






Sensitivity of surface fluxes in the ECMWF land surface model to remote sensed Leaf Area Index and roots distribution: evaluation with tower flux data

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1. Supplementary material

Table S1. CHTESSEL vegetation types and associated parameters. R_1 to R_4 denote the root fraction in layers 1 to 4 (with depths of 0.07, 0.21, 0.72 and 1.89 m). The Final 4 lines indicate the root fraction when considering an uniform rooting depth with maximum rooting depth R_{DMAX} of 0.5, 1, 2 and 2.89 meters.

Land cover type	H/L	Cveg	R_{smin}	a_r	b_r	R_1	R_2	R_3	R_4
Crops	L	0.90	100	5.55	2.61	24	41	31	4
Short grass	L	0.85	100	10.74	2.61	35	38	23	4
Tall grass	L	0.70	100	8.24	1.63	27	27	27	9
Tundra	L	0.50	80	8.99	8.99	47	45	8	0
Irrigated Crops	L	0.90	180	5.56	2.61	24	41	31	4
Semi desert	L	0.1	150	4.37	0.98	17	31	33	19
Bogs and marshes	L	0.6	240	7.34	1.30	25	34	27	11
Evergreen shrubs	L	0.50	225	6.34	1.57	23	36	30	11
Deciduous shrubs	L	0.50	225	6.33	1.16	23	36	30	11
Evergreen needleleaf trees	H	0.90	250	6.71	2.18	26	39	29	6
Deciduous needleleaf trees	H	0.90	250	7.07	1.95	26	38	29	7
Deciduous broadleaf trees	H	0.90	175	5.99	1.96	24	38	31	7
Evergreen broadleaf trees	H	0.99	240	7.34	1.30	25	34	27	14
Mixed forest	H	0.90	250	4.45	1.63	19	35	36	10
Interrupted forest	H	0.90	175	4.45	1.63	19	35	36	10
$R_{DMAX}=0.5$						14	42	44	0
$R_{DMAX}=1$						7	21	72	0
$R_{DMAX}=2$						4	11	36	50
$R_{DMAX}=3$						2	7	25	65

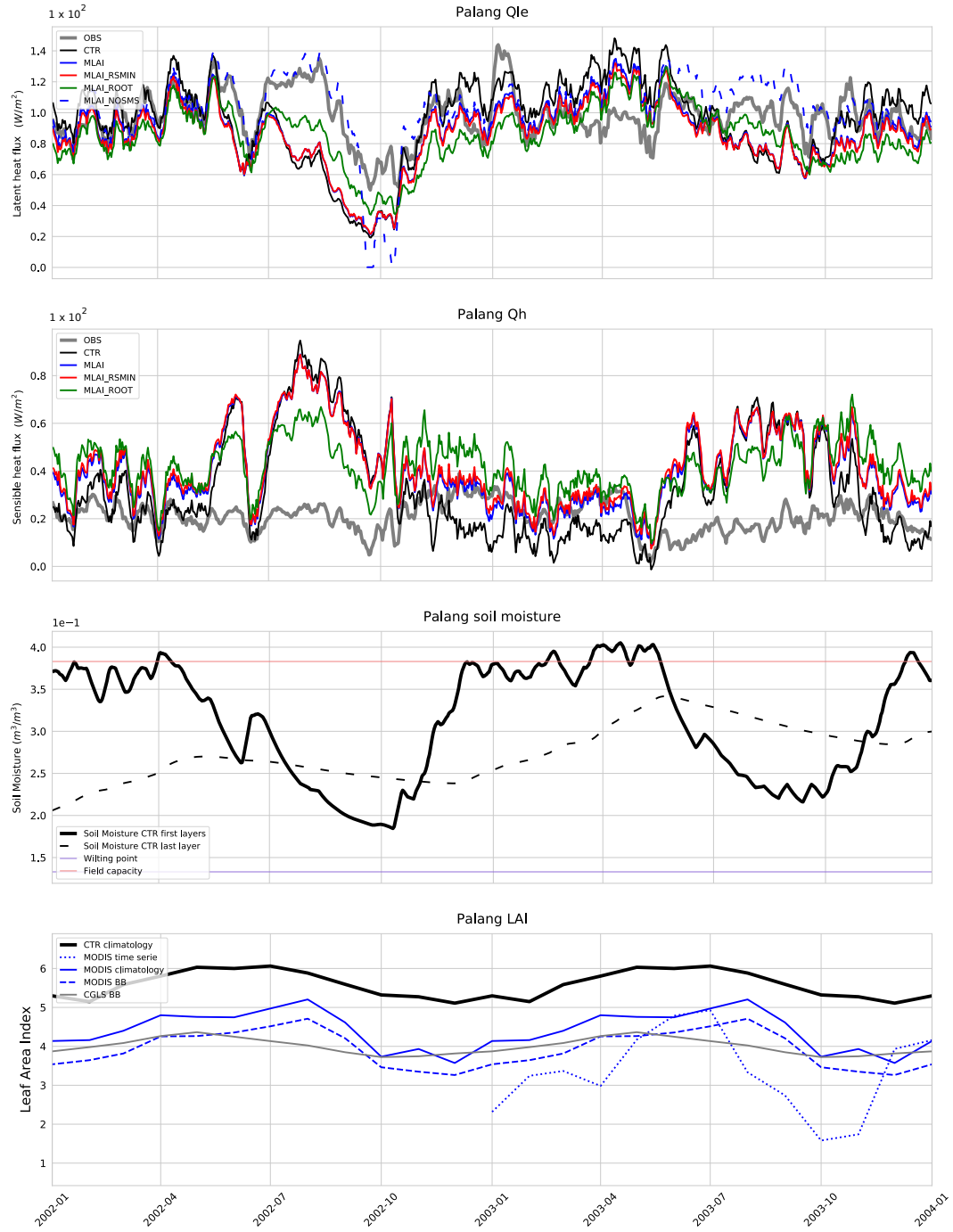


Figure S1. Time series of Sensible heat flux, latent heat flux, soil moisture and LAI in Palang. The turbulent fluxes time series compare the observations (gray) with the simulations: CTR (black), MLAI (blue), MLAI_RSMIN (red), MLAI_ROOT (green) and MLAI_NOSMS (dashed blue). The soil moisture time series shows the CTR top 3 layers meter soil moisture (top meter solid back) and the bottom layer soil moisture (dashed black) as well as the soil moisture at wilting point (blue) and field capacity (red). The LAI time series compares CTR (black) with the high resolution MODIS LAI time series (dotted blue), the high resolution MLAI (blue), the climatology of MODIS considering the 0.25° bounding box (dashed blue) and CGLS LAI climatology (grey).

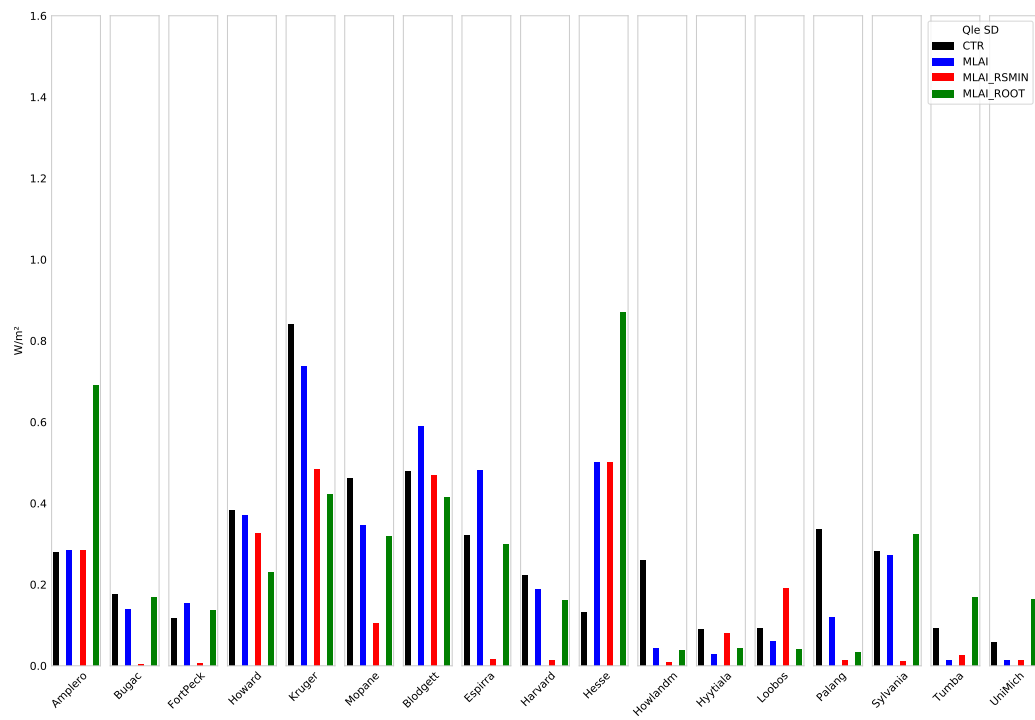


Figure S2. Latent heat flux SD in the 17 stations for each simulation: CTR, MLAI, MLAI_RSMIN and MLAI_ROOT.

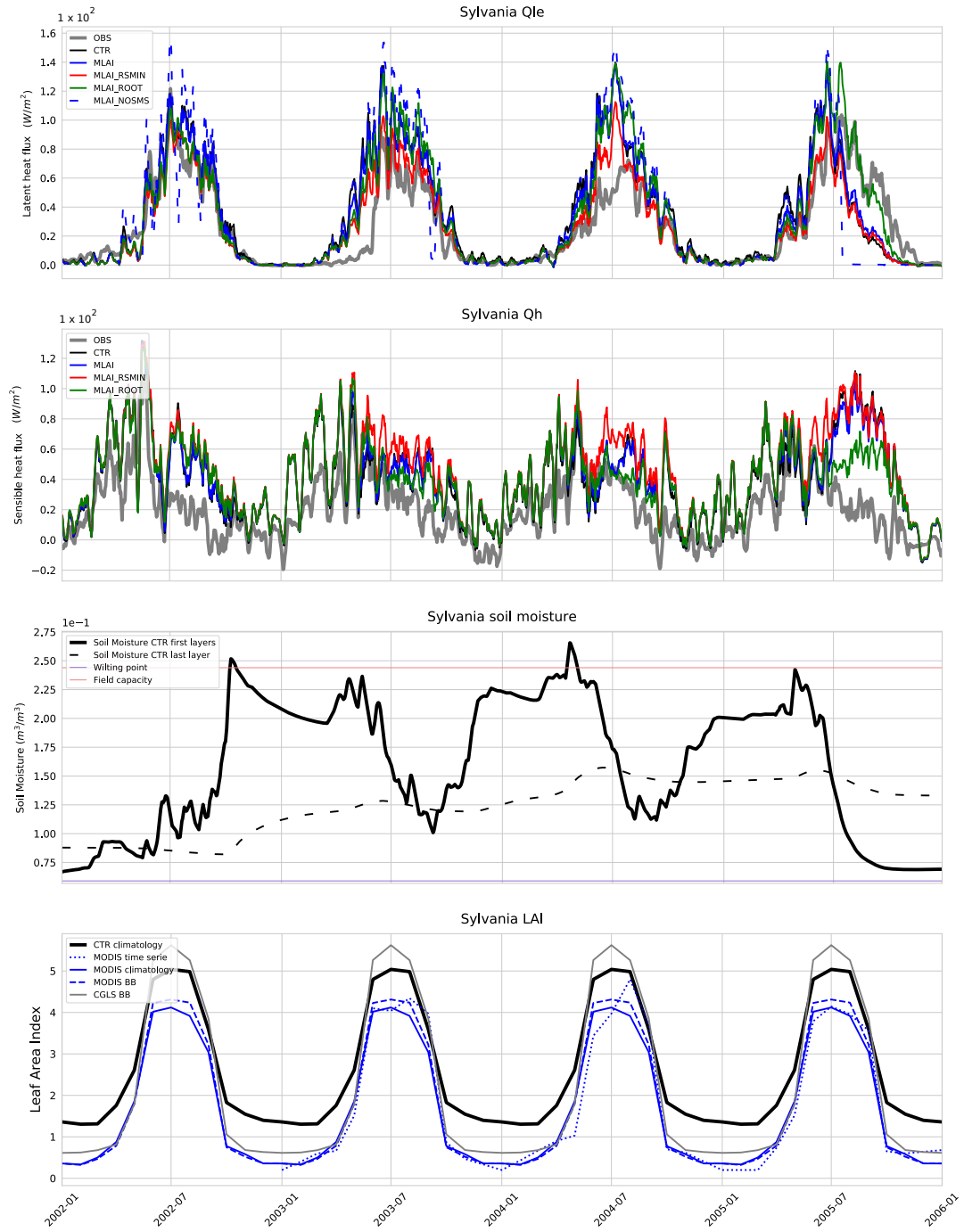


Figure S3. As Figure S1 but for Sylvania station.

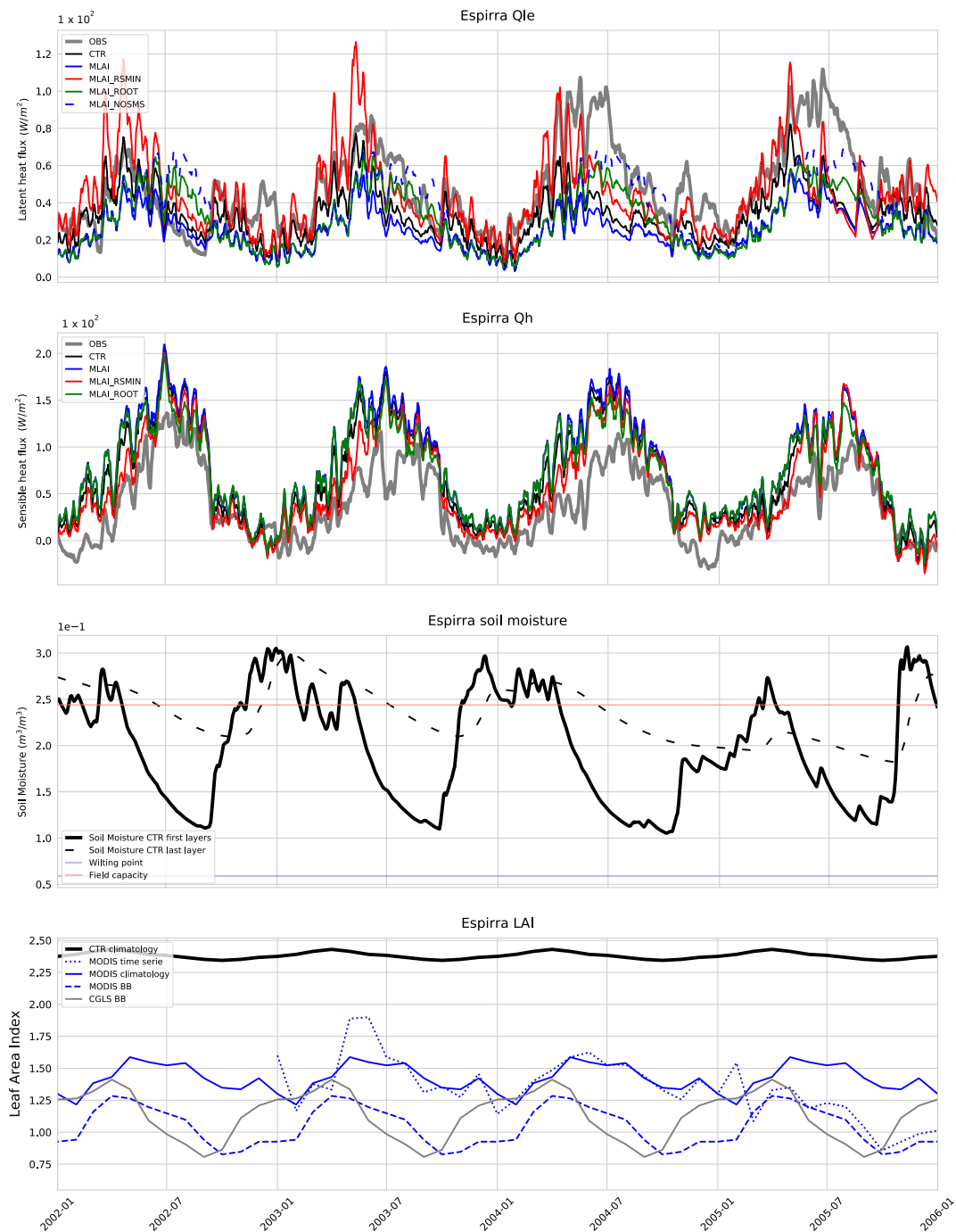


Figure S4. As Figure S1 but for Espirra station.

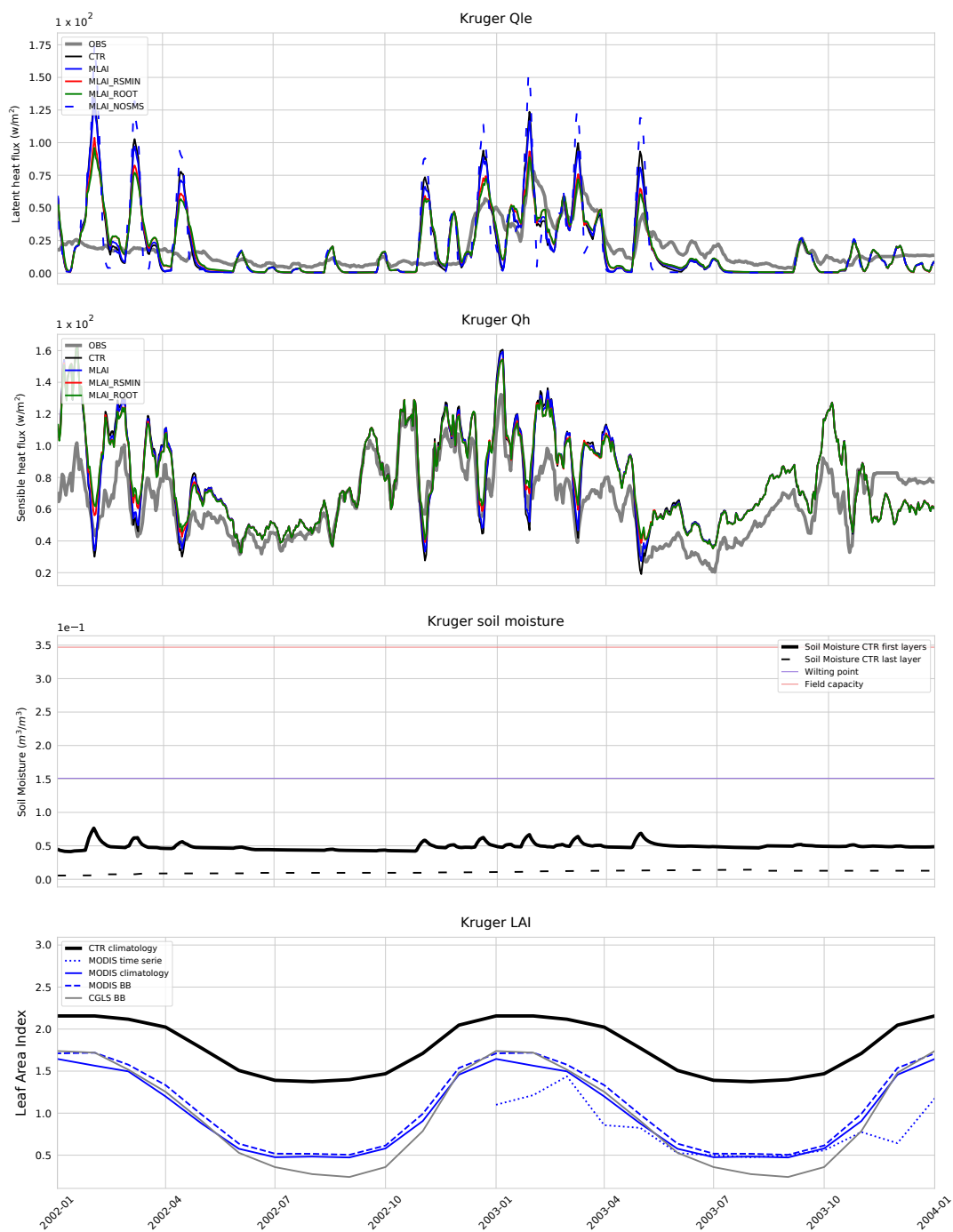


Figure S5. As Figure S1 but for Kruger station.

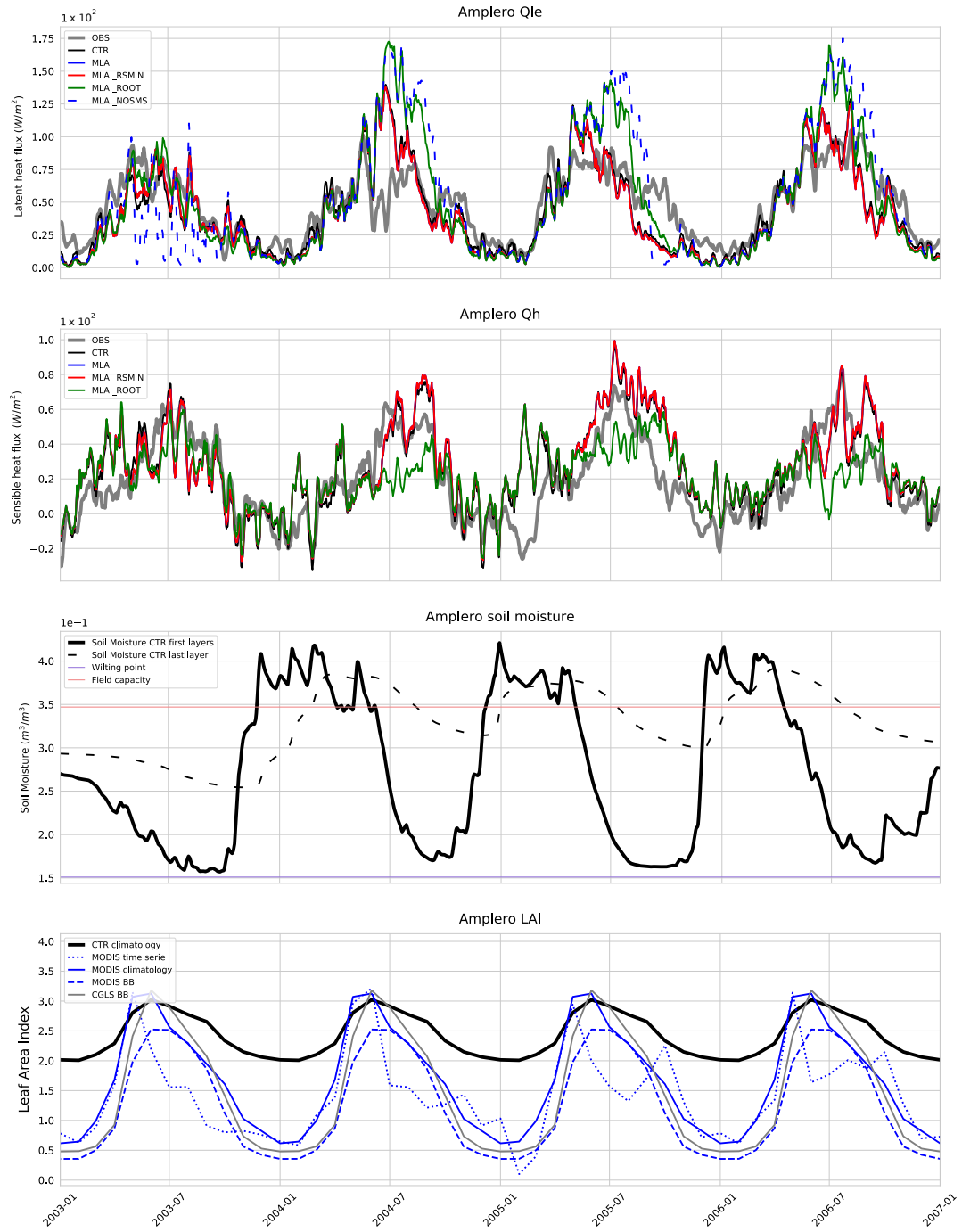


Figure S6. As Figure S1 but for Ampler station.

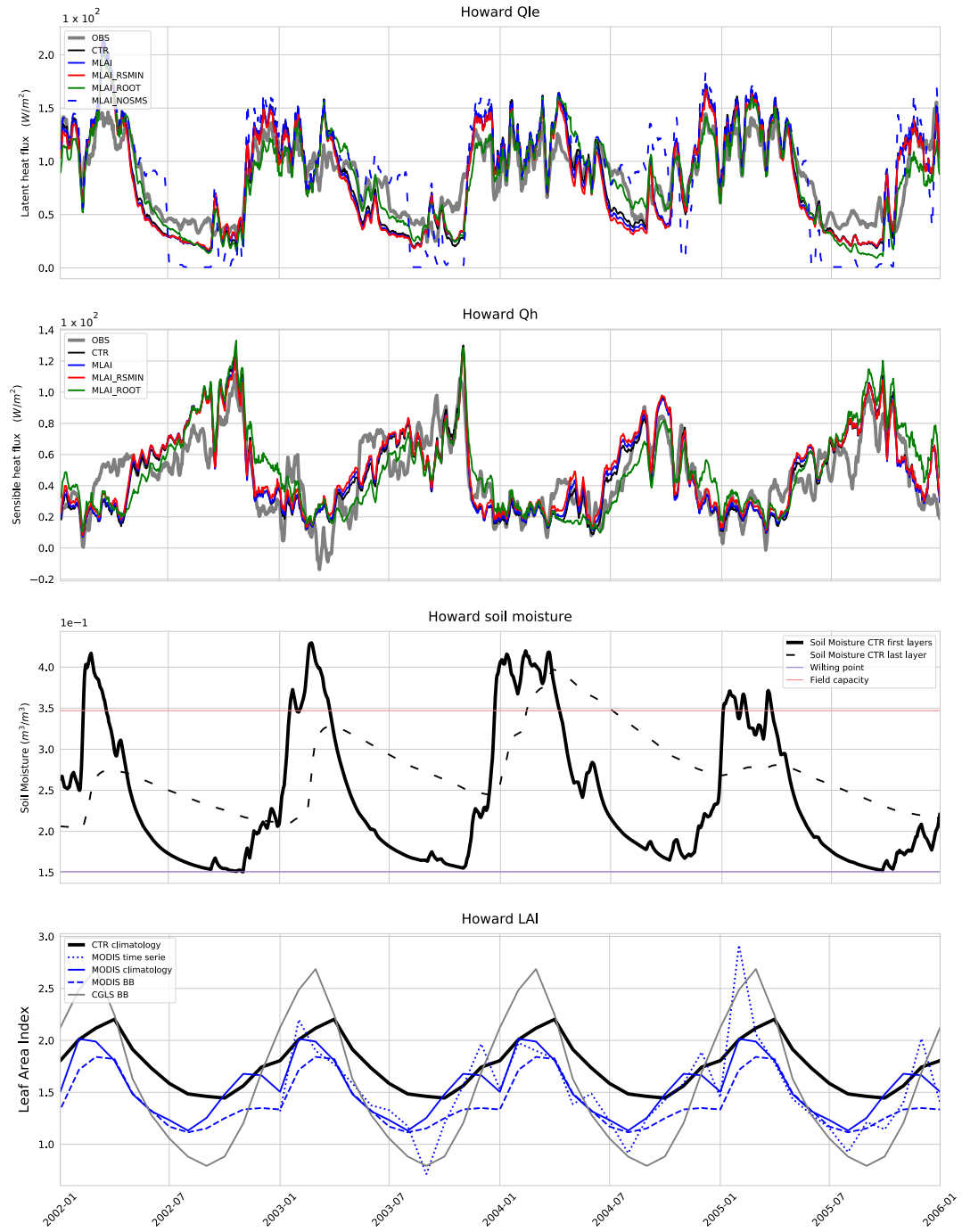


Figure S7. As Figure S1 but for Howard station.

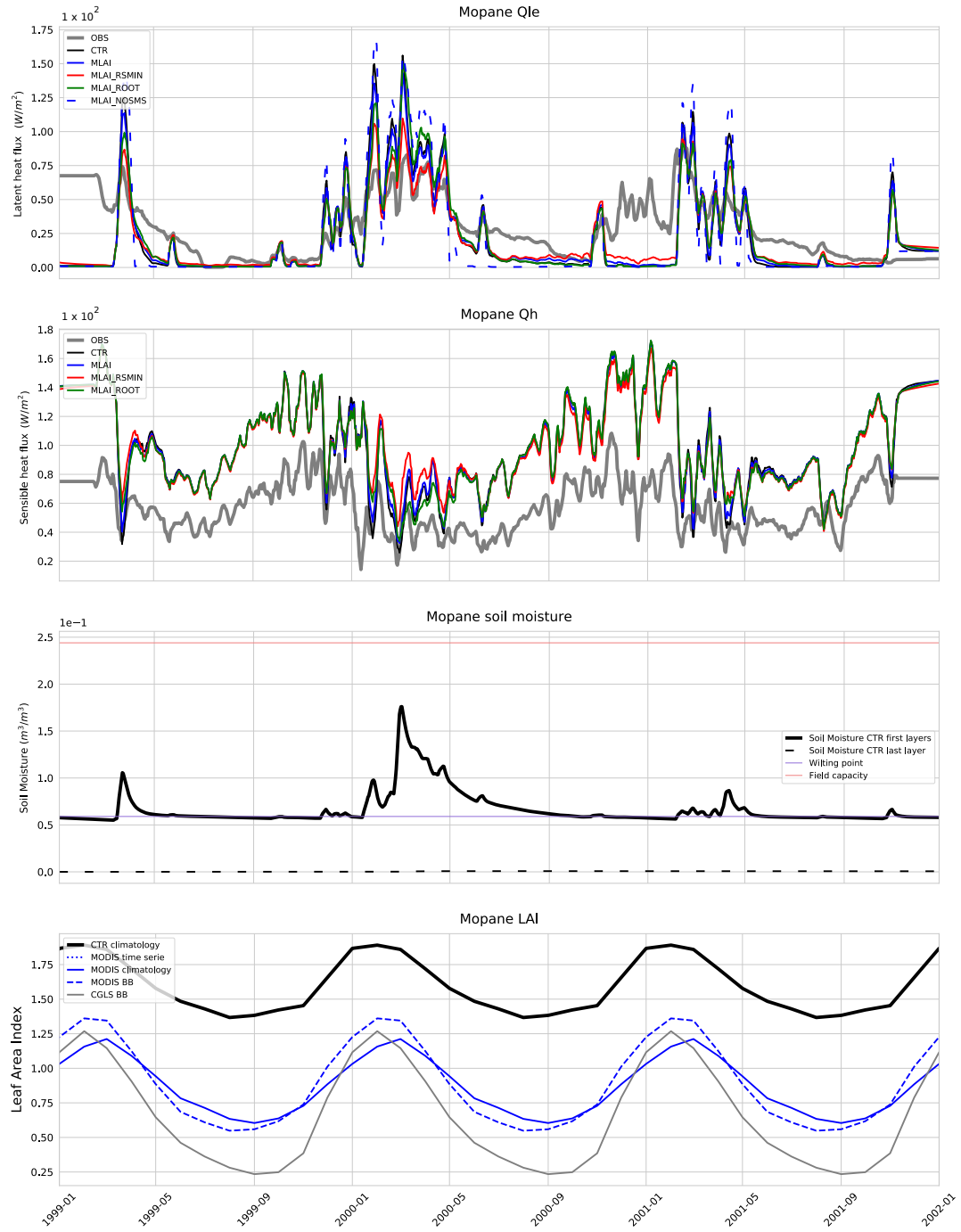


Figure S8. As Figure S1 but for Mopane station.

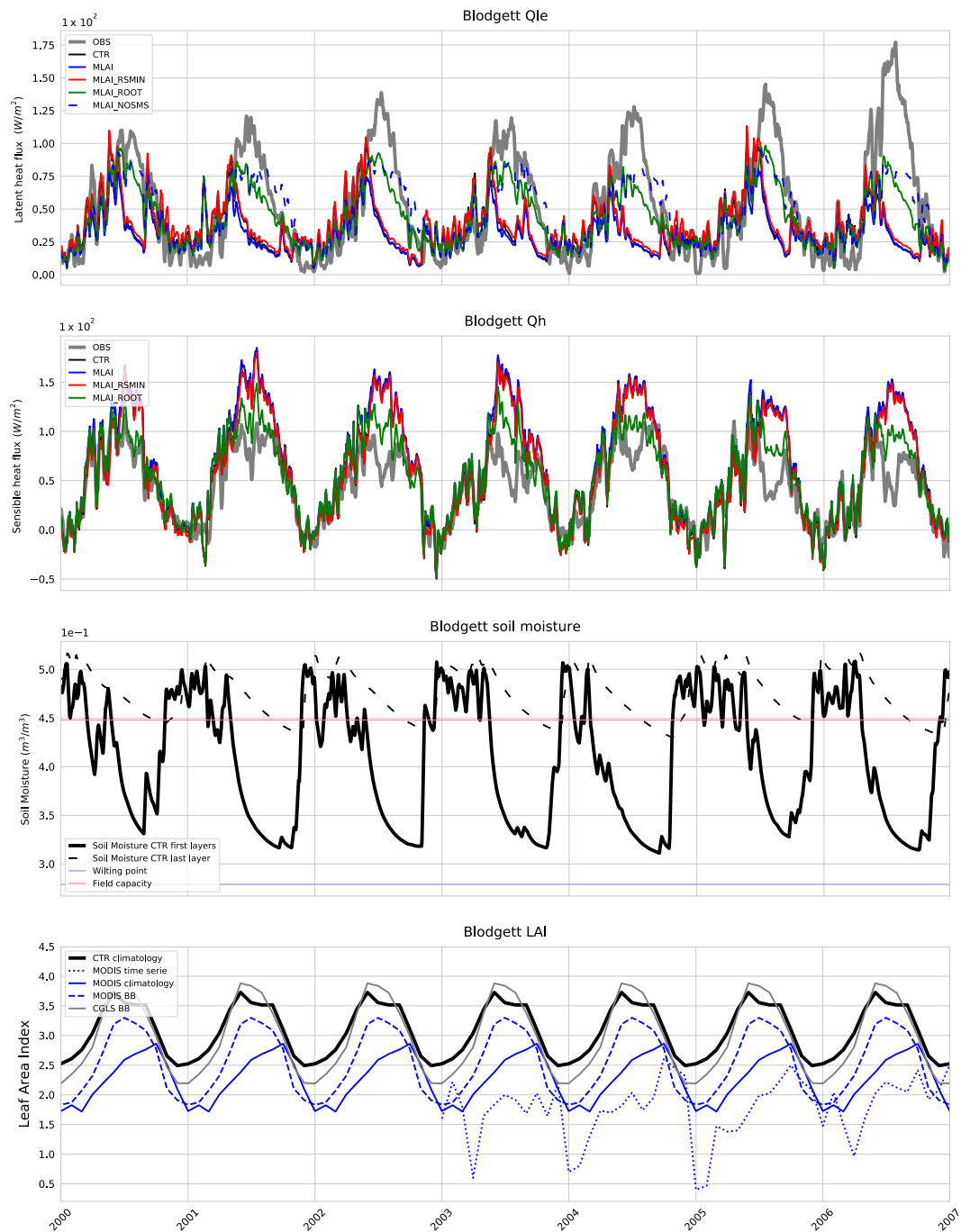


Figure S9. As Figure S1 but for Blodgett station.

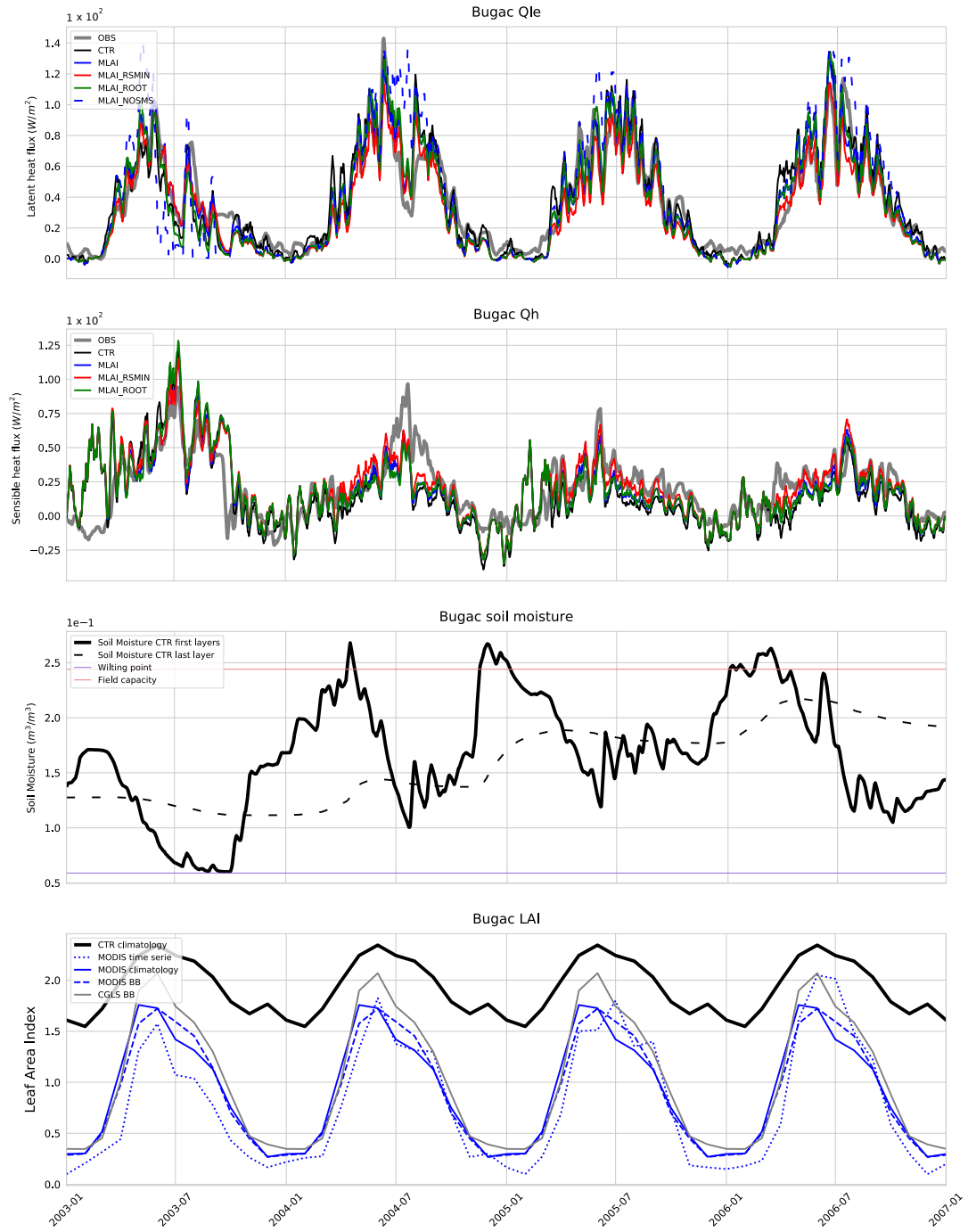


Figure S10. As Figure S1 but for Bugac station.

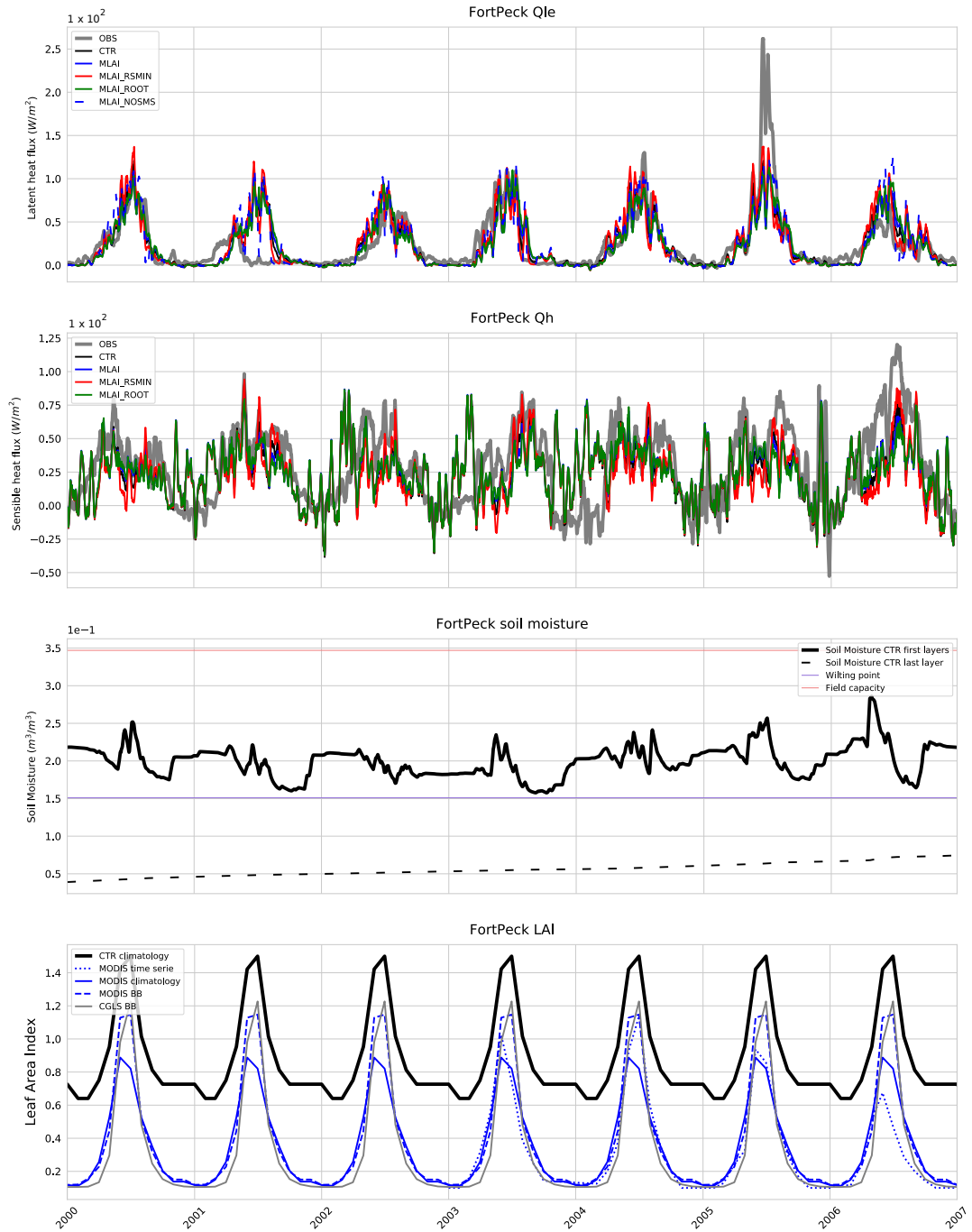


Figure S11. As Figure S1 but for Fort Peck station.

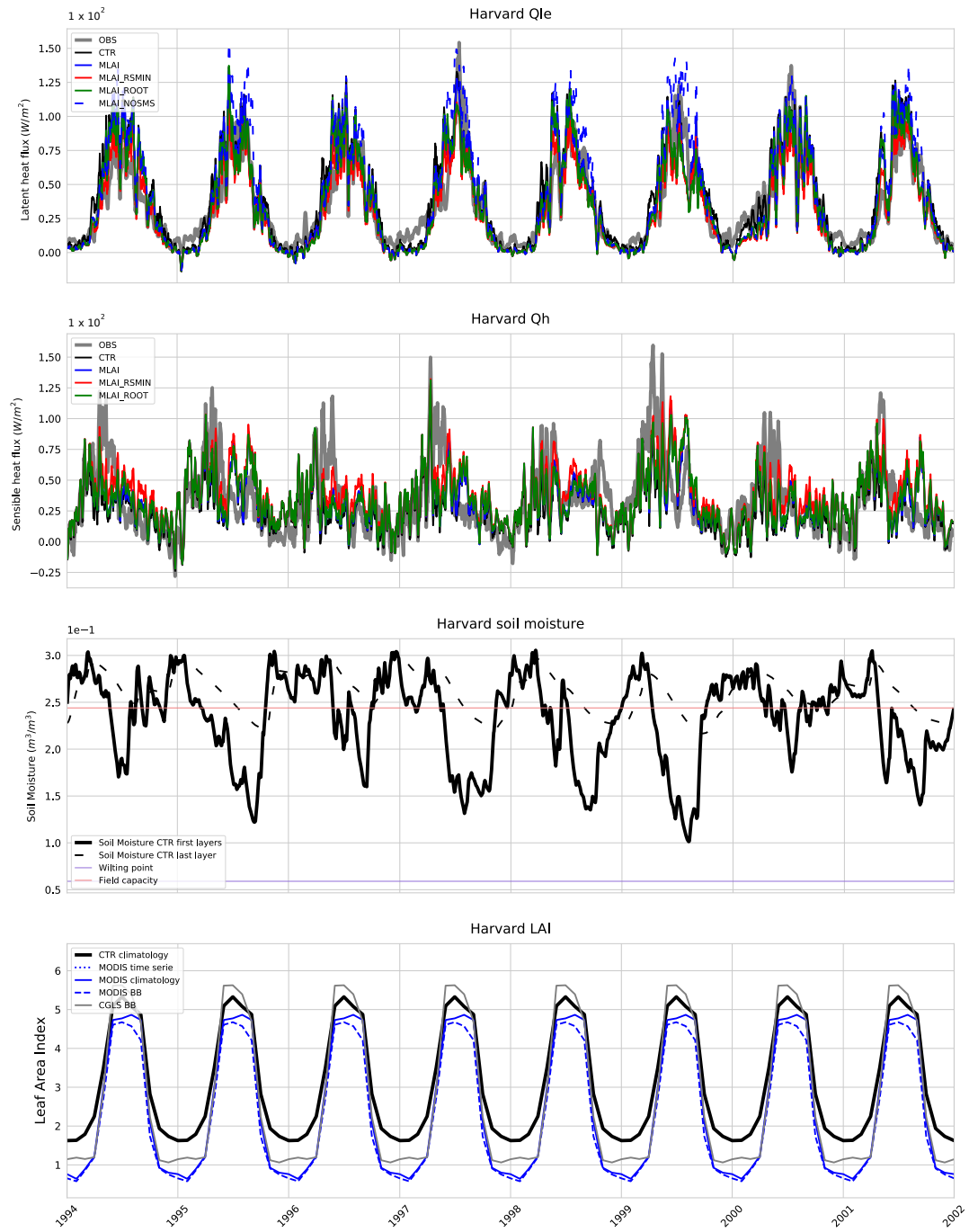


Figure S12. As Figure S1 but for Harvard station.

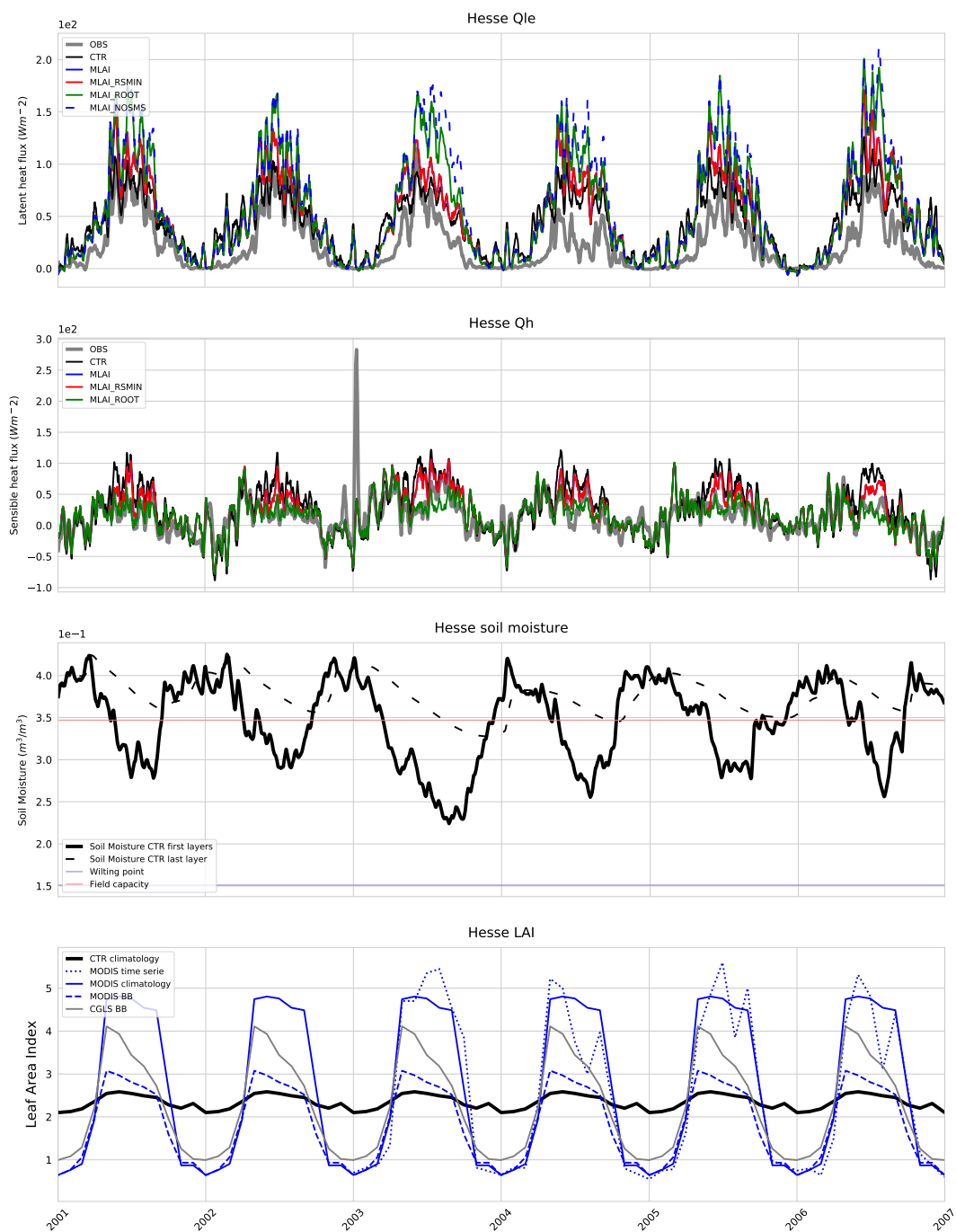


Figure S13. As Figure S1 but for Hesse station.

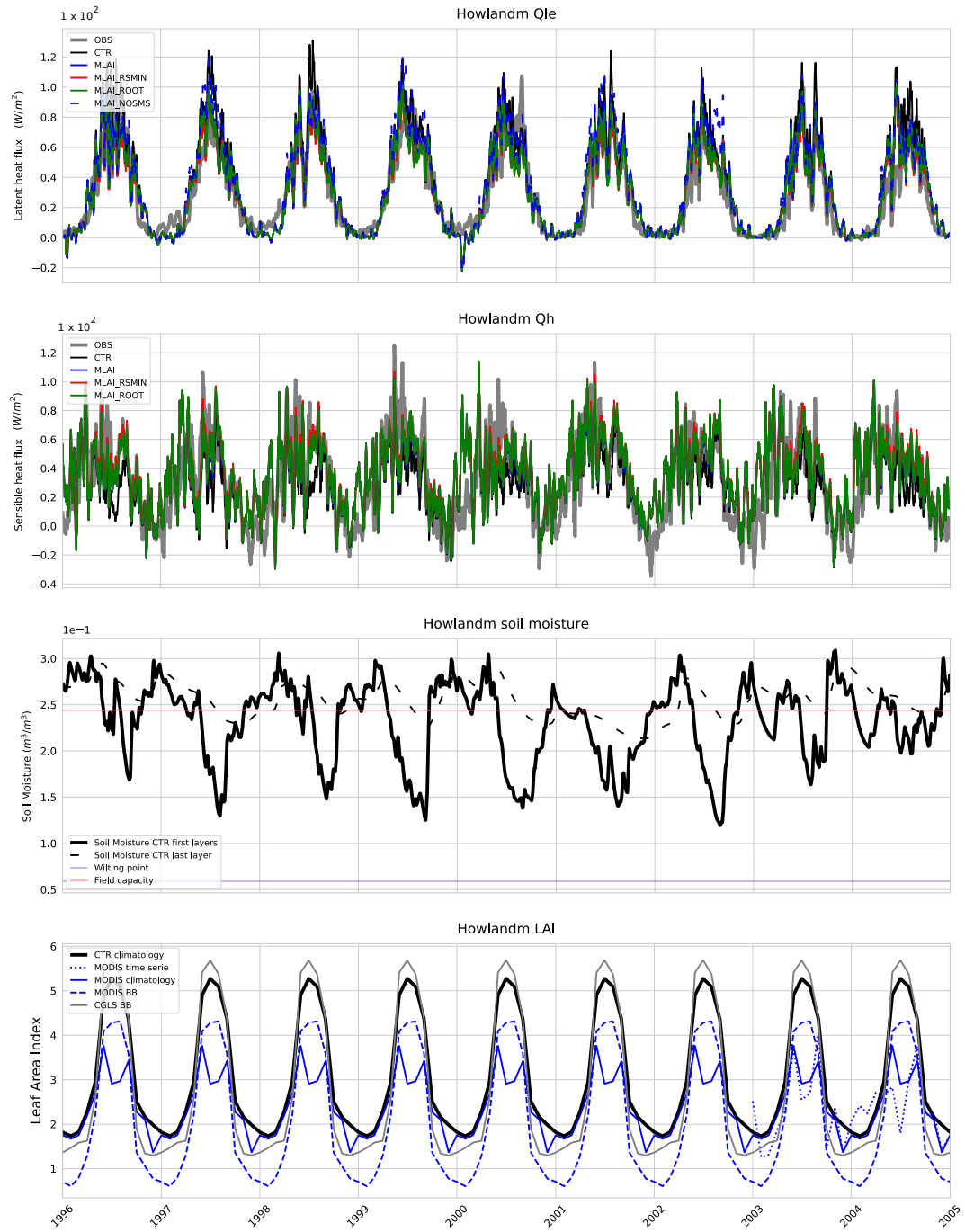


Figure S14. As Figure S1 but for Howlandm station.

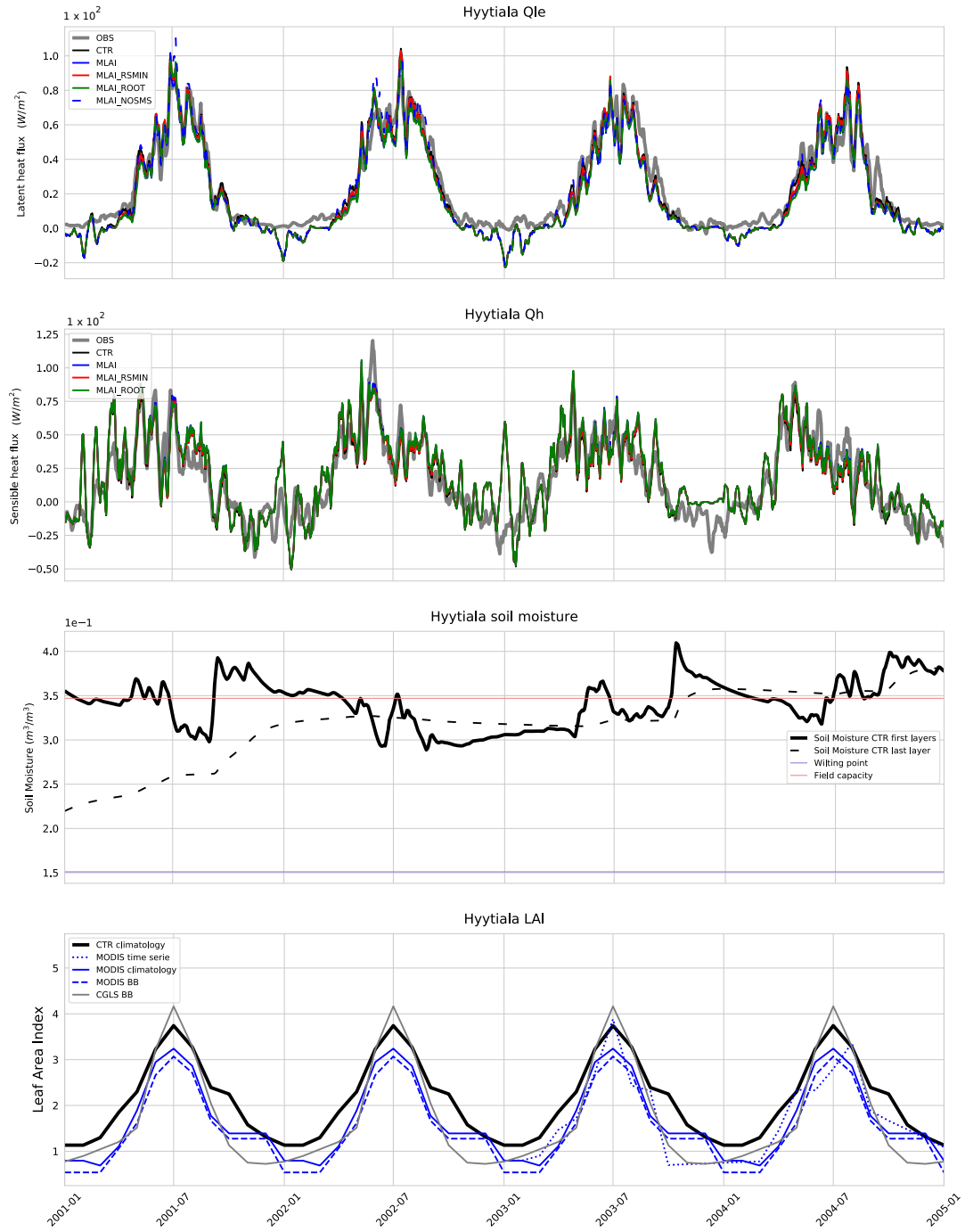


Figure S15. As Figure S1 but for Hyytiala station.

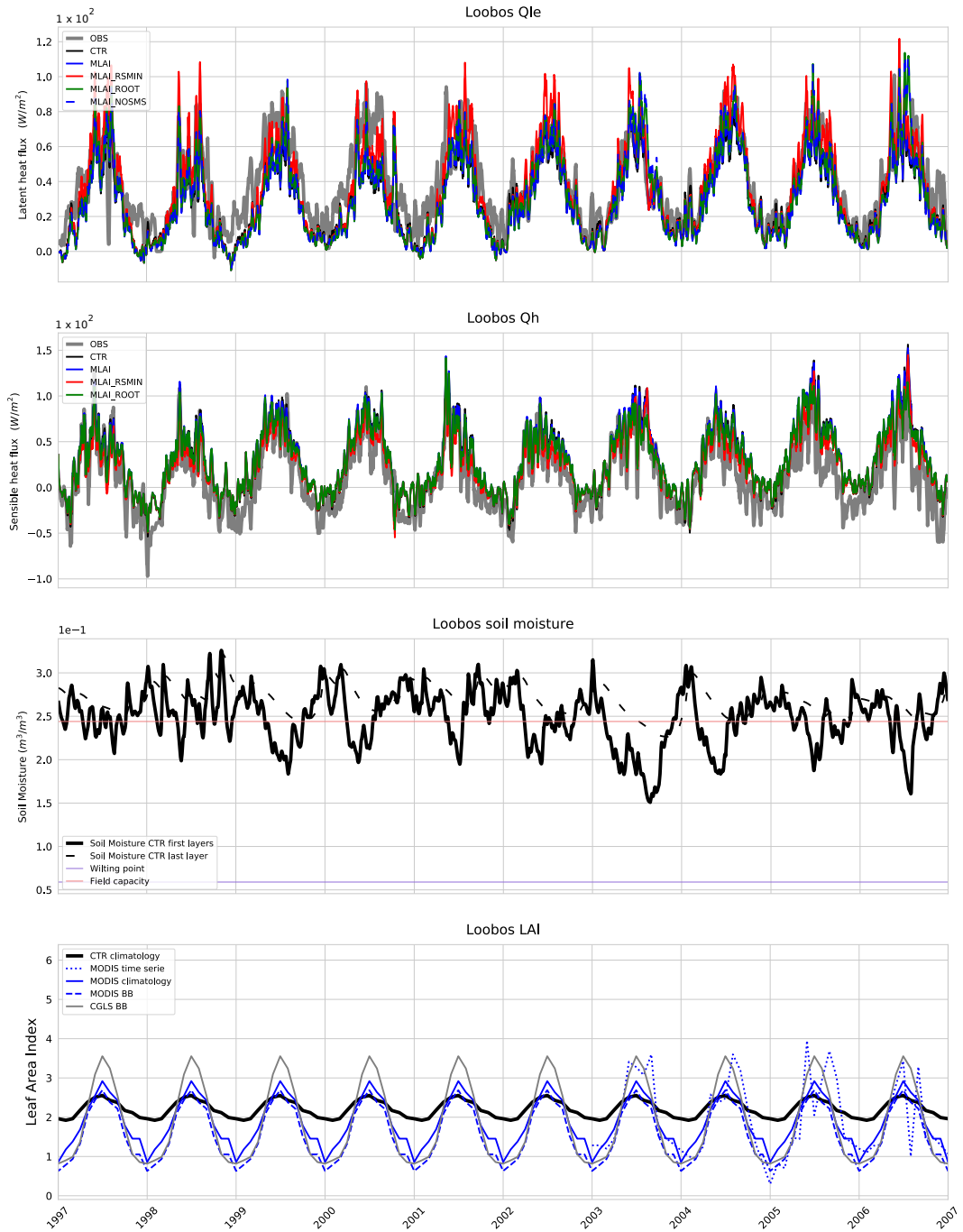


Figure S16. As Figure S1 but for Loobos station.

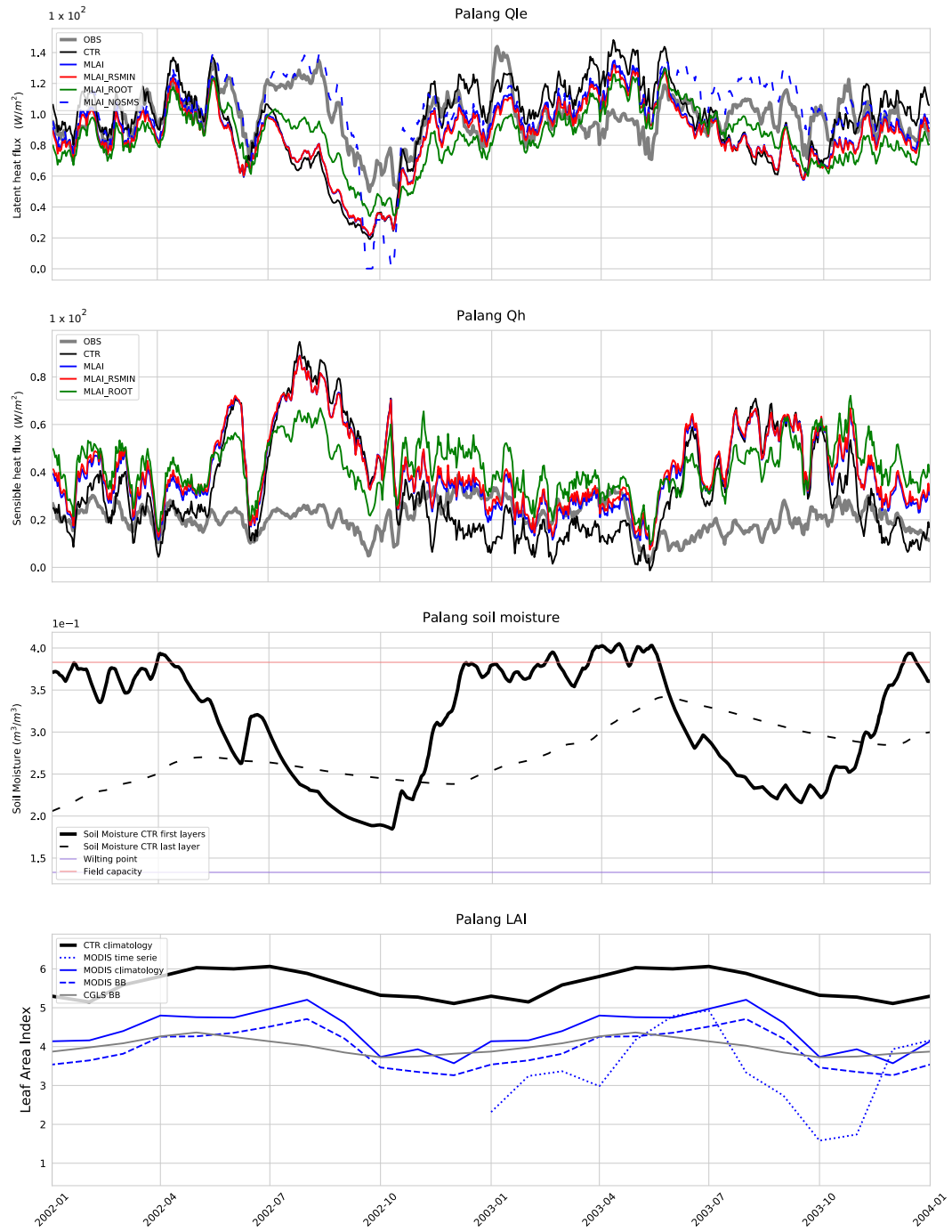


Figure S17. As Figure S1 but for Palang station.

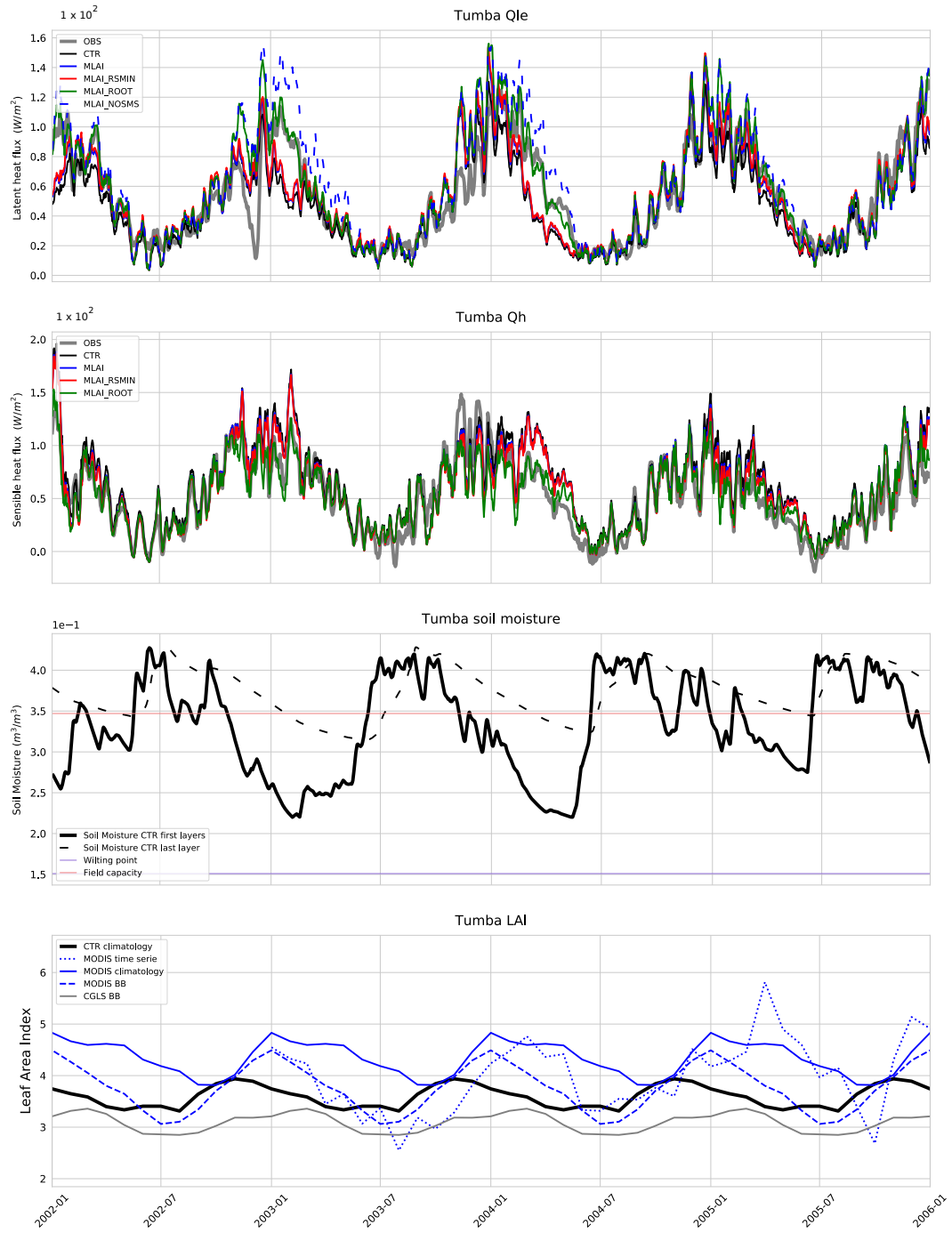


Figure S18. As Figure S1 but for Tumbarumba station.

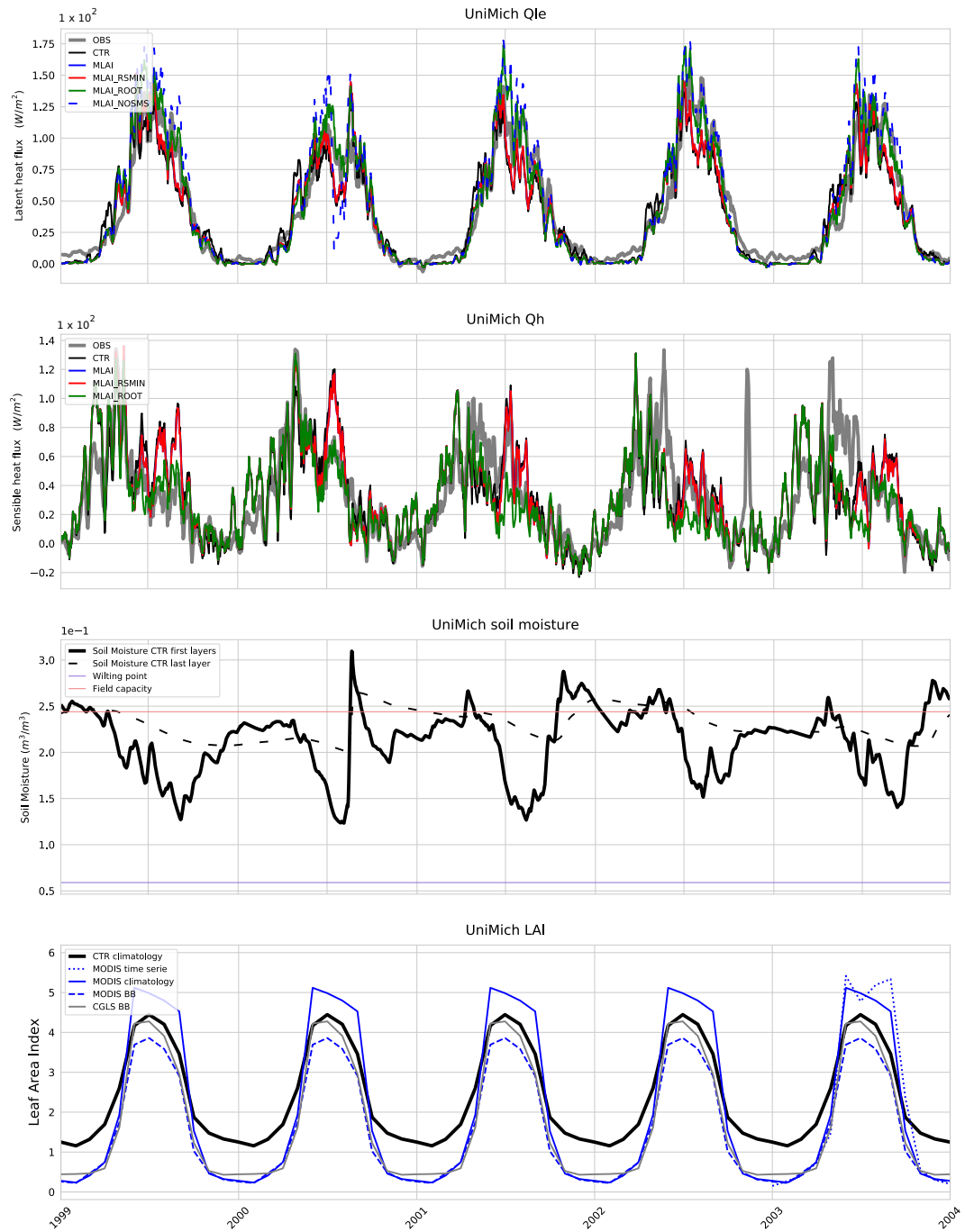


Figure S19. As Figure S1 but for University of Michigan station.

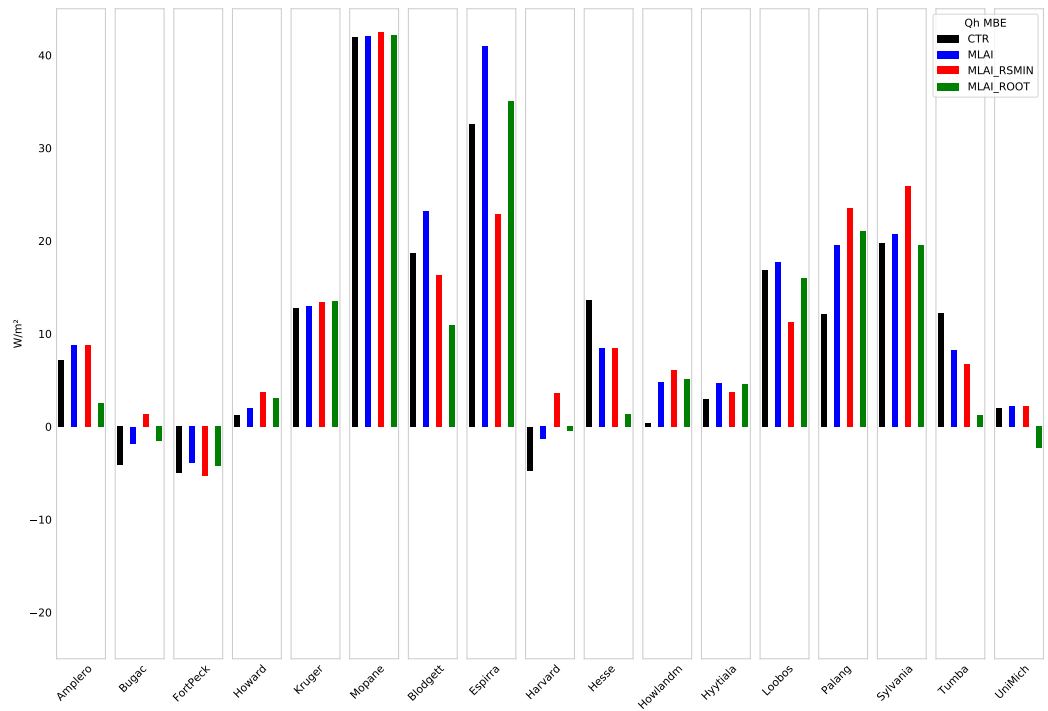


Figure S20. Sensible heat flux MBE in the 17 stations for each simulation: CTR, MLAI, MLAI_RSMIN and MLAI_ROOT.

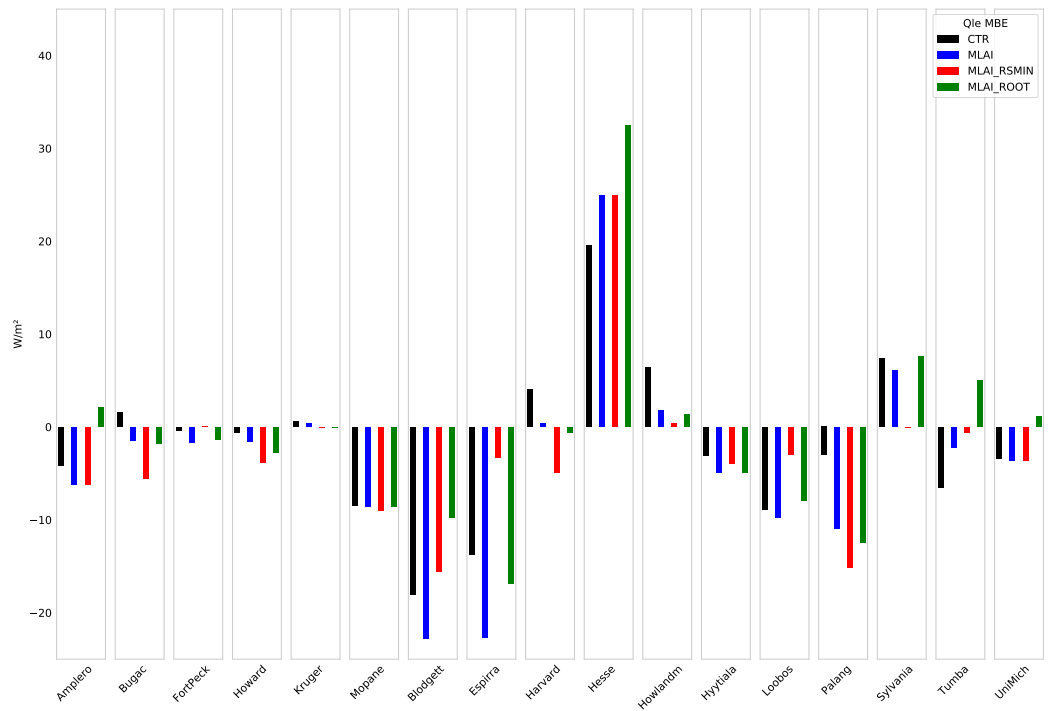


Figure S21. Latent heat flux MBE in the 17 stations for each simulation: CTR, MLAI, MLAI_RSMIN and MLAI_ROOT.

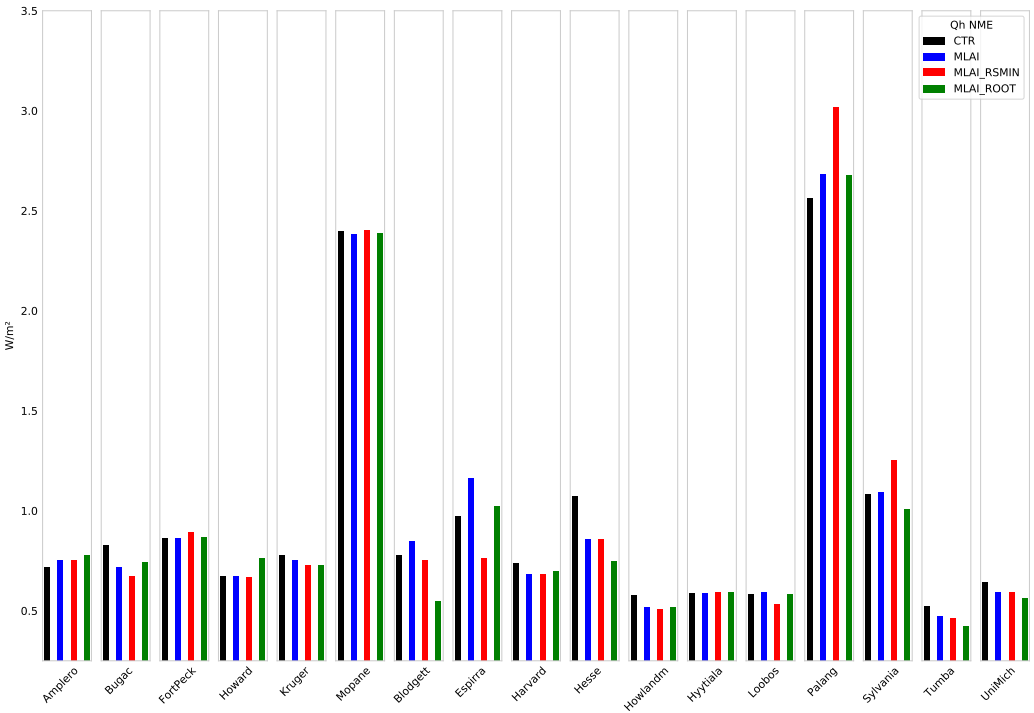


Figure S22. Sensible heat flux NME in the 17 stations for each simulation: CTR, MLAI, MLAI_RSMIN and MLAI_ROOT.

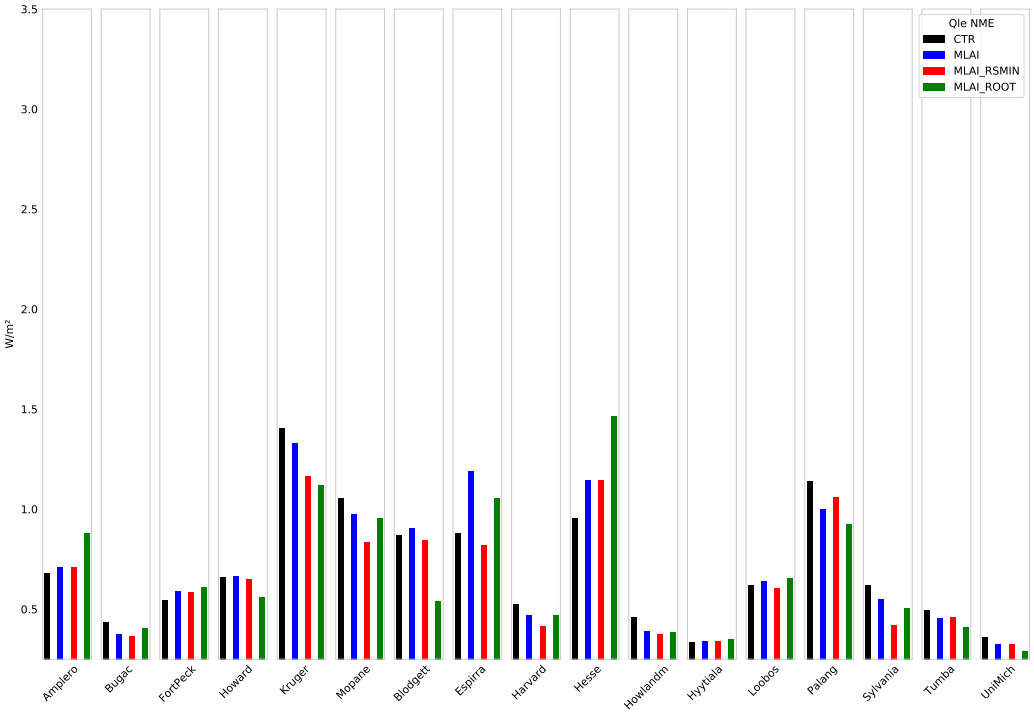


Figure S23. Latent heat flux NME in the 17 stations for each simulation: CTR, MLAI, MLAI_RSMIN and MLAI_ROOT.

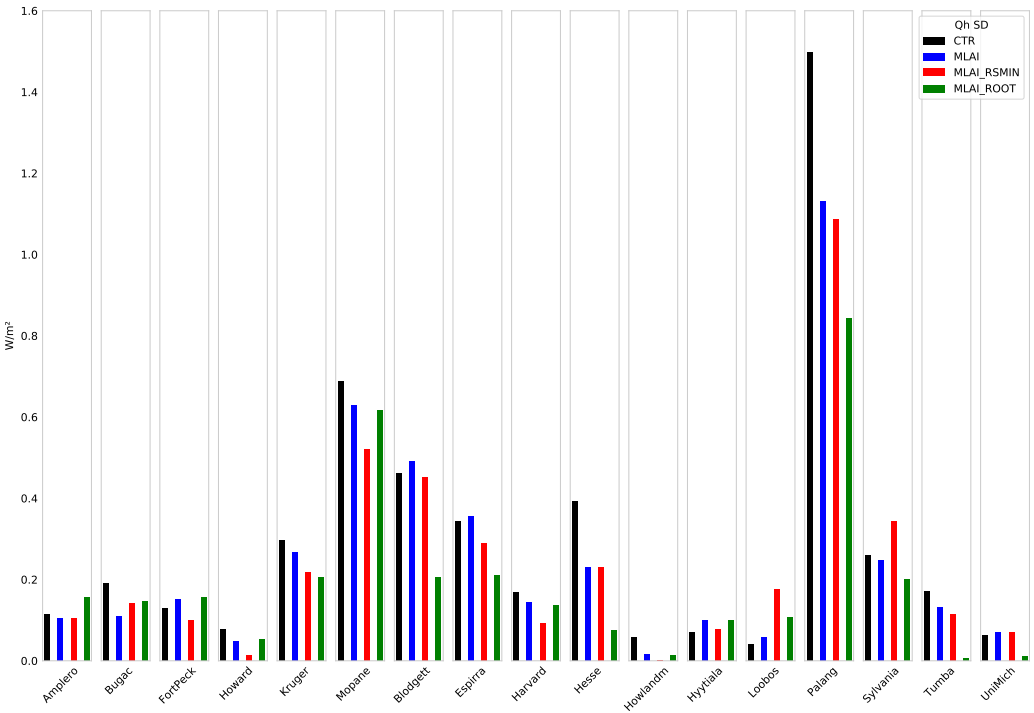


Figure S24. Sensible heat flux SD in the 17 stations for each simulation: CTR, MLAI, MLAI_RSMIN and MLAI_ROOT.

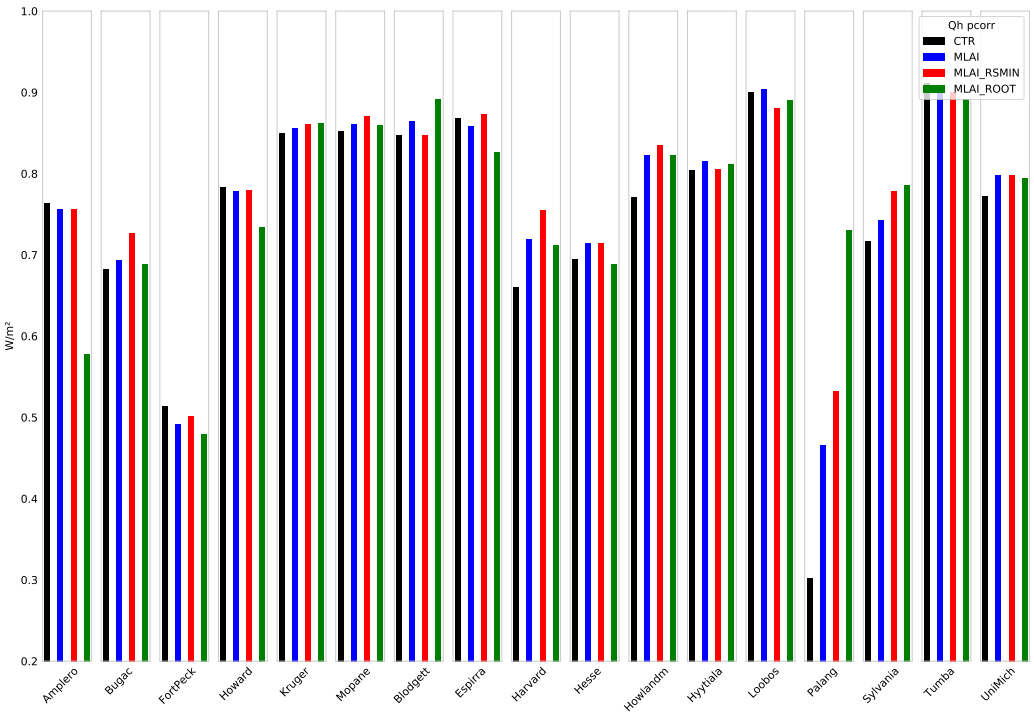


Figure S25. Sensible heat flux correlation in the 17 stations for each simulation: CTR, MLAI, MLAI_RSMIN and MLAI_ROOT.

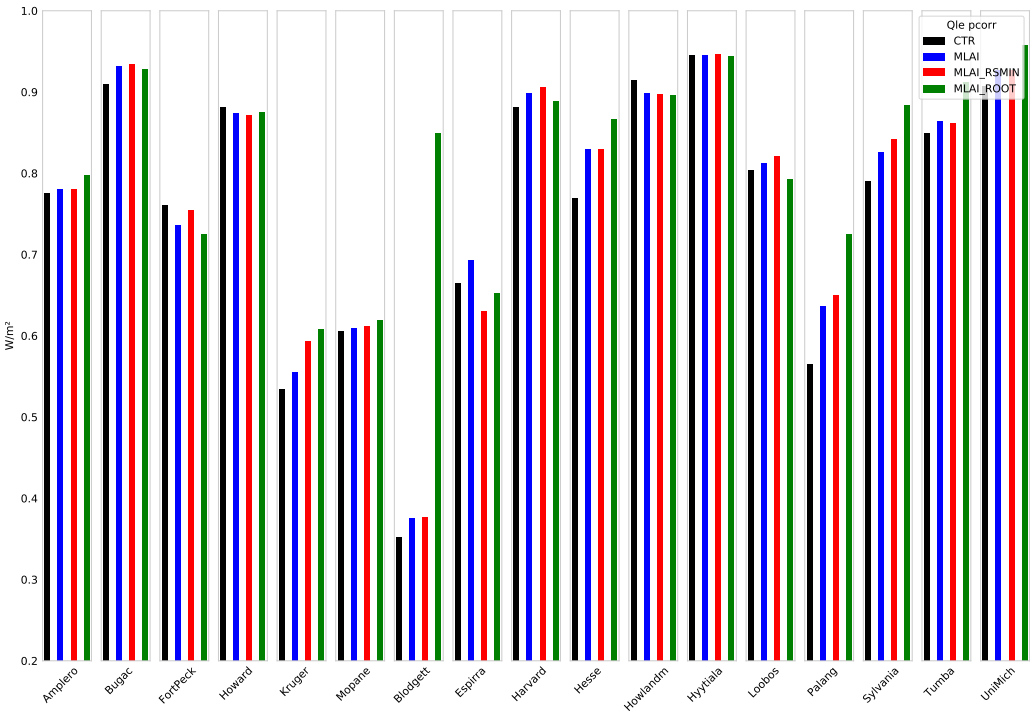


Figure S 26. Latent heat flux correlation in the 17 stations for each simulation: CTR, MLAI, MLAI_RSMIN and MLAI_ROOT.