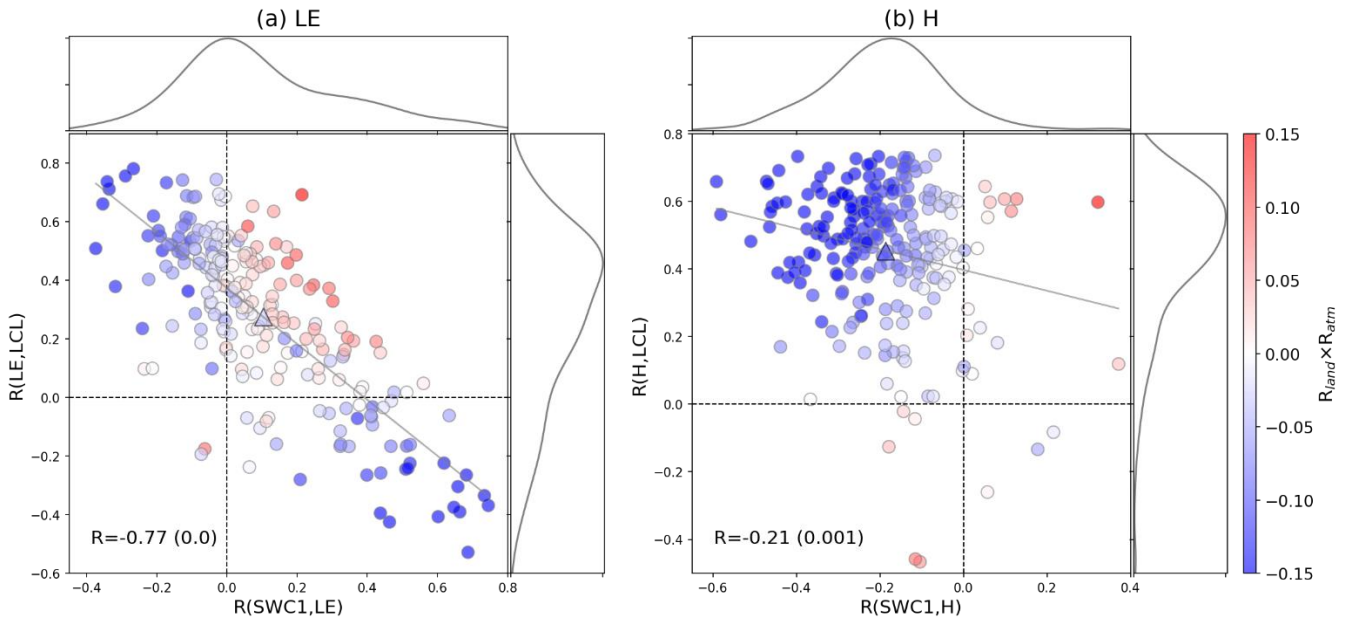
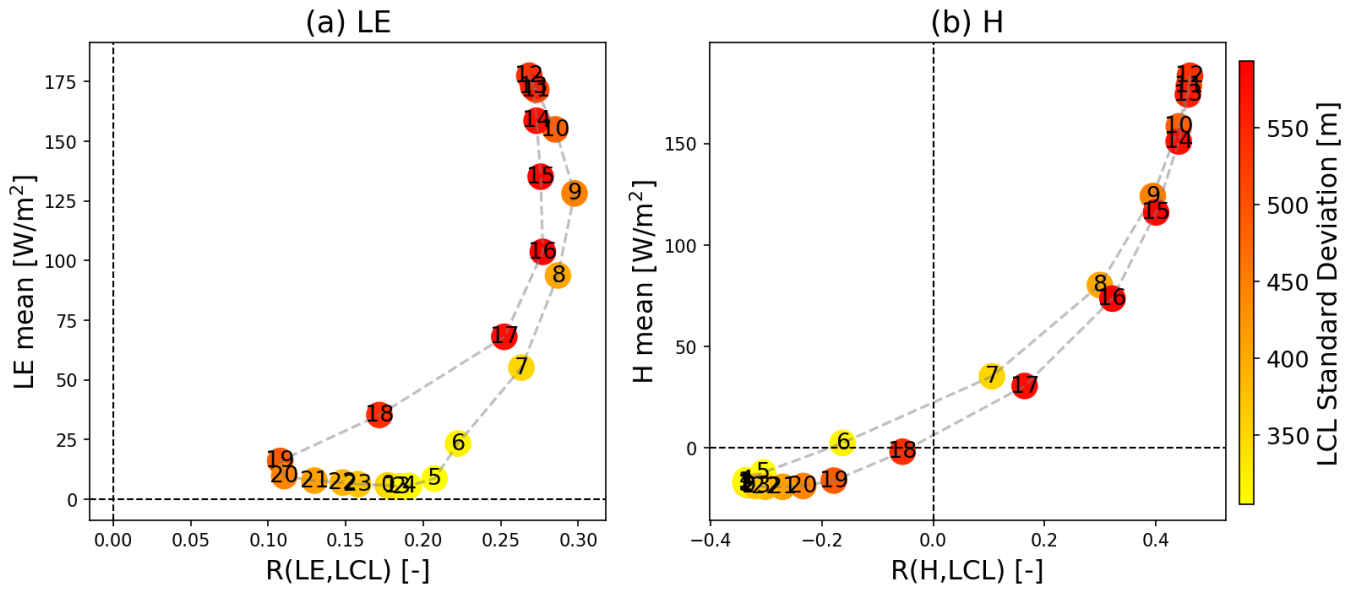


Supplementary Figure 1: Same as in Fig. 3, but for the sensitivity of land, atmospheric, and two-legged couplings composited by site-reported vegetation type.



Supplementary Figure 2: Scatter plot consisting of midday averaged (11–13 LST) land (x-axis) and atmospheric (y-axis) couplings for (a) LE and (b) H across 230 flux sites. Triangles indicate the mean across all sites. The shaded colour indicates the multiplication of those couplings, which is the correlation term of two-legged coupling (first two terms on RHS of equation 3). Correlations and corresponding p-values (bracketed) are denoted in the bottom-left corner of each panel. The kernel density distributions corresponding to the x- and y-axis are shown along the upper and right sides of each scatter plot, and are normalized to their maximum values.

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15 **Supplementary Figure 3: Scatter plot of hourly atmospheric couplings (x-axis) along with the mean climatology (y-axis) of (a) LE and (b) H across 230 site observations in which the numbers indicate local hour. The shaded colour indicates the standard deviation of LCL.**