

**Supplementary Information of “Role of vegetation cover in representing land surface temperature in the CHTESSEL (CY45R1) and SURFEX-ISBA (v8.1) land surface models: a case study over Iberia”**

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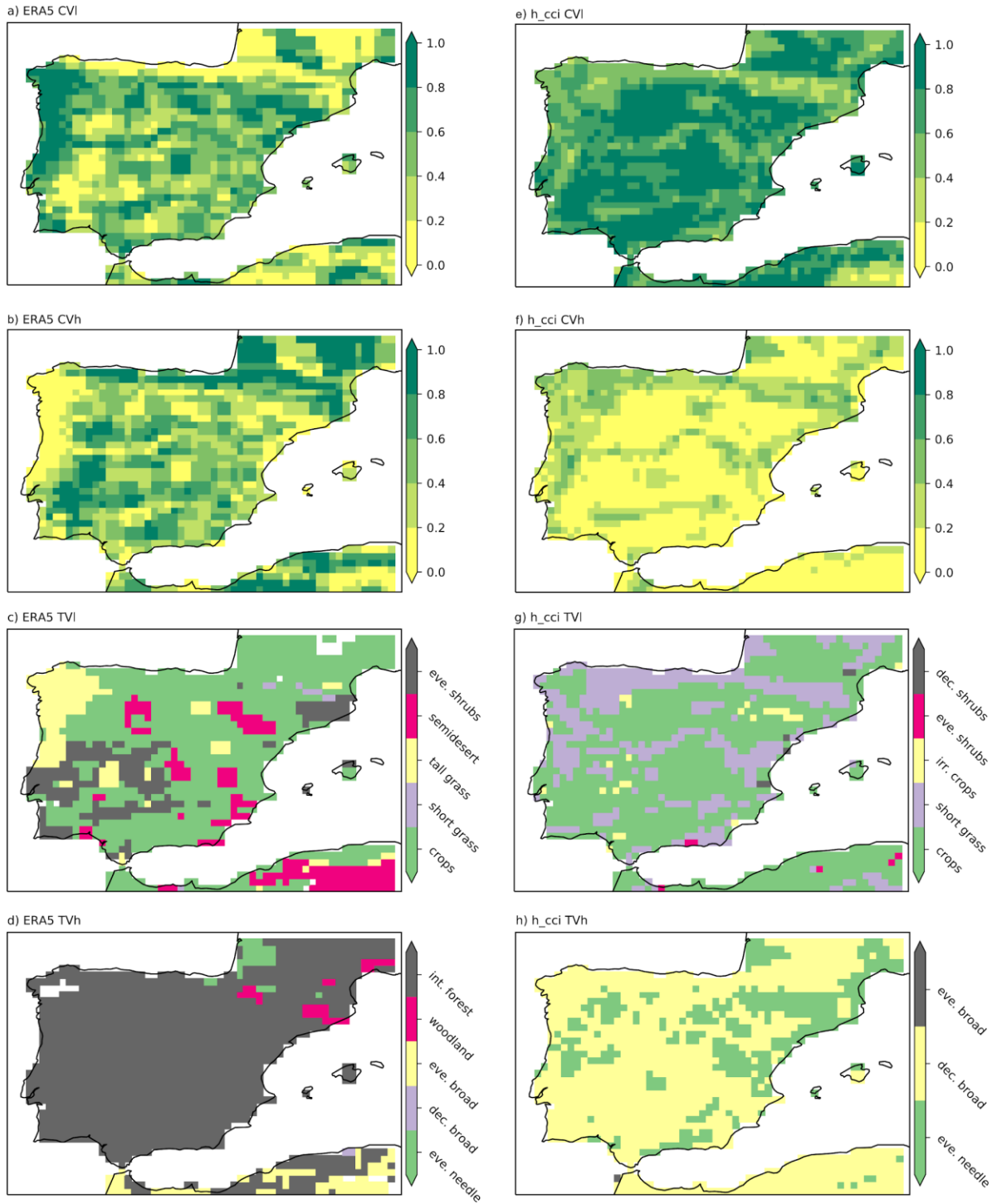
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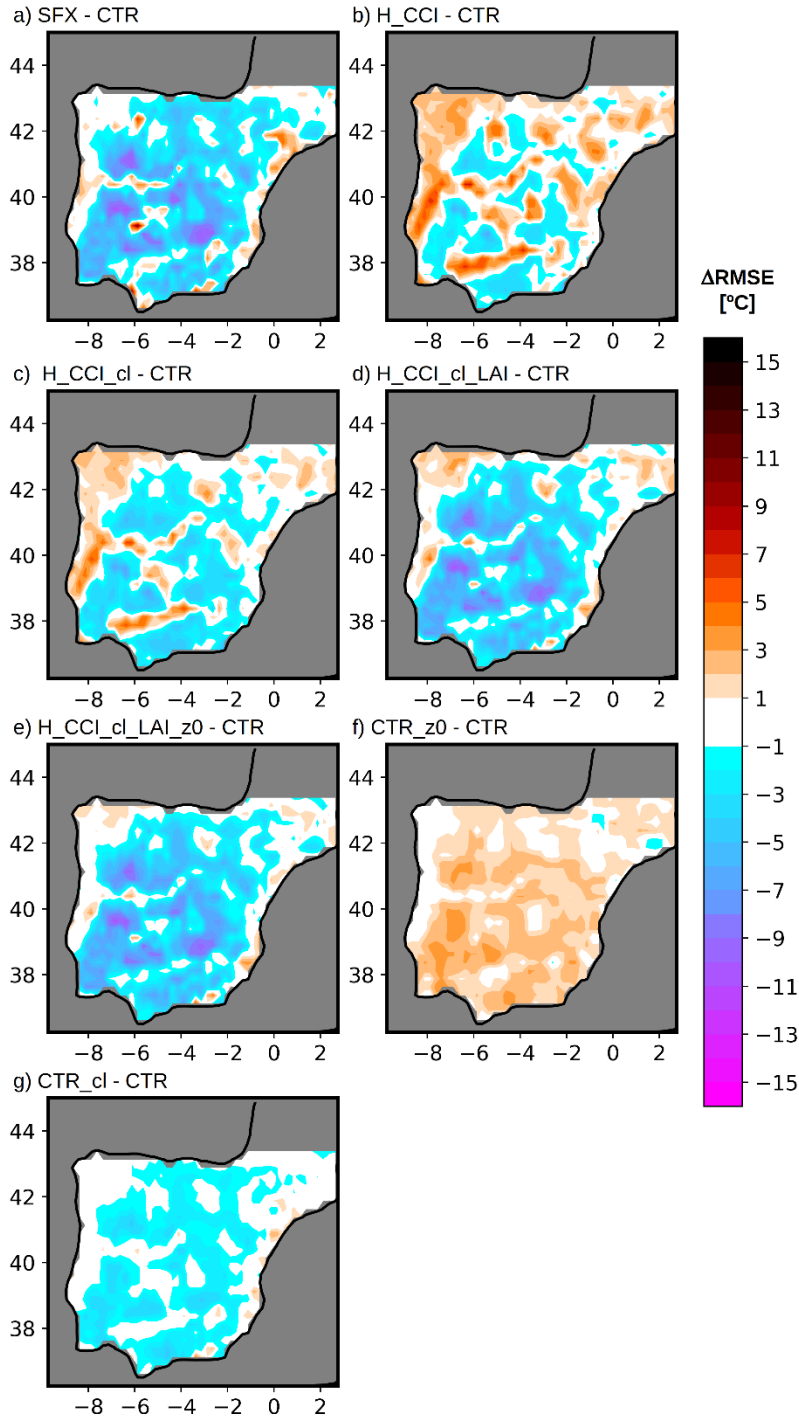
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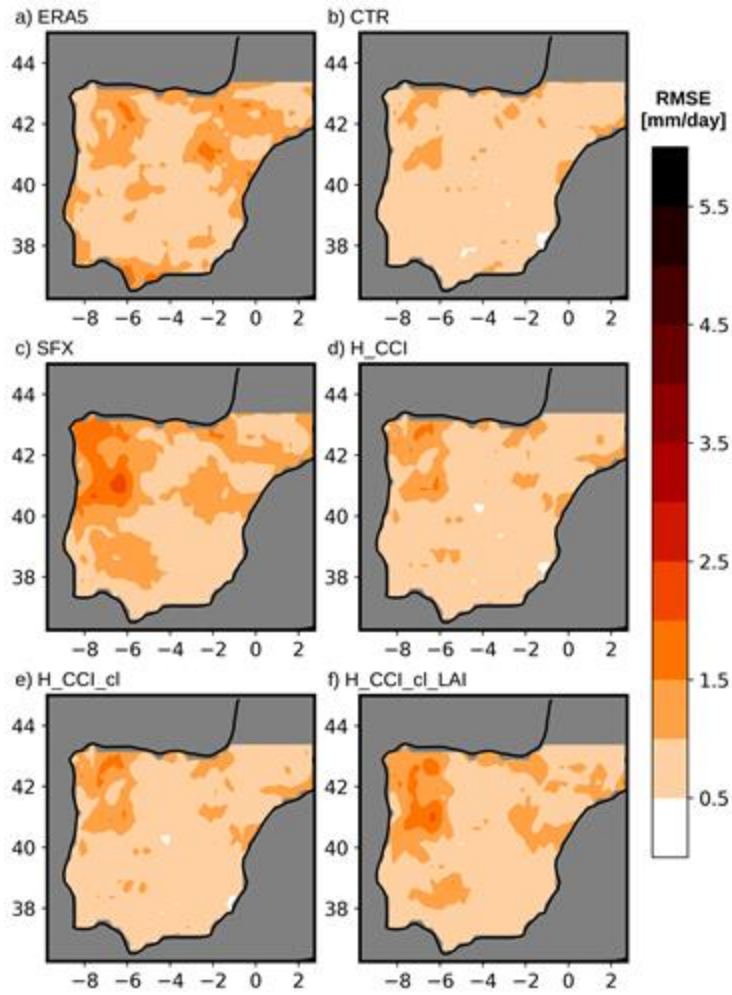
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15 **Supplementary Figure 1.** Comparison of ERA5 (a-d and CTR) with H\_CCI (e-h) vegetation cover and dominant vegetation types: CVI (a,e), CVh (b,f), TVI (c,g), TVh (d,h). Note the different color and associated dominant vegetation types in panels c, g, d, h.



20 **Supplementary Figure 2.** Difference in RMSE computed for daily maximum LST over Iberia in a) SFX minus CTR; b) H\_CCI minus CTR; c) H\_CCI\_cl minus CTR; d) H\_CCI\_cl\_LAI minus CTR; e) H\_CCI\_cl\_LAI\_z0 (same as H\_CCI\_cl\_LAI but with z0h reduced by a factor of 10) minus CTR; f) CTR\_z0 (same as CTR but with z0h reduced by a factor of 10) minus CTR; and g) CTR\_cl (same as CTR but with clumping parameterization for high and low vegetation) minus CTR.



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**Supplementary Figure 3.** JJA surface evaporation RMSE computed from a) ERA5; b) CTR; c) SFX; d) H\_CCI; e) H\_CCI\_cl; and g) H\_CCI\_cl\_LAI. Here GLEAMv3b dataset was considered as reference

30 **Supplementary table 1.** CHTESSEL land cover types and associated parameters. H/L differentiates low (L) from high (H) vegetation; cveg is the vegetation density (0–1) used in the tile fraction definition; and z0m and z0h are the roughness lengths for momentum and heat, respectively used in the calculations of the turbulent exchange coefficients for momentum, heat and water (adapted from JO19).

Index	Land Cover Type	H/L	Cveg	z0m	z0h
1	Crops, mixed farming	L	0.90	0.25	$0.25 \times 10^{-2}$
2	Short grass	L	0.85	0.20	$0.20 \times 10^{-2}$
3	Evergreen needleleaf trees	H	0.90	2.00	2.00
4	Deciduous needleleaf trees	H	0.90	2.00	2.00
5	Deciduous broadleaf trees	H	0.90	2.00	2.00
6	Evergreen broadleaf trees	H	0.99	2.00	2.00
7	Tall grass	L	0.70	0.47	$0.47 \times 10^{-2}$
8	Desert	-	0	0.013	$0.013 \times 10^{-2}$
9	Tundra	L	0.50	0.034	$0.034 \times 10^{-2}$
10	Irrigated crops	L	0.90	0.50	$0.50 \times 10^{-2}$
11	Semidesert	L	0.1	0.17	$0.17 \times 10^{-2}$
12	Ice caps and glaciers	-	-	$1.3 \times 10^{-3}$	$1.3 \times 10^{-4}$
13	Bogs and marshes	L	0.6	0.83	$0.83 \times 10^{-2}$
14	Inland water	-	-	-	-
15	Ocean	-	-	-	-
16	Evergreen shrubs	L	0.50	0.10	$0.10 \times 10^{-2}$
17	Deciduous shrubs	L	0.50	0.25	$0.25 \times 10^{-2}$
18	Mixed forest	H	0.90	2.00	2.00
19	Interrupted forest	H	0.90	1.1	1.1
20	Water and land mixtures	L	0.60	-	-