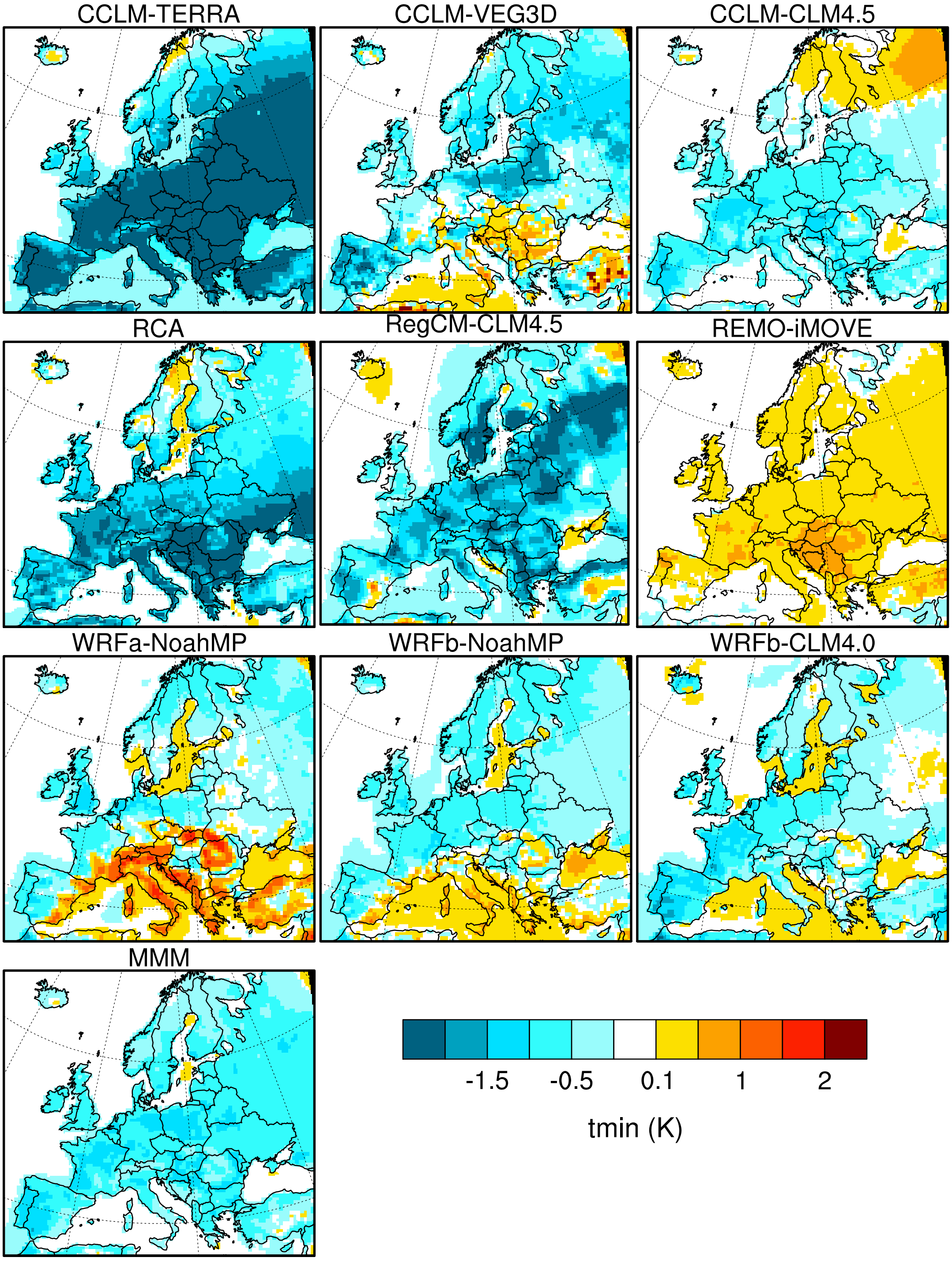
MMM
-1.5
-0.5
0.1
1
2
tmin (K)

MAM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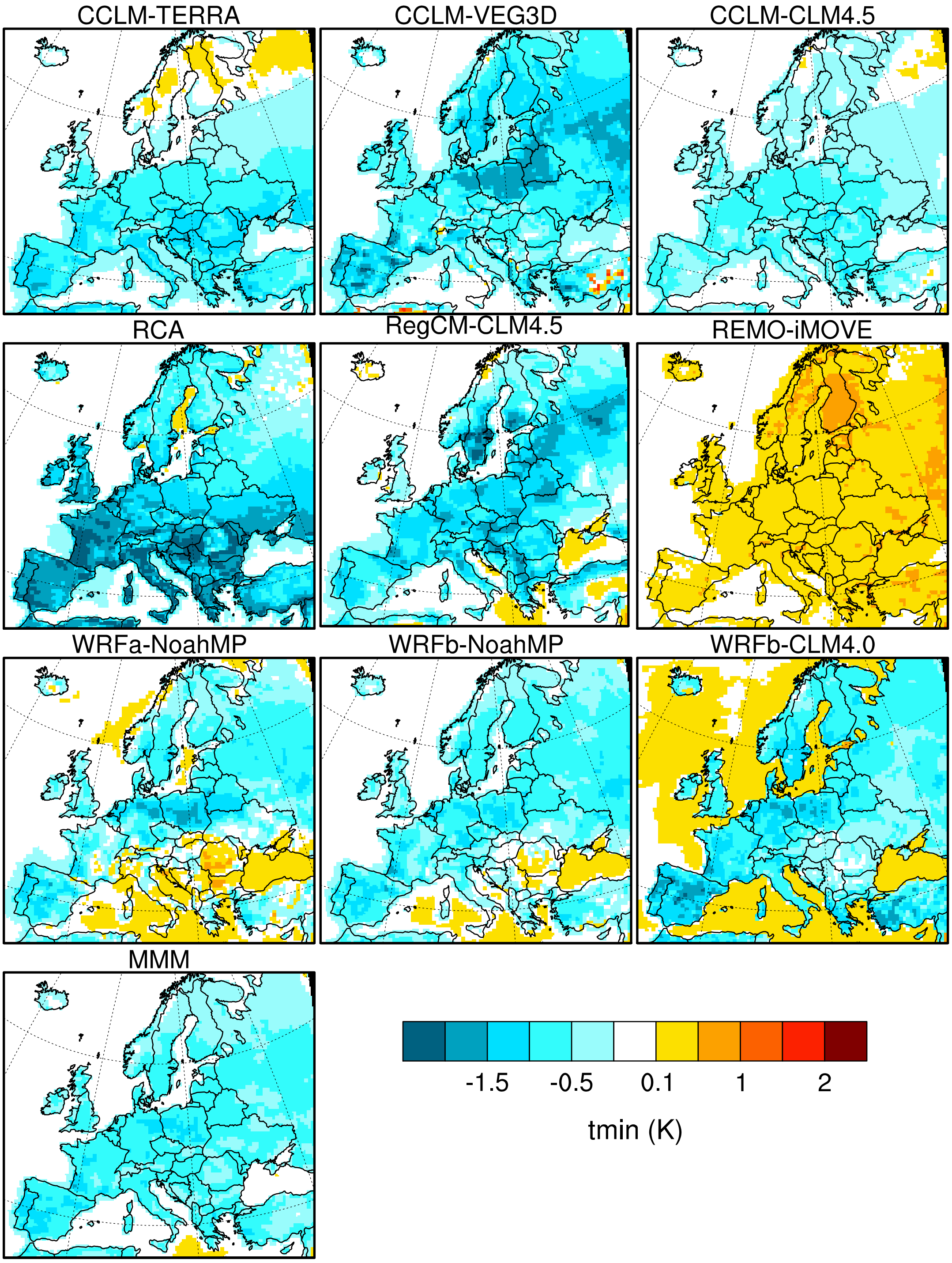
MMM
-1.5
-0.5
0.1
1
2
tmin (K)

JJA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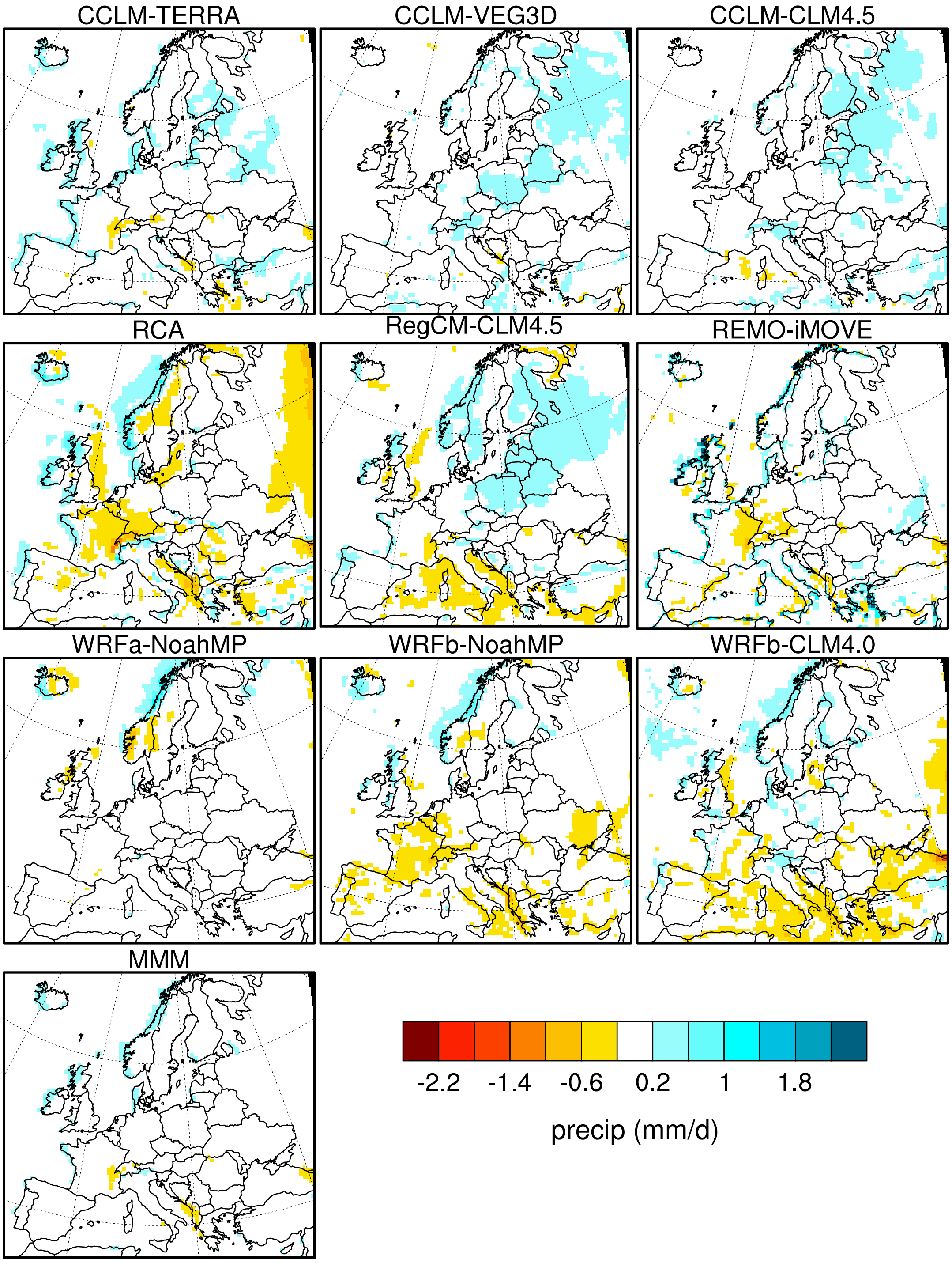
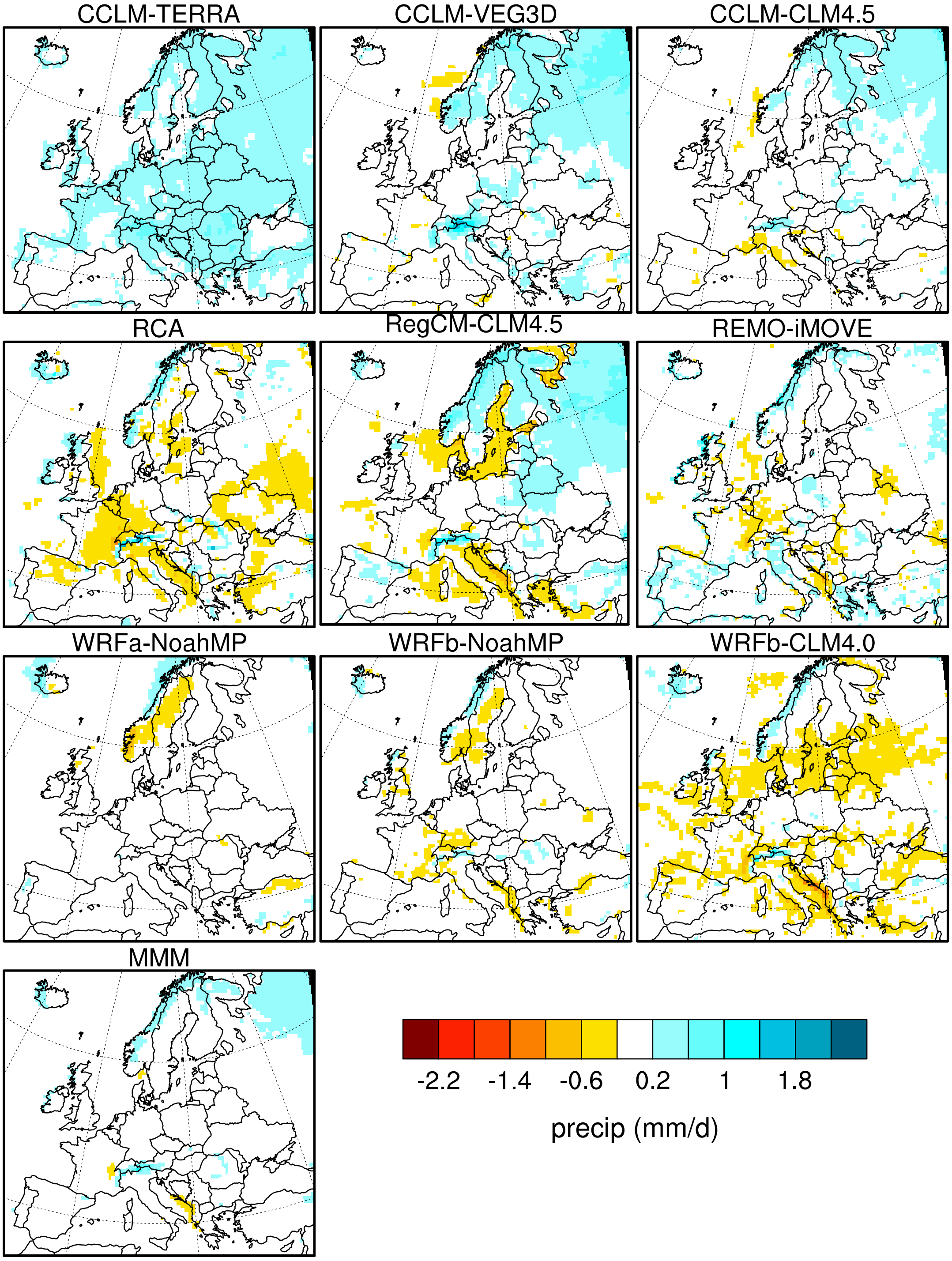
MMM
-1.5
-0.5
0.1
1
2
tmin (K)

SON



DJF

Figure S5. Total precipitation (FOREST minus GRASS). Here for DJF; next pages for MAM, JJA and SON.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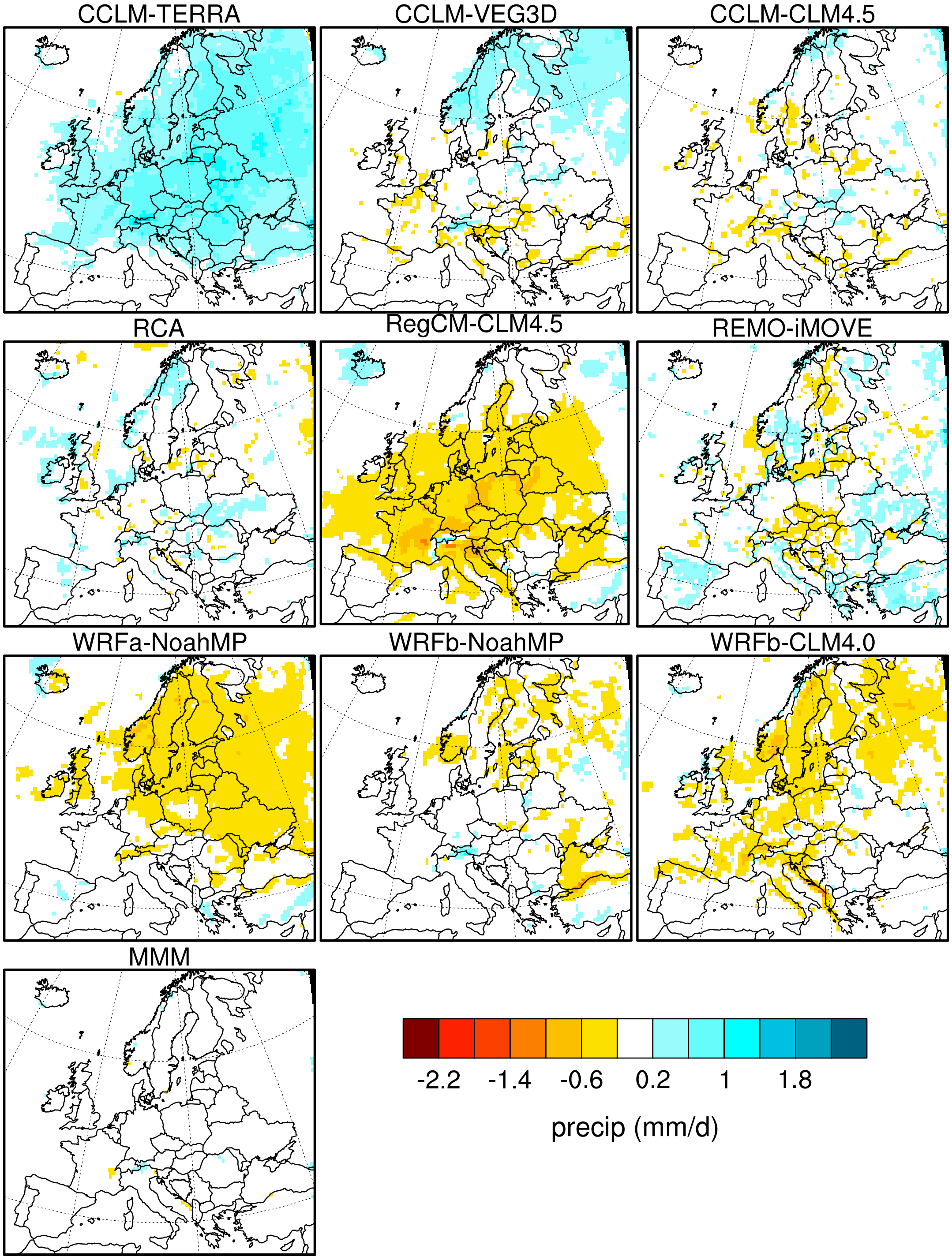
WRFb-NoahMP
WRFb-CLM4.0
MMM
-2.2
-1.4
-0.6
0.2
1
1.8
precip (mm/d)

MAM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WRFb-NoahMP
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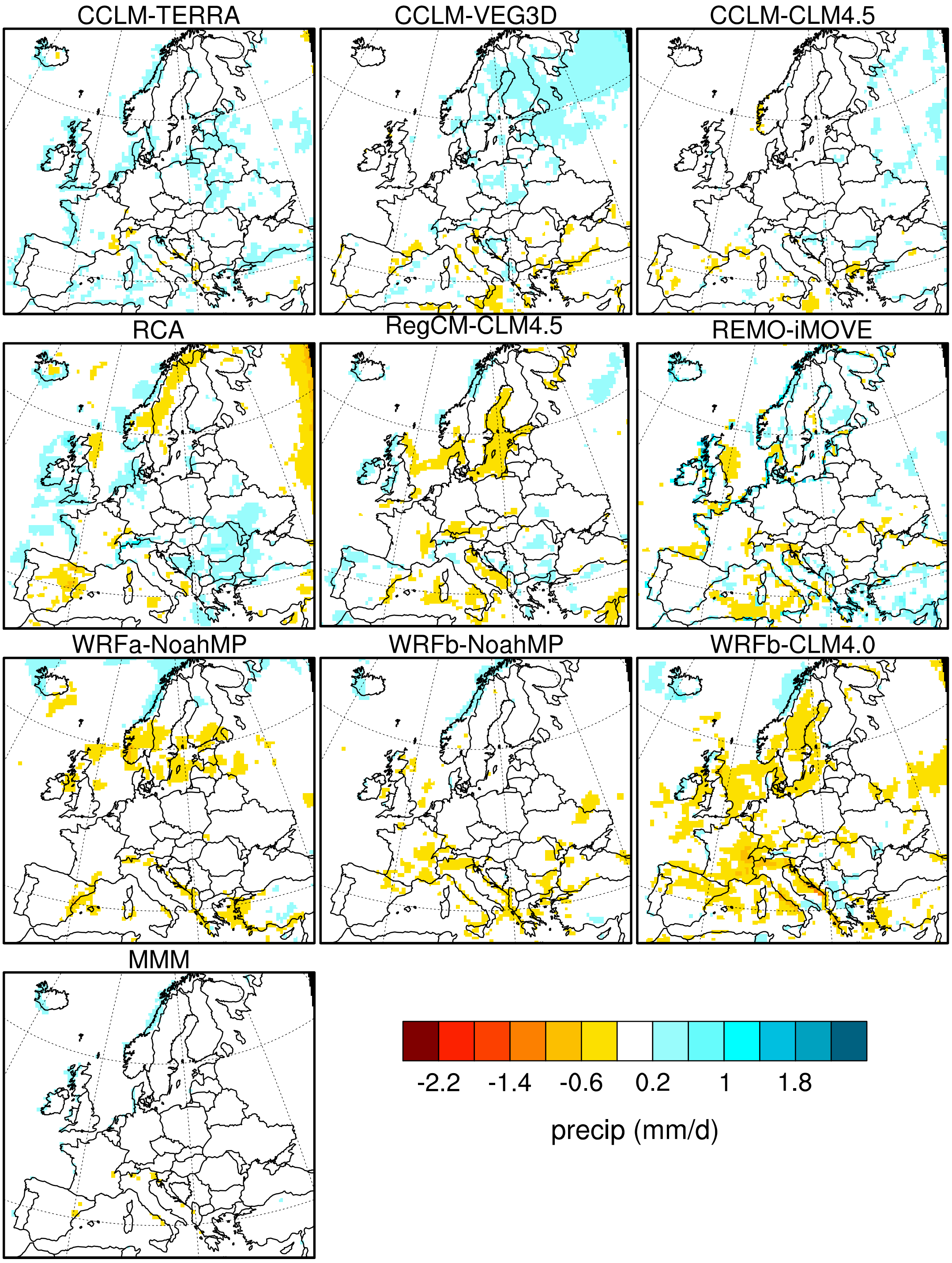
MMM
-2.2
-1.4
-0.6
0.2
1
1.8
precip (mm/d)

JJA



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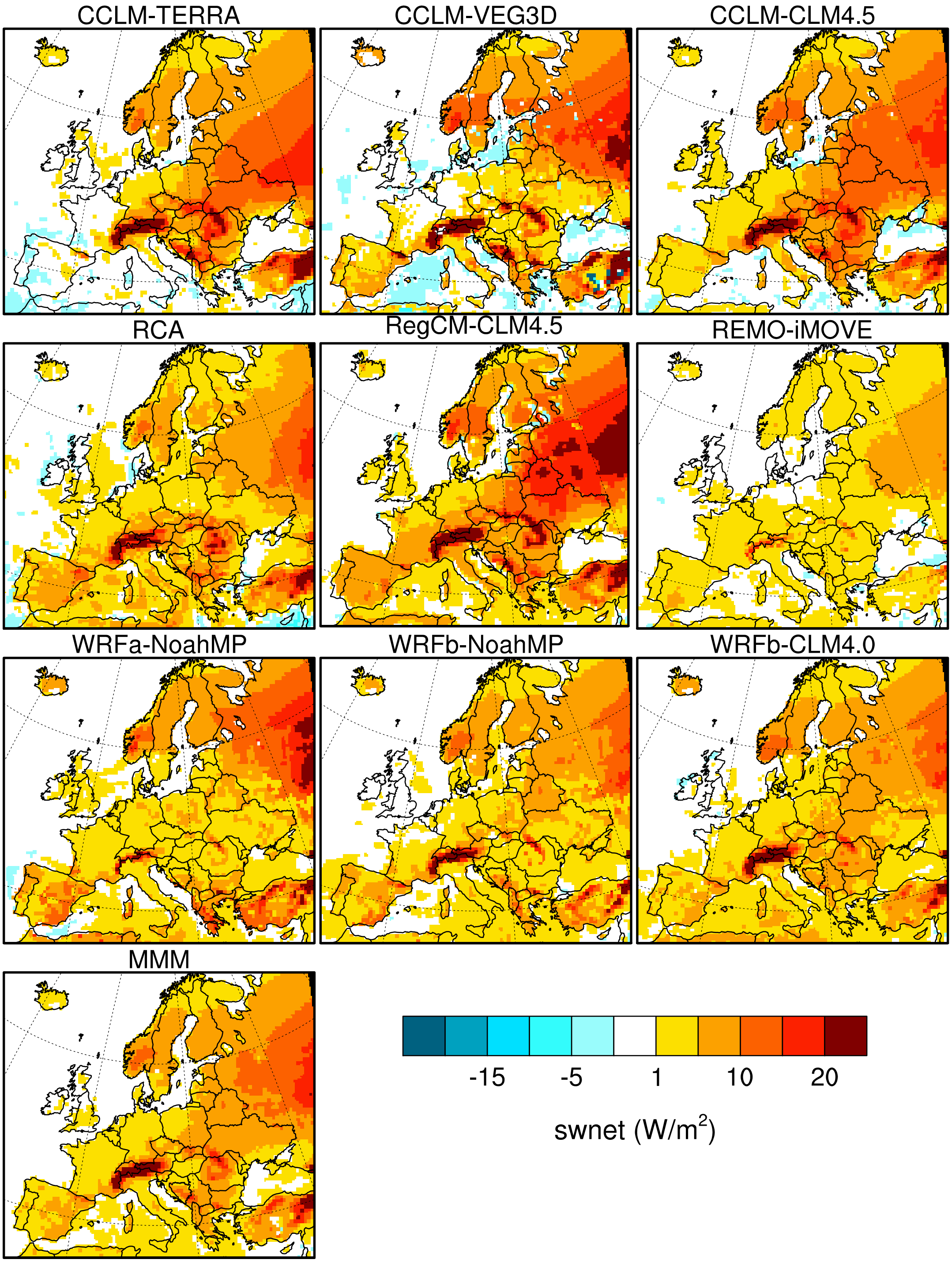
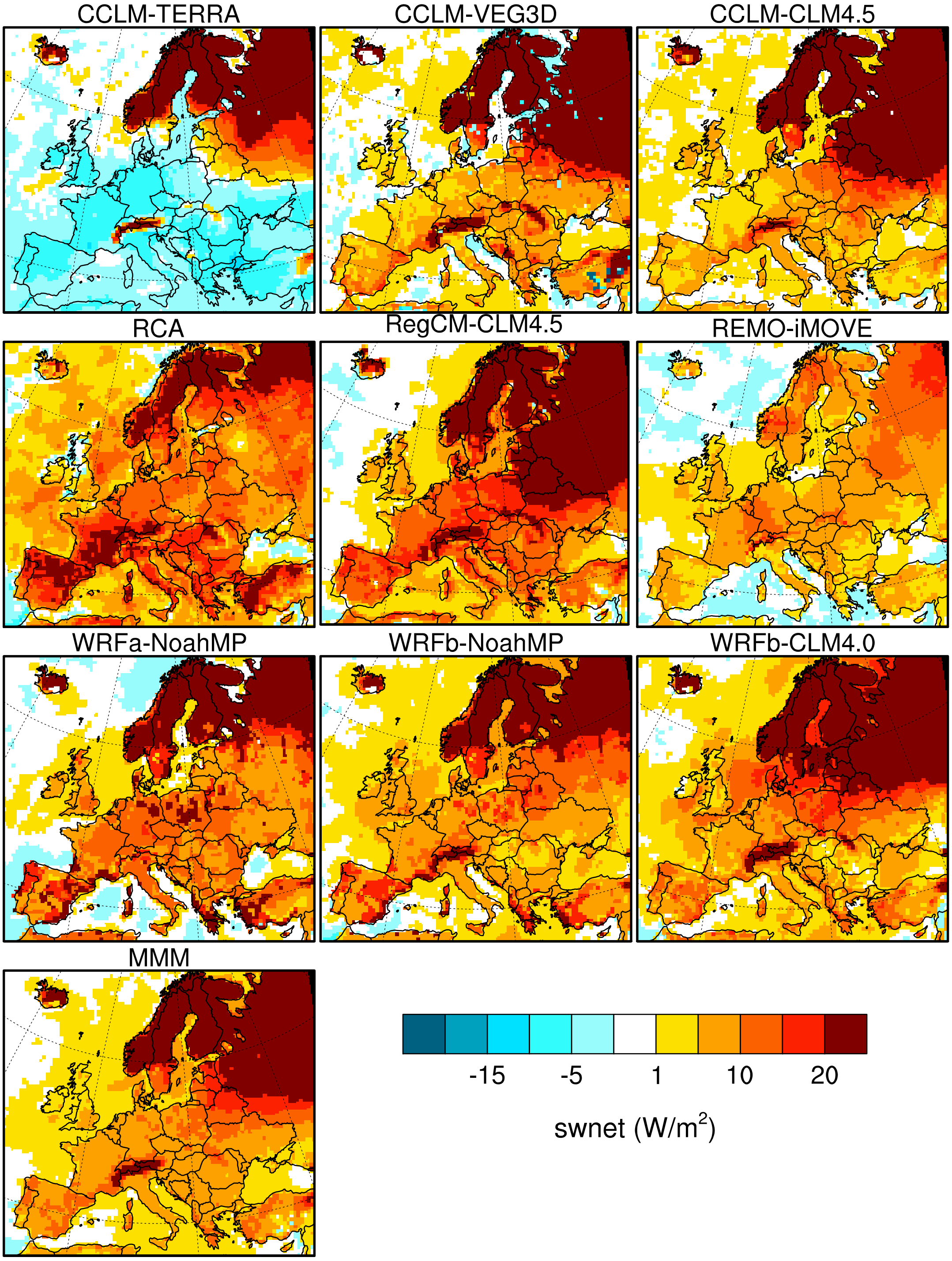
WRFb-NoahMP
WRFb-CLM4.0
MMM
-2.2
-1.4
-0.6
0.2
1
1.8
precip (mm/d)

SON



DJF

Figure S6. Net surface shortwave radiation (FOREST minus GRASS). Here for DJF; next pages for MAM, JJA and SON.



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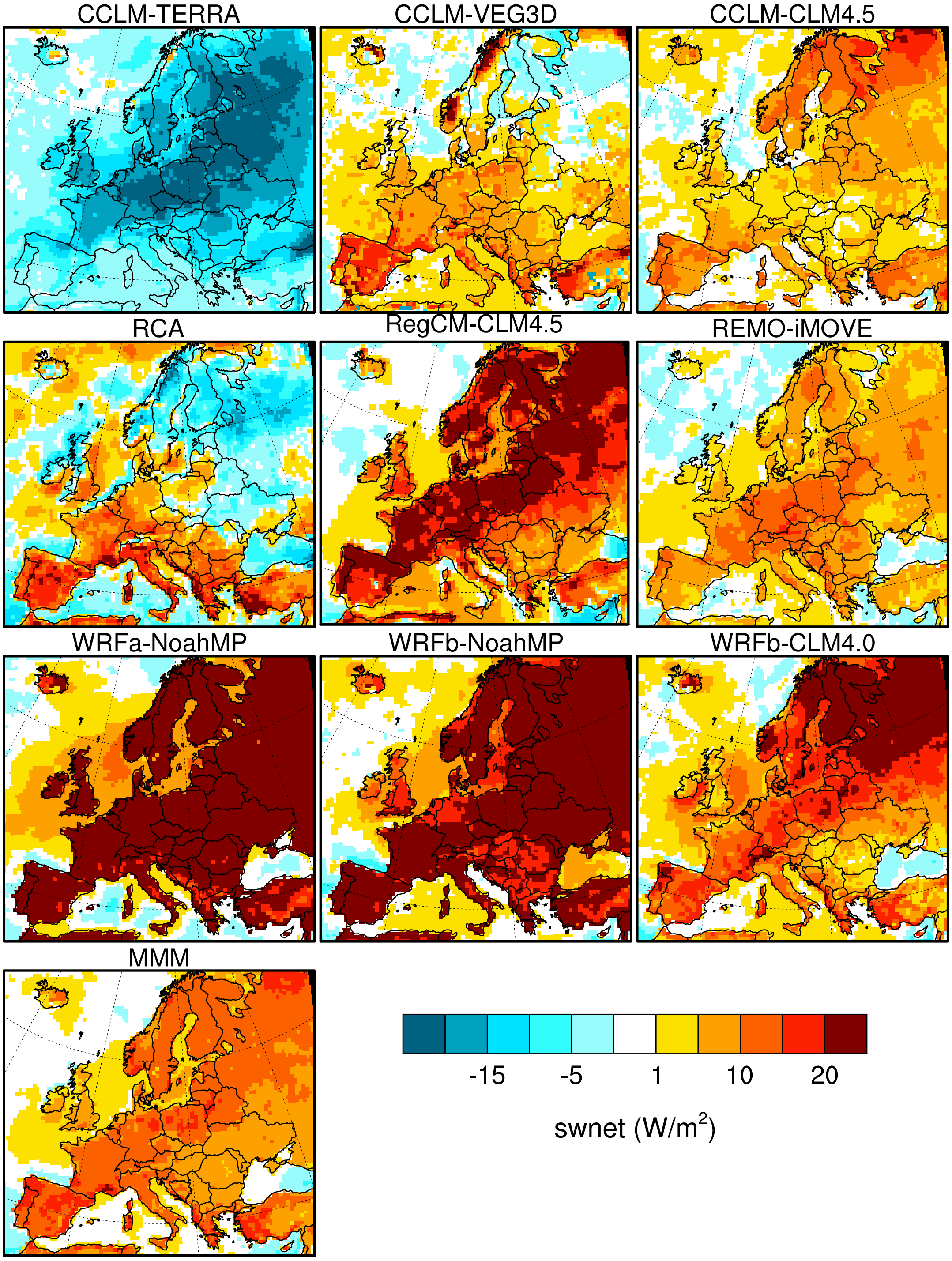
MMM
-15
-5
1
10
20
swnet (W/m2)

MAM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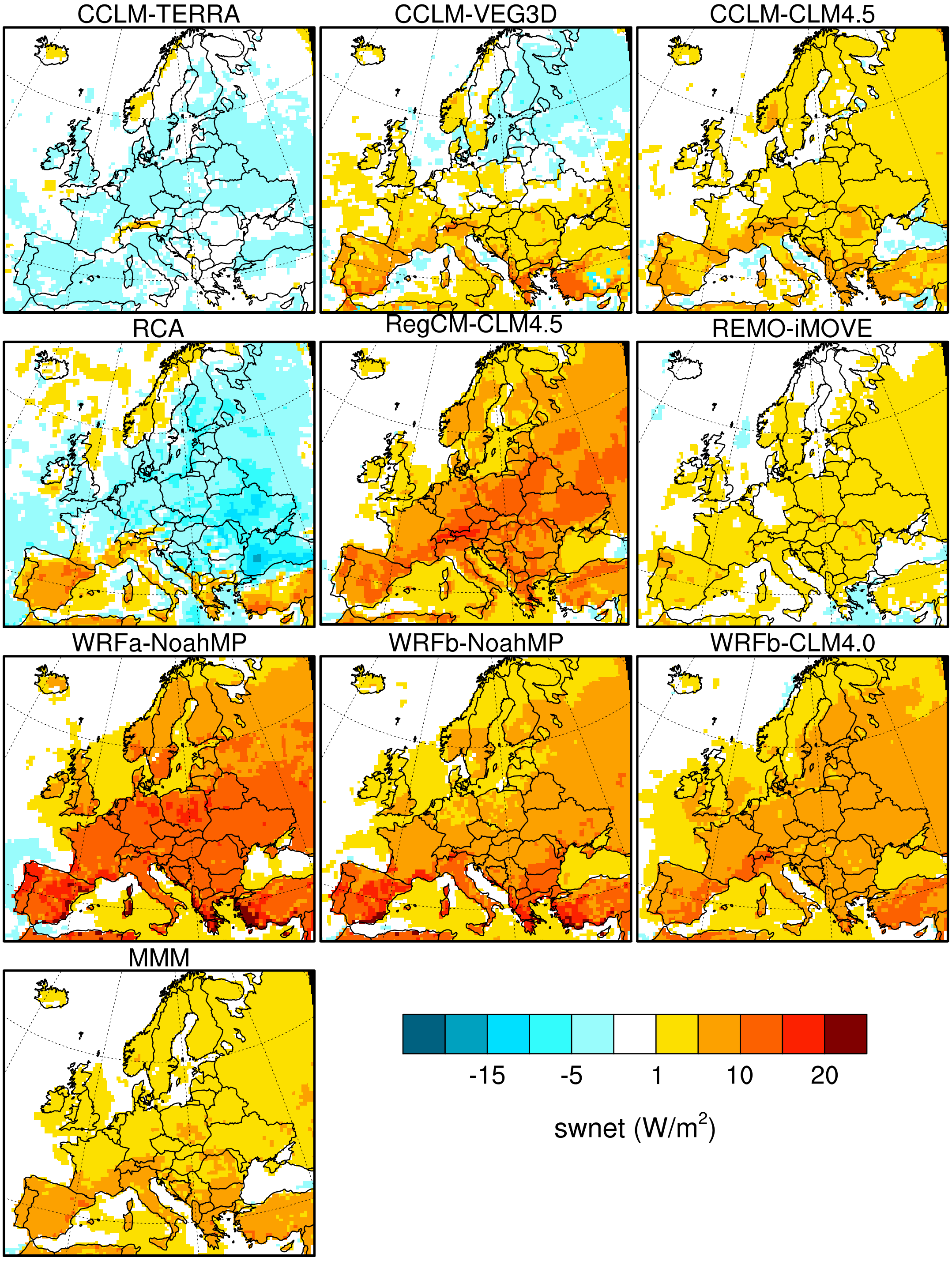
MMM
-15
-5
1
10
20
swnet (W/m2)

JJA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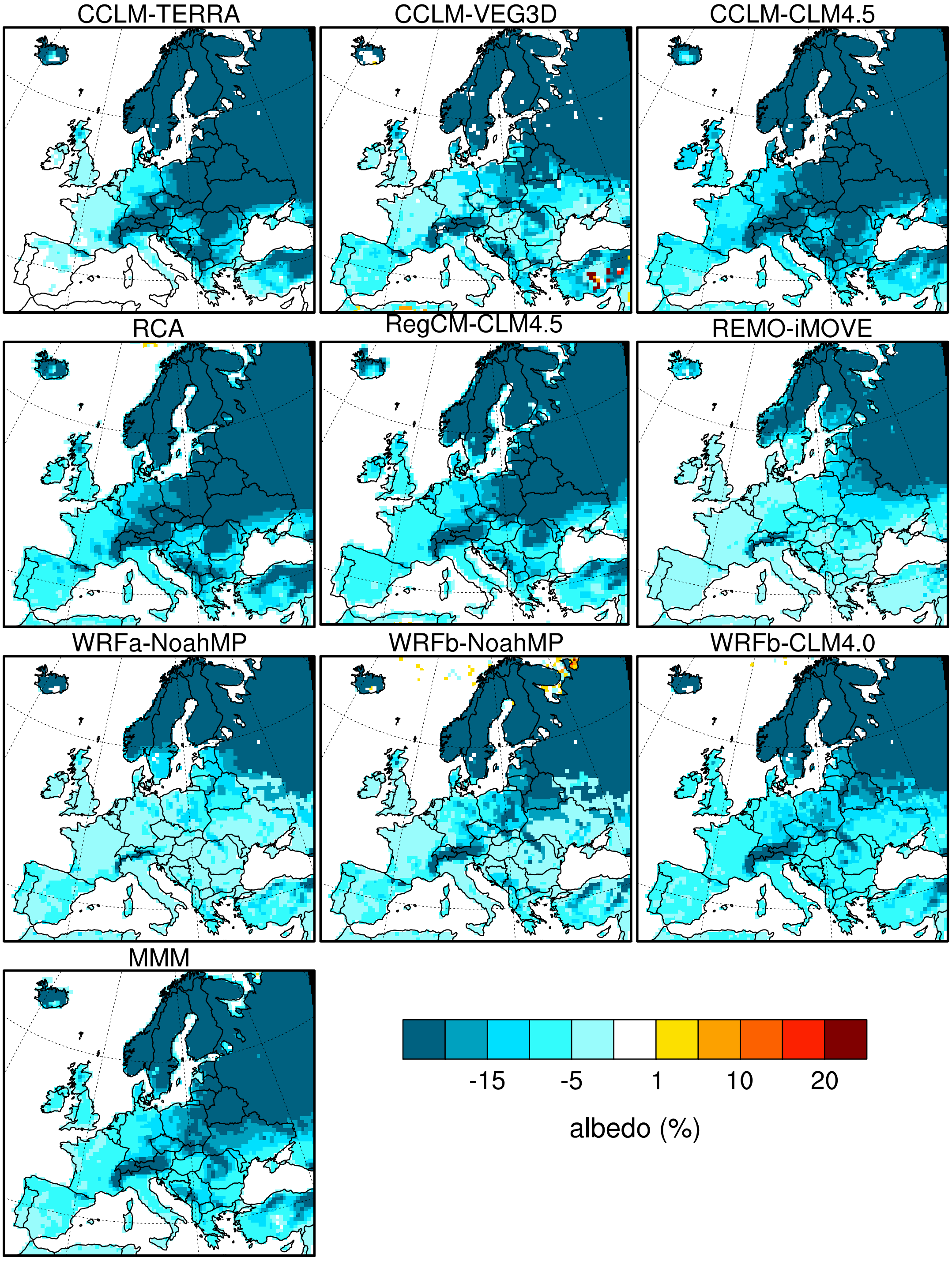
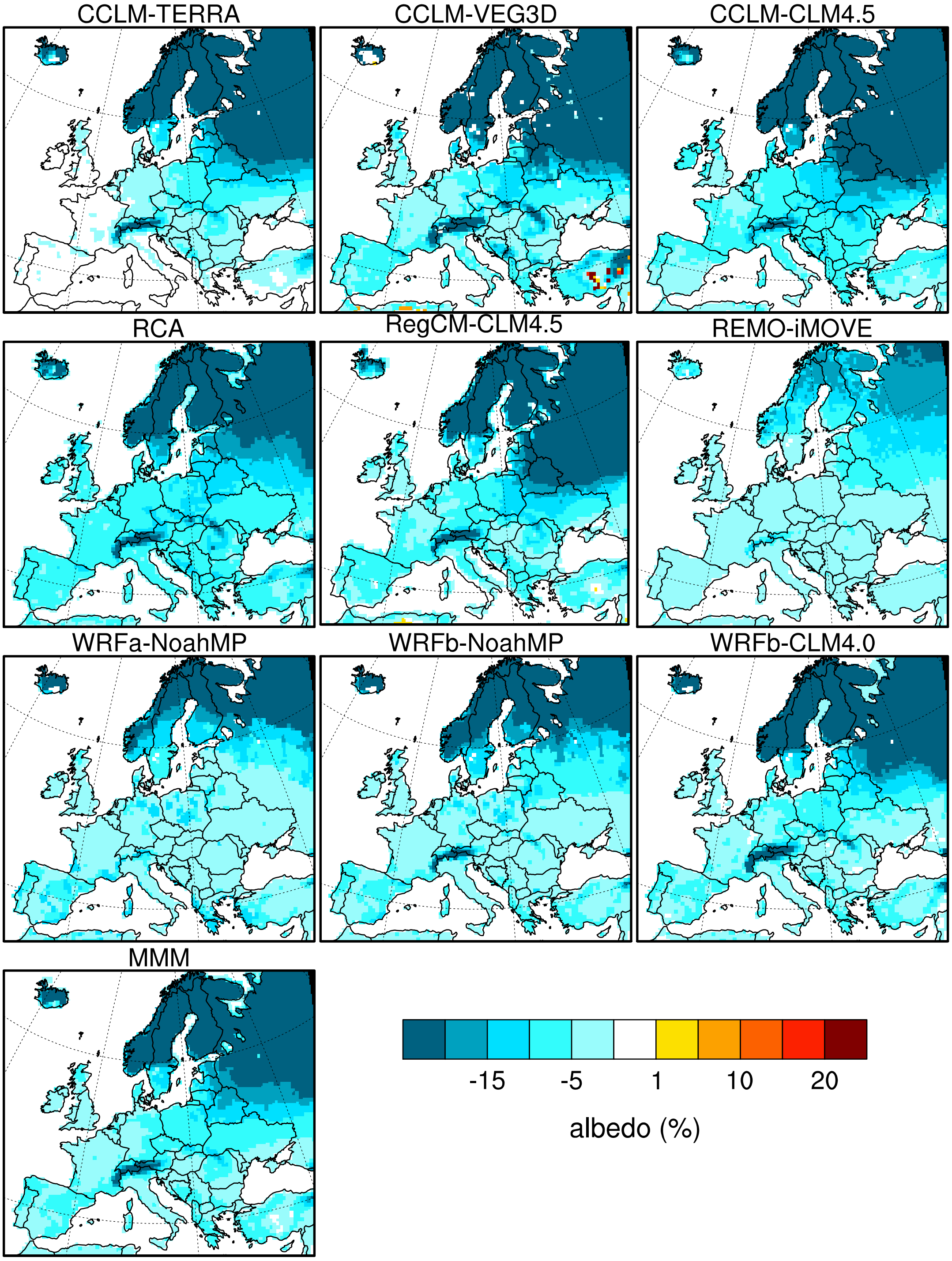
WRFb-CLM4.0
MMM
-15
-5
1
10
20
swnet (W/m^2)

SON



DJF

Figure S7. Surface albedo (FOREST minus GRASS). Here for DJF; next pages for MAM, JJA and SON.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WRFb-NoahMP
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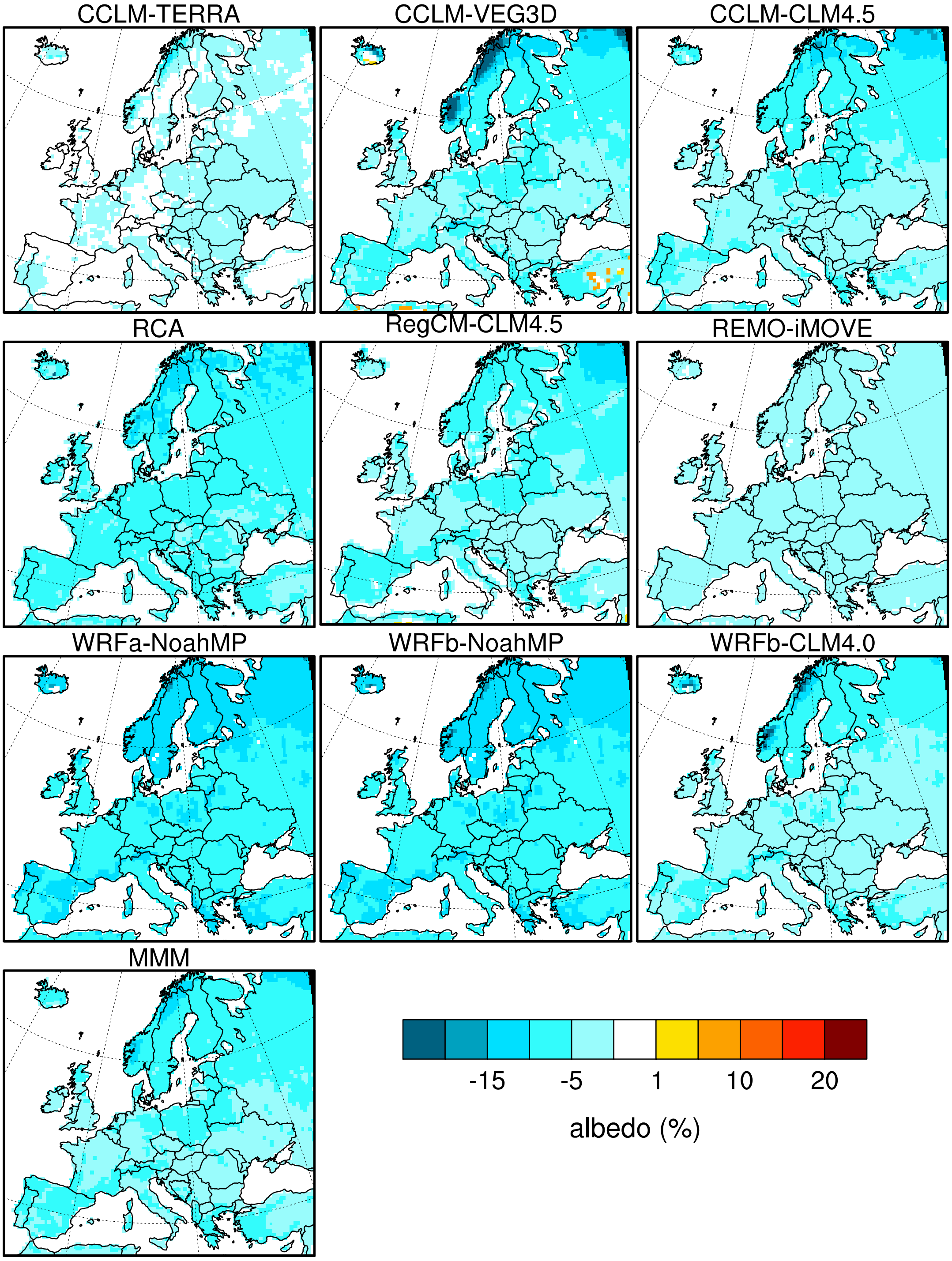
MMM
-15
-5
1
10
20
albedo (%)

MAM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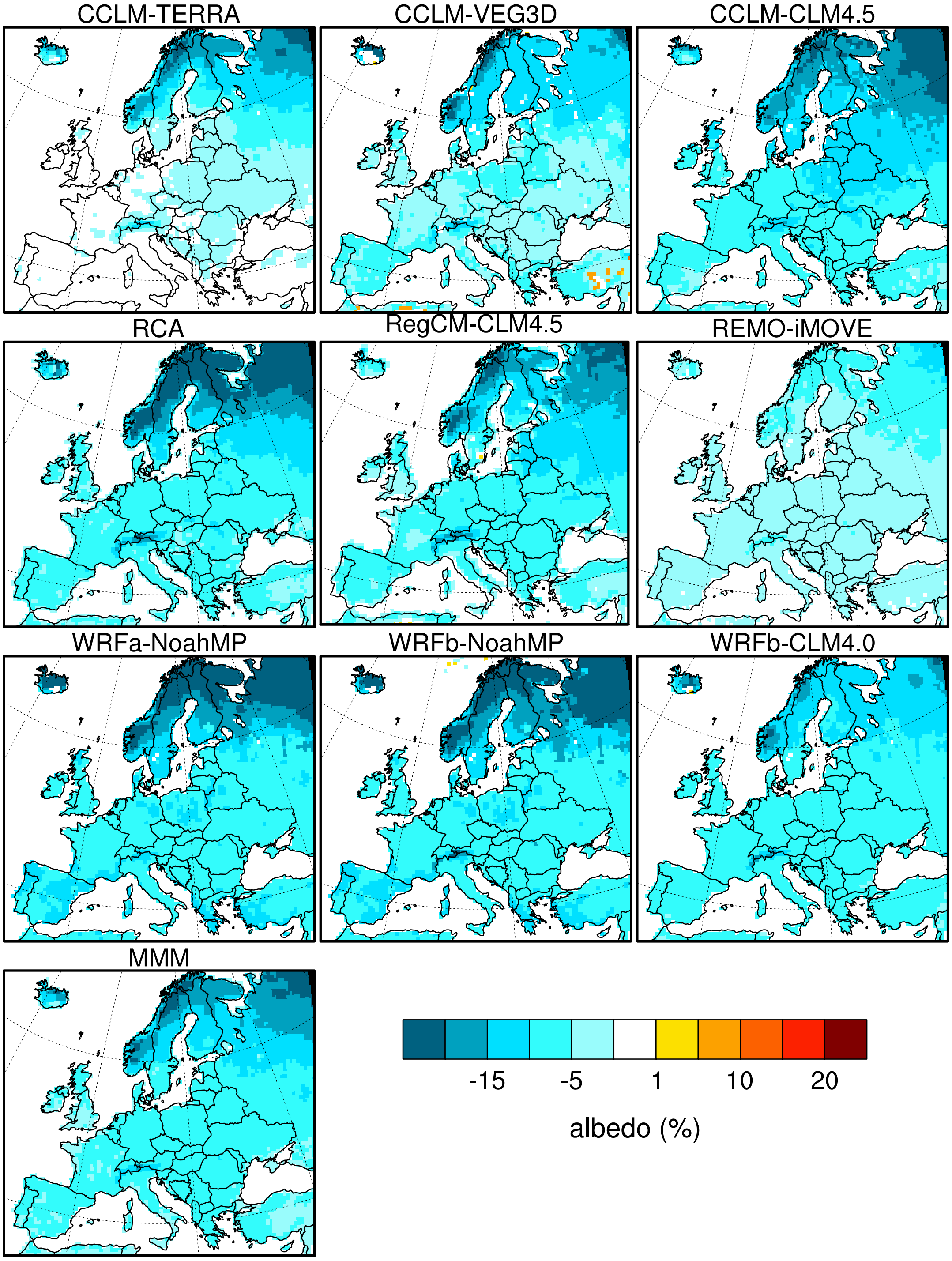
MMM
-15
-5
1
10
20
albedo (%)

JJA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REMO-iMOVE
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WRFb-NoahMP
WRFb-CLM4.0
MMM
-15
-5
1
10
20
albedo (%)

SON

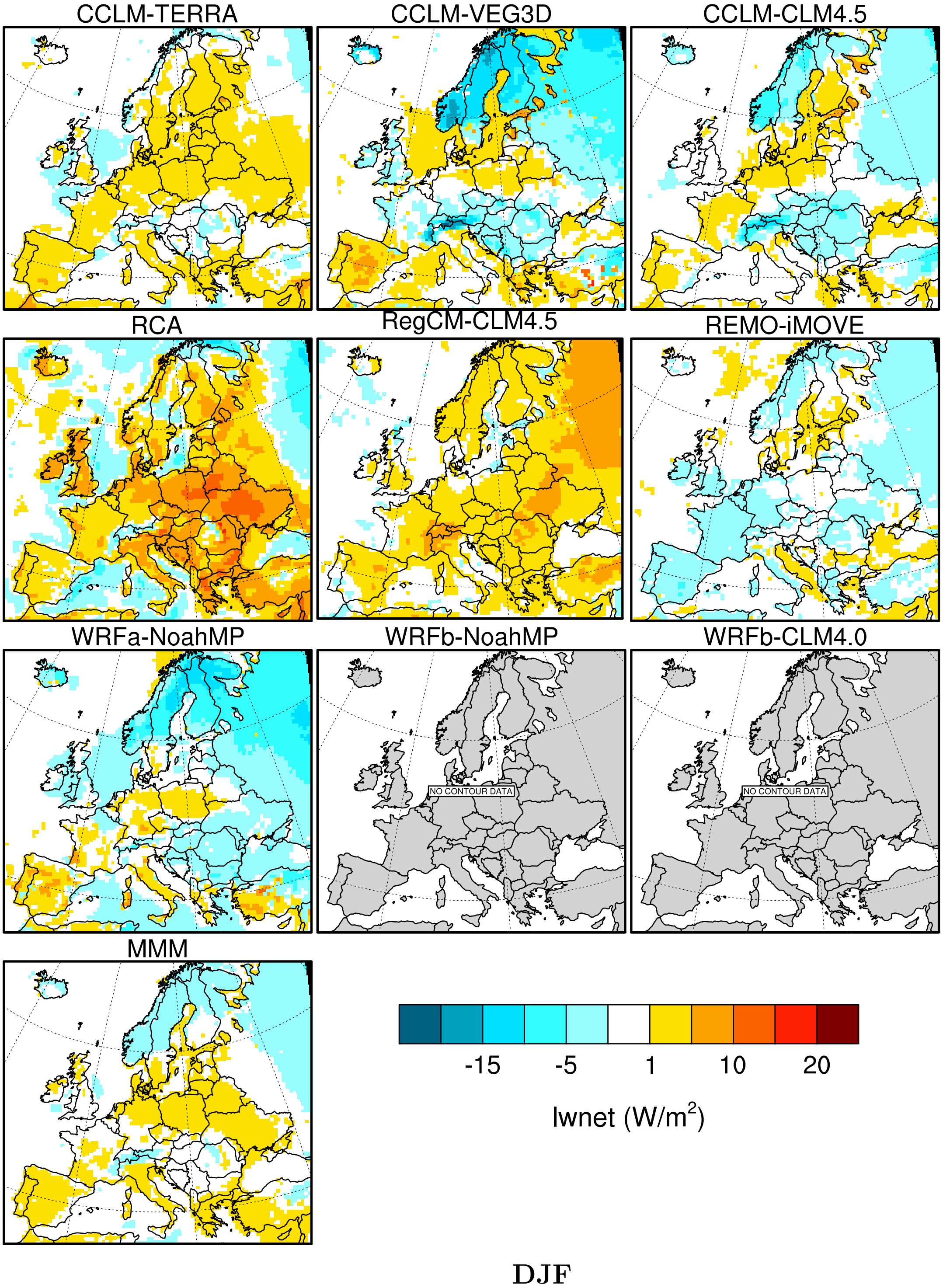
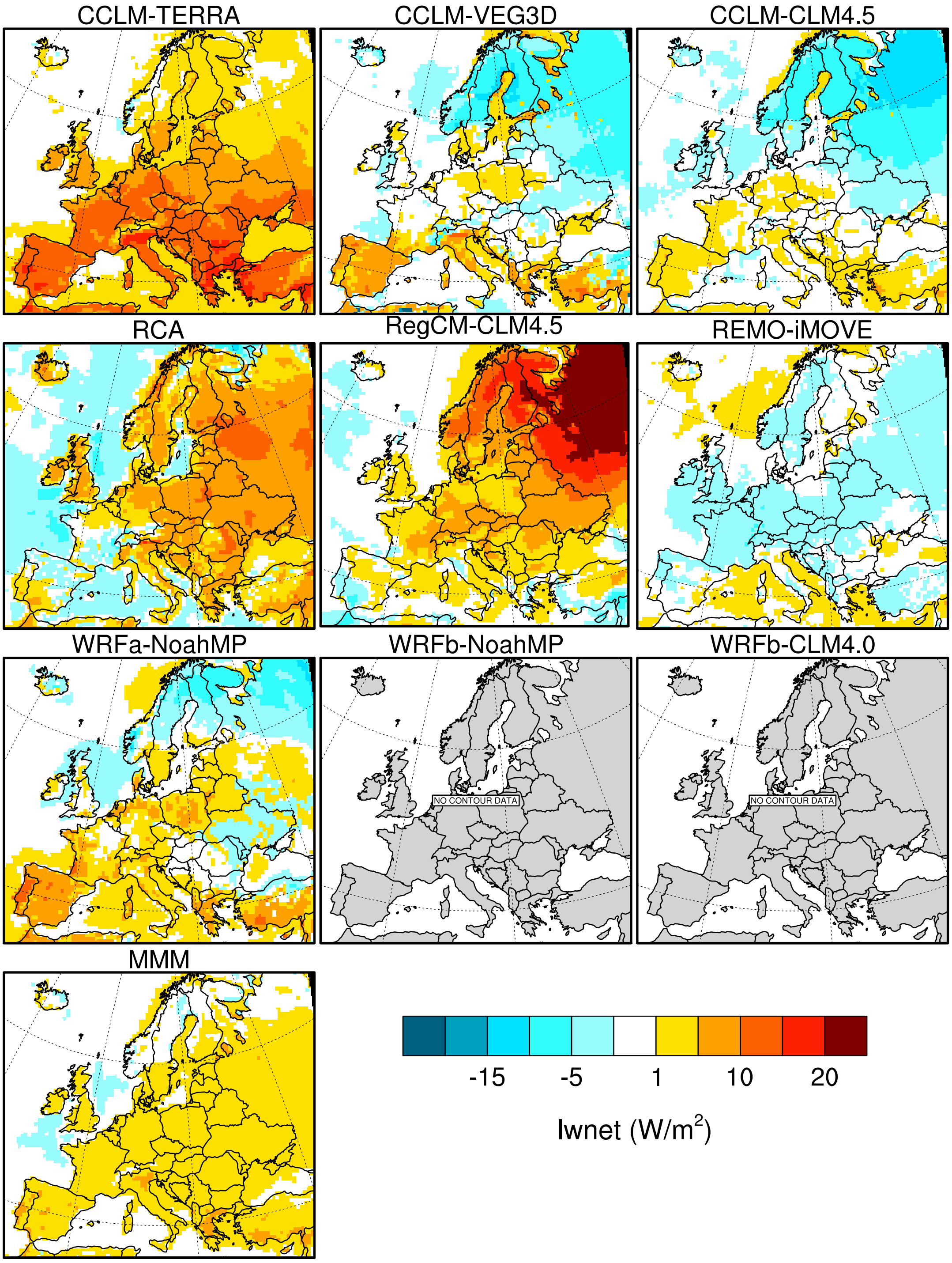


Figure S8. Net surface longwave radiation (FOREST minus GRASS). Here for DJF; next pages for MAM, JJA and SON.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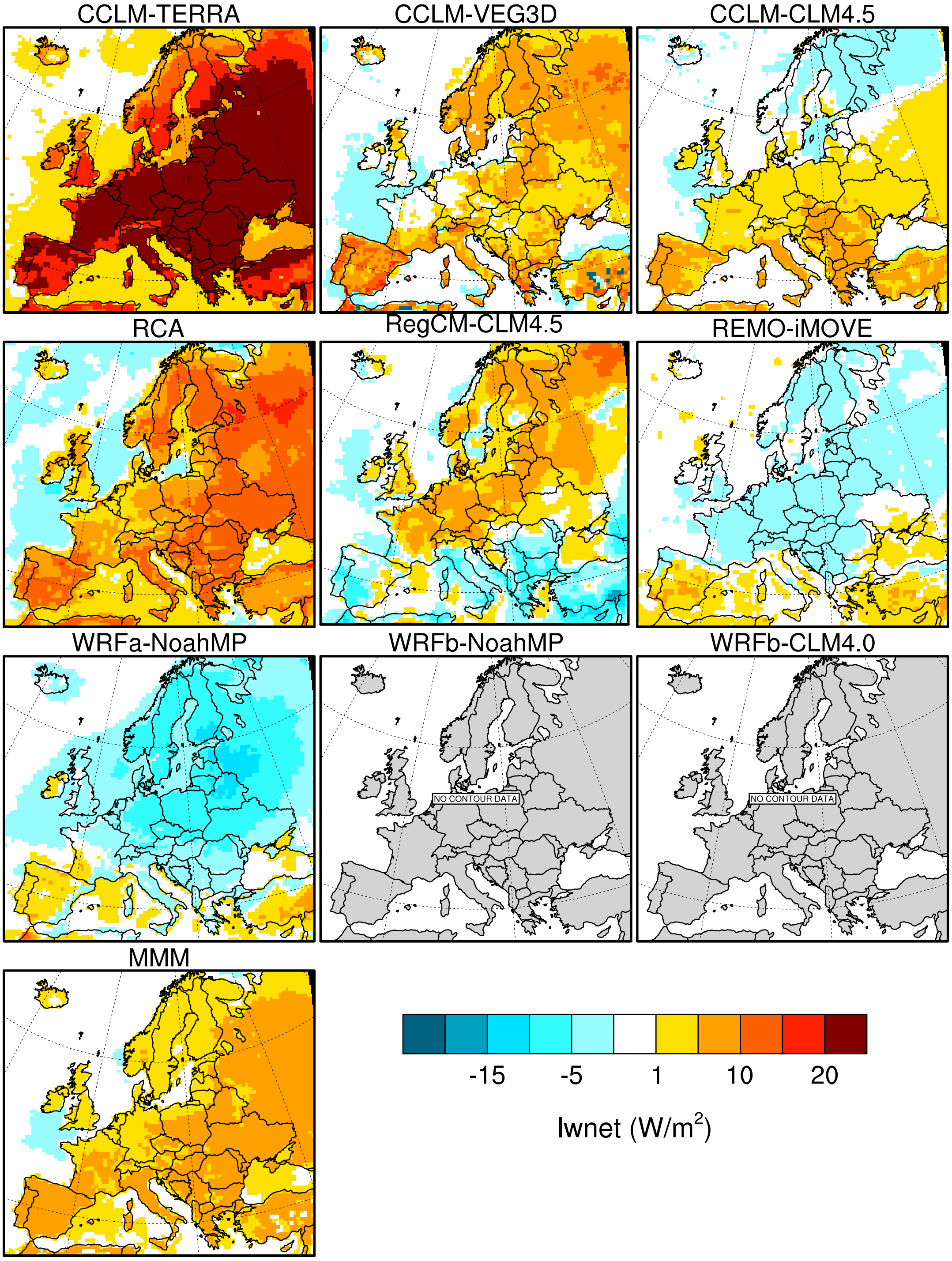
NO CONTOUR DATA
MMM
-15
-5
1
10
20
lwnet (W/m^2)

MAM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WRFb-NoahMP
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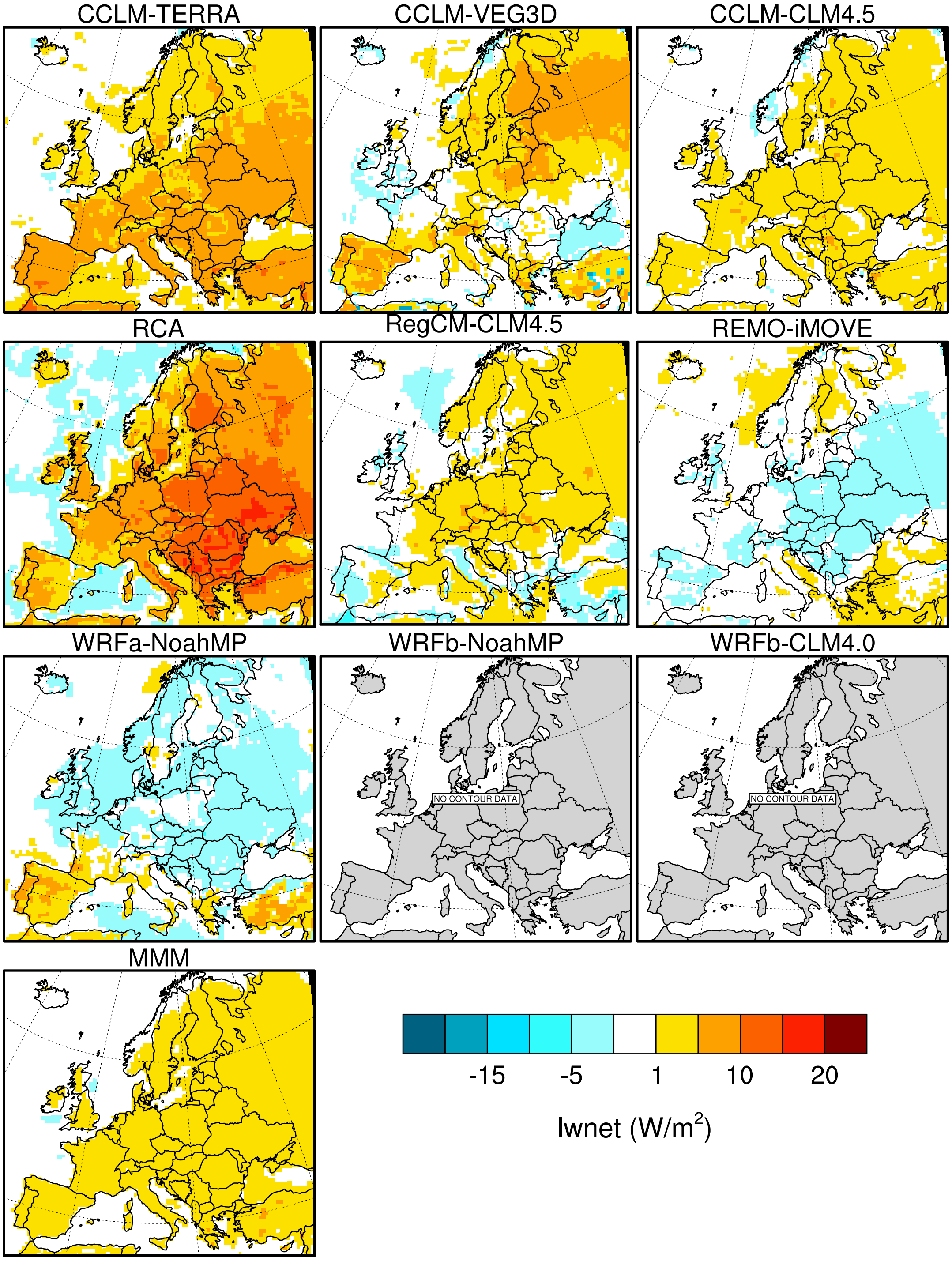
MMM
-15
-5
1
10
20
lwnet (W/m^2)

JJA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WRFb-NoahMP
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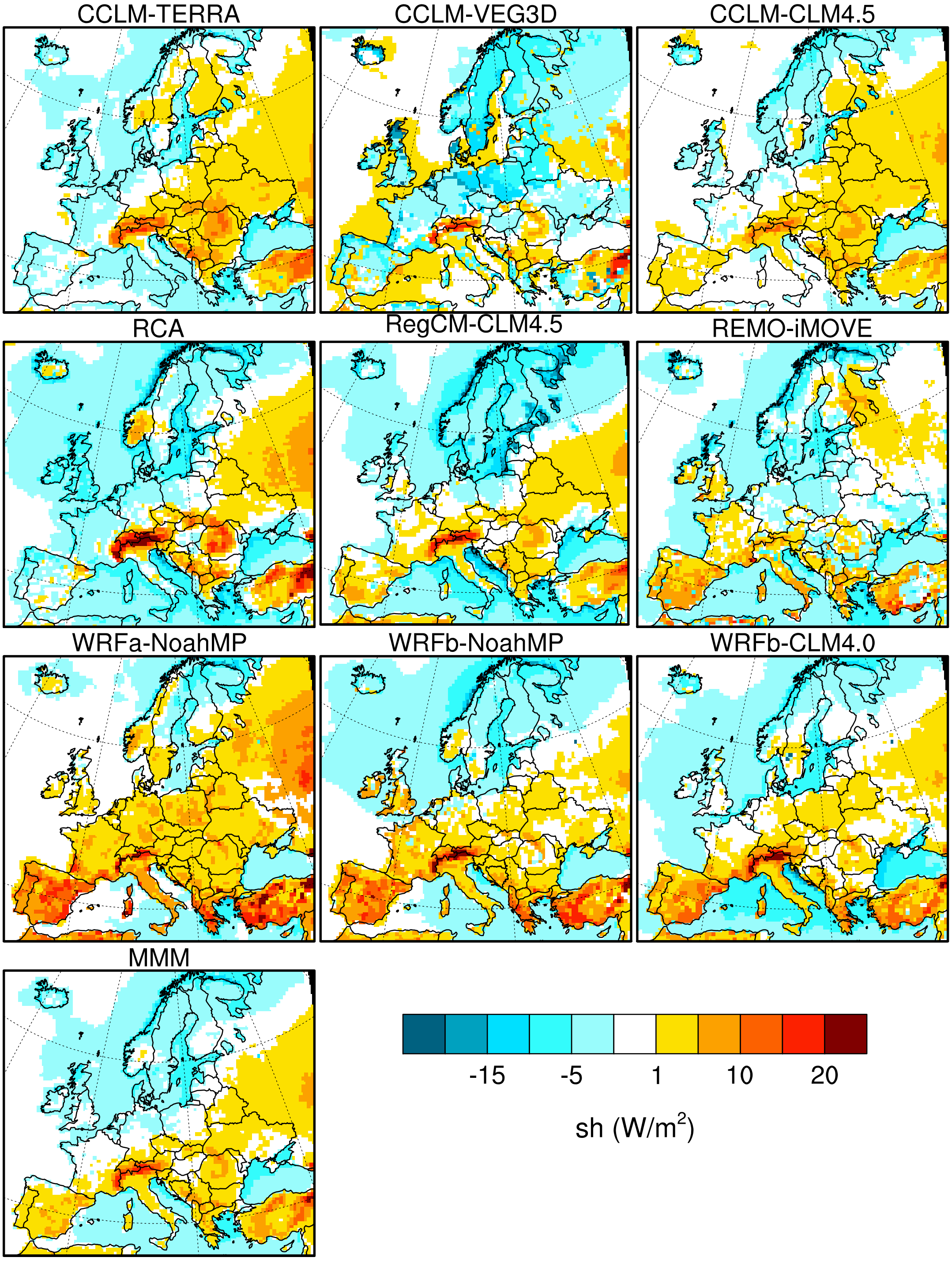
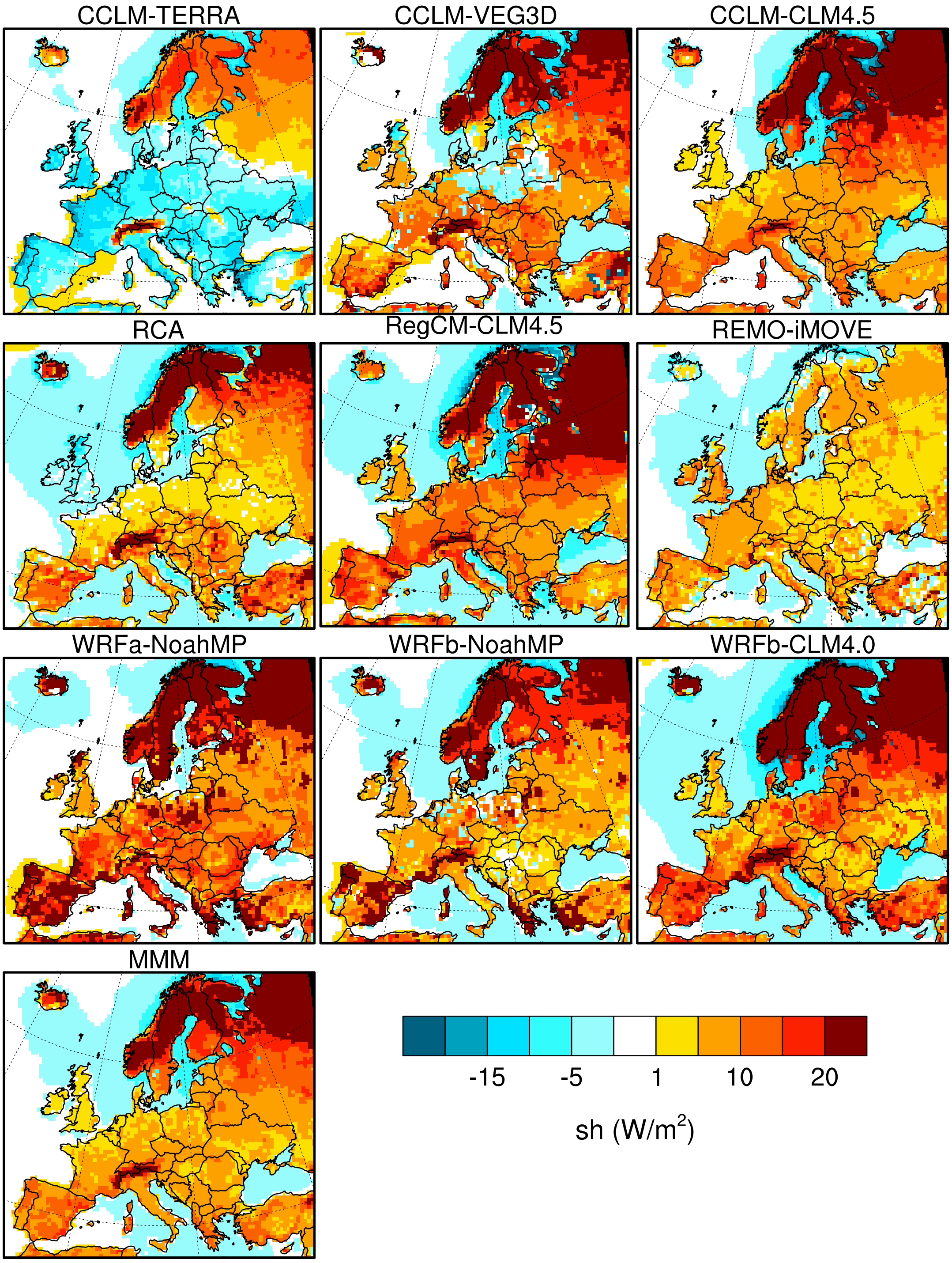
NO CONTOUR DATA
NO CONTOUR DATA
MMM
-15
-5
1
10
20
lwnet (W/m^2)

SON



DJF

Figure S9. Sensible heat flux (FOREST minus GRASS). Here for DJF; next pages for MAM, JJA and SON.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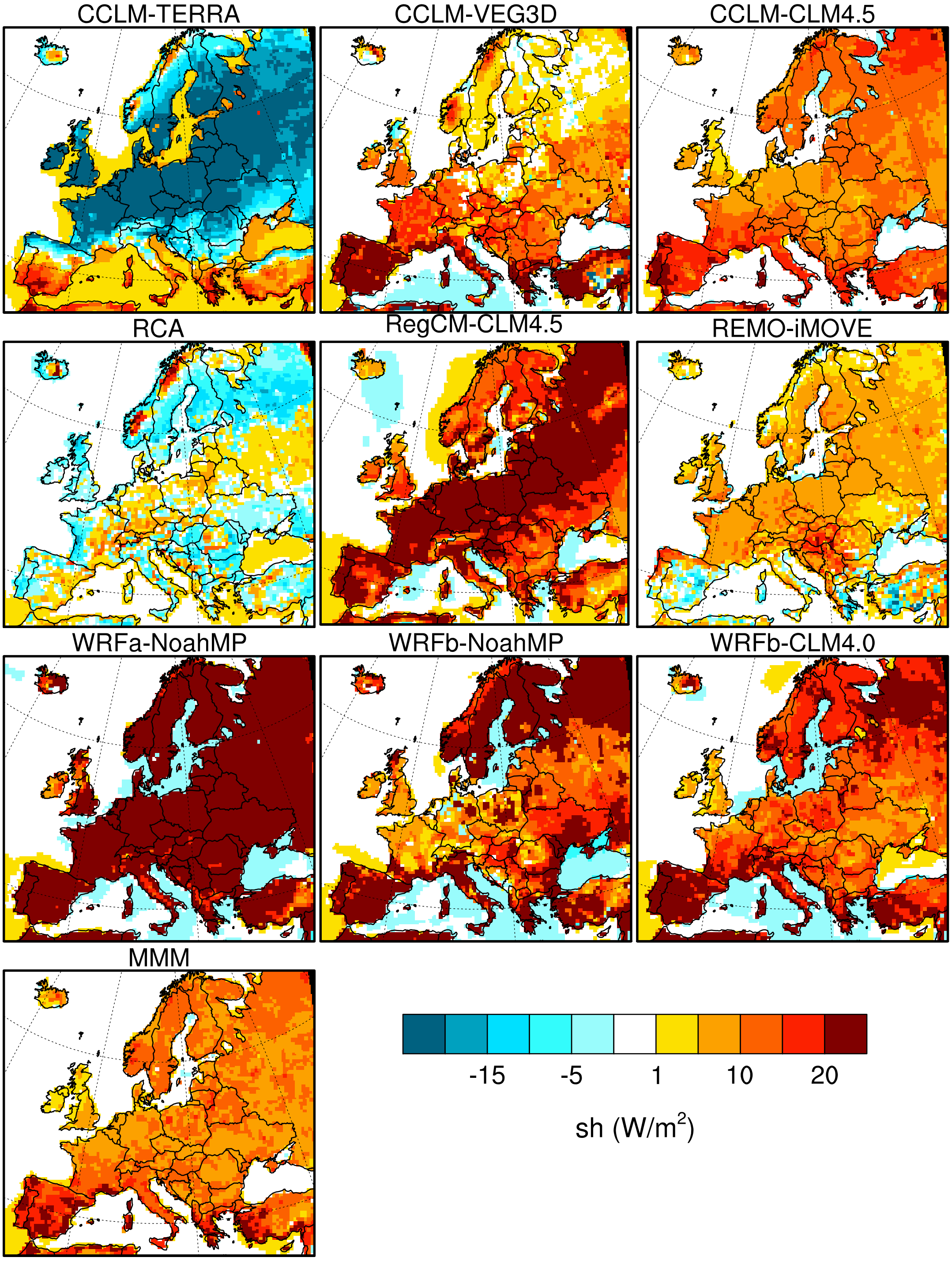
MMM
-15
-5
1
10
20
sh (W/m2)

MAM



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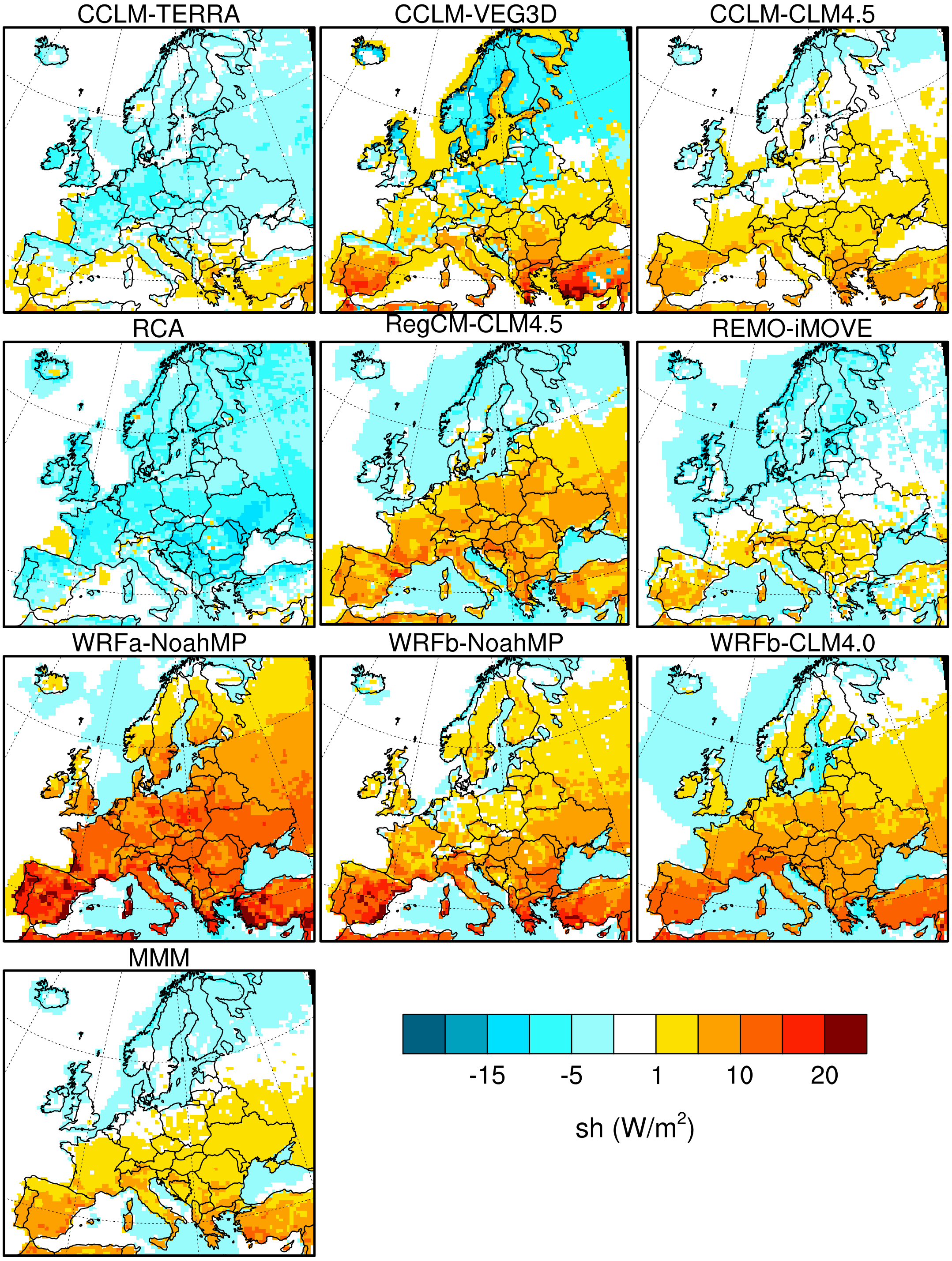
MMM
-15
-5
1
10
20
sh (W/m^2)

JJA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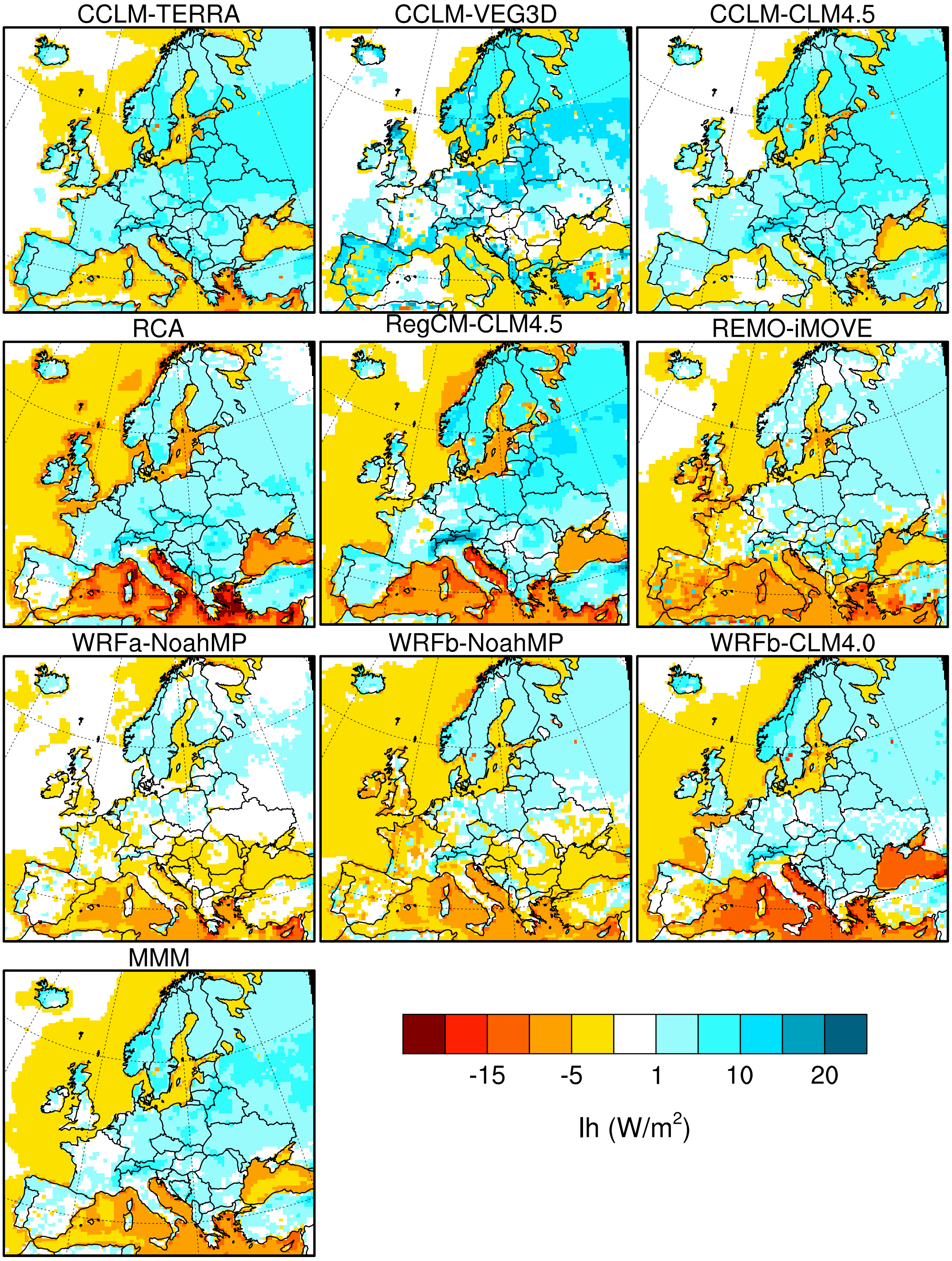
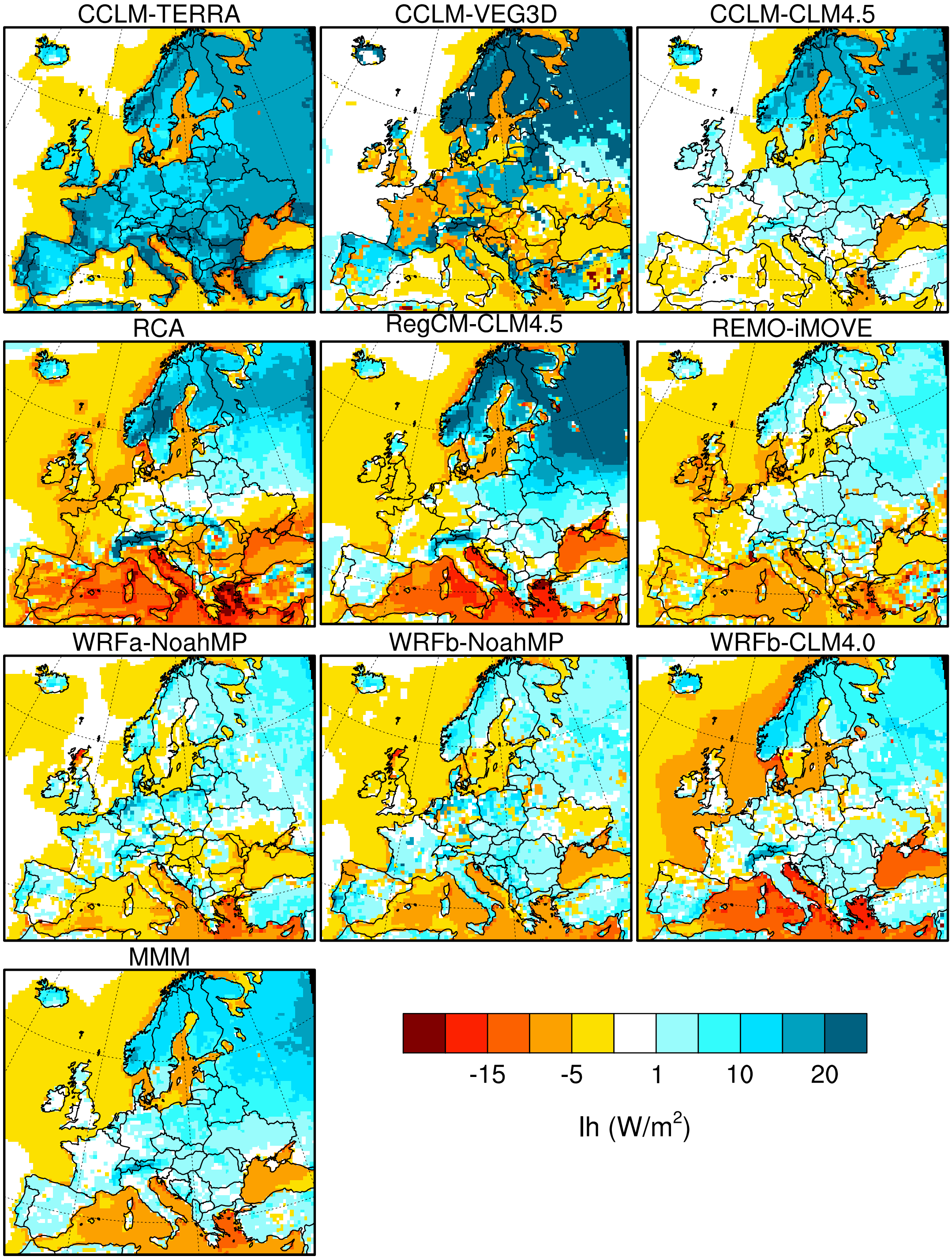
MMM
-15
-5
1
10
20
sh (W/m^2)

SON



DJF

Figure S10. Latent heat flux (FOREST minus GRASS). Here for DJF; next pages for MAM, JJA and SON.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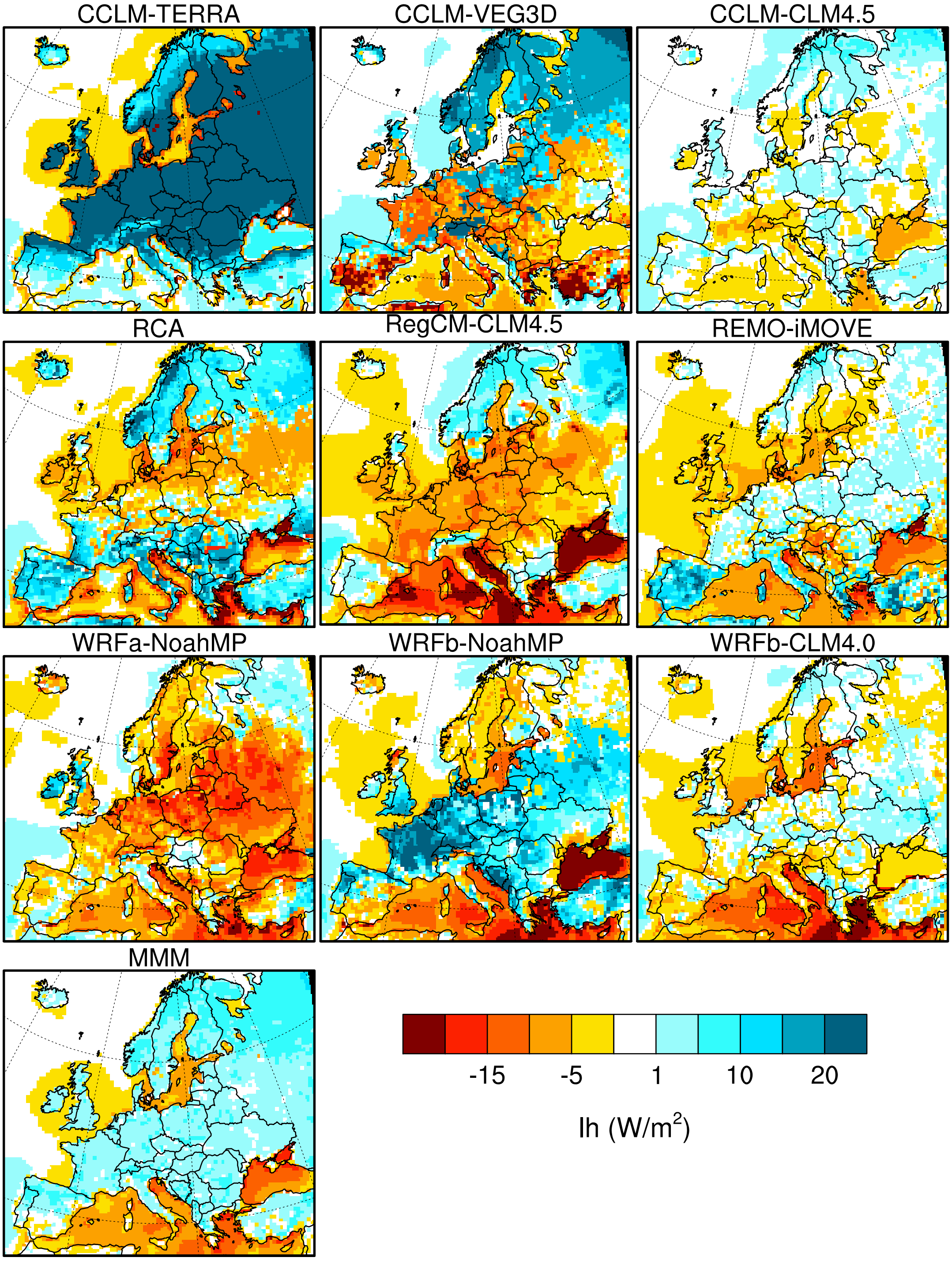
WRFb-CLM4.0
MMM
-15
-5
1
10
20
lh (W/m2)

MAM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REMO-iMOVE
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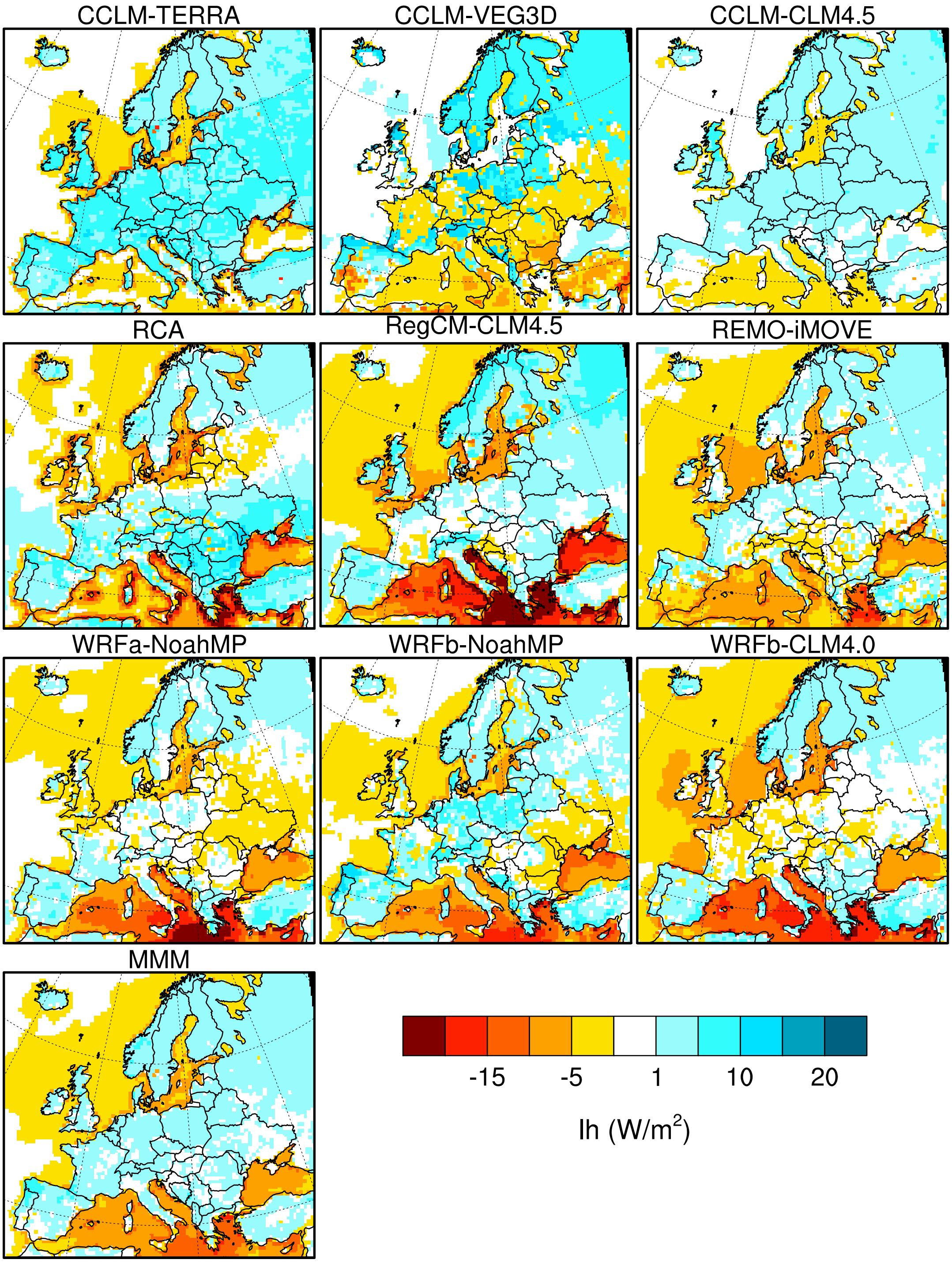
WRFb-CLM4.0
MMM
-15
-5
1
10
20
lh (W/m^2)

JJA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WRFb-CLM4.0
MMM
-15
-5
1
10
20
lh (W/m2)

SON

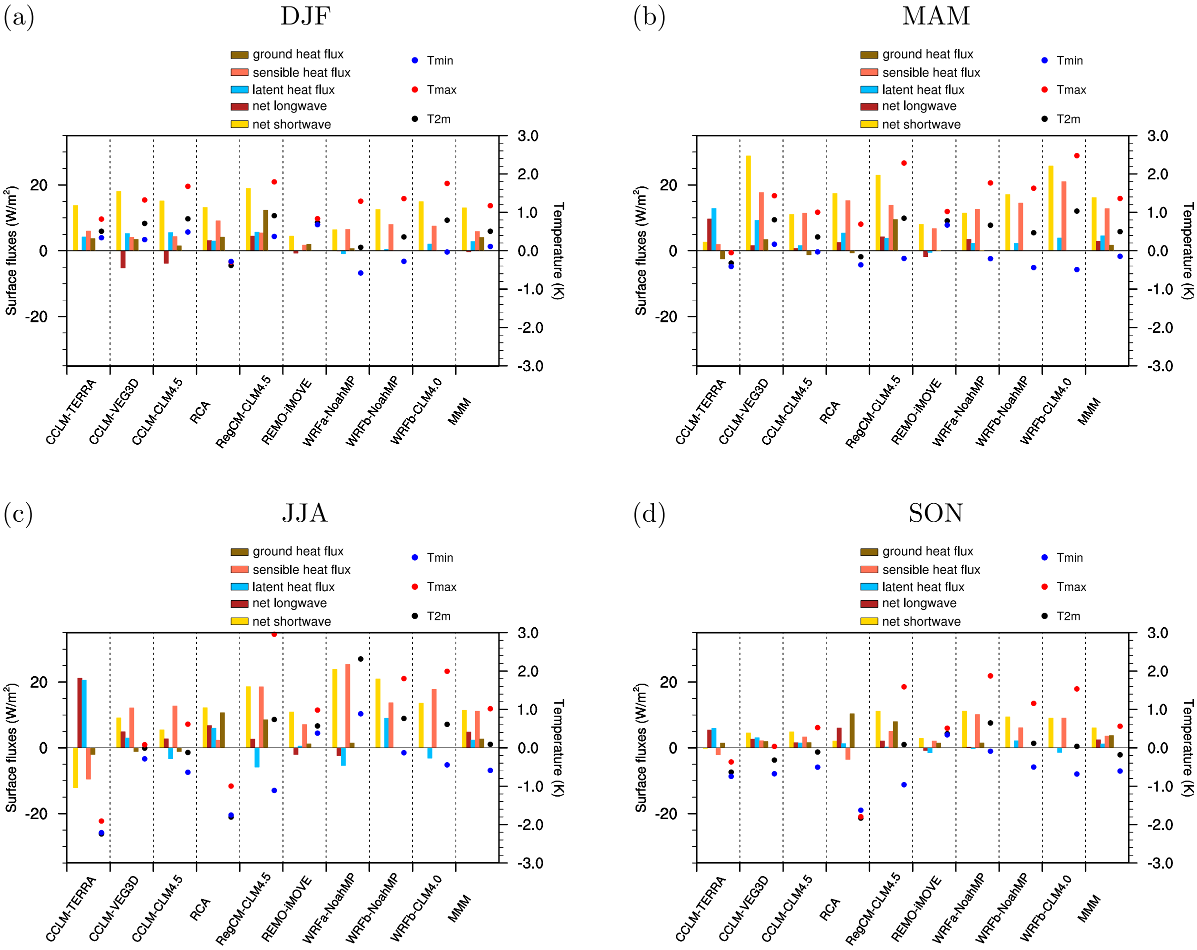

Figure S11. Changes in temperature and in surface energy balance components (FOREST minus GRASS) averaged over the Alps (AL) for DJF, MAM, JJA and SON.

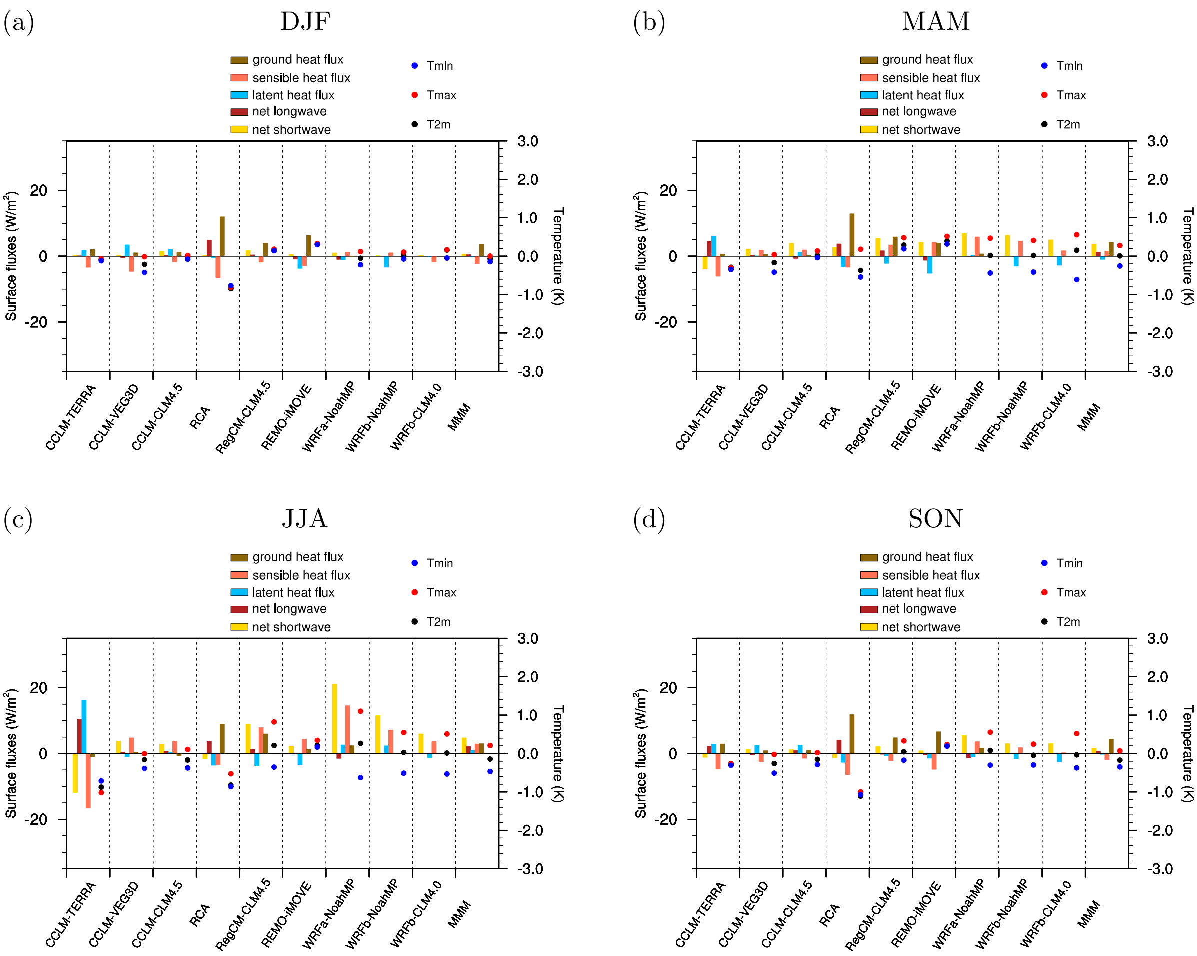

Figure S12. Changes in temperature and in surface energy balance components (FOREST minus GRASS) averaged over the British Isles (BI) for DJF, MAM, JJA and SON.

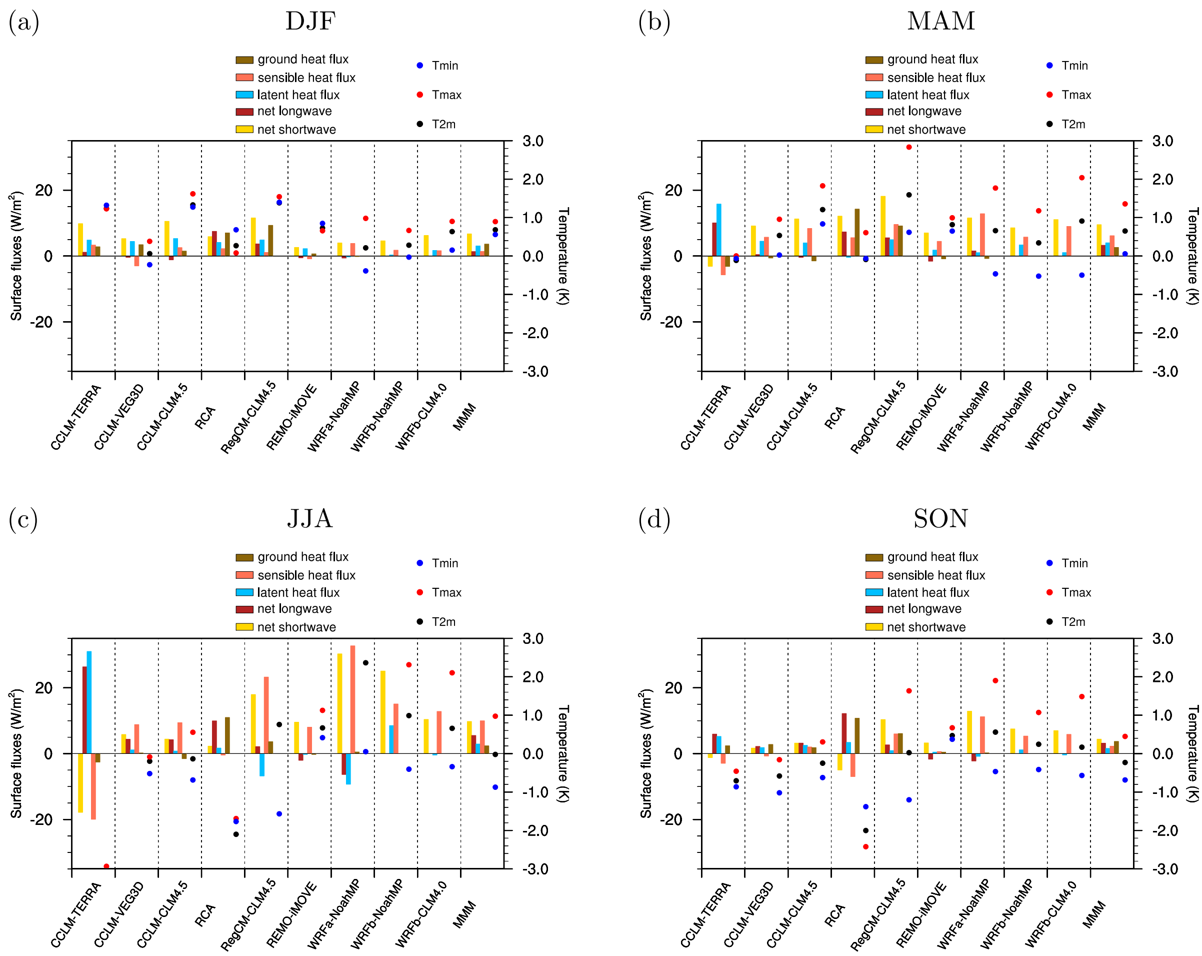

Figure S13. Changes in temperature and in surface energy balance components (FOREST minus GRASS) averaged over Eastern Europe (EA) for DJF, MAM, JJA and SON.

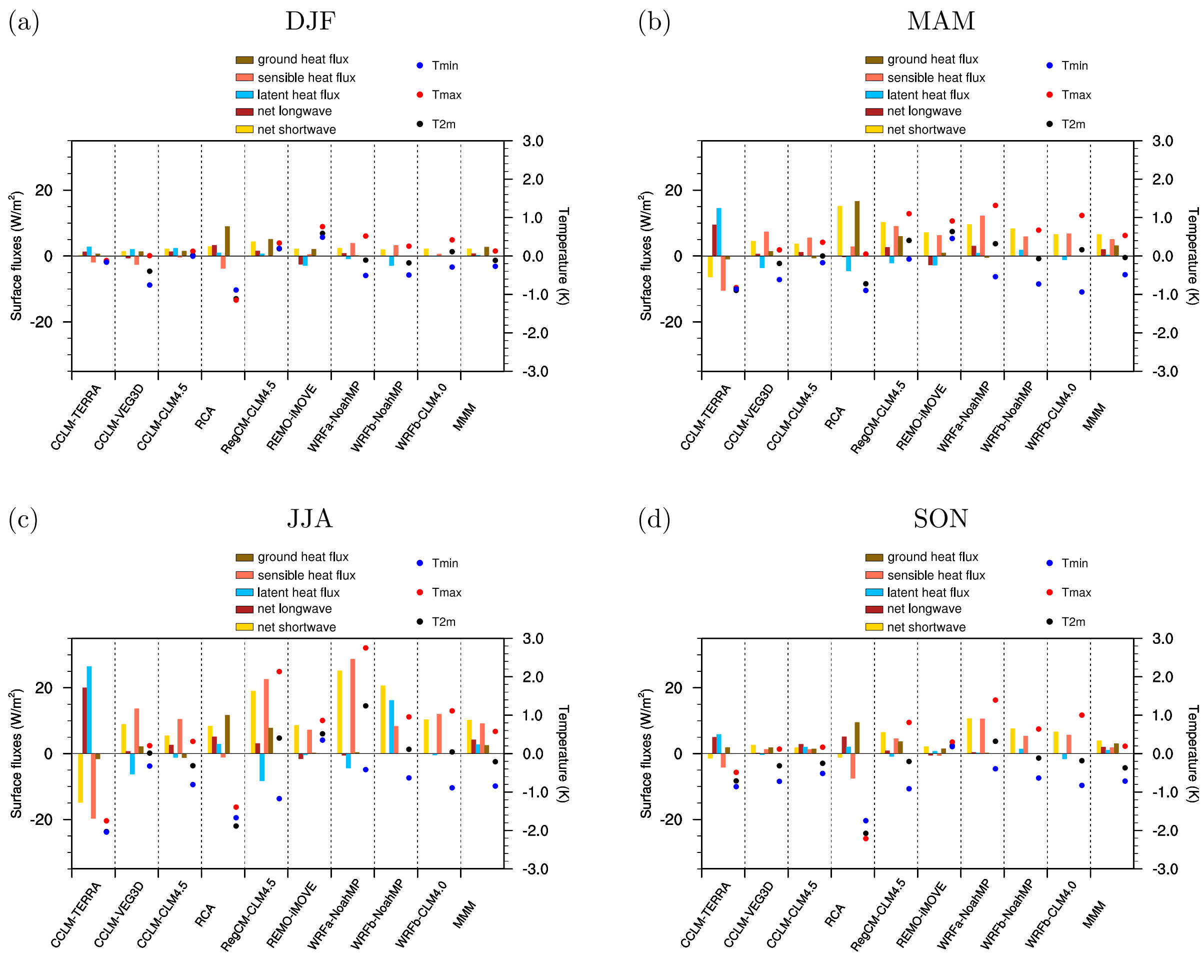

Figure S14. Changes in temperature and in surface energy balance components (FOREST minus GRASS) averaged over France (FR) for DJF, MAM, JJA and SON.

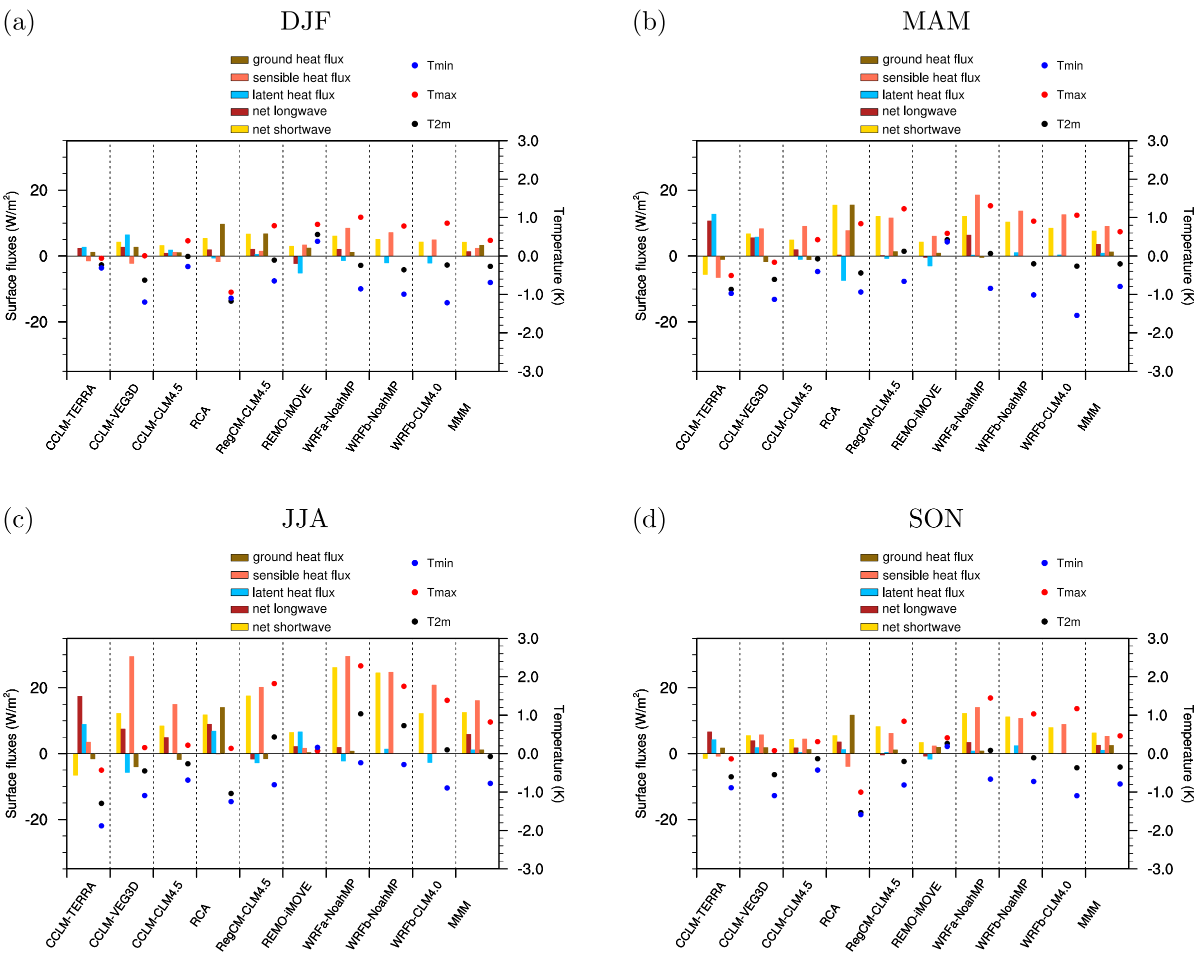

Figure S15. Changes in temperature and in surface energy balance components (FOREST minus GRASS) averaged over the Iberian Peninsula (IP) for DJF, MAM, JJA and SON.

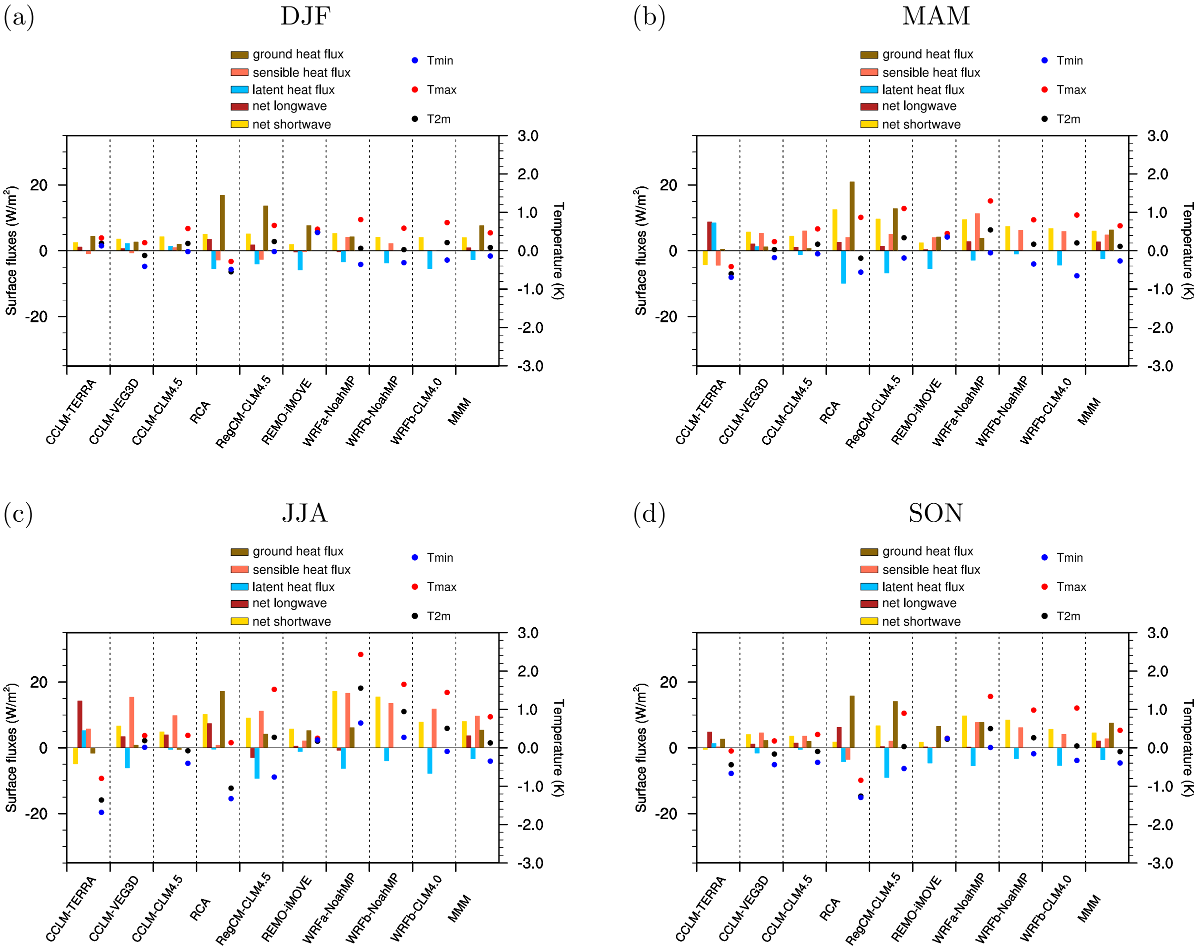

Figure S16. Changes in temperature and in surface energy balance components (FOREST minus GRASS) averaged over the Mediterranean (MD) for DJF, MAM, JJA and SON.

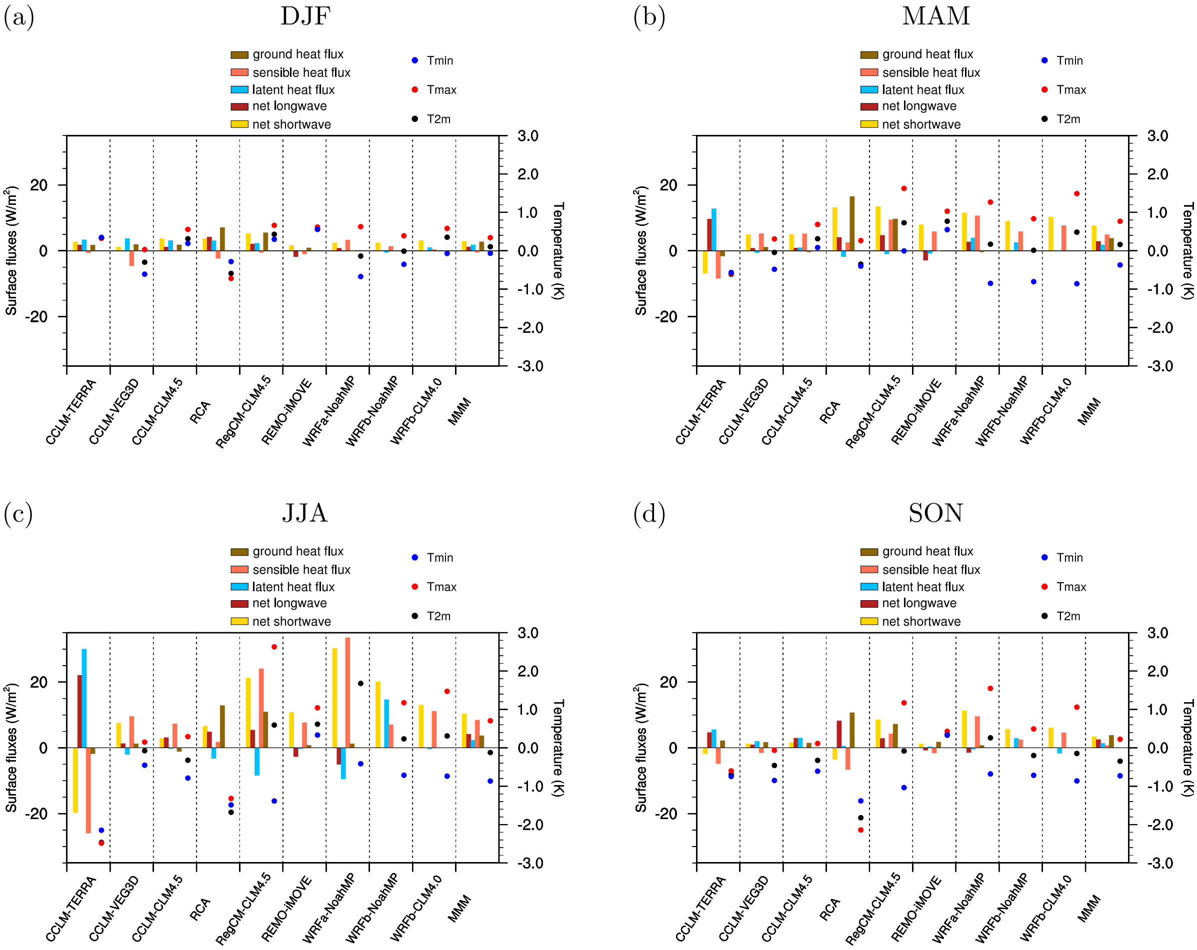

Figure S17. Changes in temperature and in surface energy balance components (FOREST minus GRASS) averaged over Mid-Europe (ME) for DJF, MAM, JJA and SON.

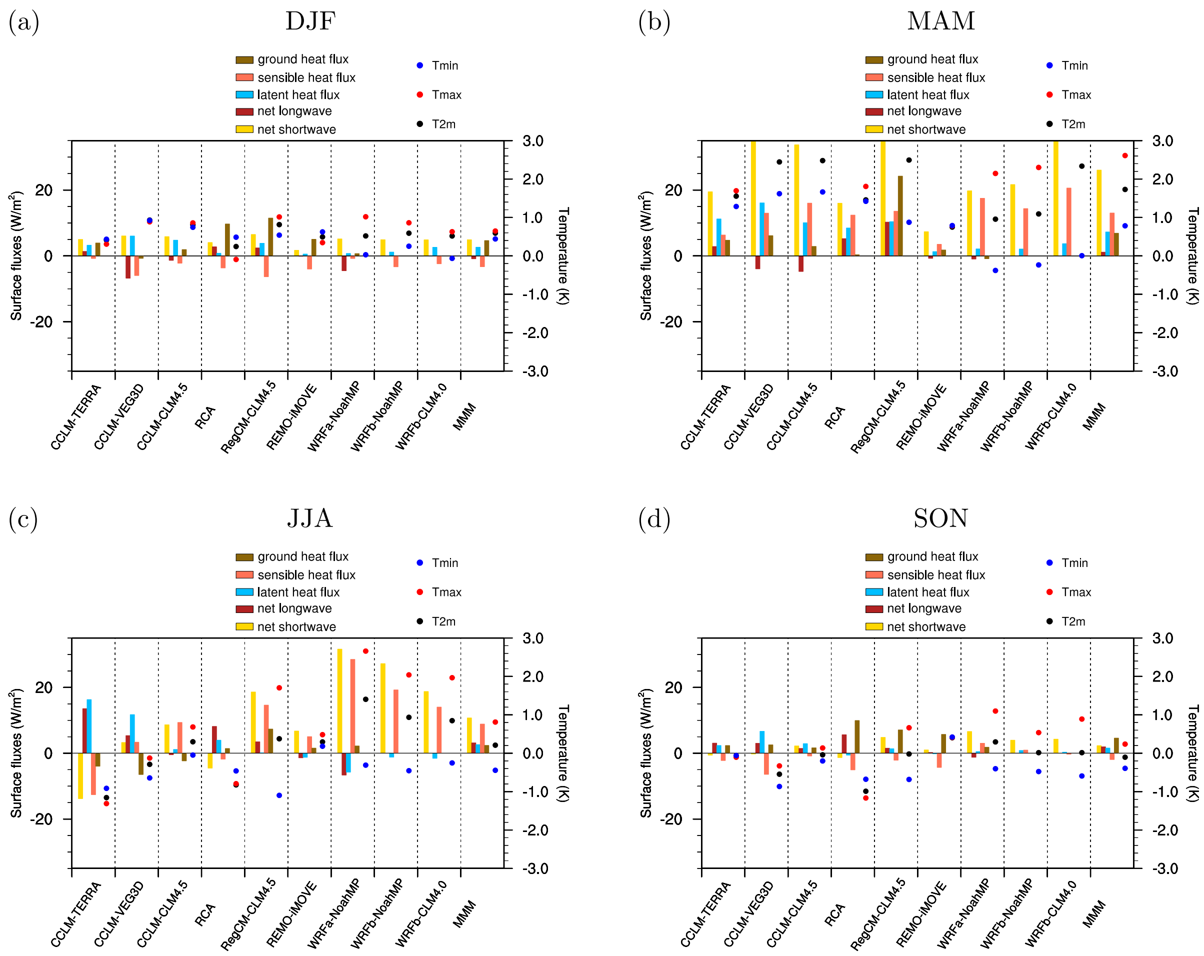

Figure S18. Changes in temperature and in surface energy balance components (FOREST minus GRASS) averaged over Scandinavia (SC) for DJF, MAM, JJA and SON.

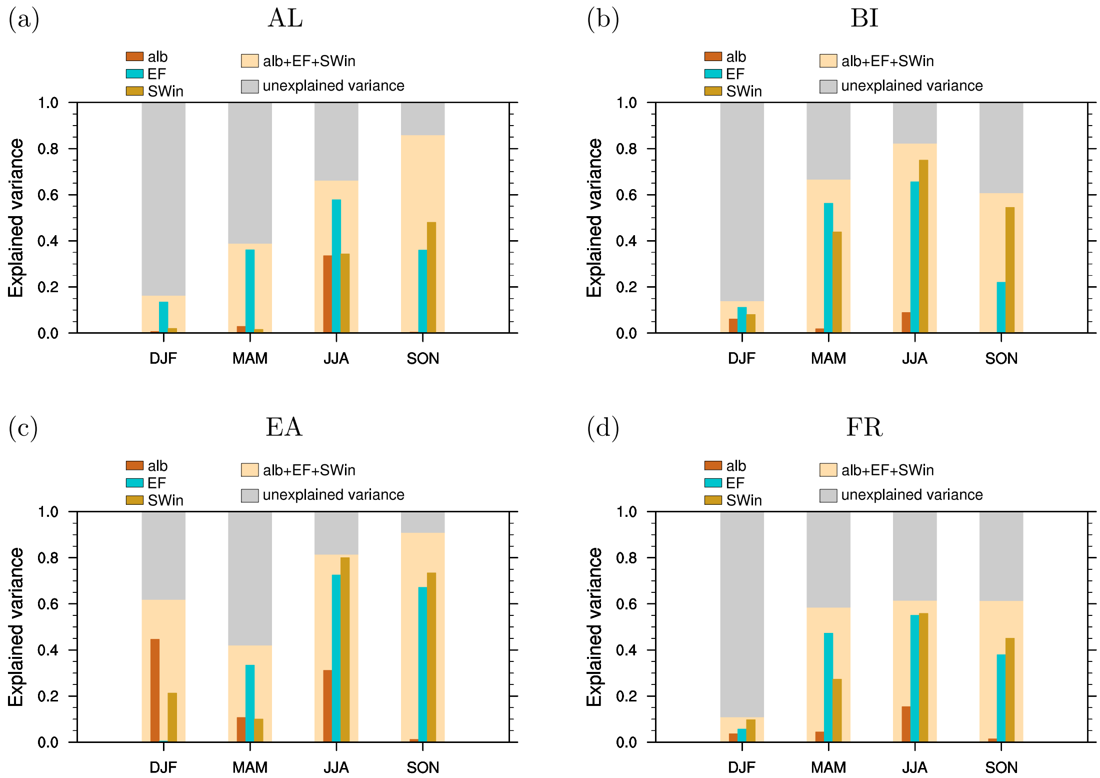

Figure S19. Fraction of inter-model variance in 2-meter temperature change (FOREST minus GRASS) explained by changes in albedo, evaporative fraction, incoming surface shortwave radiation or the three combined. Alb: inter-model correlation (Rsquared) between changes in albedo and 2-meter temperature. EF: inter-model correlation (Rsquared) between changes in evaporative fraction and 2-meter temperature. SWin: inter-model correlation (Rsquared) between changes in incoming surface shortwave radiation and 2-meter temperature. Alb+EF+SWin: Rsquared of a multi-linear regression combining the three predictors.

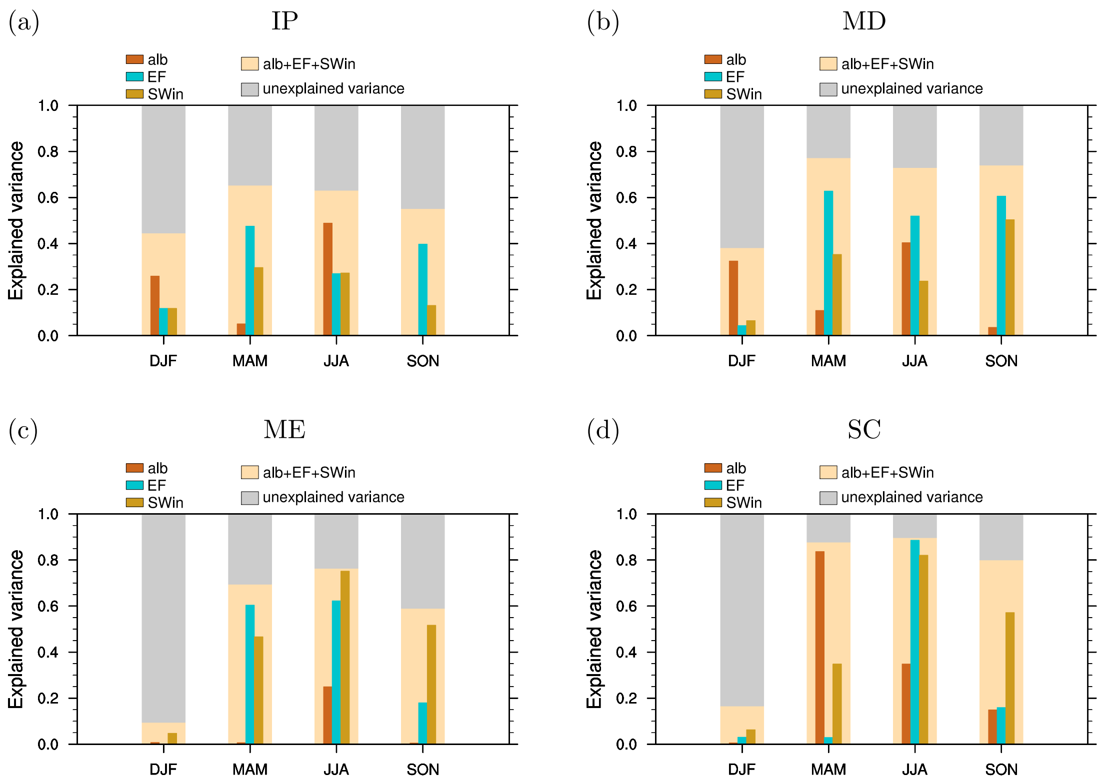

Figure S20. Fraction of inter-model variance in 2-meter temperature change (FOREST minus GRASS) explained by changes in albedo, evaporative fraction, incoming surface shortwave radiation or the three combined. Alb: inter-model correlation (Rsquared) between changes in albedo and 2-meter temperature. EF: inter-model correlation (Rsquared) between changes in evaporative fraction and 2-meter temperature. SWin: inter-model correlation (Rsquared) between changes in incoming surface shortwave radiation and 2-meter temperature. Alb+EF+SWin: Rsquared of a multi-linear regression combining the three predictors.