**Electronic Supplementary Material**

for

**How the morning-afternoon cloudiness asymmetry affects the energy-maximizing azimuth direction of fixed-tilt monofacial solar panels**

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Supplementary Tables S1-S16

Supplementary Figures S1-S14

**Supplementary Table S1.** Daily hourly change of the mean ± standard deviation of the power flux *W*Sun ± Δ*W*Sun (W/m2) of direct sunlight from January to December averaged for the period 2009-2019 in Boone County (39.0° N, -84.75° E) between sunrise and sunset (UTC - 5 hour).

time *W*Sun Δ*W*Sun

(UTC - 5 h) (W/m2) (W/m2)

January

8:30 18.276 17.279

9:30 76.482 67.624

10:30 142.814 122.801

11:30 195.436 163.982

12:30 222.702 184.048

13:30 214.861 175.325

14:30 178.059 149.078

15:30 119.633 107.155

16:30 53.076 51.256

17:30 6.566 8.588

February

7:30 2.662 4.274

8:30 45.752 44.269

9:30 122.924 108.264

10:30 198.977 168.860

11:30 261.861 212.799

12:30 299.605 231.088

13:30 288.322 215.543

14:30 247.631 193.199

15:30 184.863 147.755

16:30 104.522 89.627

17:30 30.436 29.445

18:30 0.489 1.073

March

6:30 0.534 1.287

7:30 29.445 29.937

8:30 111.686 94.170

9:30 210.970 165.167

10:30 294.315 224.295

11:30 354.453 260.925

12:30 385.423 277.705

13:30 372.187 271.895

14:30 325.083 238.208

15:30 252.337 190.890

16:30 156.968 129.726

17:30 68.185 60.069

18:30 8.788 10.058

April

5:30 0.014 0.052

6:30 15.951 16.107

7:30 91.351 72.622

8:30 201.941 148.497

9:30 311.414 214.050

10:30 397.782 265.072

11:30 451.781 296.893

12:30 463.472 305.628

13:30 445.009 294.886

14:30 395.440 258.771

15:30 310.182 216.301

16:30 213.456 155.210

17:30 111.325 85.565

18:30 30.039 25.012

19:30 0.346 0.667

May

5:30 2.160 2.343

6:30 43.439 33.791

7:30 134.320 95.245

8:30 239.597 159.434

9:30 340.217 219.927

10:30 421.089 267.051

11:30 473.704 289.096

12:30 468.246 295.379

13:30 432.390 274.341

14:30 384.393 247.627

15:30 320.005 202.814

16:30 227.342 153.432

17:30 134.869 96.727

18:30 54.125 41.265

19:30 5.546 5.151

June

5:30 5.271 3.425

6:30 58.593 36.968

7:30 160.314 94.027

8:30 272.356 158.309

9:30 382.437 212.815

10:30 478.504 246.241

11:30 528.323 265.104

12:30 529.343 268.311

13:30 480.907 260.858

14:30 440.826 230.644

15:30 368.437 201.815

16:30 288.758 153.388

17:30 187.380 99.921

18:30 88.122 47.542

19:30 17.363 9.490

July

5:30 2.069 1.990

6:30 46.869 28.110

7:30 146.071 80.601

8:30 264.616 141.822

9:30 381.632 193.593

10:30 465.874 230.178

11:30 507.038 249.031

12:30 519.739 244.565

13:30 458.121 228.459

14:30 414.173 209.279

15:30 347.358 184.173

16:30 265.136 147.627

17:30 173.625 98.031

18:30 80.115 48.164

19:30 15.197 9.578

August

5:30 0.039 0.094

6:30 23.724 13.962

7:30 111.680 58.686

8:30 231.860 113.656

9:30 361.911 161.670

10:30 460.730 196.635

11:30 508.754 217.821

12:30 522.816 227.592

13:30 460.538 225.015

14:30 408.800 205.150

15:30 341.159 165.084

16:30 250.631 122.289

17:30 146.439 75.066

18:30 49.754 29.372

19:30 3.061 3.718

September

6:30 5.167 5.024

7:30 63.042 43.439

8:30 167.323 106.534

9:30 279.378 165.844

10:30 378.632 211.098

11:30 434.355 242.870

12:30 447.252 251.473

13:30 387.299 234.630

14:30 344.886 205.710

15:30 267.207 162.064

16:30 173.603 107.495

17:30 74.041 51.312

18:30 10.430 10.983

October

6:30 0.171 0.355

7:30 28.621 22.279

8:30 111.695 77.084

9:30 211.483 134.668

10:30 292.590 183.308

11:30 338.100 214.001

12:30 348.684 220.814

13:30 313.372 212.425

14:30 252.399 177.005

15:30 175.133 128.887

16:30 87.494 69.596

17:30 18.224 17.902

18:30 0.044 0.140

November

7:30 5.312 5.928

8:30 58.972 45.746

9:30 143.503 102.285

10:30 217.209 149.965

11:30 267.111 178.621

12:30 281.428 187.885

13:30 247.802 172.671

14:30 194.108 136.636

15:30 118.348 87.049

16:30 41.161 32.734

17:30 1.4180 1.837

December

7:30 0.047 0.137

8:30 17.463 18.420

9:30 64.733 67.563

10:30 115.361 117.643

11:30 154.791 152.806

12:30 172.168 164.741

13:30 159.941 148.931

14:30 124.190 118.810

15:30 73.528 74.426

16:30 22.910 24.095

17:30 0.277 0.454

**Supplementary Table S2.** Daily hourly change of the mean ± standard deviation of the power flux *W*Sun ± Δ*W*Sun (W/m2) of direct sunlight from January to December averaged for the period 2009-2019 in Tennessee (35.5° N, -88.25° E) between sunrise and sunset (UTC - 5 hour). Although this site of Tennessee state is in the time zone UTC - 6 h, but here the data are given in UTC - 5 h.

time *W*Sun Δ*W*Sun

(UTC - 5 h) (W/m2) (W/m2)

January

8:30 18.457 16.311

9:30 87.972 75.194

10:30 170.475 137.012

11:30 238.437 185.669

12:30 277.278 214.023

13:30 288.219 208.548

14:30 258.081 187.134

15:30 191.534 141.584

16:30 104.680 80.013

17:30 25.294 21.755

18:30 0.079 0.202

February

7:30 1.057 1.875

8:30 41.082 37.404

9:30 126.912 104.917

10:30 218.909 169.201

11:30 288.056 221.093

12:30 331.467 248.217

13:30 321.346 256.032

14:30 294.438 232.225

15:30 232.179 188.426

16:30 147.872 121.052

17:30 57.349 51.329

18:30 4.117 5.125

March

6:30 0.025 0.096

7:30 17.135 19.227

8:30 88.876 79.586

9:30 184.641 151.856

10:30 277.303 220.775

11:30 347.083 267.530

12:30 382.886 293.515

13:30 372.186 283.452

14:30 345.637 257.744

15:30 280.144 216.157

16:30 194.862 155.739

17:30 100.556 81.150

18:30 21.246 17.964

April

6:30 6.228 7.433

7:30 70.628 52.626

8:30 188.221 123.285

9:30 308.376 192.011

10:30 419.764 246.163

11:30 483.731 283.100

12:30 504.501 303.401

13:30 481.355 300.844

14:30 433.525 277.724

15:30 353.251 233.543

16:30 253.105 172.261

17:30 145.530 99.101

18:30 47.190 33.329

19:30 1.516 1.820

May

5:30 0.054 0.103

6:30 24.145 18.240

7:30 107.028 75.339

8:30 223.054 144.253

9:30 338.062 211.530

10:30 439.752 261.239

11:30 500.000 288.555

12:30 521.754 292.609

13:30 484.273 277.182

14:30 432.906 249.653

15:30 379.319 212.655

16:30 281.055 165.671

17:30 173.382 107.521

18:30 73.240 47.496

19:30 9.872 7.106

June

5:30 0.326 0.231

6:30 35.689 19.299

7:30 134.831 68.243

8:30 261.729 126.138

9:30 392.645 179.104

10:30 500.657 218.546

11:30 560.298 235.857

12:30 590.641 243.665

13:30 528.989 247.613

14:30 494.428 214.451

15:30 436.202 179.247

16:30 336.079 141.093

17:30 215.077 99.682

18:30 103.050 51.181

19:30 23.011 11.826

July

5:30 0.033 0.064

6:30 24.852 14.201

7:30 114.871 58.492

8:30 241.840 114.845

9:30 367.148 166.559

10:30 468.052 207.922

11:30 526.580 233.584

12:30 557.786 242.471

13:30 493.908 225.011

14:30 453.020 208.629

15:30 405.580 176.793

16:30 315.928 140.255

17:30 204.995 96.138

18:30 100.122 47.987

19:30 22.264 10.958

August

6:30 9.403 6.666

7:30 81.998 42.849

8:30 204.470 98.459

9:30 331.216 153.933

10:30 439.657 198.044

11:30 509.297 216.800

12:30 534.697 216.031

13:30 461.167 221.615

14:30 425.837 202.495

15:30 364.845 172.815

16:30 273.086 131.908

17:30 167.462 81.998

18:30 63.251 36.114

19:30 6.099 5.842

September

6:30 1.301 1.503

7:30 51.072 31.035

8:30 165.742 90.809

9:30 296.709 151.850

10:30 407.589 198.852

11:30 464.744 232.606

12:30 482.485 243.991

13:30 428.301 233.141

14:30 374.433 214.248

15:30 299.239 174.208

16:30 203.047 119.370

17:30 100.488 62.371

18:30 20.557 16.629

19:30 0.042 0.113

October

7:30 22.206 16.422

8:30 112.467 71.127

9:30 228.607 134.393

10:30 330.085 185.461

11:30 393.302 217.332

12:30 420.392 230.079

13:30 387.664 227.229

14:30 329.646 198.114

15:30 245.700 151.583

16:30 139.405 90.725

17:30 41.596 31.351

18:30 0.985 1.765

November

7:30 3.051 3.738

8:30 53.459 41.854

9:30 143.786 104.243

10:30 230.455 159.606

11:30 292.695 196.280

12:30 321.827 211.170

13:30 308.539 201.838

14:30 252.486 171.451

15:30 170.767 119.166

16:30 77.991 55.690

17:30 9.821 8.244

December

7:30 0.016 0.054

8:30 18.947 17.951

9:30 80.214 72.276

10:30 146.742 128.822

11:30 198.139 169.065

12:30 225.767 189.067

13:30 221.261 182.815

14:30 185.896 154.888

15:30 124.099 108.112

16:30 54.141 49.674

17:30 5.820 5.769

**Supplementary Table S3.** Daily hourly change of the mean ± standard deviation of the power flux *W*Sun ± Δ*W*Sun (W/m2) of direct sunlight from January to December averaged for the period 2009-2019 in Georgia (31.25° N, -83.25° E) between sunrise and sunset (UTC - 5 hour).

time *W*Sun Δ*W*Sun

(UTC - 5 h) (W/m2) (W/m2)

January

7:30 2.408 2.092

8:30 56.980 43.202

9:30 155.974 112.078

10:30 255.416 167.520

11:30 329.103 203.476

12:30 362.064 217.227

13:30 350.008 208.460

14:30 292.476 178.628

15:30 203.032 130.815

16:30 101.988 67.513

17:30 18.677 14.879

February

7:30 10.629 9.828

8:30 84.306 64.789

9:30 192.020 137.573

10:30 298.135 198.197

11:30 377.243 241.163

12:30 413.425 257.513

13:30 394.217 246.063

14:30 335.915 218.337

15:30 245.532 171.324

16:30 141.790 102.966

17:30 44.954 33.651

18:30 0.798 1.136

March

6:30 1.136 2.012

7:30 48.330 35.782

8:30 163.839 104.541

9:30 291.788 176.799

10:30 406.813 228.848

11:30 488.687 258.543

12:30 510.322 274.354

13:30 476.159 270.405

14:30 405.324 247.166

15:30 313.053 195.901

16:30 196.265 128.842

17:30 80.666 54.672

18:30 7.898 6.426

April

6:30 19.699 15.026

7:30 116.093 70.985

8:30 257.498 140.400

9:30 400.008 204.762

10:30 514.091 249.374

11:30 573.386 279.202

12:30 587.468 286.688

13:30 527.892 286.426

14:30 457.836 265.625

15:30 356.518 216.886

16:30 242.359 150.028

17:30 121.899 73.911

18:30 24.729 15.433

May

5:30 0.664 0.708

6:30 45.228 24.866

7:30 162.194 82.139

8:30 303.579 145.494

9:30 444.568 199.203

10:30 547.004 240.225

11:30 588.591 268.257

12:30 607.050 265.891

13:30 529.813 256.854

14:30 459.270 234.918

15:30 367.521 193.269

16:30 258.638 140.932

17:30 135.390 80.546

18:30 38.772 23.716

19:30 0.621 0.746

June

5:30 1.497 0.887

6:30 49.016 24.467

7:30 160.011 74.506

8:30 284.793 131.134

9:30 412.379 180.867

10:30 510.161 209.100

11:30 571.875 220.641

12:30 568.775 232.653

13:30 490.224 215.208

14:30 415.238 200.676

15:30 338.857 172.583

16:30 238.417 131.806

17:30 132.649 76.837

18:30 45.556 28.042

19:30 2.761 2.004

July

5:30 0.337 0.401

6:30 36.154 18.386

7:30 135.409 63.859

8:30 259.733 116.367

9:30 387.823 160.644

10:30 487.221 191.830

11:30 545.768 208.546

12:30 565.882 212.050

13:30 513.446 208.634

14:30 443.891 192.989

15:30 346.293 165.335

16:30 240.119 120.601

17:30 130.251 71.922

18:30 43.300 27.558

19:30 2.672 2.022

August

6:30 18.008 10.840

7:30 98.591 56.220

8:30 214.595 112.625

9:30 343.810 166.727

10:30 450.179 198.874

11:30 509.259 214.741

12:30 527.429 207.161

13:30 469.070 199.326

14:30 402.245 186.337

15:30 312.349 152.380

16:30 201.899 110.568

17:30 99.629 61.838

18:30 25.728 17.277

19:30 0.225 0.397

September

6:30 7.557 5.138

7:30 80.460 46.079

8:30 204.005 107.787

9:30 331.104 165.519

10:30 433.947 204.954

11:30 490.527 222.723

12:30 486.904 228.307

13:30 437.835 208.377

14:30 361.666 184.384

15:30 266.209 144.332

16:30 159.102 96.823

17:30 62.311 41.526

18:30 5.668 6.095

October

6:30 1.405 1.585

7:30 58.472 33.295

8:30 184.801 93.801

9:30 321.223 149.943

10:30 426.963 196.093

11:30 487.508 219.203

12:30 490.999 220.991

13:30 425.322 219.391

14:30 346.521 183.058

15:30 244.223 131.477

16:30 121.562 70.201

17:30 25.913 18.029

18:30 0.034 0.106

November

7:30 22.991 17.181

8:30 114.118 71.553

9:30 228.774 128.814

10:30 330.269 173.511

11:30 391.309 198.252

12:30 397.518 205.800

13:30 353.440 196.218

14:30 275.928 160.645

15:30 174.606 108.376

16:30 68.375 45.076

17:30 4.765 3.937

December

7:30 3.814 4.144

8:30 51.366 46.533

9:30 131.378 110.775

10:30 207.996 162.961

11:30 261.673 195.647

12:30 287.345 205.133

13:30 265.990 192.913

14:30 215.579 156.417

15:30 137.119 102.841

16:30 53.696 41.275

17:30 3.179 2.947

**Supplementary Table S4.** Daily hourly change of the mean ± standard deviation of the power flux *W*Sun ± Δ*W*Sun (W/m2) of direct sunlight from January to December averaged for the period 2009-2019 in Central Italy (41.0° N, 15.0° E) between sunrise and sunset (UTC + 1 hour). Although Italy is in the time zone UTC + 1 h, but here the data are given in UTC.

time *W*Sun Δ*W*Sun

(UTC + 1 h) (W/m2) (W/m2)

January

6:30 2.318 2.535

7:30 29.110 27.542

8:30 79.000 64.236

9:30 132.714 96.553

10:30 167.624 117.542

11:30 169.153 122.281

12:30 146.274 109.041

13:30 104.147 79.815

14:30 52.541 41.984

15:30 10.879 10.405

February

5:30 0.043 0.135

6:30 12.299 13.269

7:30 56.496 51.272

8:30 123.115 97.831

9:30 187.823 136.947

10:30 225.668 157.890

11:30 222.633 160.051

12:30 201.934 145.694

13:30 156.886 116.128

14:30 95.761 73.849

15:30 37.161 29.848

16:30 2.633 3.434

March

5:30 8.520 11.600

6:30 56.268 54.475

7:30 146.502 108.395

8:30 241.865 158.589

9:30 321.261 198.121

10:30 353.694 218.711

11:30 344.512 222.581

12:30 307.418 208.740

13:30 246.277 171.922

14:30 170.739 120.527

15:30 91.039 66.089

16:30 22.253 18.069

17:30 0.094 0.222

April

4:30 3.639 4.860

5:30 45.190 37.683

6:30 134.489 89.172

7:30 261.537 136.044

8:30 381.968 177.505

9:30 456.737 209.033

10:30 481.879 231.571

11:30 466.248 231.627

12:30 414.700 215.584

13:30 337.664 182.871

14:30 248.213 141.997

15:30 150.650 87.202

16:30 55.429 34.422

17:30 4.302 3.889

May

3:30 0.113 0.194

4:30 18.931 13.965

5:30 88.663 54.882

6:30 197.791 98.655

7:30 332.520 133.473

8:30 442.945 171.091

9:30 500.511 204.544

10:30 518.195 213.213

11:30 493.944 207.628

12:30 450.578 189.096

13:30 368.415 164.172

14:30 274.173 128.947

15:30 177.646 89.315

16:30 85.069 43.418

17:30 17.576 10.075

18:30 0.038 0.076

June

3:30 0.758 0.491

4:30 32.041 18.011

5:30 119.754 56.369

6:30 254.432 87.344

7:30 400.354 114.040

8:30 520.815 137.020

9:30 581.142 170.982

10:30 604.789 186.895

11:30 579.018 193.880

12:30 514.035 184.392

13:30 435.945 162.074

14:30 328.689 139.057

15:30 224.877 98.388

16:30 122.509 53.888

17:30 37.454 16.525

18:30 1.099 0.686

July

3:30 0.168 0.231

4:30 27.474 12.521

5:30 120.234 45.715

6:30 260.643 71.644

7:30 415.908 91.325

8:30 541.308 114.239

9:30 623.601 137.012

10:30 653.544 154.911

11:30 635.448 160.007

12:30 578.341 158.133

13:30 480.548 146.005

14:30 369.085 121.991

15:30 252.929 86.800

16:30 137.617 47.377

17:30 41.373 13.903

18:30 0.950 0.690

August

4:30 9.305 6.225

5:30 81.549 33.771

6:30 212.529 65.802

7:30 368.378 85.745

8:30 507.058 103.926

9:30 594.774 126.421

10:30 627.618 141.303

11:30 613.745 144.516

12:30 552.370 140.447

13:30 446.808 128.327

14:30 328.611 105.481

15:30 203.263 73.163

16:30 90.595 35.910

17:30 14.749 9.909

September

4:30 0.357 0.631

5:30 27.376 19.515

6:30 102.311 64.616

7:30 215.706 110.317

8:30 332.751 148.624

9:30 413.064 174.806

10:30 443.278 182.146

11:30 420.543 177.388

12:30 371.822 160.203

13:30 279.833 133.338

14:30 185.688 96.610

15:30 92.170 53.989

16:30 22.121 17.108

17:30 0.242 0.554

October

5:30 5.907 6.384

6:30 46.715 38.394

7:30 124.328 85.779

8:30 215.570 131.069

9:30 281.901 163.796

10:30 309.741 176.518

11:30 298.114 174.402

12:30 250.890 149.191

13:30 180.416 112.849

14:30 103.748 66.151

15:30 30.901 23.064

16:30 0.879 1.568

November

5:30 0.156 0.403

6:30 14.913 15.601

7:30 60.328 51.167

8:30 127.648 89.600

9:30 190.625 119.944

10:30 218.607 133.649

11:30 210.086 132.697

12:30 171.697 110.109

13:30 111.215 75.704

14:30 47.029 33.344

15:30 4.707 4.608

December

6:30 3.281 3.099

7:30 36.502 28.322

8:30 92.018 63.498

9:30 147.823 90.462

10:30 184.002 104.471

11:30 180.854 106.371

12:30 147.870 91.193

13:30 96.001 59.683

14:30 37.704 23.656

15:30 2.085 1.637

**Supplementary Table S5.** Daily hourly change of the mean ± standard deviation of the power flux *W*Sun ± Δ*W*Sun (W/m2) of direct sunlight from January to December averaged for the period 2009-2019 in Central Hungary (47.0° N, 19.0° E) between sunrise and sunset (UTC + 1 hour). Although Hungary is in the time zone UTC + 1 h, but here the data are given in UTC.

time *W*Sun Δ*W*Sun

(UTC + 1 h) (W/m2) (W/m2)

January

6:30 1.460 2.023

7:30 21.709 22.784

8:30 58.787 56.276

9:30 95.927 84.445

10:30 117.252 99.857

11:30 113.242 97.555

12:30 89.656 78.838

13:30 53.349 49.070

14:30 17.272 18.281

15:30 0.678 1.439

February

5:30 0.158 0.467

6:30 12.614 14.842

7:30 51.471 51.024

8:30 101.769 92.797

9:30 143.181 126.134

10:30 163.850 143.039

11:30 156.297 138.260

12:30 126.756 118.235

13:30 88.318 85.539

14:30 45.160 46.744

15:30 11.106 12.992

16:30 0.078 0.235

March

4:30 0.238 0.624

5:30 18.049 19.346

6:30 79.104 61.547

7:30 166.108 112.887

8:30 248.359 157.585

9:30 304.449 188.368

10:30 320.315 200.195

11:30 298.299 197.631

12:30 252.595 178.621

13:30 185.439 139.882

14:30 115.223 91.612

15:30 50.069 42.528

16:30 7.958 8.589

April

3:30 0.104 0.245

4:30 17.351 14.817

5:30 88.904 52.933

6:30 189.234 102.130

7:30 297.699 148.924

8:30 388.791 185.739

9:30 447.589 205.872

10:30 451.614 211.986

11:30 422.649 212.733

12:30 359.746 195.214

13:30 283.963 161.191

14:30 196.136 116.581

15:30 109.727 66.677

16:30 36.151 24.011

17:30 2.007 2.517

May

3:30 5.206 4.517

4:30 49.261 29.448

5:30 136.901 74.199

6:30 226.140 126.472

7:30 322.926 172.193

8:30 394.227 210.172

9:30 429.411 230.281

10:30 436.378 232.490

11:30 418.943 224.062

12:30 374.277 200.226

13:30 314.350 161.935

14:30 231.716 123.665

15:30 145.440 80.341

16:30 65.024 38.993

17:30 13.801 9.228

18:30 0.065 0.127

June

3:30 11.792 6.047

4:30 66.070 33.634

5:30 157.308 75.684

6:30 250.034 125.778

7:30 336.548 169.435

8:30 408.841 204.477

9:30 451.473 219.430

10:30 459.141 216.882

11:30 443.056 211.418

12:30 391.750 200.352

13:30 333.451 172.177

14:30 255.749 135.244

15:30 169.952 93.747

16:30 89.388 49.832

17:30 27.673 15.832

18:30 1.281 0.947

July

3:30 6.900 4.659

4:30 56.661 27.389

5:30 150.155 67.602

6:30 249.653 111.999

7:30 354.481 150.669

8:30 439.566 177.134

9:30 495.719 195.148

10:30 506.398 197.630

11:30 481.646 195.473

12:30 436.567 181.294

13:30 374.757 156.059

14:30 287.655 121.820

15:30 192.309 80.741

16:30 99.710 43.402

17:30 29.260 14.259

18:30 1.050 0.926

August

3:30 0.351 0.555

4:30 26.306 13.481

5:30 109.440 44.344

6:30 213.758 89.840

7:30 327.388 127.370

8:30 425.364 157.043

9:30 484.587 180.971

10:30 502.191 182.185

11:30 477.278 182.792

12:30 430.828 167.342

13:30 349.349 138.921

14:30 252.854 107.429

15:30 153.657 69.368

16:30 62.042 31.267

17:30 8.678 7.622

September

4:30 3.186 3.850

5:30 43.983 29.670

6:30 121.579 74.037

7:30 212.691 120.105

8:30 291.429 160.179

9:30 346.271 183.485

10:30 360.176 191.234

11:30 337.389 179.034

12:30 283.338 160.296

13:30 213.447 127.344

14:30 135.795 86.667

15:30 59.714 42.268

16:30 10.297 11.149

17:30 0.025 0.083

October

5:30 10.525 11.066

6:30 56.052 46.230

7:30 122.356 92.529

8:30 185.905 133.069

9:30 226.643 158.321

10:30 240.498 166.135

11:30 224.313 157.497

12:30 179.087 129.864

13:30 116.879 90.795

14:30 53.770 47.529

15:30 10.149 12.213

16:30 0.032 0.106

November

5:30 0.253 0.532

6:30 14.246 14.913

7:30 52.610 47.909

8:30 98.967 81.084

9:30 135.379 104.417

10:30 147.970 110.835

11:30 137.523 105.025

12:30 99.777 82.313

13:30 53.804 47.555

14:30 13.879 13.500

15:30 0.090 0.232

December

6:30 1.481 1.994

7:30 21.903 21.163

8:30 56.055 51.789

9:30 86.777 74.440

10:30 98.819 83.717

11:30 90.317 78.044

12:30 66.243 57.310

13:30 33.334 29.668

14:30 5.977 5.569

**Supplementary Table S6.** Daily hourly change of the mean ± standard deviation of the power flux *W*Sun ± Δ*W*Sun (W/m2) of direct sunlight from January to December averaged for the period 2009-2019 in South Sweden (58.0° N, 13.0° E) between sunrise and sunset (UTC + 1 hour). Although Sweden is in the time zone UTC + 1 h, but here the data are given in UTC.

time *W*Sun Δ*W*Sun

(UTC + 1 h) (W/m2) (W/m2)

January

7:30 0.202 0.656

8:30 5.675 8.573

9:30 17.252 22.048

10:30 28.503 33.742

11:30 31.469 36.913

12:30 26.344 32.638

13:30 14.329 18.801

14:30 3.257 5.685

15:30 0.025 0.093

February

6:30 0.721 1.923

7:30 11.286 17.294

8:30 35.160 43.518

9:30 61.492 69.171

10:30 80.800 87.237

11:30 89.680 93.151

12:30 81.795 85.705

13:30 60.179 66.295

14:30 32.609 38.239

15:30 8.712 13.186

16:30 0.197 0.559

March

5:30 4.504 8.065

6:30 28.110 32.904

7:30 73.259 71.935

8:30 126.362 111.061

9:30 173.037 143.441

10:30 204.460 156.970

11:30 208.011 157.559

12:30 186.630 144.740

13:30 153.651 122.028

14:30 100.735 86.067

15:30 52.695 48.616

16:30 15.168 17.239

17:30 0.529 1.248

April

3:30 0.233 0.586

4:30 11.618 14.026

5:30 52.526 46.793

6:30 114.220 88.358

7:30 180.357 130.239

8:30 244.010 167.617

9:30 293.904 189.634

10:30 314.093 203.496

11:30 316.307 207.454

12:30 292.819 191.274

13:30 257.681 165.144

14:30 203.985 130.590

15:30 139.059 92.104

16:30 72.389 51.720

17:30 21.343 18.818

18:30 0.994 1.830

May

2:30 0.247 0.477

3:30 11.267 10.926

4:30 50.716 38.564

5:30 115.47 77.293

6:30 178.825 120.591

7:30 252.841 160.469

8:30 314.747 195.125

9:30 354.247 221.764

10:30 358.077 230.338

11:30 349.681 226.249

12:30 322.026 212.846

13:30 275.967 186.070

14:30 231.066 153.304

15:30 178.238 114.326

16:30 121.082 77.168

17:30 62.912 40.596

18:30 17.338 13.797

19:30 0.806 1.302

June

2:30 1.976 1.470

3:30 22.806 16.336

4:30 71.159 47.701

5:30 138.608 87.792

6:30 189.255 127.434

7:30 253.003 162.703

8:30 312.209 195.464

9:30 348.474 212.369

10:30 367.053 224.700

11:30 355.157 224.186

12:30 333.559 213.335

13:30 294.511 188.594

14:30 257.071 162.983

15:30 206.136 129.964

16:30 146.351 93.544

17:30 86.282 55.438

18:30 35.238 23.453

19:30 6.018 4.186

July

2:30 0.484 0.776

3:30 13.837 11.572

4:30 52.852 38.402

5:30 114.938 75.423

6:30 165.030 111.296

7:30 229.760 149.250

8:30 283.016 187.396

9:30 320.970 209.585

10:30 339.173 220.082

11:30 336.434 221.454

12:30 316.485 205.965

13:30 280.627 189.690

14:30 236.598 155.803

15:30 188.777 122.589

16:30 133.962 86.026

17:30 76.062 49.594

18:30 28.542 20.086

19:30 3.673 3.504

August

3:30 0.982 1.866

4:30 16.254 16.730

5:30 56.038 47.631

6:30 101.086 81.367

7:30 158.790 117.403

8:30 212.714 147.255

9:30 243.170 169.264

10:30 257.100 176.601

11:30 257.842 181.077

12:30 242.241 169.855

13:30 218.147 153.882

14:30 174.054 127.765

15:30 125.610 93.605

16:30 78.092 59.987

17:30 31.014 27.415

18:30 5.099 6.764

19:30 0.016 0.055

September

4:30 0.739 1.602

5:30 15.493 17.615

6:30 43.472 44.989

7:30 93.298 80.362

8:30 138.402 112.104

9:30 178.314 141.505

10:30 196.740 148.263

11:30 193.376 142.585

12:30 172.002 131.354

13:30 138.327 107.426

14:30 98.539 78.831

15:30 55.664 47.621

16:30 19.430 20.558

17:30 1.993 3.952

October

5:30 0.521 1.229

6:30 10.042 14.536

7:30 35.264 41.777

8:30 65.552 68.858

9:30 94.205 93.380

10:30 110.457 106.702

11:30 110.889 106.765

12:30 94.756 91.429

13:30 68.060 68.763

14:30 35.283 40.908

15:30 9.522 13.882

16:30 0.269 0.789

November

6:30 0.051 0.192

7:30 3.502 6.346

8:30 13.487 20.409

9:30 25.340 34.809

10:30 33.243 42.454

11:30 32.318 42.762

12:30 26.275 34.408

13:30 12.847 17.769

14:30 2.417 4.501

December

7:30 0.045 0.164

8:30 3.998 5.423

9:30 13.340 16.969

10:30 21.324 25.964

11:30 21.738 25.861

12:30 14.422 18.048

13:30 4.756 6.055

14:30 0.053 0.101

**Supplementary Table S7.** Daily hourly change of the mean ± standard deviation of the power flux *W*diff ± Δ*W*diff (W/m2) of diffuse skylight from January to December averaged for the period 2009-2019 in Boone County (39.0° N, -84.75° E) between sunrise and sunset (UTC - 5 hour).

time *W*diff Δ*W*diff

(UTC - 5 h) (W/m2) (W/m2)

January

7:30 0.086 0.179

8:30 23.527 9.373

9:30 69.486 25.639

10:30 104.477 40.361

11:30 127.934 53.041

12:30 138.510 60.350

13:30 138.112 59.621

14:30 121.175 50.619

15:30 91.314 36.579

16:30 52.657 21.055

17:30 9.716 6.102

February

7:30 5.154 4.219

8:30 46.545 17.836

9:30 94.242 34.197

10:30 132.101 52.834

11:30 156.692 64.798

12:30 168.938 71.582

13:30 175.324 73.916

14:30 158.212 65.043

15:30 128.285 50.744

16:30 86.490 32.730

17:30 35.468 14.861

18:30 1.592 1.744

March

6:30 1.524 2.225

7:30 31.615 16.040

8:30 80.044 30.368

9:30 119.966 48.255

10:30 154.828 66.784

11:30 181.638 82.365

12:30 192.858 87.410

13:30 188.873 83.537

14:30 175.324 75.074

15:30 147.864 60.235

16:30 111.705 43.055

17:30 63.771 23.743

18:30 13.536 6.978

April

5:30 0.169 0.369

6:30 20.165 10.803

7:30 66.632 21.646

8:30 106.687 37.437

9:30 142.026 55.767

10:30 175.214 73.862

11:30 198.115 88.529

12:30 214.099 93.365

13:30 210.845 93.921

14:30 198.153 83.857

15:30 167.349 63.950

16:30 131.667 46.159

17:30 88.596 29.686

18:30 36.150 13.206

19:30 1.629 1.653

May

5:30 5.907 3.433

6:30 45.936 14.880

7:30 89.527 27.366

8:30 129.657 43.751

9:30 165.750 59.887

10:30 193.334 74.924

11:30 210.663 82.224

12:30 223.728 86.725

13:30 226.585 82.642

14:30 207.137 75.203

15:30 181.720 61.511

16:30 146.095 46.809

17:30 102.508 30.113

18:30 56.390 16.303

19:30 11.192 5.091

June

5:30 10.808 2.744

6:30 54.216 13.047

7:30 95.270 25.738

8:30 130.312 42.729

9:30 159.551 59.727

10:30 182.430 69.183

11:30 201.109 80.893

12:30 214.840 84.199

13:30 224.270 81.482

14:30 210.016 73.394

15:30 184.117 58.868

16:30 148.795 43.903

17:30 109.755 27.101

18:30 69.051 13.715

19:30 22.826 4.968

20:30 0.036 0.044

July

5:30 5:300 2.672

6:30 44.535 10.884

7:30 84.904 20.897

8:30 119.118 35.579

9:30 149.160 52.211

10:30 173.584 62.185

11:30 197.586 70.844

12:30 209.391 74.107

13:30 226.845 78.652

14:30 210.468 69.903

15:30 184.899 60.466

16:30 150.825 46.733

17:30 109.775 29.841

18:30 66.663 14.962

19:30 20.309 5.613

20:30 0.013 0.027

August

5:30 0.366 0.558

6:30 26.073 7.934

7:30 73.976 16.136

8:30 113.482 32.341

9:30 141.592 46.187

10:30 165.761 59.625

11:30 187.825 69.414

12:30 199.601 74.449

13:30 205.503 70.645

14:30 193.988 65.252

15:30 168.290 53.229

16:30 132.928 39.935

17:30 93.084 22.048

18:30 48.038 13.207

19:30 6.166 4.431

September

6:30 8.677 4.546

7:30 52.335 16.320

8:30 92.910 28.611

9:30 124.695 43.808

10:30 148.610 57.317

11:30 161.776 65.673

12:30 170.627 67.936

13:30 176.653 65.404

14:30 157.653 56.205

15:30 131.491 43.635

16:30 98.005 27.596

17:30 57.112 16.223

18:30 12.882 7.823

October

6:30 0.810 1.075

7:30 29.297 11.868

8:30 74.077 23.168

9:30 106.908 37.220

10:30 133.762 51.512

11:30 149.343 61.629

12:30 156.299 65.790

13:30 148.692 58.482

14:30 132.920 50.688

15:30 103.892 36.327

16:30 66.120 22.028

17:30 20.826 10.664

18:30 0.294 0.593

November

7:30 7.907 5.136

8:30 47.262 16.912

9:30 81.090 27.770

10:30 106.216 40.894

11:30 120.150 49.435

12:30 123.685 53.160

13:30 121.383 51.341

14:30 105.762 41.741

15:30 77.847 28.978

16:30 39.551 14.761

17:30 3.418 2.471

December

7:30 0.346 0.532

8:30 23.702 10.410

9:30 64.097 25.225

10:30 96.029 38.521

11:30 114.992 49.890

12:30 124.620 53.120

13:30 122.617 51.425

14:30 102.885 42.462

15:30 72.635 28.608

16:30 32.324 12.250

17:30 1.380 0.870

**Supplementary Table S8.** Daily hourly change of the mean ± standard deviation of the power flux *W*diff ± Δ*W*diff (W/m2) of diffuse skylight from January to December averaged for the period 2009-2019 in Tennessee (35.5° N, -88.25° E) between sunrise and sunset (UTC - 5 hour). Although this site of Tennessee state is in the time zone UTC - 6 h, but here the data are given in UTC - 5 h.

time *W*diff Δ*W*diff

(UTC - 5 h) (W/m2) (W/m2)

January

8:30 18.422 7.277

9:30 60.541 22.682

10:30 92.120 36.942

11:30 114.756 48.326

12:30 125.634 56.064

13:30 125.849 57.469

14:30 113.163 50.912

15:30 94.595 40.320

16:30 65.595 25.602

17:30 24.159 11.611

18:30 0.342 0.596

February

7:30 2.523 2.529

8:30 38.565 15.444

9:30 83.828 33.242

10:30 118.852 49.417

11:30 145.869 63.700

12:30 160.867 74.132

13:30 160.695 75.326

14:30 147.575 69.339

15:30 123.599 54.841

16:30 91.398 34.231

17:30 50.317 18.492

18:30 7.077 4.364

March

6:30 0.225 0.505

7:30 20.940 12.112

8:30 69.946 26.168

9:30 114.562 42.769

10:30 148.792 58.974

11:30 174.694 72.238

12:30 192.079 86.695

13:30 203.231 88.597

14:30 187.111 79.249

15:30 158.001 64.278

16:30 117.274 44.805

17:30 72.840 24.305

18:30 23.316 10.155

19:30 0.117 0.235

April

6:30 10.249 6.530

7:30 56.890 18.183

8:30 100.234 32.702

9:30 139.464 52.157

10:30 169.668 69.766

11:30 196.533 86.035

12:30 213.046 95.348

13:30 213.572 96.618

14:30 196.662 83.721

15:30 171.308 67.619

16:30 134.623 47.181

17:30 94.138 27.792

18:30 45.897 13.268

19:30 4.288 2.673

May

5:30 0.672 0.708

6:30 29.650 10.648

7:30 77.108 23.659

8:30 117.678 37.325

9:30 152.659 56.402

10:30 180.383 71.195

11:30 203.744 82.850

12:30 218.333 84.942

13:30 228.143 88.810

14:30 219.620 79.344

15:30 187.395 66.888

16:30 152.282 48.701

17:30 110.078 29.457

18:30 64.196 15.834

19:30 15.755 5.533

June

5:30 2.184 0.636

6:30 38.423 8.378

7:30 83.279 20.370

8:30 118.463 34.987

9:30 148.882 48.402

10:30 171.313 61.167

11:30 190.869 71.164

12:30 201.780 76.750

13:30 215.230 78.173

14:30 200.554 66.823

15:30 180.334 61.584

16:30 151.984 45.430

17:30 115.336 29.274

18:30 74.984 14.180

19:30 27.853 5.228

20:30 0.225 0.177

July

5:30 0.442 0.509

6:30 27.931 7.567

7:30 74.724 16.506

8:30 111.015 30.606

9:30 141.389 46.421

10:30 166.826 58.081

11:30 187.695 68.320

12:30 201.507 72.472

13:30 223.137 75.555

14:30 211.324 70.912

15:30 185.758 58.912

16:30 152.462 44.355

17:30 115.008 27.187

18:30 72.940 14.749

19:30 25.354 5.622

20:30 0.148 0.163

August

6:30 13.040 4.394

7:30 61.235 12.621

8:30 101.878 24.607

9:30 134.730 40.520

10:30 162.006 56.183

11:30 184.321 66.770

12:30 197.903 70.790

13:30 219.809 74.599

14:30 202.561 64.671

15:30 172.367 52.852

16:30 139.040 38.883

17:30 100.094 23.214

18:30 55.971 13.903

19:30 10.047 5.456

September

6:30 3.322 2.221

7:30 42.030 11.957

8:30 84.030 22.912

9:30 116.005 36.601

10:30 137.840 48.310

11:30 157.063 58.133

12:30 169.128 61.059

13:30 184.637 69.009

14:30 169.841 60.320

15:30 141.969 47.934

16:30 109.098 31.294

17:30 68.685 18.678

18:30 21.754 10.635

19:30 0.292 0.574

October

6:30 0.064 0.143

7:30 21.303 7.939

8:30 66.450 18.892

9:30 99.054 32.886

10:30 122.986 45.924

11:30 140.703 55.703

12:30 145.298 55.614

13:30 146.242 58.043

14:30 132.558 48.470

15:30 109.980 36.575

16:30 77.098 22.906

17:30 34.927 13.875

18:30 2.193 2.595

November

7:30 5.621 4.048

8:30 43.690 17.271

9:30 79.804 30.107

10:30 105.771 41.156

11:30 121.994 50.125

12:30 125.970 52.246

13:30 121.823 49.402

14:30 109.869 42.790

15:30 88.750 31.989

16:30 55.480 18.690

17:30 12.563 5.255

December

7:30 0.148 0.295

8:30 21.614 9.917

9:30 61.309 23.505

10:30 91.885 35.622

11:30 112.941 43.916

12:30 123.994 49.888

13:30 121.451 52.801

14:30 108.739 44.934

15:30 86.419 34.242

16:30 50.842 18.874

17:30 9.381 4.014

**Supplementary Table S9.** Daily hourly change of the mean ± standard deviation of the power flux *W*diff ± Δ*W*diff (W/m2) of diffuse skylight from January to December averaged for the period 2009-2019 in Georgia (31.25° N, -83.25° E) between sunrise and sunset (UTC - 5 hour).

time *W*diff Δ*W*diff

(UTC - 5 h) (W/m2) (W/m2)

January

7:30 4.719 1.895

8:30 44.948 14.600

9:30 83.789 29.433

10:30 113.462 45.217

11:30 132.847 55.394

12:30 142.270 61.351

13:30 138.957 61.377

14:30 125.872 50.142

15:30 100.669 37.019

16:30 64.870 21.199

17:30 17.969 7.614

February

7:30 13.908 6.602

8:30 63.841 20.656

9:30 106.031 37.413

10:30 137.697 53.611

11:30 155.596 67.342

12:30 164.933 73.976

13:30 163.689 70.310

14:30 152.009 60.984

15:30 125.396 46.511

16:30 88.642 27.194

17:30 41.285 13.582

18:30 2.530 2.039

March

6:30 2.875 3.122

7:30 41.928 15.985

8:30 90.735 26.465

9:30 131.851 46.124

10:30 161.801 63.378

11:30 180.063 74.409

12:30 189.597 80.119

13:30 187.671 79.530

14:30 173.325 69.403

15:30 146.399 54.098

16:30 110.823 35.500

17:30 63.394 16.679

18:30 11.796 4.556

April

5:30 0.044 0.111

6:30 21.108 8.983

7:30 72.993 20.196

8:30 113.811 35.423

9:30 142.967 50.879

10:30 166.513 64.919

11:30 183.778 70.715

12:30 196.374 79.277

13:30 200.037 82.986

14:30 177.960 72.280

15:30 154.373 56.327

16:30 120.270 38.972

17:30 77.821 21.117

18:30 25.630 7.683

19:30 0.076 0.149

May

5:30 3.029 1.669

6:30 43.869 10.520

7:30 90.948 22.207

8:30 128.393 37.844

9:30 155.934 52.761

10:30 178.603 69.129

11:30 200.303 82.033

12:30 206.919 82.009

13:30 210.671 76.796

14:30 196.404 64.765

15:30 167.017 53.889

16:30 130.510 36.648

17:30 90.439 20.980

18:30 42.197 9.843

19:30 2.785 1.624

June

5:30 5.391 1.139

6:30 49.878 9.575

7:30 95.609 21.014

8:30 133.584 36.870

9:30 162.489 50.702

10:30 183.118 59.044

11:30 198.925 65.903

12:30 211.650 68.998

13:30 219.896 68.392

14:30 205.146 62.993

15:30 178.270 52.827

16:30 142.896 38.053

17:30 101.129 24.231

18:30 52.523 11.256

19:30 7.708 2.049

July

5:30 2.085 1.263

6:30 40.119 8.060

7:30 90.163 17.408

8:30 130.236 32.651

9:30 160.694 46.188

10:30 181.974 58.392

11:30 199.840 65.765

12:30 205.049 66.938

13:30 212.680 63.828

14:30 196.181 57.127

15:30 172.084 47.689

16:30 140.894 35.695

17:30 101.040 21.459

18:30 52.327 10.138

19:30 7.483 2.060

August

5:30 0.034 0.073

6:30 24.115 5.802

7:30 80.311 16.348

8:30 126.956 32.021

9:30 159.184 49.589

10:30 183.945 66.454

11:30 199.767 70.727

12:30 205.037 69.041

13:30 208.659 61.782

14:30 191.519 54.010

15:30 167.084 47.934

16:30 130.086 33.609

17:30 83.544 20.750

18:30 33.178 10.708

19:30 1.323 1.408

September

6:30 11.926 4.109

7:30 63.309 15.018

8:30 107.215 29.270

9:30 139.477 44.101

10:30 161.325 54.802

11:30 175.953 62.632

12:30 187.411 64.566

13:30 188.897 61.101

14:30 171.118 49.978

15:30 140.322 38.828

16:30 102.746 25.938

17:30 55.908 16.041

18:30 9.438 5.885

October

6:30 3.421 2.128

7:30 44.126 10.590

8:30 85.562 21.763

9:30 112.837 36.067

10:30 131.523 49.602

11:30 144.081 57.811

12:30 149.171 56.833

13:30 150.558 59.860

14:30 135.218 48.870

15:30 106.926 32.323

16:30 71.536 17.703

17:30 23.310 9.065

18:30 0.234 0.476

November

6:30 0.058 0.133

7:30 21.931 8.687

8:30 68.229 19.544

9:30 100.912 30.292

10:30 120.840 44.332

11:30 132.080 52.672

12:30 135.461 55.472

13:30 133.702 53.703

14:30 117.071 40.164

15:30 89.652 26.951

16:30 52.438 13.318

17:30 7.596 2.825

December

7:30 6.781 3.486

8:30 47.134 16.488

9:30 83.579 27.813

10:30 111.946 41.281

11:30 131.543 51.418

12:30 135.732 54.987

13:30 128.815 52.303

14:30 109.816 41.771

15:30 81.729 28.346

16:30 45.842 14.703

17:30 5.940 2.512

**Supplementary Table S10.** Daily hourly change of the mean ± standard deviation of the power flux *W*diff ± Δ*W*diff (W/m2) of diffuse skylight from January to December averaged for the period 2009-2019 in Central Italy (41.0° N, 15.0° E) between sunrise and sunset (UTC + 1 hour). Although Italy is in the time zone UTC + 1 h, but here the data are given in UTC.

time *W*diff Δ*W*diff

(UTC + 1 h) (W/m2) (W/m2)

January

6:30 7.095 2.977

7:30 49.245 15.232

8:30 91.740 27.682

9:30 118.870 34.812

10:30 132.290 39.170

11:30 135.555 40.252

12:30 123.553 35.241

13:30 99.851 27.401

14:30 62.789 17.194

15:30 17.898 8.715

16:30 0.090 0.209

February

5:30 0.493 0.890

6:30 25.177 12.584

7:30 78.589 24.383

8:30 122.031 34.366

9:30 152.294 42.687

10:30 170.167 46.551

11:30 174.962 47.304

12:30 163.638 43.038

13:30 136.196 33.351

14:30 98.181 23.715

15:30 50.640 14.601

16:30 6.742 4.687

March

4:30 0.069 0.197

5:30 15.769 10.770

6:30 68.031 23.300

7:30 117.431 33.967

8:30 154.511 44.677

9:30 178.178 53.956

10:30 193.618 62.682

11:30 196.658 63.024

12:30 183.848 56.578

13:30 158.708 46.922

14:30 122.119 33.867

15:30 79.533 22.866

16:30 28.683 11.691

17:30 0.650 0.976

April

4:30 9.445 6.676

5:30 58.233 17.719

6:30 114.032 29.175

7:30 152.971 42.646

8:30 179.657 53.939

9:30 199.670 66.217

10:30 209.069 70.569

11:30 212.939 72.420

12:30 203.205 66.583

13:30 179.719 52.555

14:30 145.532 38.634

15:30 103.447 24.077

16:30 57.302 14.531

17:30 9.925 5.094

May

3:30 1.573 1.437

4:30 35.747 10.408

5:30 90.289 18.887

6:30 139.628 31.876

7:30 169.797 40.332

8:30 190.687 48.495

9:30 213.748 60.945

10:30 230.994 67.370

11:30 234.836 66.807

12:30 222.222 59.979

13:30 197.036 44.658

14:30 168.388 34.940

15:30 126.445 23.520

16:30 82.198 13.749

17:30 30.954 8.749

18:30 0.783 0.943

June

3:30 4.840 0.856

4:30 47.755 5.876

5:30 98.116 18.106

6:30 135.866 29.862

7:30 159.470 38.674

8:30 174.950 44.031

9:30 193.752 55.200

10:30 206.157 61.961

11:30 210.062 57.948

12:30 203.894 54.583

13:30 186.130 44.832

14:30 161.274 33.448

15:30 127.851 21.975

16:30 91.757 13.578

17:30 47.568 6.260

18:30 5.402 1.365

July

3:30 1.568 1.274

4:30 35.412 7.354

5:30 82.621 13.930

6:30 116.146 22.712

7:30 135.468 24.625

8:30 153.551 31.826

9:30 167.570 39.949

10:30 177.541 44.537

11:30 182.329 46.437

12:30 178.287 43.681

13:30 168.399 38.719

14:30 150.380 32.791

15:30 120.245 19.366

16:30 85.360 10.257

17:30 43.689 6.007

18:30 4.374 1.824

August

4:30 15.080 5.366

5:30 64.238 9.489

6:30 104.027 19.586

7:30 126.542 24.033

8:30 142.310 31.746

9:30 156.222 40.753

10:30 165.695 42.555

11:30 169.197 46.215

12:30 164.694 40.246

13:30 153.595 33.856

14:30 133.957 26.357

15:30 102.433 16.277

16:30 66.255 10.444

17:30 19.908 8.513

18:30 0.128 0.270

September

4:30 2.173 2.060

5:30 39.878 11.016

6:30 92.909 21.304

7:30 130.934 31.733

8:30 152.364 38.927

9:30 168.654 48.051

10:30 177.740 52.032

11:30 182.842 48.792

12:30 170.847 43.981

13:30 151.436 37.474

14:30 119.025 25.869

15:30 79.418 16.967

16:30 29.789 13.168

17:30 1.284 1.886

October

5:30 12.761 6.620

6:30 61.499 18.516

7:30 106.311 29.223

8:30 132.566 35.952

9:30 149.697 42.283

10:30 155.221 44.118

11:30 154.983 42.475

12:30 140.710 37.434

13:30 115.370 29.456

14:30 80.289 19.891

15:30 36.185 14.011

16:30 2.707 3.206

November

5:30 1.036 1.386

6:30 28.801 12.275

7:30 76.367 22.629

8:30 110.011 29.892

9:30 127.848 32.818

10:30 132.483 33.862

11:30 129.161 34.120

12:30 113.761 28.648

13:30 88.299 21.298

14:30 51.738 12.867

15:30 9.632 4.581

December

6:30 8.935 3.522

7:30 51.252 12.527

8:30 89.167 21.731

9:30 110.847 27.260

10:30 119.664 29.933

11:30 118.726 31.219

12:30 105.607 23.525

13:30 80.278 16.183

14:30 44.730 8.371

15:30 5.687 1.710

**Supplementary Table S11.** Daily hourly change of the mean ± standard deviation of the power flux *W*diff ± Δ*W*diff (W/m2) of diffuse skylight from January to December averaged for the period 2009-2019 in Central Hungary (47.0° N, 19.0° E) between sunrise and sunset (UTC + 1 hour). Although Hungary is in the time zone UTC + 1 h, but here the data are given in UTC.

time *W*diff Δ*W*diff

(UTC + 1 h) (W/m2) (W/m2)

January

6:30 5.553 2.943

7:30 40.820 12.905

8:30 75.847 22.006

9:30 99.795 29.681

10:30 110.622 33.494

11:30 110.912 33.518

12:30 98.018 29.261

13:30 71.377 20.891

14:30 33.073 13.453

15:30 2.730 3.036

February

5:30 1.093 1.683

6:30 27.190 13.438

7:30 72.714 22.803

8:30 109.353 33.698

9:30 136.498 41.413

10:30 151.951 46.432

11:30 152.398 47.029

12:30 140.736 43.964

13:30 112.207 34.986

14:30 71.487 22.055

15:30 24.417 12.000

16:30 0.653 1.083

March

4:30 1.071 1.764

5:30 25.409 14.418

6:30 72.734 21.586

7:30 112.596 32.239

8:30 143.717 44.429

9:30 165.600 55.524

10:30 178.525 59.790

11:30 182.225 59.369

12:30 169.086 52.195

13:30 146.287 40.573

14:30 108.890 27.910

15:30 62.232 17.497

16:30 14.837 8.282

17:30 0.023 0.074

April

3:30 0.775 1.274

4:30 24.352 12.775

5:30 70.821 16.774

6:30 109.629 27.592

7:30 141.695 39.857

8:30 165.688 50.234

9:30 185.223 58.686

10:30 200.725 66.751

11:30 203.465 64.923

12:30 193.617 58.156

13:30 170.543 48.042

14:30 137.724 35.331

15:30 95.588 20.587

16:30 47.599 12.664

17:30 6.189 4.469

May

3:30 13.282 6.063

4:30 57.590 12.388

5:30 99.129 20.093

6:30 134.789 33.621

7:30 163.933 46.570

8:30 186.747 55.240

9:30 208.061 62.322

10:30 219.042 62.872

11:30 220.834 62.340

12:30 209.072 57.785

13:30 187.138 46.600

14:30 154.458 35.072

15:30 116.415 22.950

16:30 73.195 15.056

17:30 27.490 9.423

18:30 0.958 1.168

June

2:30 0.113 0.069

3:30 22.921 4.796

4:30 65.803 12.329

5:30 103.130 20.955

6:30 135.776 29.250

7:30 166.303 41.794

8:30 188.974 49.792

9:30 208.197 56.429

10:30 220.224 57.370

11:30 221.577 57.256

12:30 211.045 52.070

13:30 187.436 45.411

14:30 160.468 36.326

15:30 125.259 25.586

16:30 86.745 15.516

17:30 43.952 8.150

18:30 6.261 1.854

July

3:30 13.835 5.067

4:30 55.411 10.343

5:30 92.091 16.717

6:30 124.473 27.687

7:30 150.775 38.077

8:30 172.312 44.937

9:30 186.055 52.420

10:30 200.130 58.316

11:30 201.824 55.854

12:30 192.588 52.812

13:30 174.034 43.717

14:30 150.785 34.722

15:30 119.405 24.046

16:30 83.184 14.164

17:30 40.932 8.257

18:30 4.701 2.310

August

3:30 1.831 2.013

4:30 31.803 9.851

5:30 74.004 12.567

6:30 104.912 19.585

7:30 130.458 27.843

8:30 149.963 35.929

9:30 164.067 44.792

10:30 174.824 48.606

11:30 177.443 49.549

12:30 168.296 44.088

13:30 153.028 35.884

14:30 130.528 29.216

15:30 97.199 19.319

16:30 58.607 13.417

17:30 15.208 8.375

18:30 0.084 0.202

September

4:30 7.837 5.329

5:30 48.798 14.766

6:30 89.492 22.811

7:30 119.276 33.683

8:30 141.588 40.205

9:30 159.031 47.392

10:30 167.220 49.852

11:30 166.608 47.521

12:30 156.577 43.418

13:30 134.623 36.443

14:30 102.687 27.392

15:30 62.771 19.376

16:30 18.033 11.776

17:30 0.321 0.686

October

4:30 0.127 0.294

5:30 17.200 9.507

6:30 58.715 18.154

7:30 93.833 26.740

8:30 117.715 35.082

9:30 133.784 40.353

10:30 138.731 40.246

11:30 134.675 38.367

12:30 120.334 32.674

13:30 93.500 24.556

14:30 58.015 18.143

15:30 16.879 11.534

16:30 0.296 0.643

November

5:30 1.212 1.712

6:30 25.112 13.068

7:30 63.273 21.225

8:30 90.651 28.102

9:30 107.287 32.290

10:30 113.566 34.709

11:30 105.870 31.141

12:30 89.104 25.848

13:30 61.334 18.555

14:30 23.136 10.815

15:30 0.663 1.060

December

6:30 5.412 2.835

7:30 38.188 10.954

8:30 69.175 17.201

9:30 90.895 23.227

10:30 101.089 25.465

11:30 97.377 25.358

12:30 79.407 19.965

13:30 51.198 13.144

14:30 13.706 4.129

**Supplementary Table S12.** Daily hourly change of the mean ± standard deviation of the power flux *W*diff ± Δ*W*diff (W/m2) of diffuse skylight from January to December averaged for the period 2009-2019 in South Sweden (58.0° N, 13.0° E) between sunrise and sunset (UTC + 1 hour). Although Sweden is in the time zone UTC + 1 h, but here the data are given in UTC.

time *W*diff Δ*W*diff

(UTC + 1 h) (W/m2) (W/m2)

January

7:30 1.269 1.732

8:30 18.476 9.008

9:30 41.494 15.414

10:30 55.325 19.265

11:30 57.805 19.690

12:30 50.047 18.040

13:30 32.636 14.532

14:30 9.647 7.943

15:30 0.212 0.504

February

6:30 2.333 3.302

7:30 23.287 13.704

8:30 56.319 19.812

9:30 83.094 26.855

10:30 99.064 31.695

11:30 103.390 32.442

12:30 94.480 29.787

13:30 75.696 24.878

14:30 47.727 19.117

15:30 16.076 11.648

16:30 0.750 1.363

March

4:30 0.082 0.254

5:30 8.415 9.262

6:30 39.411 21.072

7:30 76.142 26.305

8:30 107.526 32.683

9:30 129.119 40.841

10:30 142.100 45.512

11:30 147.463 47.031

12:30 139.281 44.330

13:30 119.326 37.946

14:30 94.862 30.955

15:30 61.403 22.387

16:30 24.009 14.880

17:30 1.830 2.673

April

3:30 1.035 1.748

4:30 17.810 12.981

5:30 53.957 20.001

6:30 87.668 28.612

7:30 118.421 39.946

8:30 142.808 51.999

9:30 160.406 58.942

10:30 170.727 61.415

11:30 171.975 60.975

12:30 168.012 59.271

13:30 148.950 49.814

14:30 124.231 39.077

15:30 95.179 29.614

16:30 62.610 20.256

17:30 26.656 13.457

18:30 2.662 3.296

May

2:30 1.194 1.549

3:30 19.139 9.349

4:30 51.758 14.513

5:30 84.946 23.213

6:30 116.662 37.297

7:30 142.401 46.573

8:30 165.832 56.568

9:30 183.408 65.121

10:30 194.302 69.128

11:30 195.751 67.712

12:30 192.617 62.964

13:30 176.689 55.201

14:30 149.813 43.159

15:30 118.956 31.121

16:30 88.998 23.934

17:30 56.814 15.116

18:30 24.665 10.405

19:30 2.674 2.933

June

2:30 6.507 2.137

3:30 33.367 9.526

4:30 63.835 16.972

5:30 92.401 26.916

6:30 125.319 35.251

7:30 153.897 47.894

8:30 175.630 57.629

9:30 193.605 65.227

10:30 203.925 66.909

11:30 205.486 66.952

12:30 197.895 63.686

13:30 180.193 57.216

14:30 155.213 47.616

15:30 128.082 36.293

16:30 99.308 27.518

17:30 71.006 18.691

18:30 41.147 11.098

19:30 12.888 4.160

20:30 0.050 0.052

July

2:30 2.123 2.086

3:30 22.914 9.046

4:30 54.497 15.022

5:30 84.064 23.042

6:30 114.350 36.112

7:30 143.251 46.022

8:30 164.648 54.876

9:30 179.373 61.705

10:30 189.058 65.622

11:30 189.015 65.044

12:30 183.424 64.279

13:30 166.403 53.288

14:30 149.315 43.648

15:30 121.476 36.026

16:30 95.185 27.083

17:30 66.342 18.042

18:30 36.121 10.384

19:30 8.244 4.424

August

3:30 3.053 3.560

4:30 26.014 12.580

5:30 61.478 19.327

6:30 94.493 28.062

7:30 125.224 36.438

8:30 150.489 46.113

9:30 170.451 55.614

10:30 181.926 57.750

11:30 182.277 55.775

12:30 174.518 53.514

13:30 158.099 47.741

14:30 133.286 43.117

15:30 103.123 32.582

16:30 71.630 22.539

17:30 39.054 16.296

18:30 9.540 8.523

19:30 0.159 0.388

September

4:30 2.413 3.185

5:30 25.218 14.205

6:30 60.650 22.923

7:30 92.609 30.106

8:30 119.667 36.612

9:30 135.531 43.252

10:30 148.542 46.950

11:30 148.470 47.185

12:30 139.139 40.857

13:30 119.884 36.172

14:30 93.402 29.961

15:30 61.791 21.733

16:30 27.915 16.630

17:30 4.247 5.475

October

5:30 1.792 2.682

6:30 20.260 14.900

7:30 49.457 23.019

8:30 75.687 30.867

9:30 91.591 36.100

10:30 98.940 38.582

11:30 97.875 38.144

12:30 87.820 34.644

13:30 69.171 28.502

14:30 43.842 20.837

15:30 15.322 13.380

16:30 0.982 1.834

November

6:30 0.480 0.888

7:30 11.395 8.970

8:30 34.003 16.044

9:30 52.240 20.444

10:30 61.673 22.631

11:30 60.473 22.195

12:30 48.862 19.068

13:30 29.791 13.780

14:30 7.369 6.449

15:30 0.051 0.161

December

7:30 0.311 0.574

8:30 12.422 6.113

9:30 31.090 11.523

10:30 41.028 14.539

11:30 41.683 14.658

12:30 32.518 12.005

13:30 14.830 5.857

14:30 0.506 0.346

**Supplementary Table S13.** Ideal azimuth angle α\*n and percent energy gain Δ*Z*ms(θ\*n) = (*e*max - *e*south)/*e*south of a smooth, Fresnel-reflecting, fixed-tilt solar panel with reflectivity *R*(λ) > 0, elevation angle θ\*n (= 90o - β, where β is the tilt angle measured from the horizontal in the solar panel literature) compared to a panel with the same θ\*n but facing south as a function of θ\*n in Boone County (39.0° N, -84.75° E), Tennessee (35.5° N, -88.25° E) and Georgia (31.25° N, -83.25° E), where *e*max = *e*(θ\*n, α\*n) and *e*south = *e*(θ\*n, αn = 0o).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***R*(λ) > 0** | | | | | | |
|  | **Boone County** | | **Tennessee** | | **Georgia** | |
| **θ\*n** | **α\*n** | **Δ*Z*ms (%)** | **α\*n** | **Δ*Z*ms (%)** | **α\*n** | **Δ*Z*ms (%)** |
| **0o** | -31o | 1.815 | -36o | 2.793 | -42o | 4.977 |
| **5o** | -24o | 0.919 | -29o | 1.385 | -37o | 2.986 |
| **10o** | -16o | 0.469 | -21o | 0.596 | -30o | 1.639 |
| **15o** | -12o | 0.275 | -15o | 0.280 | -23o | 0.871 |
| **20o** | -9o | 0.203 | -9o | 0.152 | -16o | 0.501 |
| **25o** | -7o | 0.150 | -8o | 0.084 | -12o | 0.337 |
| **30o** | -6o | 0.113 | -5o | 0.078 | -10o | 0.268 |
| **35o** | -5o | 0.100 | -5o | 0.078 | -9o | 0.204 |
| **40o** | -5o | 0.090 | -5o | 0.076 | -7o | 0.149 |
| **45o** | -4o | 0.078 | -5o | 0.065 | -6o | 0.121 |
| **50o** | -4o | 0.056 | -4o | 0.037 | -6o | 0.104 |
| **55o** | -4o | 0.034 | -3o | 0.023 | -6o | 0.093 |
| **60o** | -4o | 0.026 | -2o | 0.015 | -6o | 0.085 |
| **65o** | -3o | 0.025 | -2o | 0.011 | -6o | 0.070 |
| **70o** | -3o | 0.022 | -2o | 0.010 | -6o | 0.053 |
| **75o** | -3o | 0.018 | -2o | 0.010 | -5o | 0.039 |
| **80o** | -3o | 0.012 | -2o | 0.007 | -5o | 0.026 |
| **85o** | -3o | 0.006 | -2o | 0.003 | -5o | 0.013 |

**Supplementary Table S14.** Ideal azimuth angle α\*n and percent energy gain Δ*Z*ms(θ\*n) = (*e*max - *e*south)/*e*south of a smooth, Fresnel-reflecting, fixed-tilt solar panel with reflectivity *R*(λ) > 0, elevation angle θ\*n (= 90o - β, where β is the tilt angle measured from the horizontal in the solar panel literature) compared to a panel with the same θ\*n but facing south as a function of θ\*n in Central Italy (41.0° N, 15.0° E), Central Hungary (47.0° N, 19.0° E) and South Sweden (58.0° N, 13.0° E), where *e*max = *e*(θ\*n, α\*n) and *e*south = *e*(θ\*n, αn = 0o).

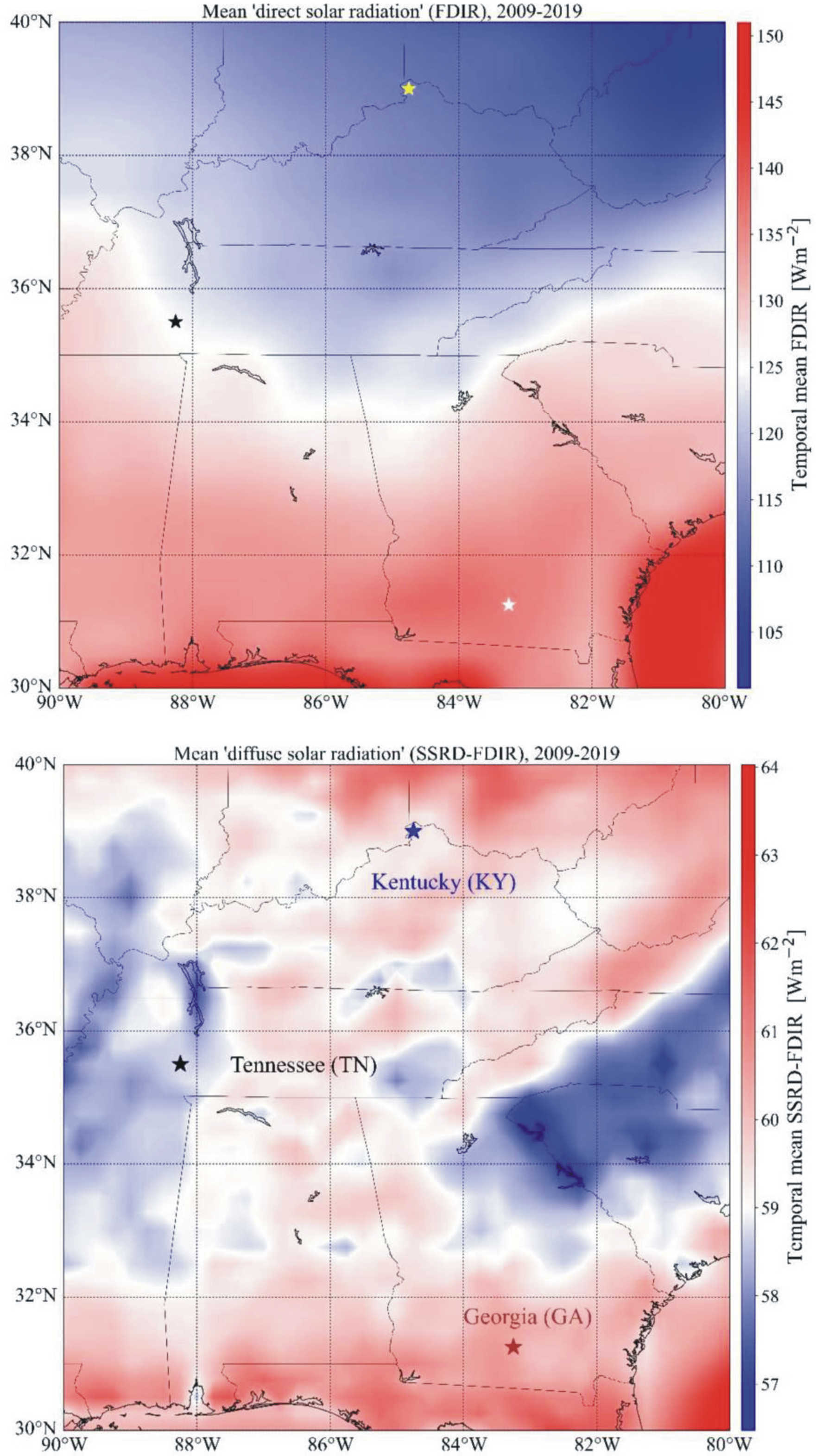
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***R*(λ) > 0** | | | | | | |
|  | **Central Italy** | | **Central Hungary** | | **South Sweden** | |
| **θ\*n** | **α\*n** | **Δ*Z*ms (%)** | **α\*n** | **Δ*Z*ms (%)** | **α\*n** | **Δ*Z*ms (%)** |
| **0o** | -25o | 0.649 | -21o | 0.805 | +1o | 0.001 |
| **5o** | -17o | 0.186 | -15o | 0.480 | 0o | 0 |
| **10o** | -6o | 0.044 | -11o | 0.321 | +2o | 0.004 |
| **15o** | -2o | 0.012 | -9o | 0.242 | +3o | 0.033 |
| **20o** | -2o | 0.009 | -8o | 0.188 | +3o | 0.037 |
| **25o** | -2o | 0.007 | -6o | 0.170 | +3o | 0.015 |
| **30o** | -2o | 0.005 | -6o | 0.162 | 0o | 0 |
| **35o** | -2o | 0.005 | -5o | 0.144 | 0o | 0 |
| **40o** | -1o | 0.002 | -5o | 0.110 | -1o | 0 |
| **45o** | -1o | 0.001 | -5o | 0.069 | -1o | 0 |
| **50o** | -1o | 0.001 | -4o | 0.047 | 0o | 0 |
| **55o** | -1o | 0.001 | -4o | 0.046 | +1o | 0.002 |
| **60o** | -1o | 0.001 | -4o | 0.046 | +1o | 0.001 |
| **65o** | -1o | 0.001 | -4o | 0.046 | +1o | 0 |
| **70o** | 0o | 0 | -4o | 0.041 | 0o | 0 |
| **75o** | 0o | 0 | -4o | 0.030 | +1o | 0 |
| **80o** | 0o | 0 | -4o | 0.019 | +1o | 0 |
| **85o** | 0o | 0 | -4o | 0.001 | 0o | 0 |

**Supplementary Table S15.** Ideal azimuth angle α\*n and percent energy gain Δ*Z*ms(θ\*n) = (*e*max - *e*south)/*e*south of a smooth, Fresnel-reflecting, fixed-tilt solar panel with reflectivity *R*(λ) = 0, elevation angle θ\*n (= 90o - β, where β is the tilt angle measured from the horizontal in the solar panel literature) compared to a panel with the same θ\*n but facing south as a function of θ\*n in Boone County (39.0° N, -84.75° E), Tennessee (35.5° N, -88.25° E) and Georgia (31.25° N, -83.25° E), where *e*max = *e*(θ\*n, α\*n) and *e*south = *e*(θ\*n, αn = 0o).

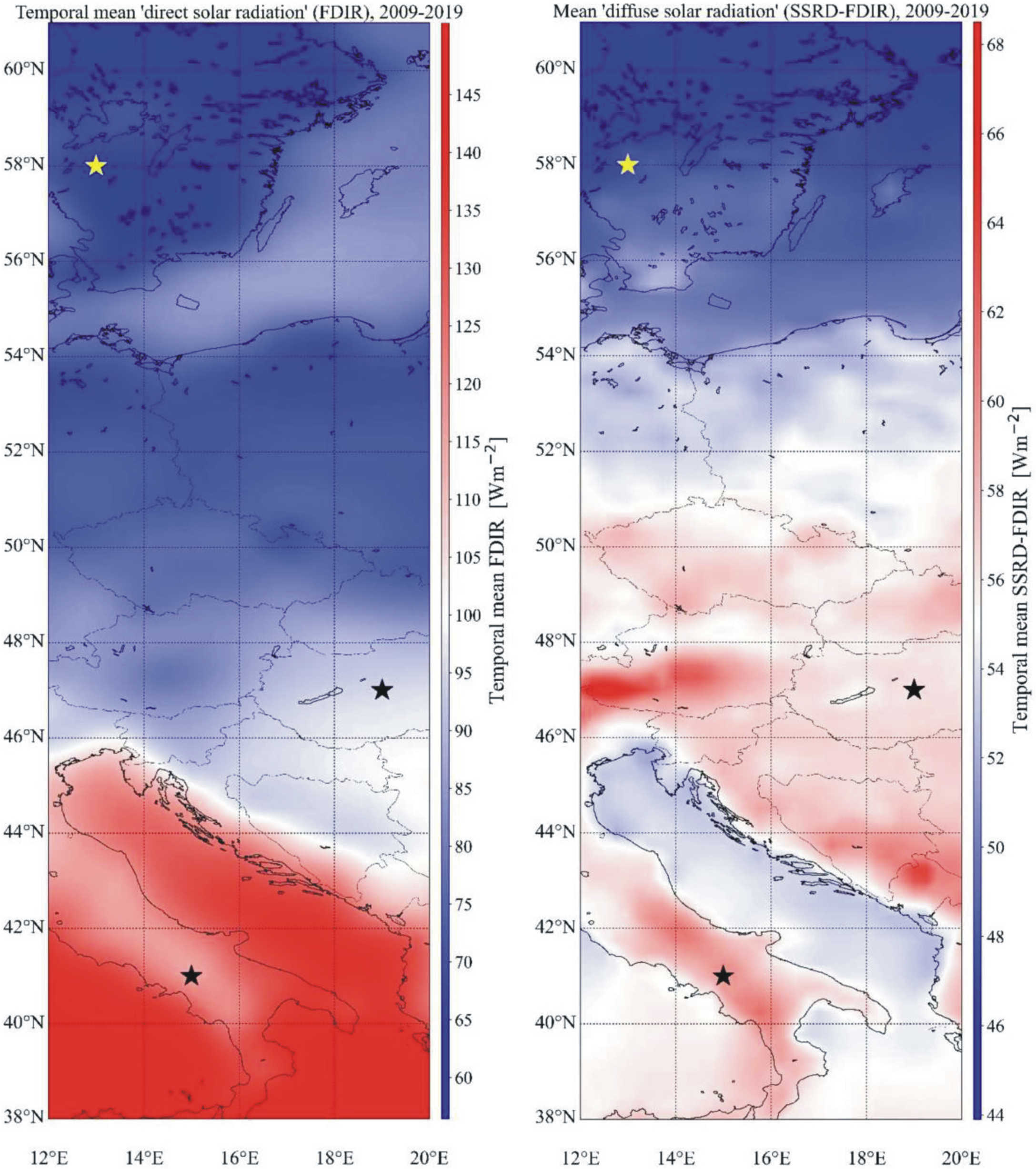
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***R*(λ) = 0** | | | | | | |
|  | **Boone County** | | **Tennessee** | | **Georgia** | |
| **θ\*n** | **α\*n** | **Δ*Z*ms (%)** | **α\*n** | **Δ*Z*ms (%)** | **α\*n** | **Δ*Z*ms (%)** |
| **0o** | -22o | 0.904 | -27o | 1.299 | -34o | 2.684 |
| **5o** | -14o | 0.458 | -20o | 0.556 | -27o | 1.502 |
| **10o** | -13o | 0.259 | -15o | 0.300 | -22o | 0.870 |
| **15o** | -9o | 0.214 | -10o | 0.159 | -15o | 0.488 |
| **20o** | -8o | 0.154 | -9o | 0.078 | -13o | 0.326 |
| **25o** | -4o | 0.112 | -6o | 0.054 | -9o | 0.288 |
| **30o** | -4o | 0.094 | -6o | 0.100 | -8o | 0.213 |
| **35o** | -4o | 0.091 | -5o | 0.100 | -7o | 0.141 |
| **40o** | -4o | 0.078 | -5o | 0.066 | -5o | 0.114 |
| **45o** | -4o | 0.047 | -2o | 0.010 | -6o | 0.107 |
| **50o** | -4o | 0.041 | -1o | 0.008 | -7o | 0.105 |
| **55o** | -3o | 0.035 | -1o | 0.007 | -8o | 0.114 |
| **60o** | -3o | 0.030 | -2o | 0.006 | -8o | 0.099 |
| **65o** | -3o | 0.030 | -2o | 0.006 | -6o | 0.058 |
| **70o** | -3o | 0.026 | -3o | 0.020 | -5o | 0.044 |
| **75o** | -3o | 0.019 | -4o | 0.017 | -5o | 0.033 |
| **80o** | -3o | 0.007 | -2o | 0.004 | -5o | 0.022 |
| **85o** | -3o | 0.004 | -2o | 0.002 | -5o | 0.011 |

**Supplementary Table S16.** Ideal azimuth angle α\*n and percent energy gain Δ*Z*ms(θ\*n) = (*e*max - *e*south)/*e*south of a smooth, Fresnel-reflecting, fixed-tilt solar panel with reflectivity *R*(λ) = 0, elevation angle θ\*n (= 90o - β, where β is the tilt angle measured from the horizontal in the solar panel literature) compared to a panel with the same θ\*n but facing south as a function of θ\*n in Central Italy (41.0° N, 15.0° E), Central Hungary (47.0° N, 19.0° E) and South Sweden (58.0° N, 13.0° E), where *e*max = *e*(θ\*n, α\*n) and *e*south = *e*(θ\*n, αn = 0o).

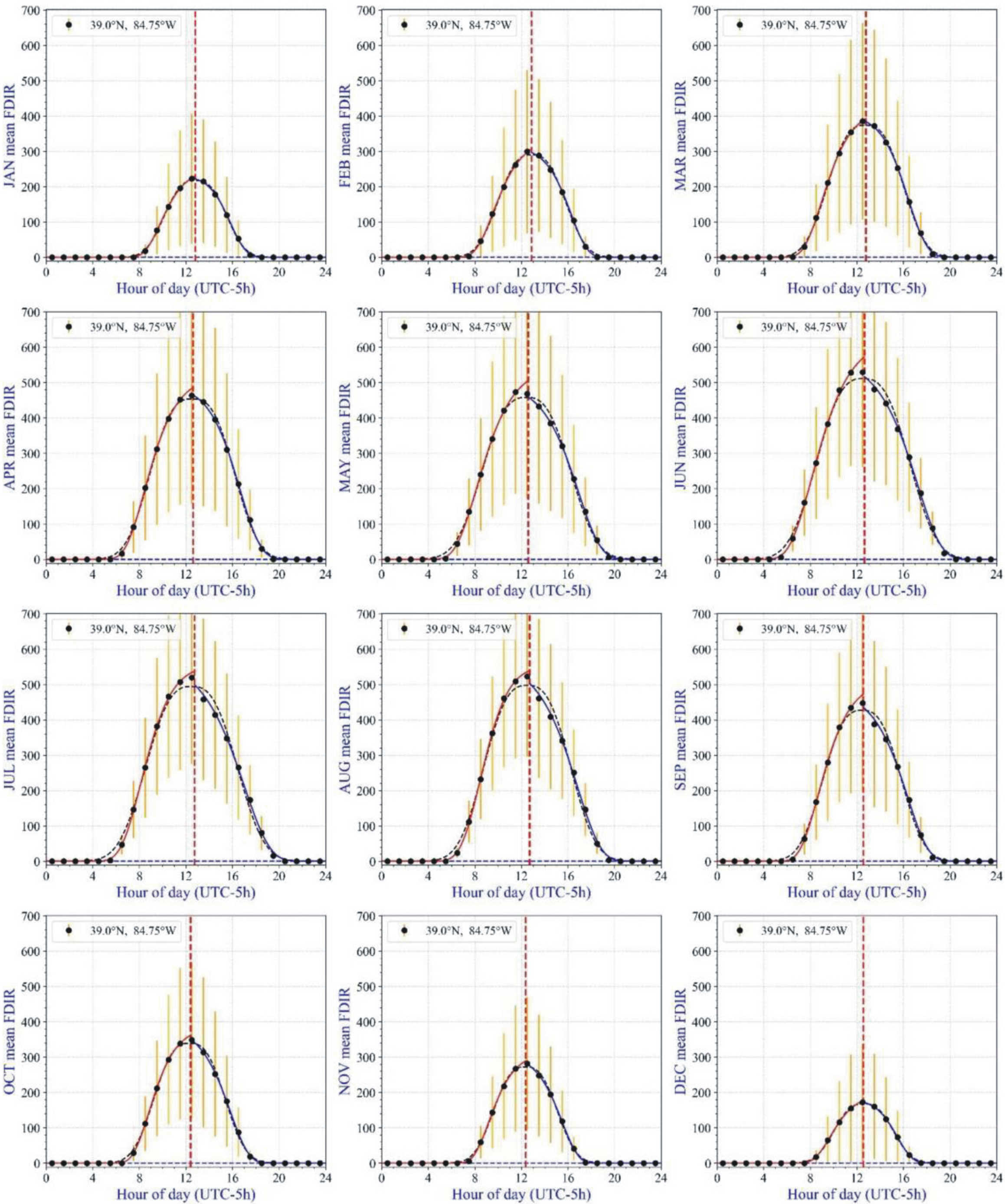
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***R*(λ) = 0** | | | | | | |
|  | **Central Italy** | | **Central Hungary** | | **South Sweden** | |
| **θ\*n** | **α\*n** | **Δ*Z*ms (%)** | **α\*n** | **Δ*Z*ms (%)** | **α\*n** | **Δ*Z*ms (%)** |
| **0o** | -15o | 0.121 | -15o | 0.479 | 0o | 0 |
| **5o** | -6o | 0.077 | -10o | 0.320 | +4o | 0.038 |
| **10o** | -4o | 0.009 | -9o | 0.247 | +4o | 0.094 |
| **15o** | -1o | 0.006 | -8o | 0.188 | +4o | 0.061 |
| **20o** | -1o | 0.005 | -5o | 0.194 | +2o | 0.005 |
| **25o** | -1o | 0.004 | -5o | 0.173 | -1o | 0.010 |
| **30o** | -4o | 0.013 | -5o | 0.141 | -1o | 0.009 |
| **35o** | -1o | 0.001 | -6o | 0.087 | -1o | 0.008 |
| **40o** | -1o | 0.001 | -8o | 0.023 | -1o | 0.008 |
| **45o** | -1o | 0.001 | -2o | 0.010 | +1o | 0.002 |
| **50o** | -1o | 0.001 | -5o | 0.037 | +3o | 0.016 |
| **55o** | -1o | 0.001 | -5o | 0.066 | +3o | 0.018 |
| **60o** | -1o | 0.001 | -5o | 0.070 | +1o | 0.002 |
| **65o** | 0o | 0 | -5o | 0.060 | +1o | 0.002 |
| **70o** | 0o | 0 | -4o | 0.038 | +1o | 0.002 |
| **75o** | 0o | 0 | -4o | 0.022 | +2o | 0.005 |
| **80o** | 0o | 0 | -4o | 0.014 | +1o | 0 |
| **85o** | 0o | 0 | -4o | 0.007 | 0o | 0 |



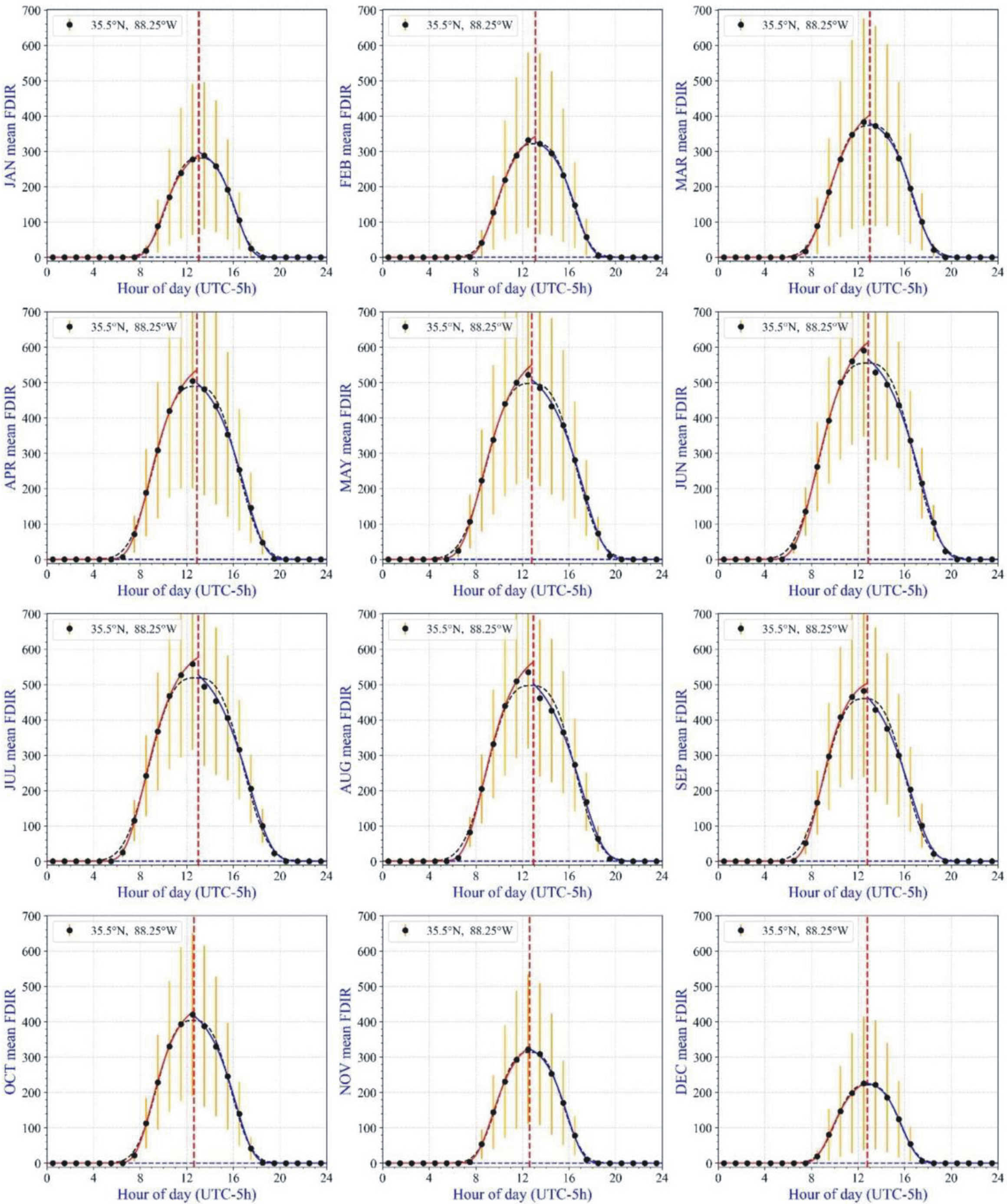
**Supplementary Figure S1.** North-American maps of the 10-year mean power flux (W/m2) of direct sunlight (A) and diffuse skylight (B) averaged for the period 2009-2019. The three sites – Boone County (Kentucky, 39.0° N, -84.75° E), Tennessee (35.5° N, -88.25° E) and Georgia (31.25° N, -83.25° E) – for which our computations were performed, are marked by asterix.



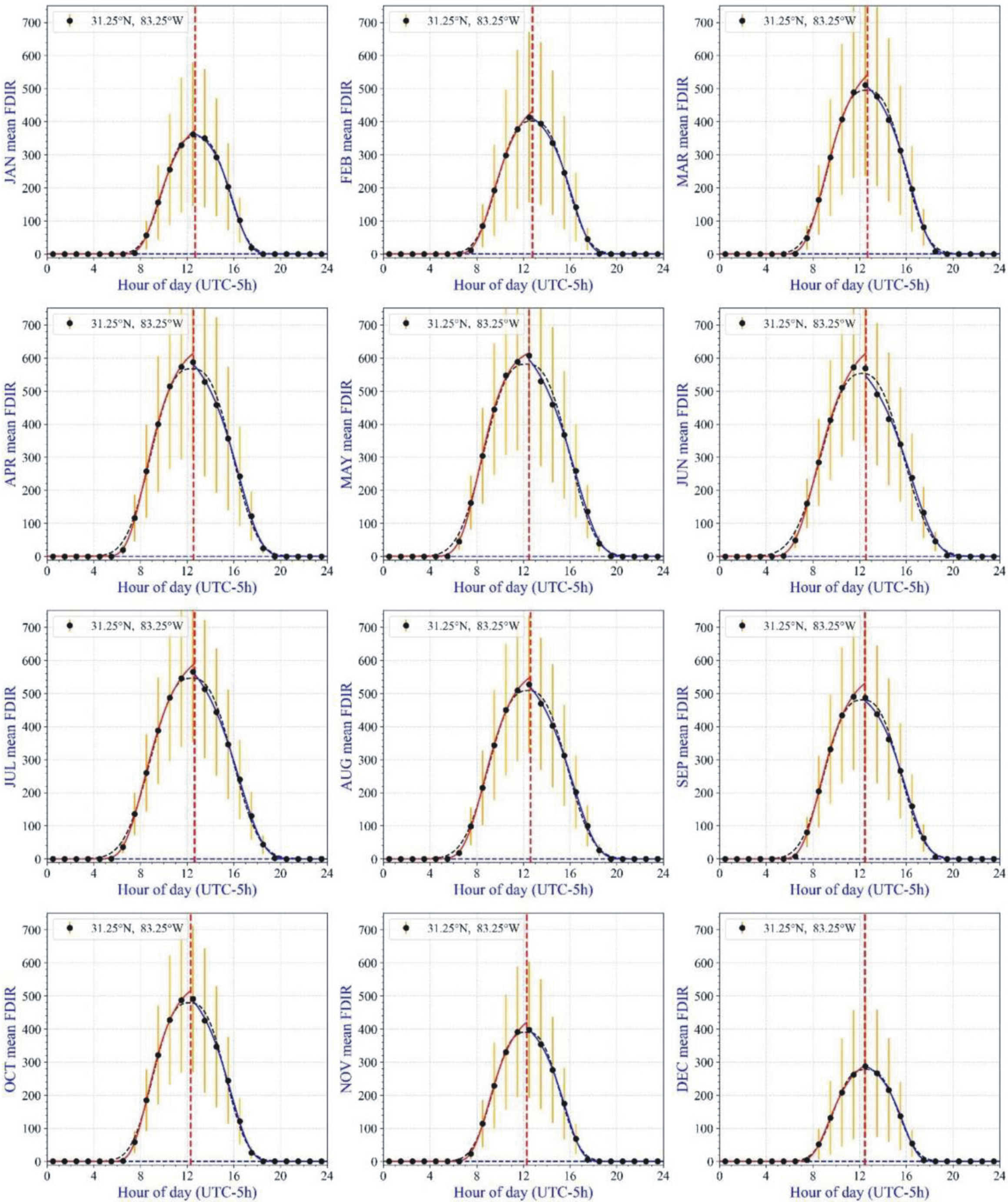
**Supplementary Figure S2.** European maps of the 10-year mean power flux (W/m2) of direct sunlight (A) and diffuse skylight (B) averaged for the period 2009-2019. The three European sites – Central Italy (41.0° N, 15.0° E), Central Hungary (47.0° N, 19.0° E) and South Sweden (58.0° N, 13.0° E) – for which our computations were performed, are marked by asterix.



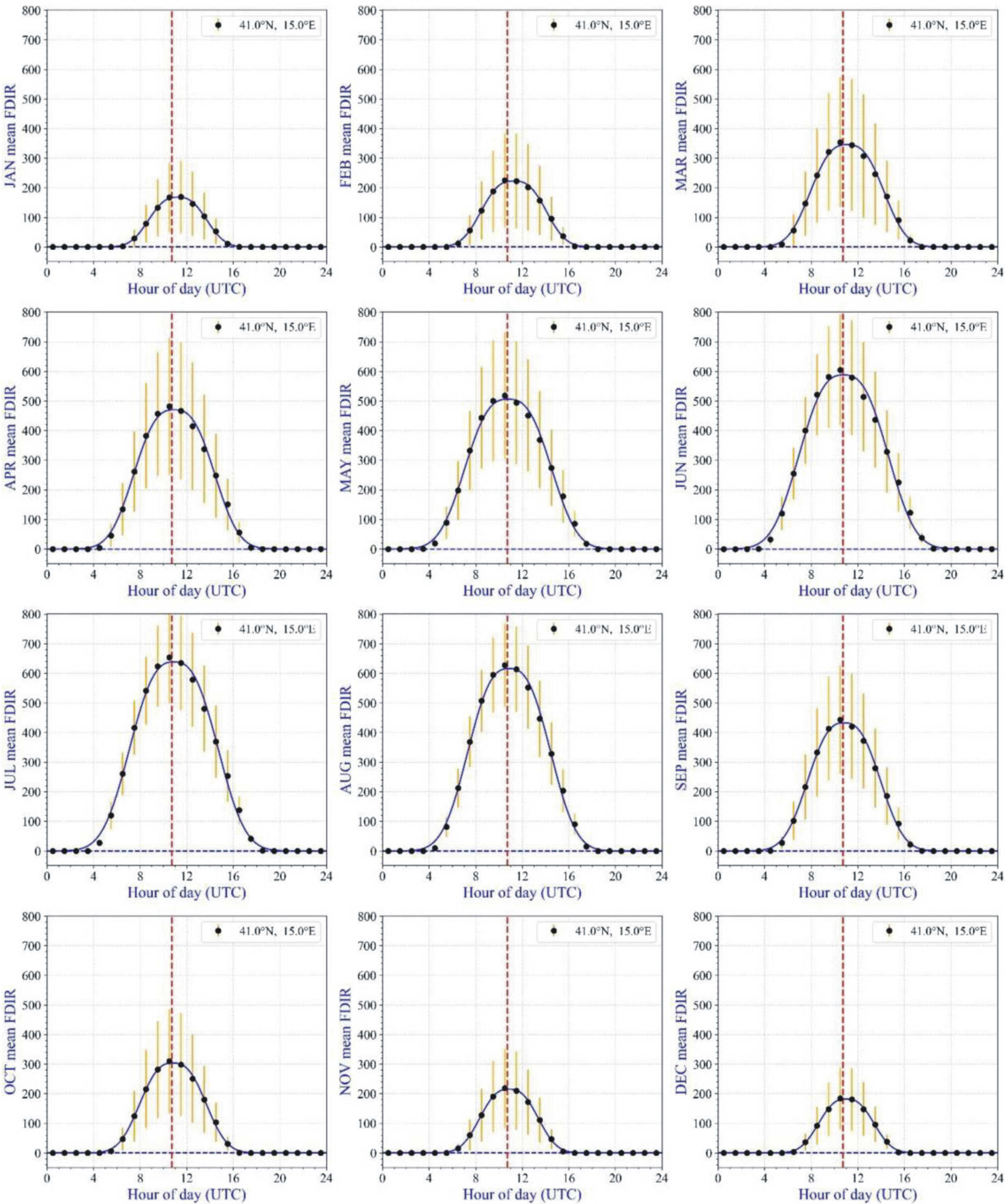
**Supplementary Figure S3.** Daily hourly change of the mean (black dots) ± standard deviation (orange vertical bars) of the power flux *W*Sun ± Δ*W*Sun (W/m2) of direct sunlight from January to December averaged for the period 2009-2019 in Boone County (39.0° N, -84.75° E) between sunrise and sunset (UTC - 5 hour).



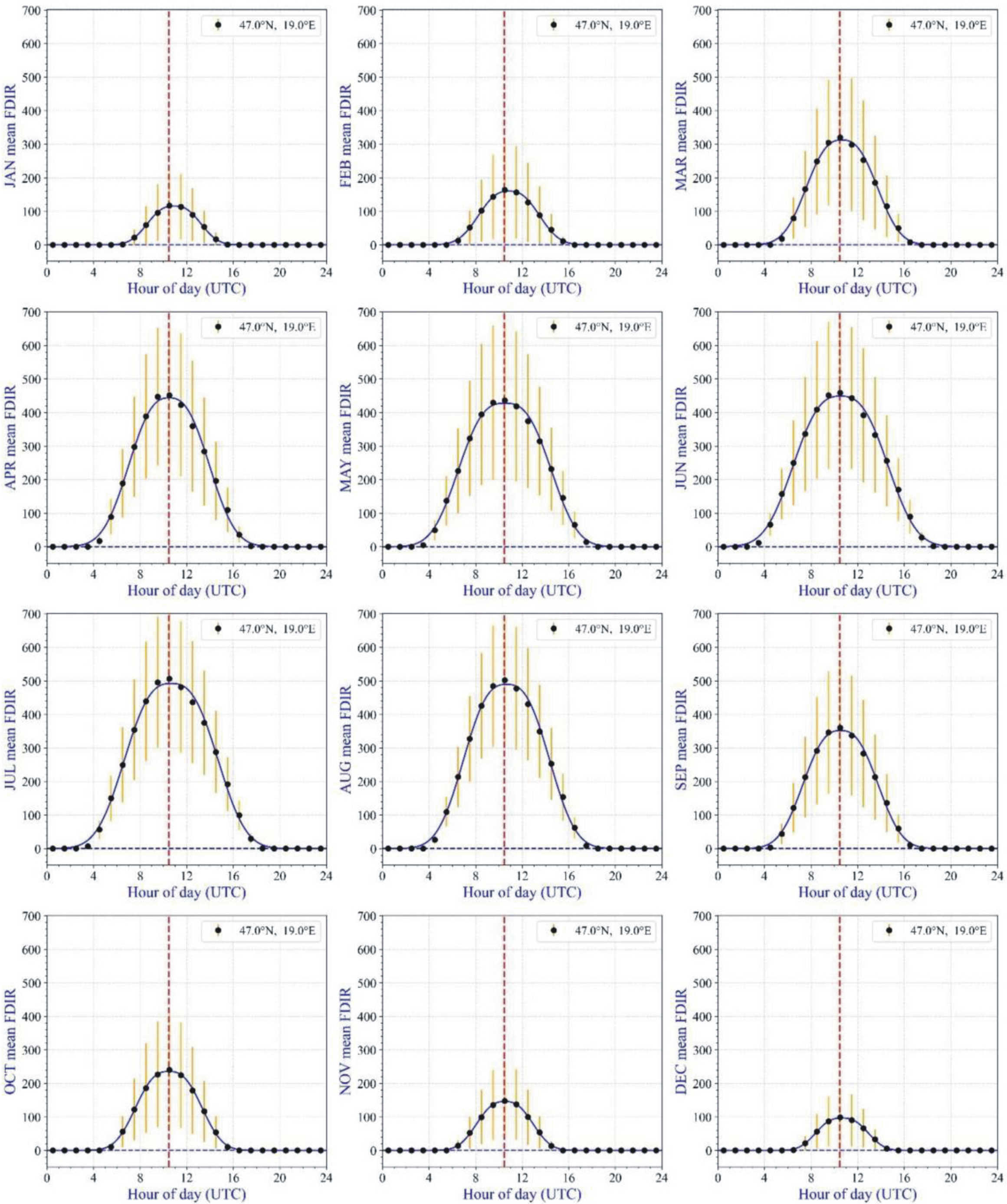
**Supplementary Figure S4.** Daily hourly change of the mean (black dots) ± standard deviation (orange vertical bars) of the power flux *W*Sun ± Δ*W*Sun (W/m2) of direct sunlight from January to December averaged for the period 2009-2019 in Tennessee (35.5° N, -88.25° E) between sunrise and sunset (UTC - 5 hour).



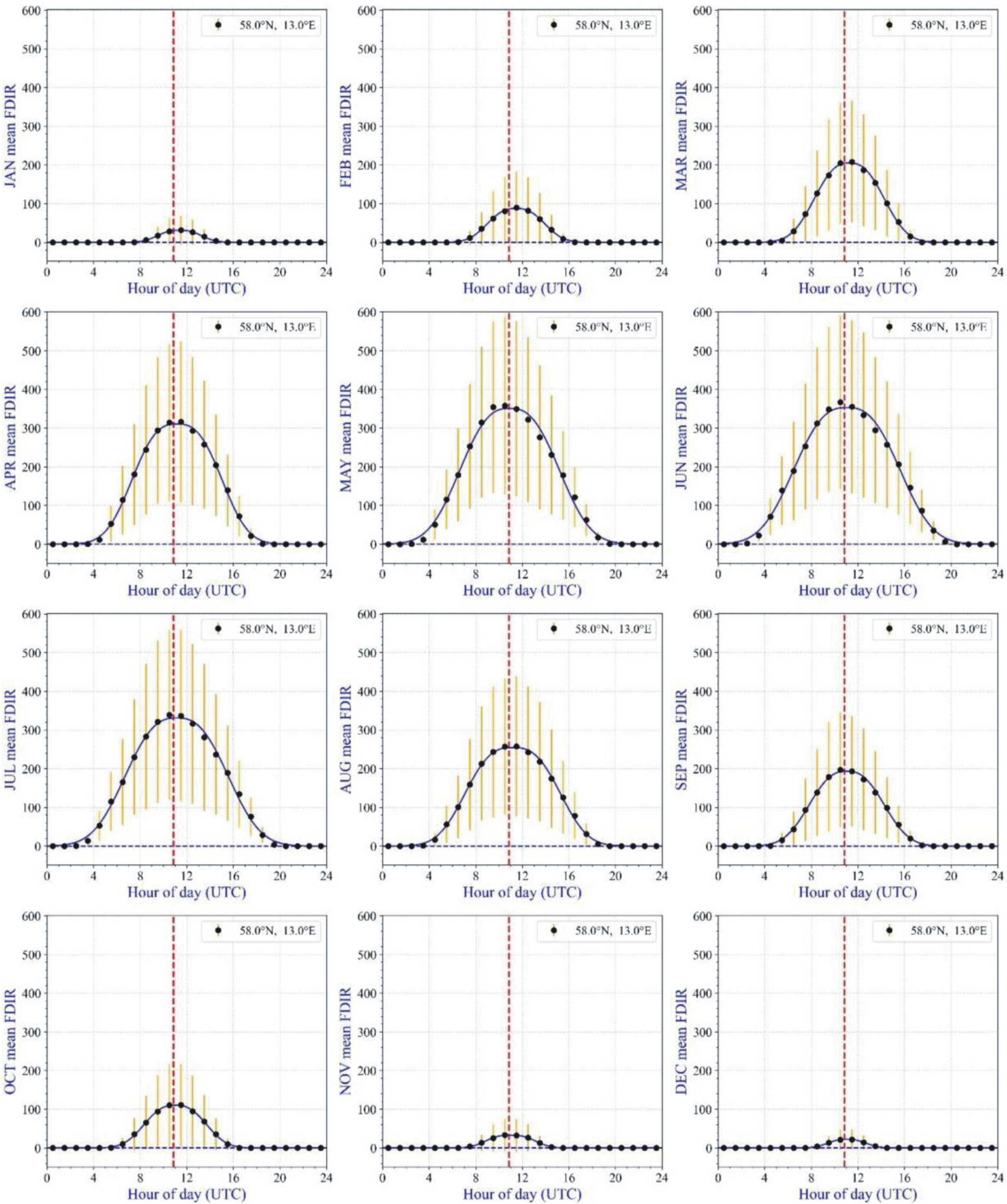
**Supplementary Figure S5.** Daily hourly change of the mean (black dots) ± standard deviation (orange vertical bars) of the power flux *W*Sun ± Δ*W*Sun (W/m2) of direct sunlight from January to December averaged for the period 2009-2019 in Georgia (31.25° N, -83.25° E) between sunrise and sunset (UTC - 5 hour).



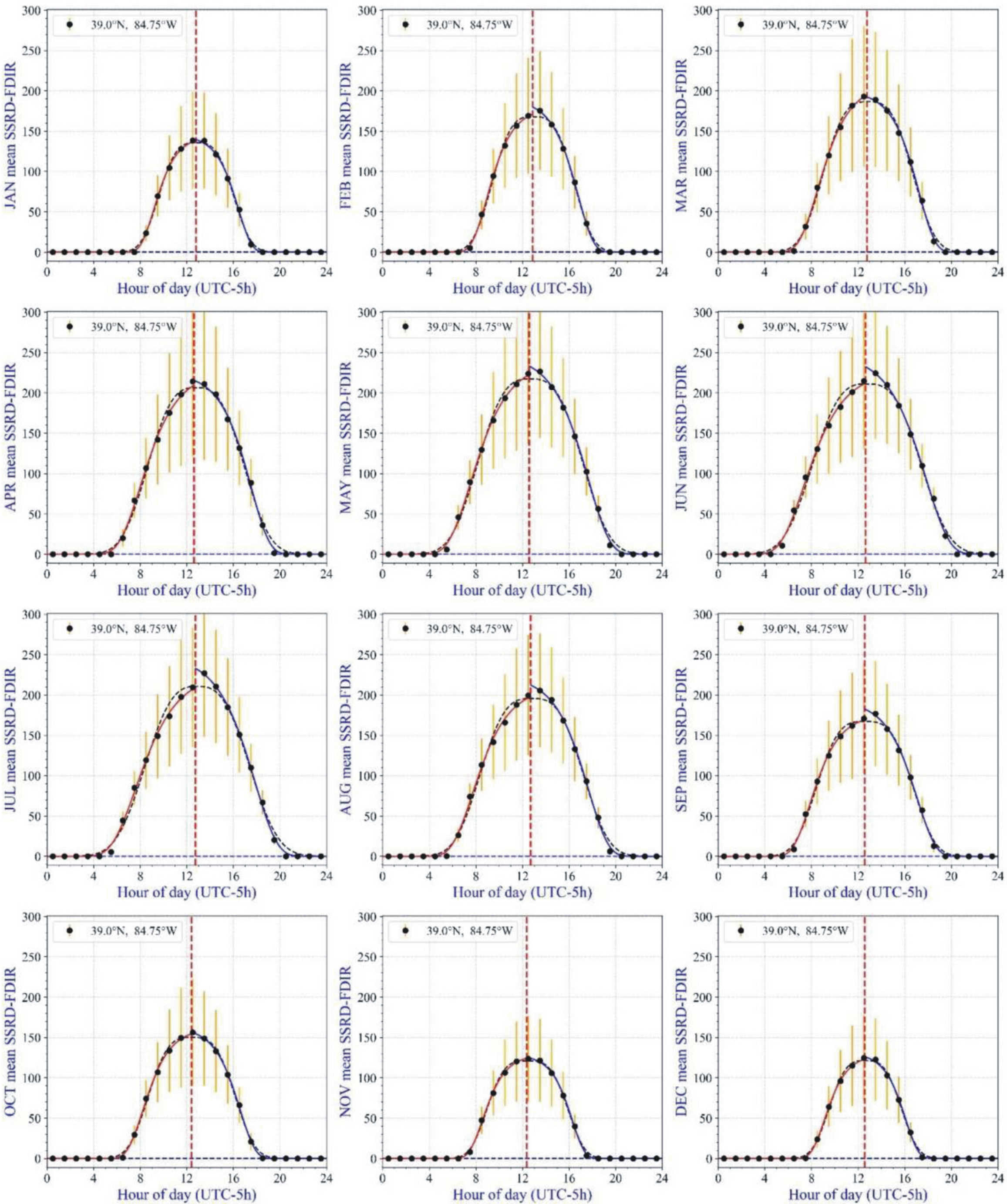
**Supplementary Figure S6.** Daily hourly change of the mean (black dots) ± standard deviation (orange vertical bars) of the power flux *W*Sun ± Δ*W*Sun (W/m2) of direct sunlight from January to December averaged for the period 2009-2019 in Central Italy (41.0° N, 15.0° E) between sunrise and sunset (UTC + 1 hour).



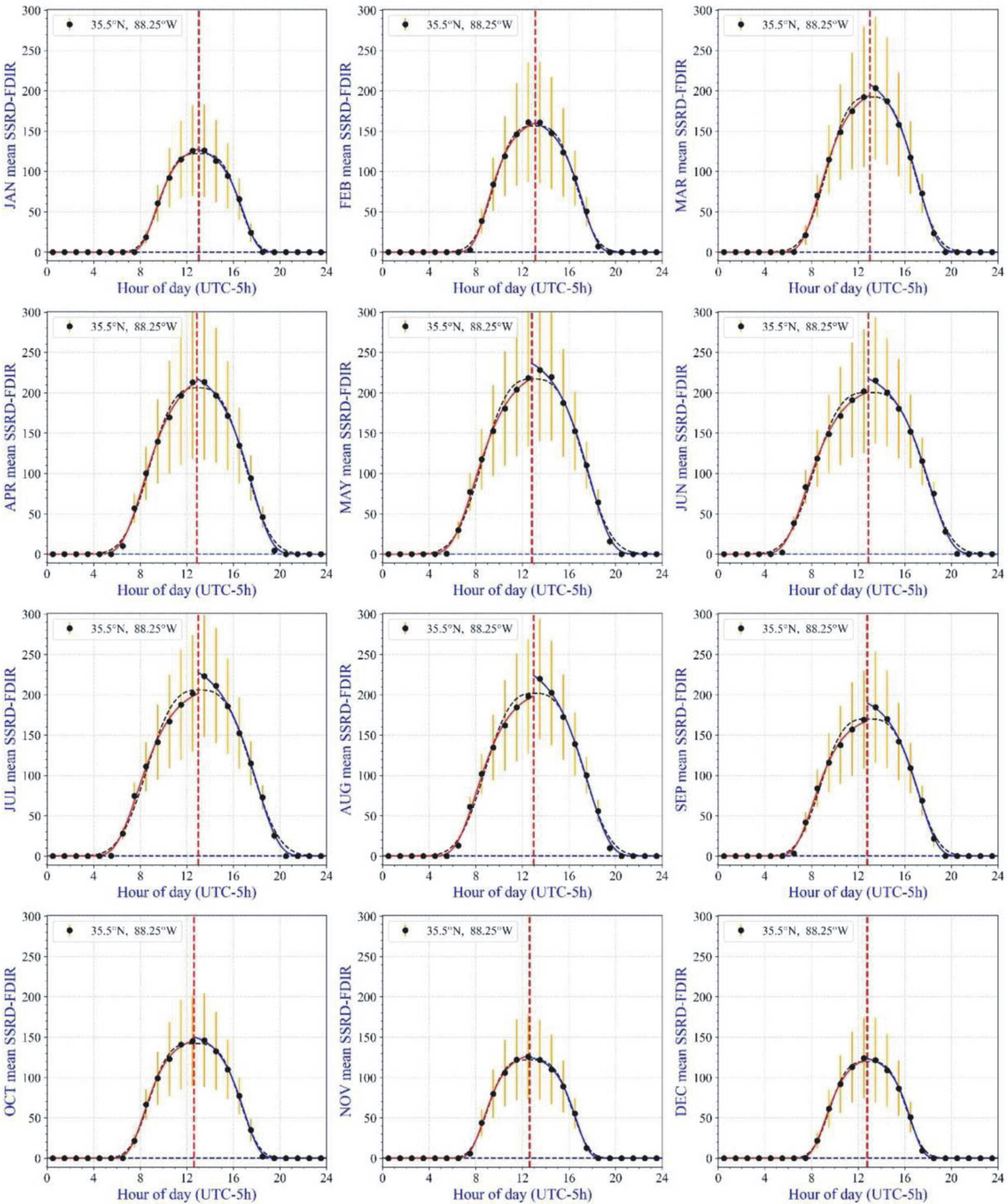
**Supplementary Figure S7.** Daily hourly change of the mean (black dots) ± standard deviation (orange vertical bars) of the power flux *W*Sun ± Δ*W*Sun (W/m2) of direct sunlight from January to December averaged for the period 2009-2019 in Central Hungary (47.0° N, 19.0° E) between sunrise and sunset (UTC + 1 hour).



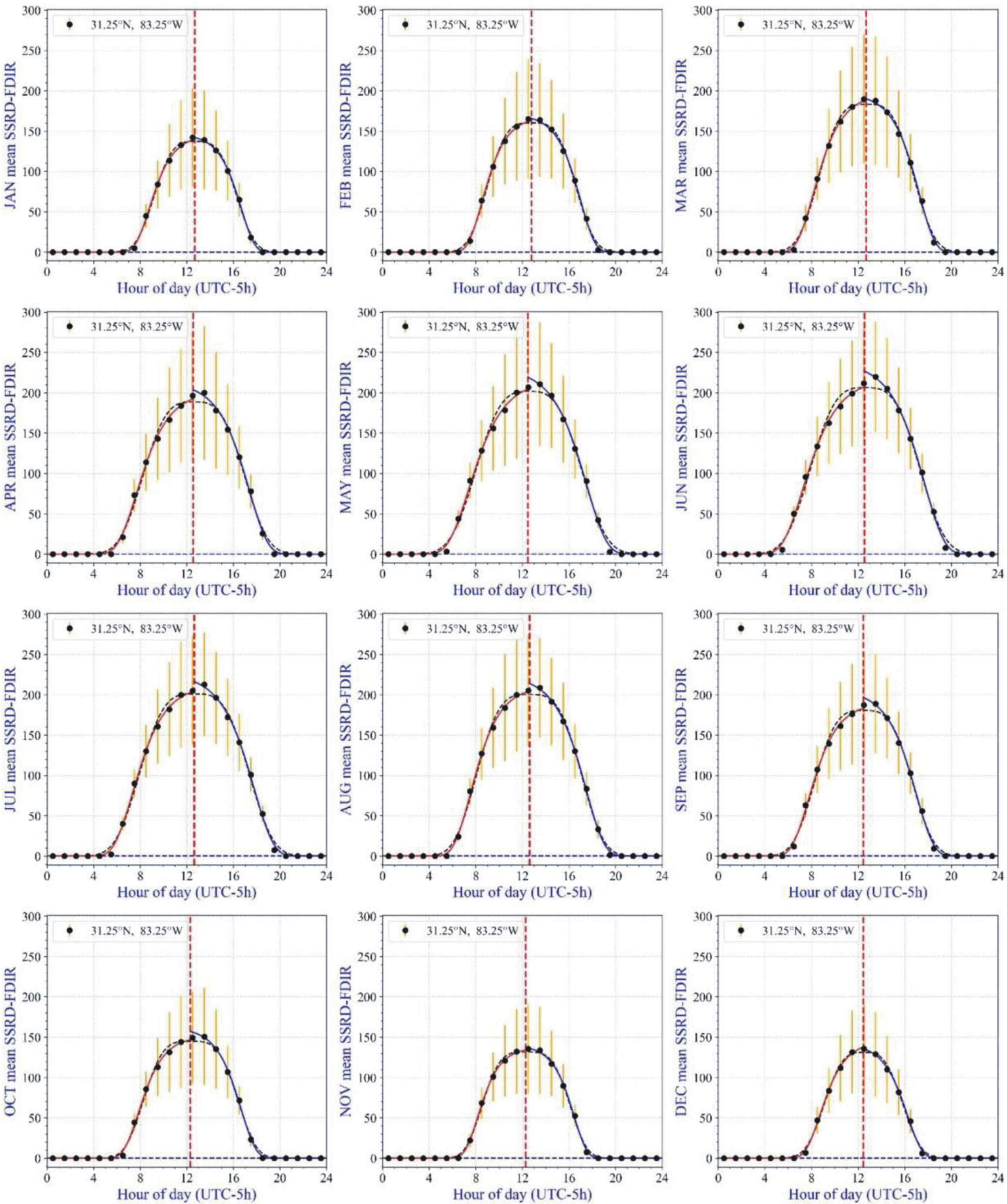
**Supplementary Figure S8.** Daily hourly change of the mean (black dots) ± standard deviation (orange vertical bars) of the power flux *W*Sun ± Δ*W*Sun (W/m2) of direct sunlight from January to December averaged for the period 2009-2019 in South Sweden (58.0° N, 13.0° E) between sunrise and sunset (UTC + 1 hour).



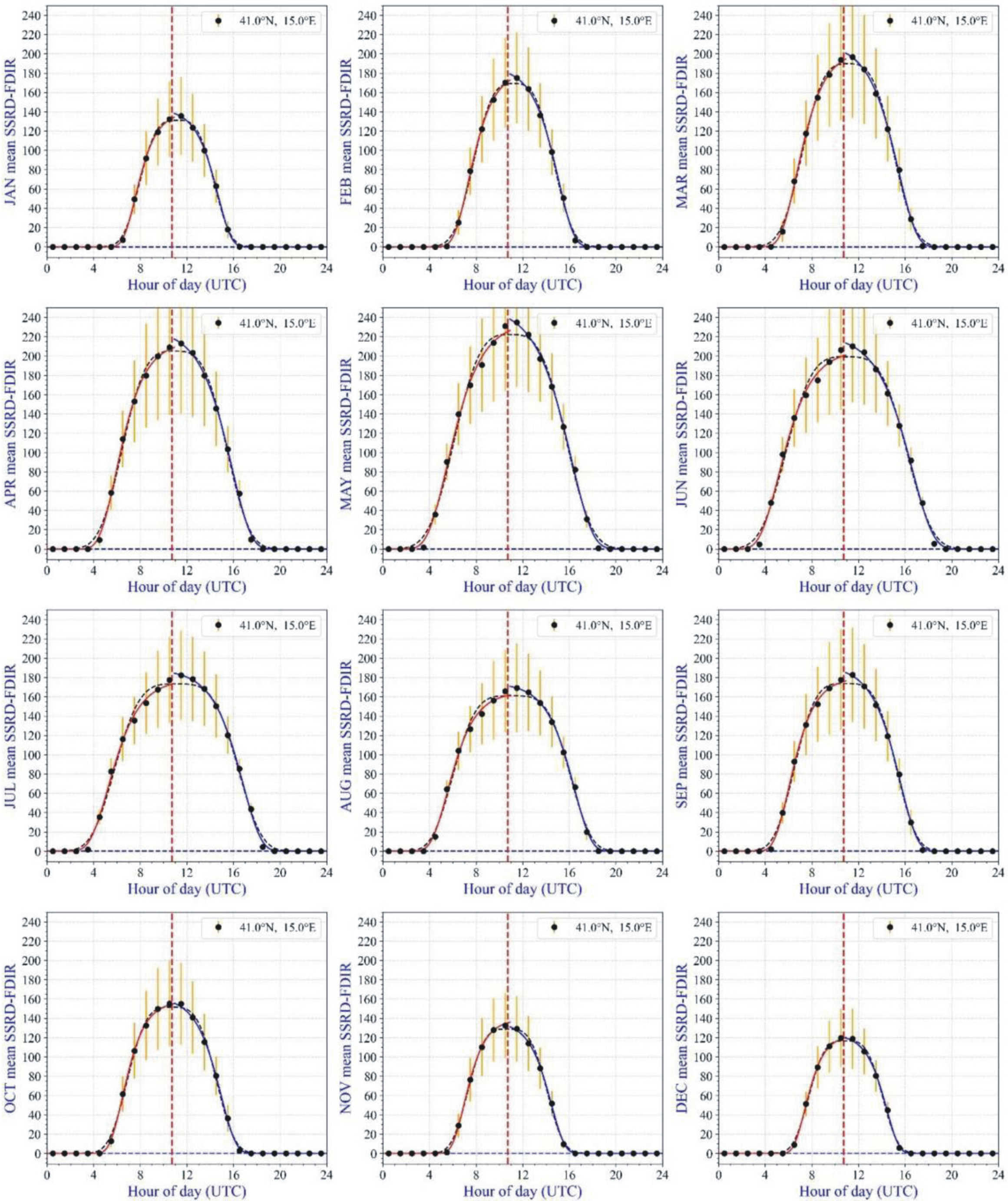
**Supplementary Figure S9.** Daily hourly change of the mean (black dots) ± standard deviation (orange vertical bars) of the power flux *W*diff ± Δ*W*diff (W/m2) of diffuse skylight from January to December averaged for the period 2009-2019 in Boone County (39.0° N, -84.75° E) between sunrise and sunset (UTC - 5 hour).



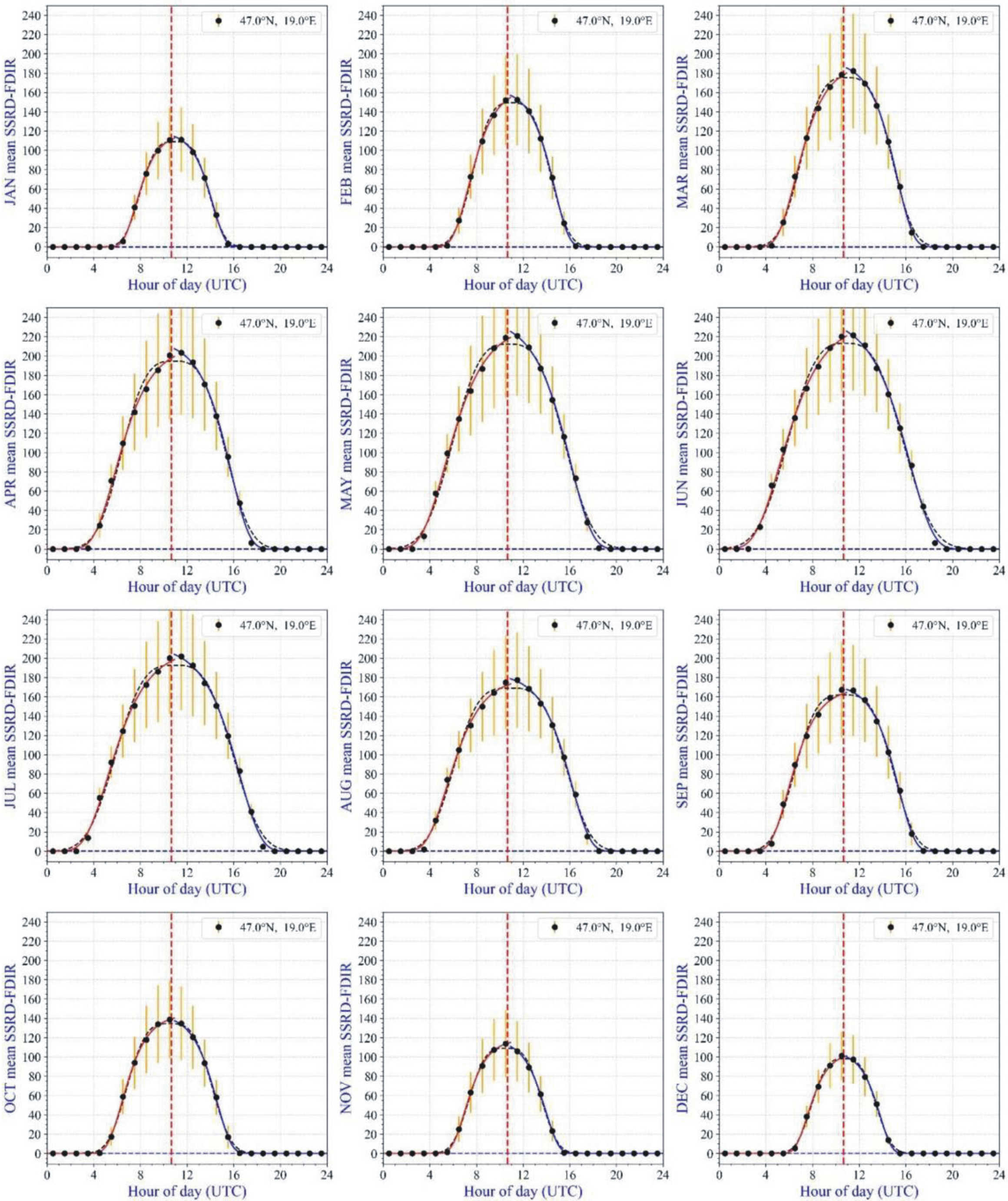
**Supplementary Figure S10.** Daily hourly change of the mean (black dots) ± standard deviation (orange vertical bars) of the power flux *W*diff ± Δ*W*diff (W/m2) of diffuse skylight from January to December averaged for the period 2009-2019 in Tennessee (35.5° N, -88.25° E) between sunrise and sunset (UTC - 5 hour).



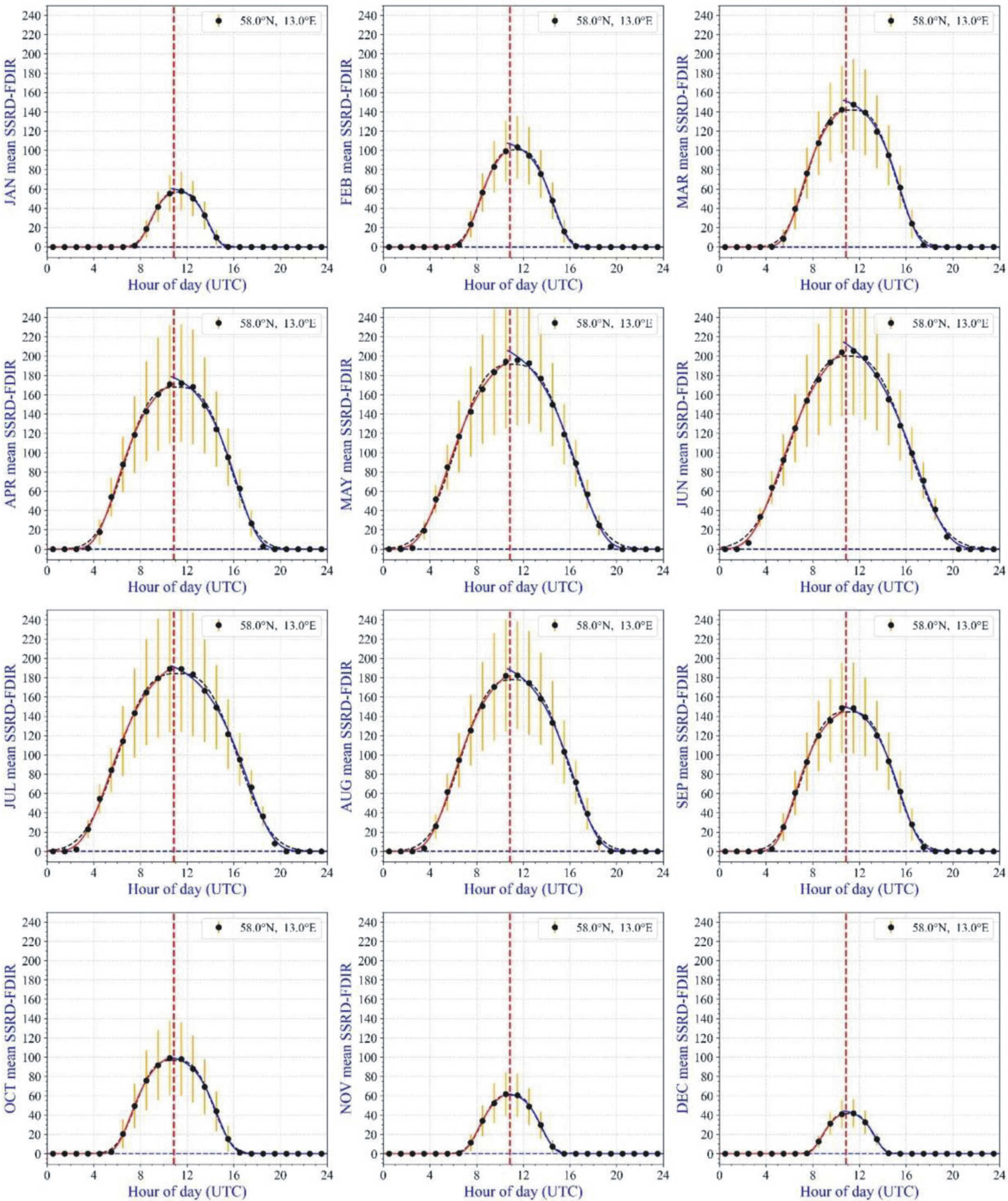
**Supplementary Figure S11.** Daily hourly change of the mean (black dots) ± standard deviation (orange vertical bars) of the power flux *W*diff ± Δ*W*diff (W/m2) of diffuse skylight from January to December averaged for the period 2009-2019 in Georgia (31.25° N, -83.25° E) between sunrise and sunset (UTC - 5 hour).



**Supplementary Figure S12.** Daily hourly change of the mean (black dots) ± standard deviation (orange vertical bars) of the power flux *W*diff ± Δ*W*diff (W/m2) of diffuse skylight from January to December averaged for the period 2009-2019 in Central Italy (41.0° N, 15.0° E) between sunrise and sunset (UTC + 1 hour).



**Supplementary Figure S13.** Daily hourly change of the mean (black dots) ± standard deviation (orange vertical bars) of the power flux *W*diff ± Δ*W*diff (W/m2) of diffuse skylight from January to December averaged for the period 2009-2019 in Central Hungary (47.0° N, 19.0° E) between sunrise and sunset (UTC + 1 hour).



**Supplementary Figure S14.** Daily hourly change of the mean (black dots) ± standard deviation (orange vertical bars) of the power flux *W*diff ± Δ*W*diff (W/m2) of diffuse skylight from January to December averaged for the period 2009-2019 in South Sweden (58.0° N, 13.0° E) between sunrise and sunset (UTC + 1 hour).