

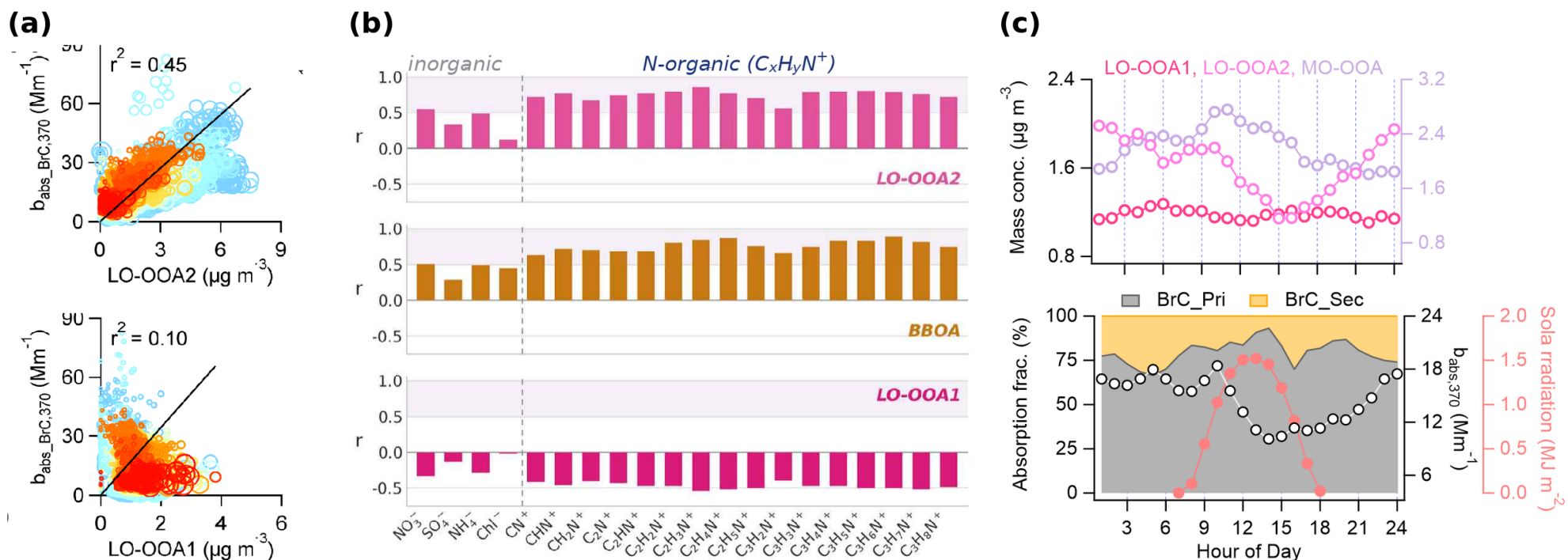


**Figure 4.** Nighttime secondary BrC absorption is nitrogen-associated. (a) Whole-particle BrC absorption  $b_{\text{abs,BrC}}$  at 370 nm versus the nighttime secondary factor LO-OOA2 ( $r^2 = 0.45$ ) and versus LO-OOA1 ( $r^2 = 0.10$ ); marker colour scales with the  $\text{C}_x\text{H}_y\text{N}^+$  loading. (b) Pearson correlation ( $r$ ) of each online factor's time series with individual ions: LO-OOA2 and BBOA correlate strongly and positively with the nitrogen-containing organic fragments ( $\text{C}_x\text{H}_y\text{N}^+$ ;  $r \sim 0.58$ – $0.86$  and  $0.65$ – $0.90$ , respectively), whereas LO-OOA1 is uncorrelated-to-negative, so its absorption is not nitrogen-driven. (c) Mean diurnal cycles (local time). Top: mean mass concentrations of the three secondary factors — LO-OOA1 and LO-OOA2 (left axis) and MO-OOA (right axis). Bottom: the primary and secondary contributions to BrC absorption at 370 nm (BrC\_Pri, grey; BrC\_Sec, orange), with the whole-particle  $b_{\text{abs,BrC}}(370)$  (open circles, right axis) and the incident solar radiation (filled circles, far-right axis). BrC absorption and LO-OOA2 both rise through the night, when a shallow boundary layer and high relative humidity favour aqueous processing and the secondary share of BrC absorption is largest then, whereas MO-OOA peaks near midday with solar radiation, when photobleaching drives whole-particle BrC absorption to its minimum.