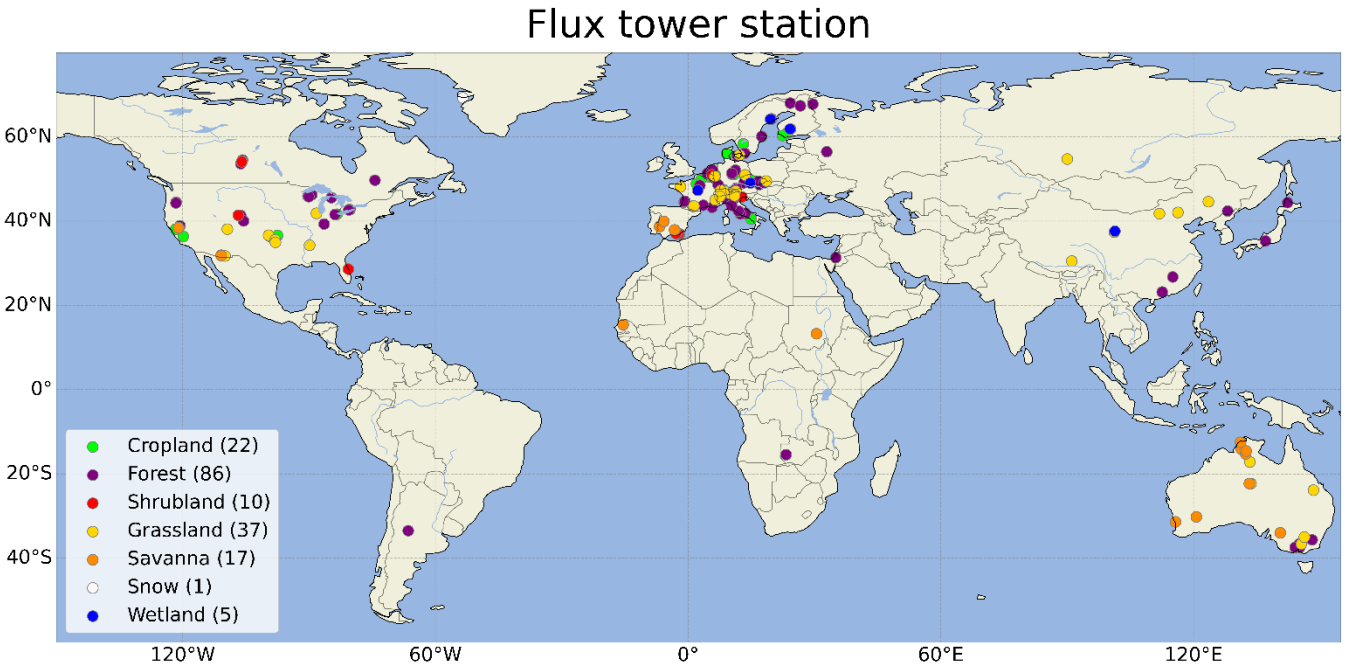

Figure S1: Spatial distribution of flux tower observation stations in Fig. 9, differentiated by IGBP land cover types.

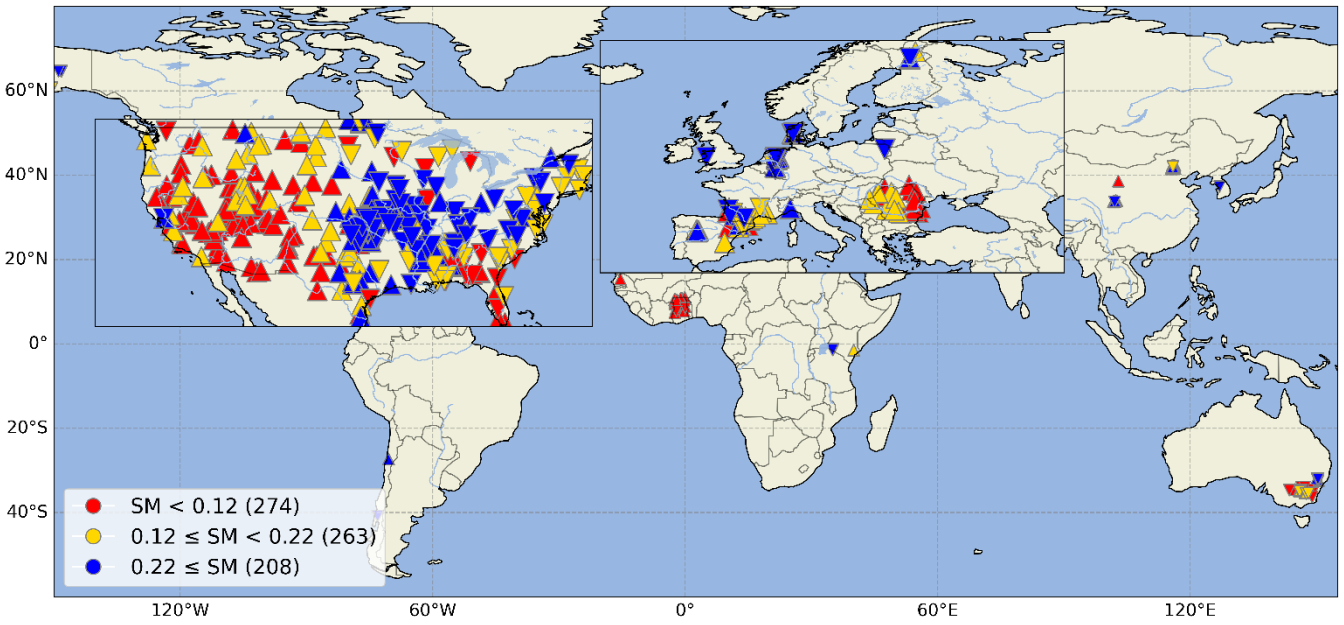

Figure S2: Spatial distribution of ISMN stations in Fig. 7a, classified with SM.

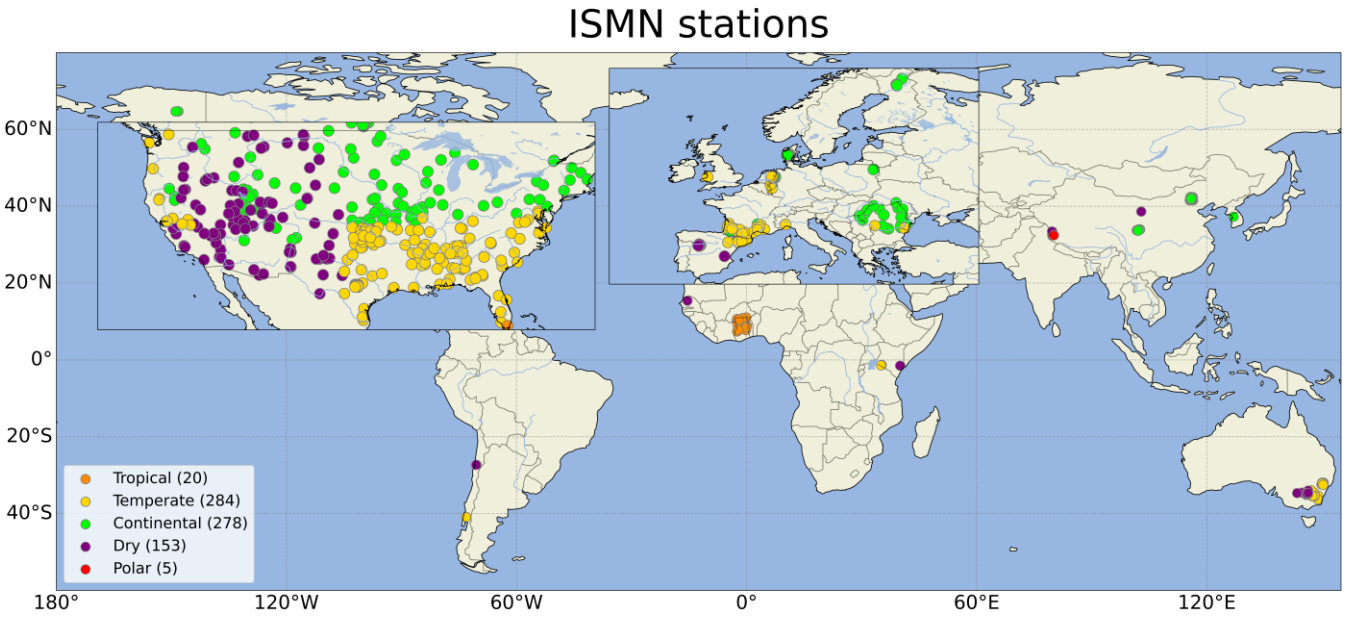

Figure S3: Locations of ISMN stations grouped according to the first-level Köppen-Geiger climate classification. Stations with unknown types (N=5) are not shown.

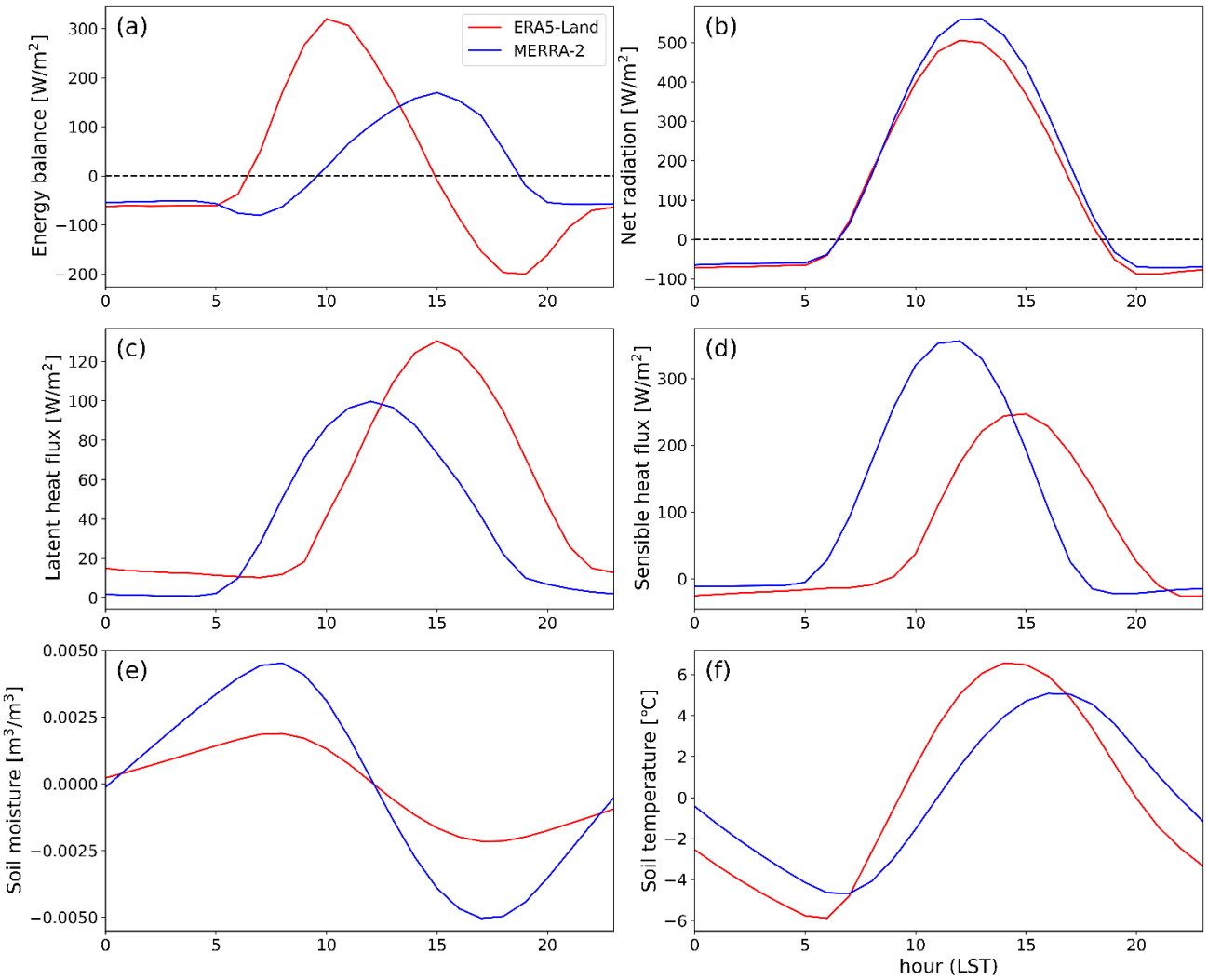

Figure S4: Example of the diurnal cycle of (a) energy balance (SW_{net}+LW_{net}-LH-SH), (b) net radiation (SW_{net}+LW_{net}), (c) latent heat flux, (d) sensible heat flux, (e) surface SM, and (f) TS from ERA5-Land (red) and MERRA-2 (blue) at the RSMN-Calarasi station (44.21°N, 27.34°E).