**Supplemental Figure 1.** *The least squares linear regression of $u_s$ against $u_*$.*
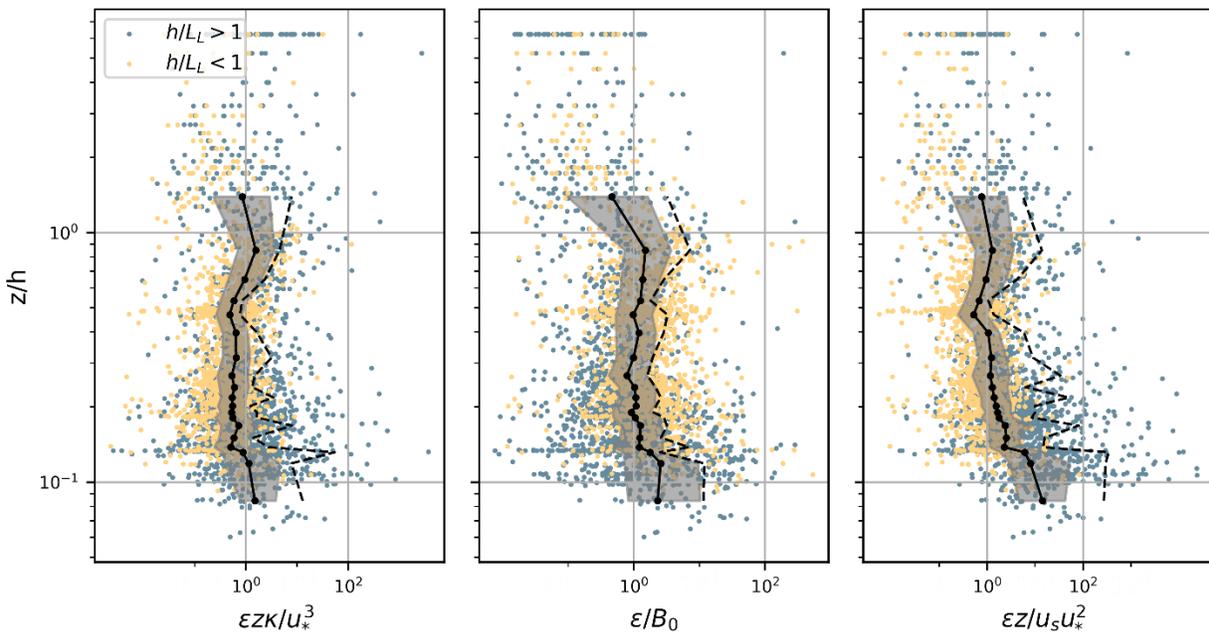


**Supplemental Figure 2.** *Measurements of $\varepsilon$ scaled by Law of the Wall (Equation 2), surface buoyancy flux (Equation 3), and $u_s u_*^2/h$ scalings across $z/h$. Solid black line indicates binned median and dashed black line indicates binned mean, calculated across all data points. Shaded area denotes the interquartile range. The instrument is close to the bottom of the mixed layer where $\frac{z}{h} \sim 1$ and far above it where $\frac{z}{h} \ll 1$.*