

*Water Resources Research*

Supporting Information for

**Resolve the clear-sky continuous diurnal cycle of high-resolution ECOSTRESS Evapotranspiration and Land Surface Temperature**

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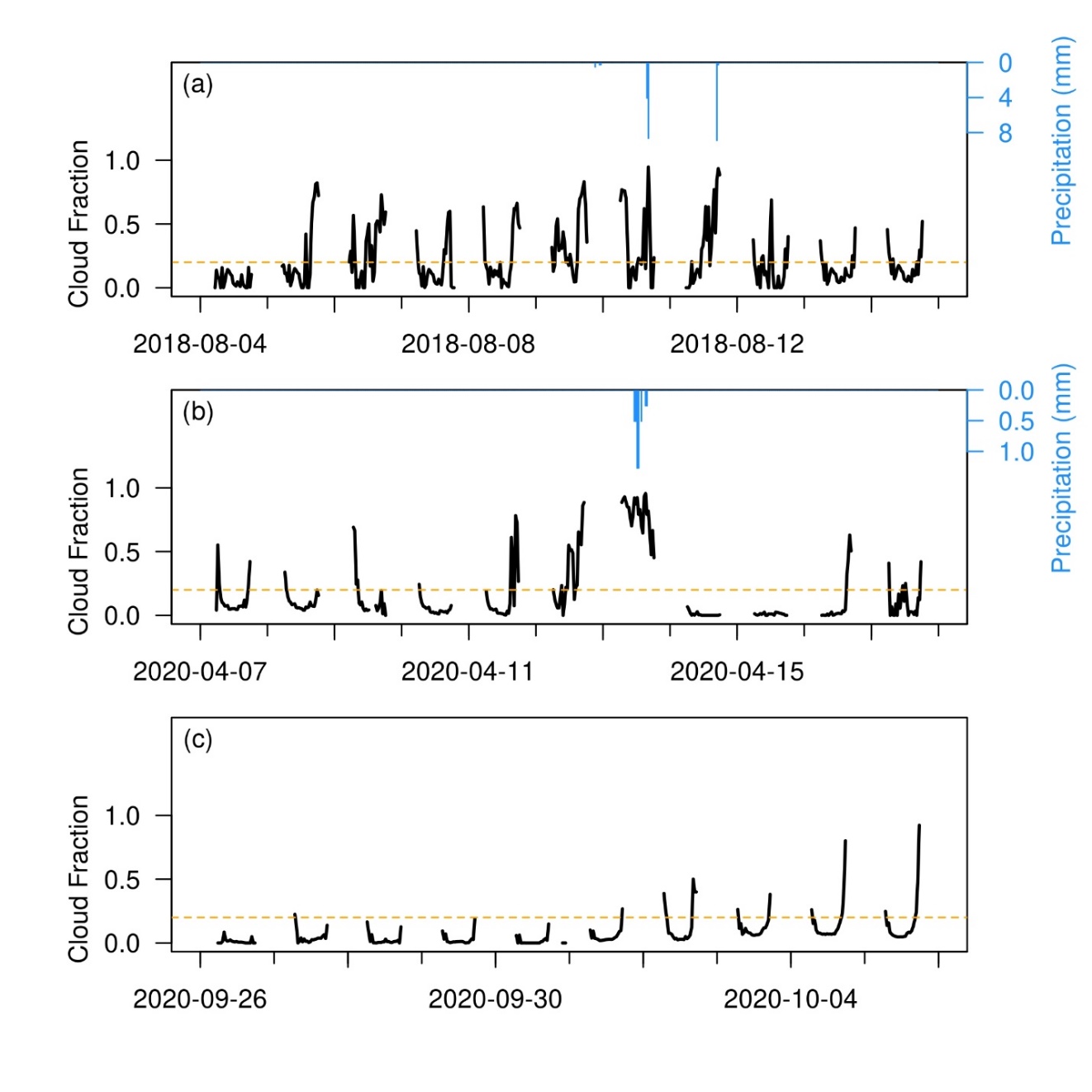
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**Contents of this file**

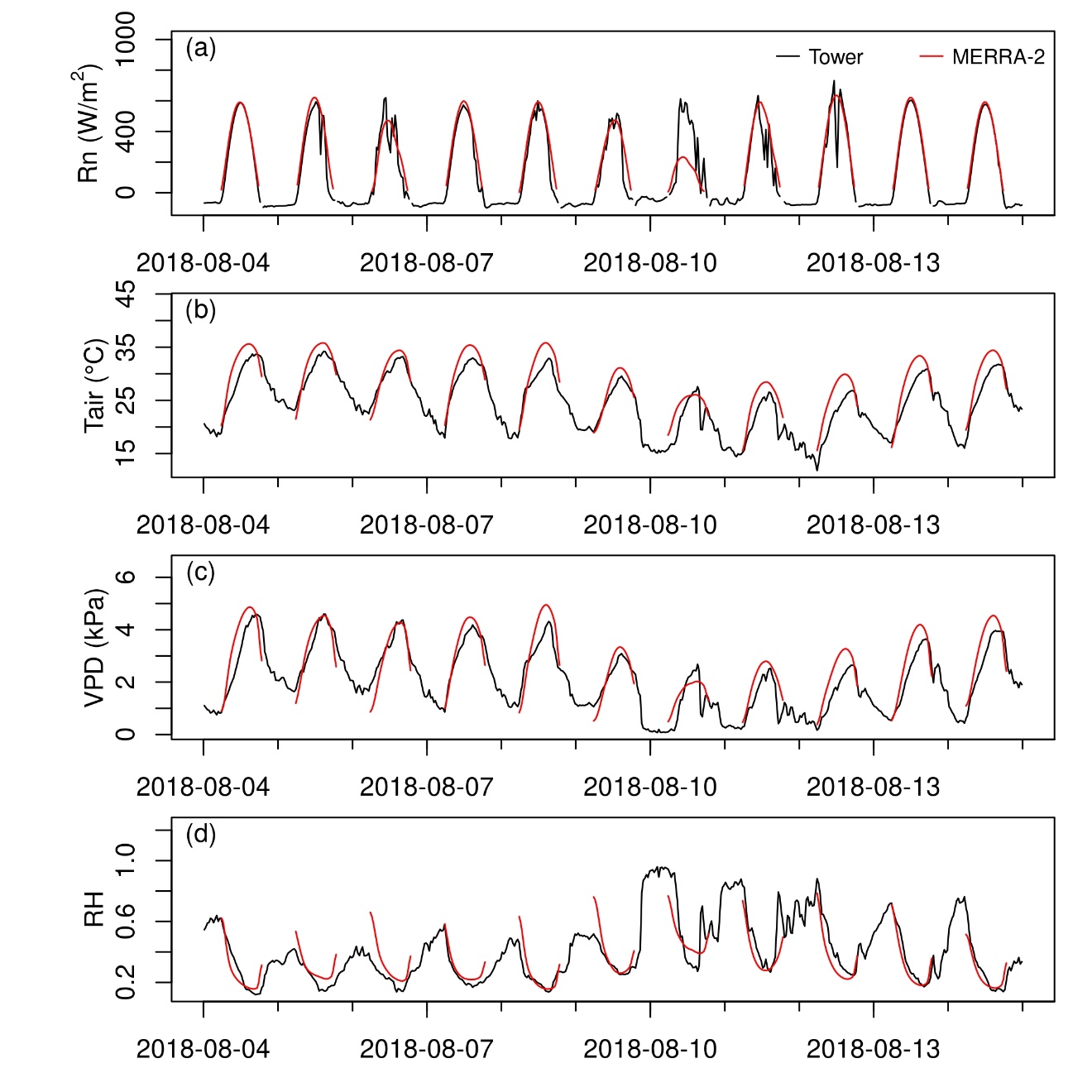
Figures S1 to S10

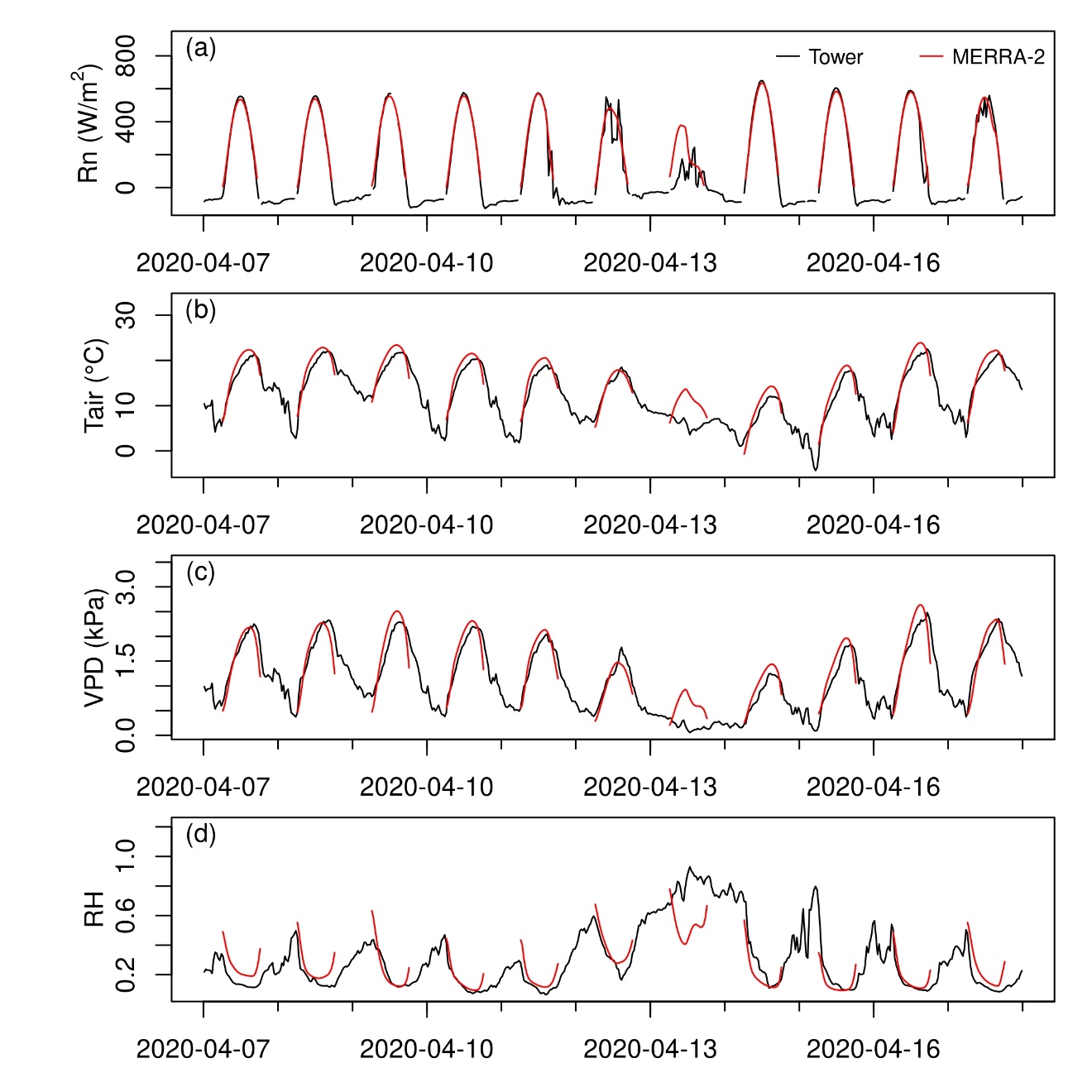
**Introduction**

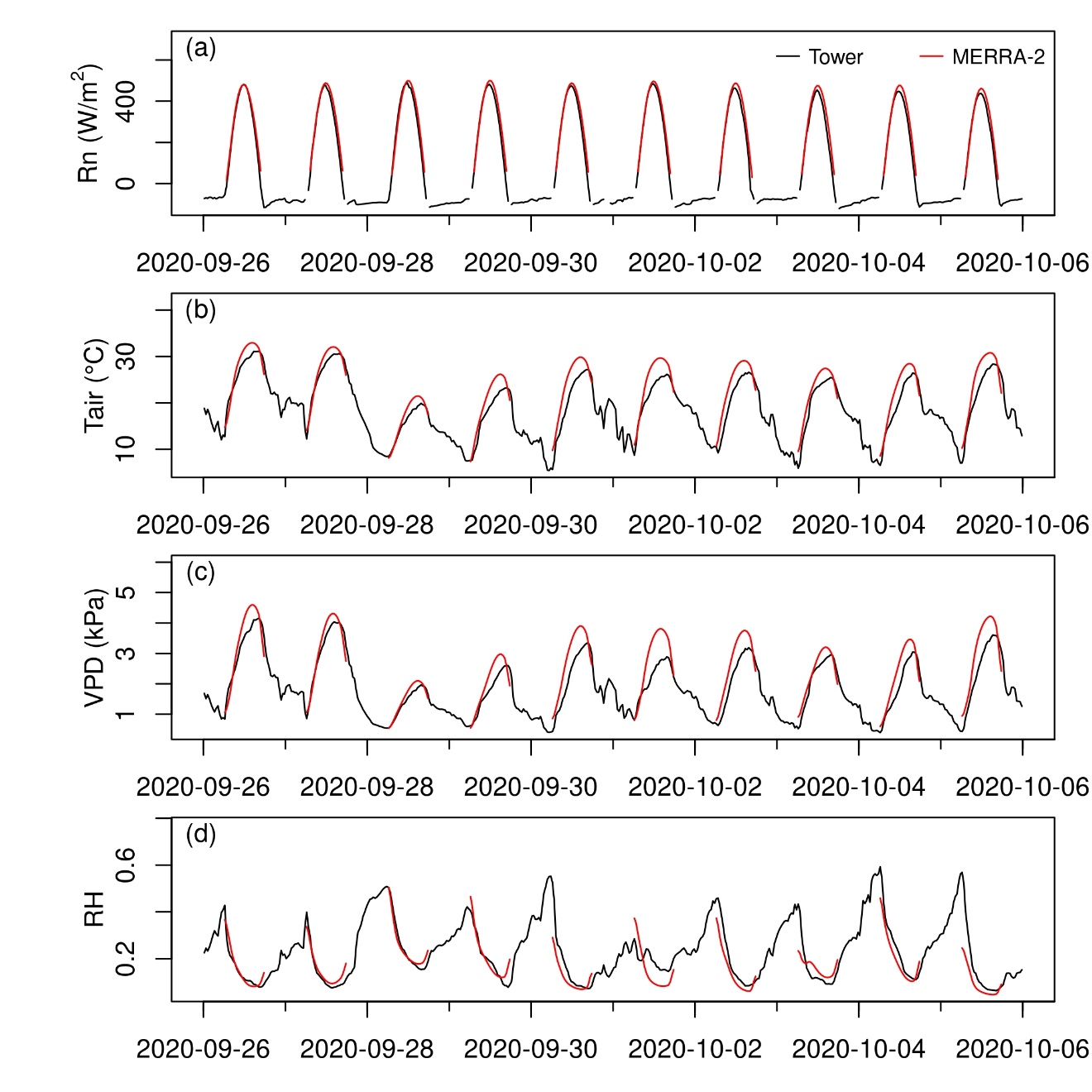
This supporting information entails figures for rainfall/cloud data at US-Seg (Fig. S1), other meteorological data (i.e., Rn, Tair, VPD, RH) from tower and MERRA-2 at US-Seg and US-ARM (Fig. S2-S5), comparison between GOES and ECOSTRESS LST (Fig. S6), soil water content measurements during the first time window at US-Seg (Fig. S7), LST and ET uncertainty (Fig. S8 and S9), and animations of constructed LST and ET (Fig. S10).

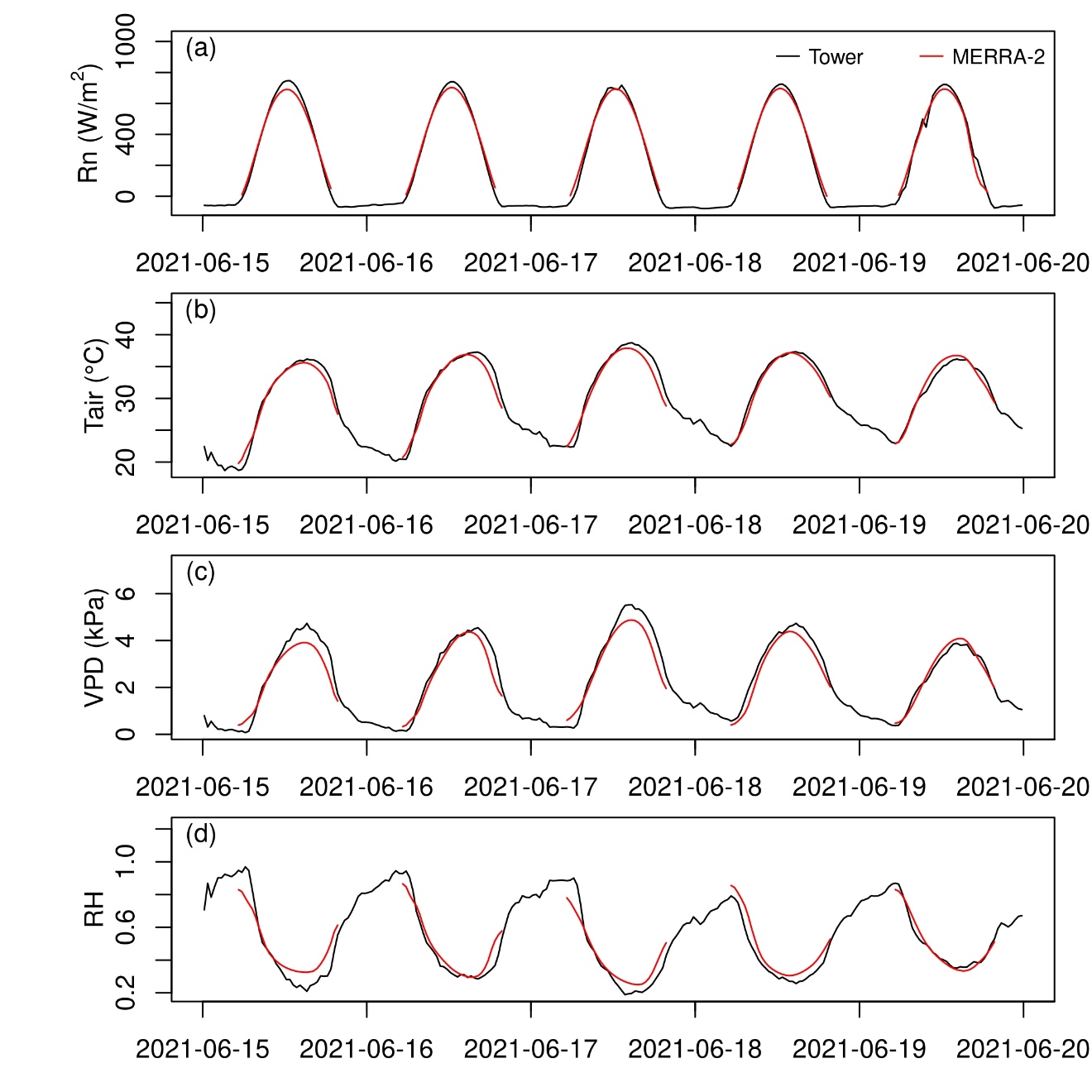


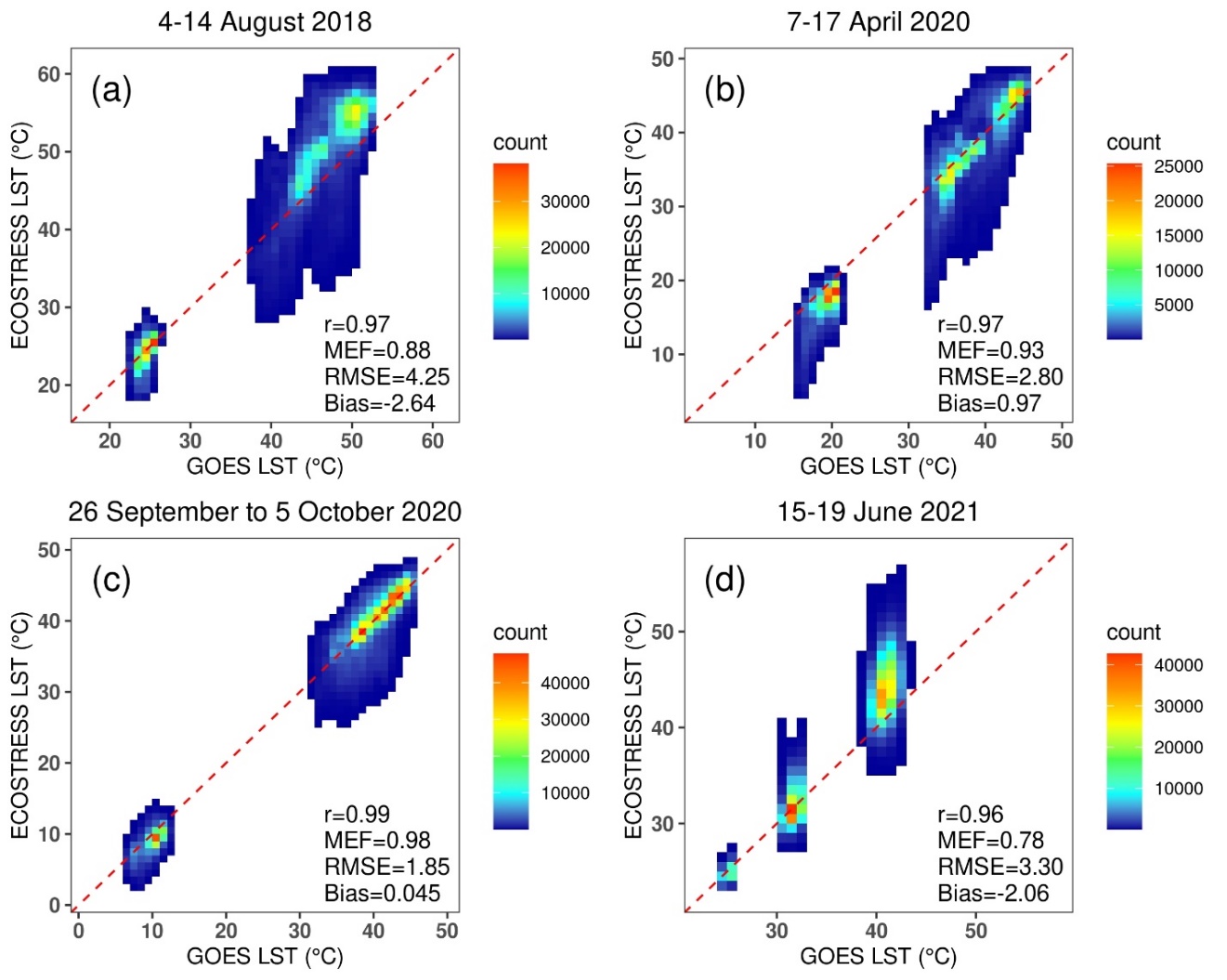
**Figure S1.** Precipitation (the right ordinates) and cloud fraction (the left ordinates, calculated by Eq. 13) at US-Seg during (a) 4-14 August 2018, (b) 7-17 April 2020, and (c) 26 September to 5 October 2020. The dash orange line represents the cutoff (cloud fraction = 0.2) between clear-sky and cloudy conditions.

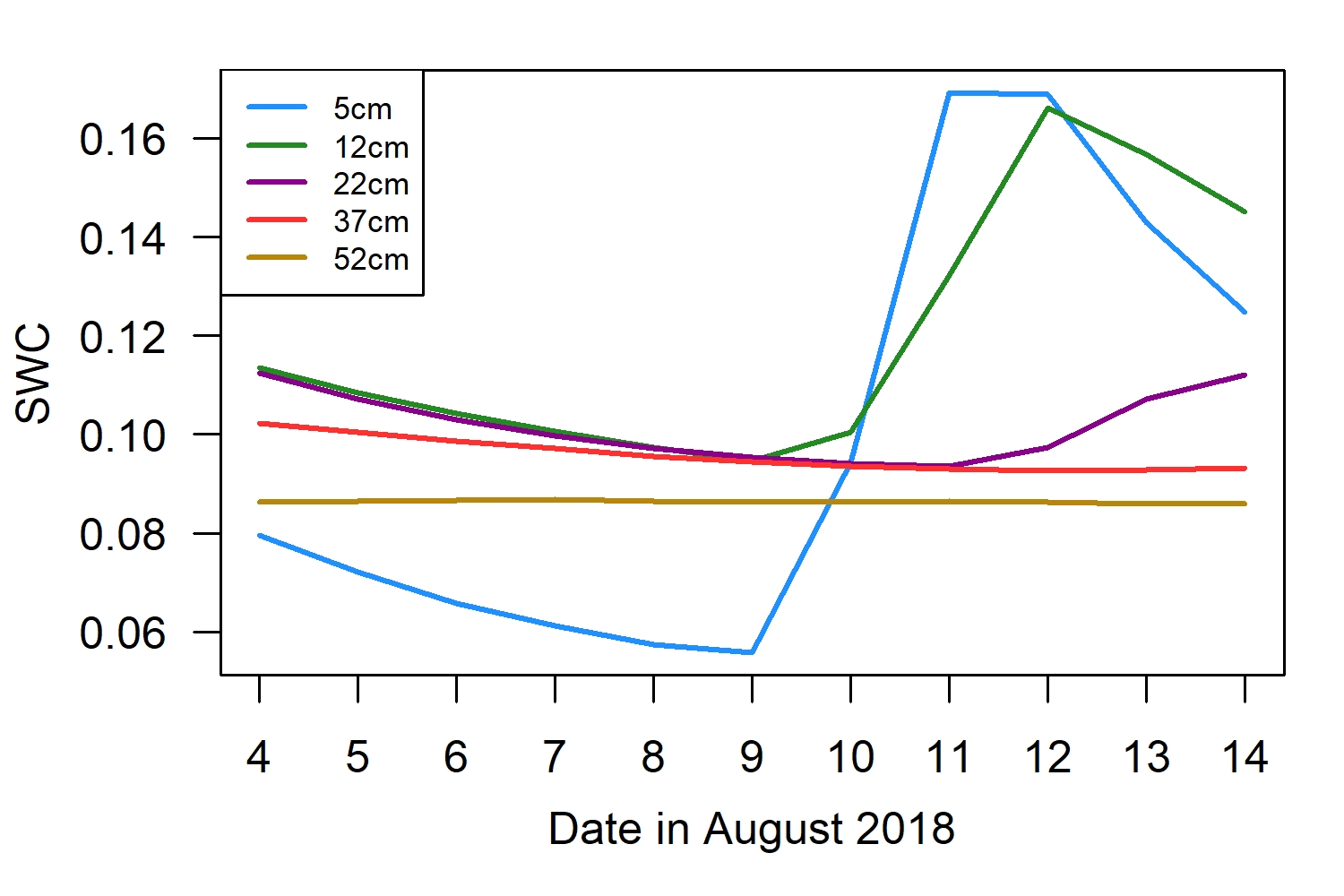
**Figure S2.** Comparison of (a) net radiation (Rn), (b) air temperature (Ta), (c) vapor pressure deficit (VPD) and (d) relative humidity (RH) between MERRA-2 and tower measurements at US-Seg during 4-14 August 2018. Only daytime data is plotted for MERRA-2.

**Figure S3.** Same as Fig. S2 but for the time window during 7-17 April 2020.

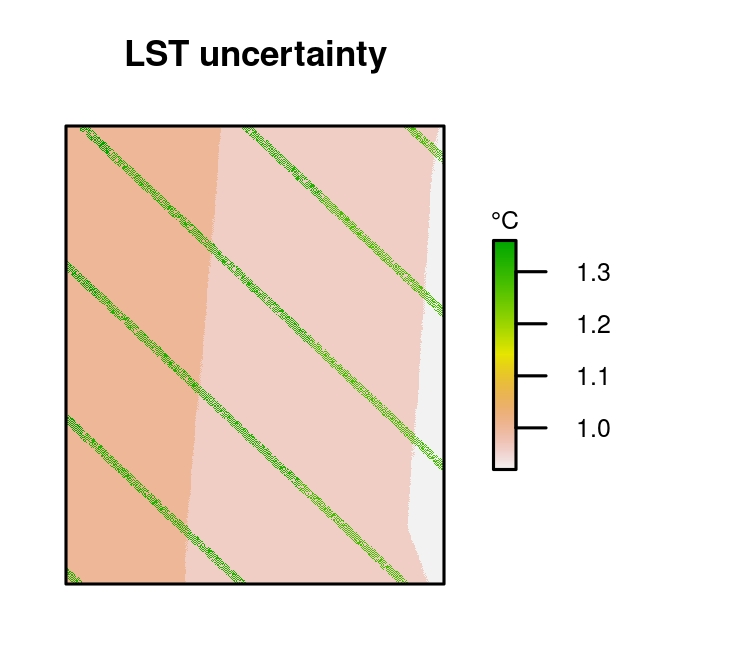
**Figure S4.** Same as Fig. S2 but for the time window from 26 September to 5 October 2020.

** Figure S5.** Same as Fig. S2 but for the time window during 15-19 June 2021 at US-ARM.

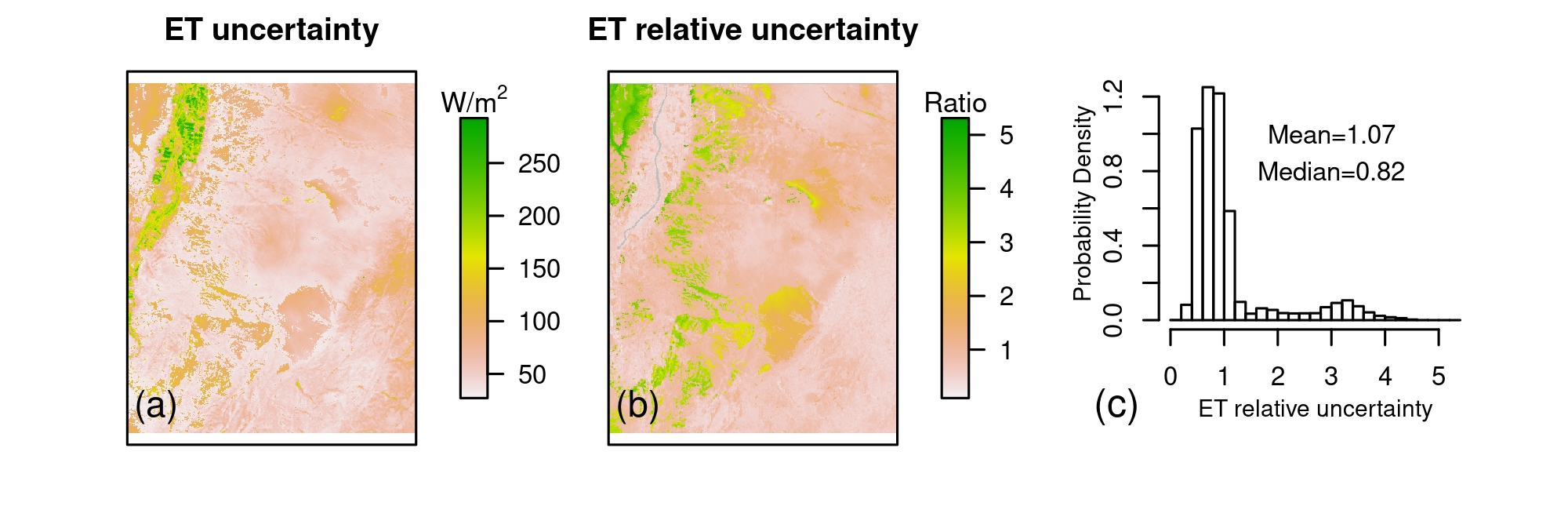
**Figure S6.** Comparison between the GOES LST (interpolated spatially and temporally, y axis) and the ECOSTRESS (x axis) pooled from all the pixels and all the overpasses of each time window: (a) 4-14 August 2018, (b) 7-17 April 2020, (c) 26 September to 5 October 2020 for the domain centered at US-Seg; (d) 15-19 June 2021 for the domain centered at US-ARM. Different colors indicate scatter density. The red dashed line is 1:1 line. The statistics are calculated for GOES LST using ECOSTRESS LST as reference.



**Figure S7.** *In situ* soil water content (SWC) measurements for five depths during 4-14 August 2018 at US-Seg.



**Figure S8.** ECOSTRESS LST uncertainty of the overpass on 27 September 2020, 14:56 in local time in the 0.3°×0.3° domain centered at US-Seg (same overpass as in Fig. 5).

**Figure S9.** ECOSTRESS ET uncertainty of the overpasses on 7 August 2018, 13:20 in local time in the 0.3°×0.3° domain centered at US-Seg (same overpass as in Fig. 9). (a) ECOSTRESS ET uncertainty, calculated as the standard deviation of ET calculation from the PT-JPL model and two other physics-based models (Mu et al., 2007, 2011; Su 2002); (b) ET relative uncertainty, calculated as the ratio of (a) and ECOSTRESS ET (Fig. 9a); (c) histogram of (b).

**Figure S10.** The full hourly time series of (a) LST and (b) ET mapping in the test domain centered at US-Seg during 26 September and 5 October 2020. Please refer to the Supplementary Data for full animation.