



Supplement of

Deployment and evaluation of a low-cost sensor system for atmospheric CO₂ monitoring on a sea–air interface buoy

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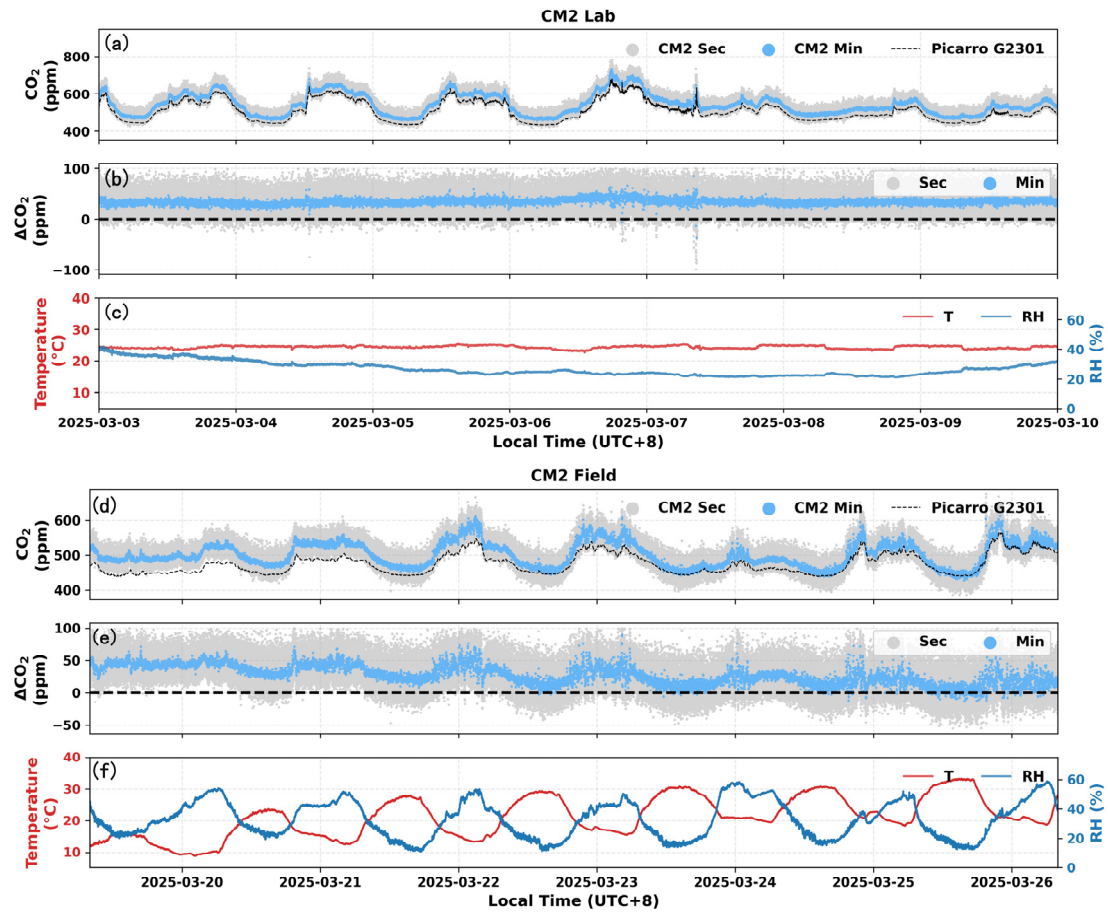


Figure S1: Time series of CM2 data during laboratory (a-c) and land-based field (d-f) observations. (a, d) CM2-measured CO_2 concentration at second-level resolution (grey dots) and minute-level resolution (blue dots), alongside Picarro-measured CO_2 concentration (black line). (b, e) Time series of CO_2 concentration difference ($\Delta\text{CO}_2\text{-CM2-Picarro}$) at second-level (grey dots) and minute-level (blue dots) resolution. (c, f) Time series of ambient temperature (T, red line) and relative humidity (RH, blue line).

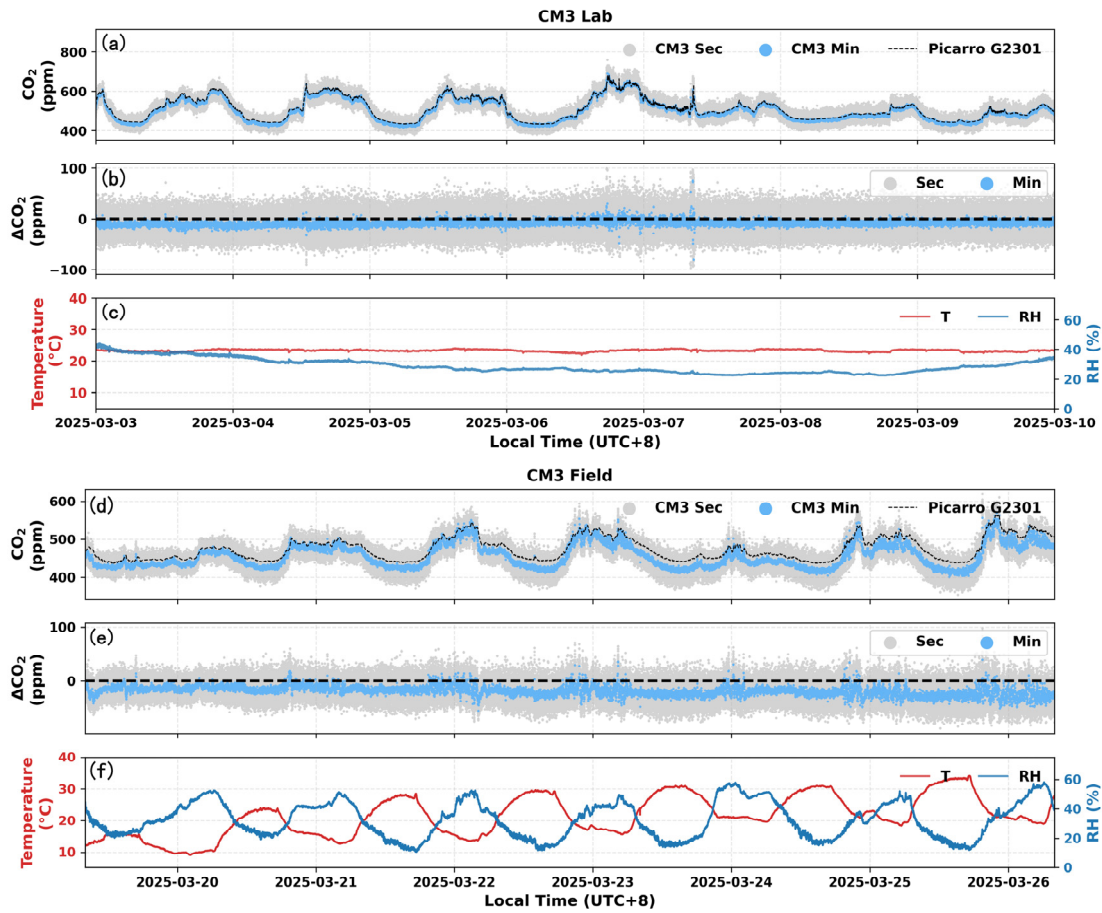


Figure S2: Time series of CM3 data during laboratory (a-c) and land-based field (d-f) observations. (a, d) CM3-measured CO₂ concentration at second-level resolution (grey dots) and minute-level resolution (blue dots), alongside Picarro-measured CO₂ concentration (black line). (b, e) Time series of CO₂ concentration difference ($\Delta\text{CO}_2 = \text{CM3} - \text{Picarro}$) at second-level (grey dots) and minute-level (blue dots) resolution. (c, f) Time series of ambient temperature (T, red line) and relative humidity (RH, blue line).

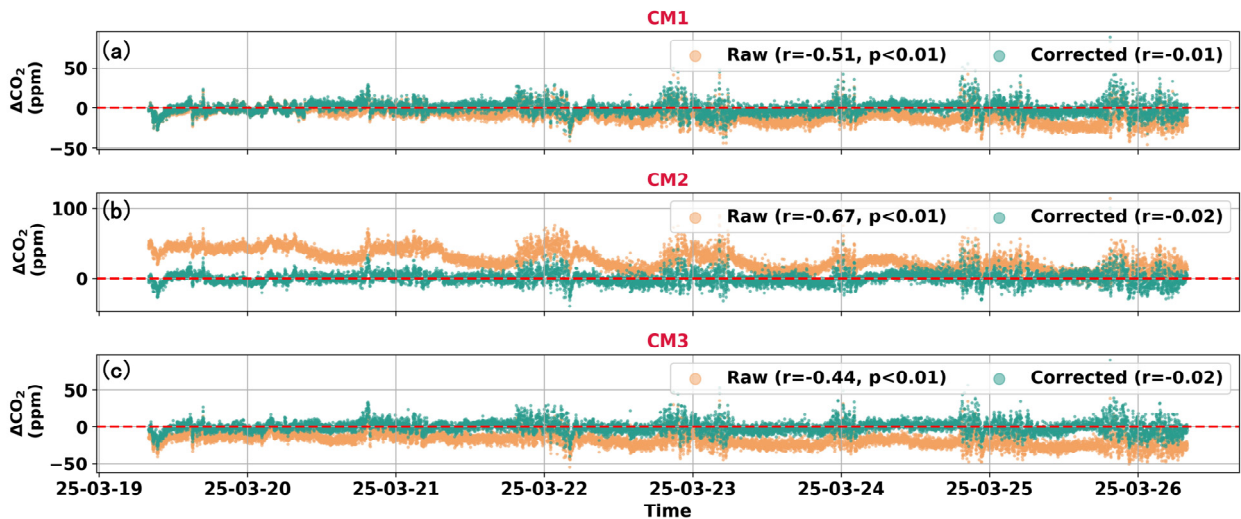


Figure S3: Variations of ΔCO_2 ($\Delta\text{CO}_2 = \text{CM} - \text{Picarro}$) for CM1 (a), CM2 (b), and CM3 (c) during land-based field observations, as functions of time. Orange dots represent data before environmental correction, while green dots represent data after environmental correction.

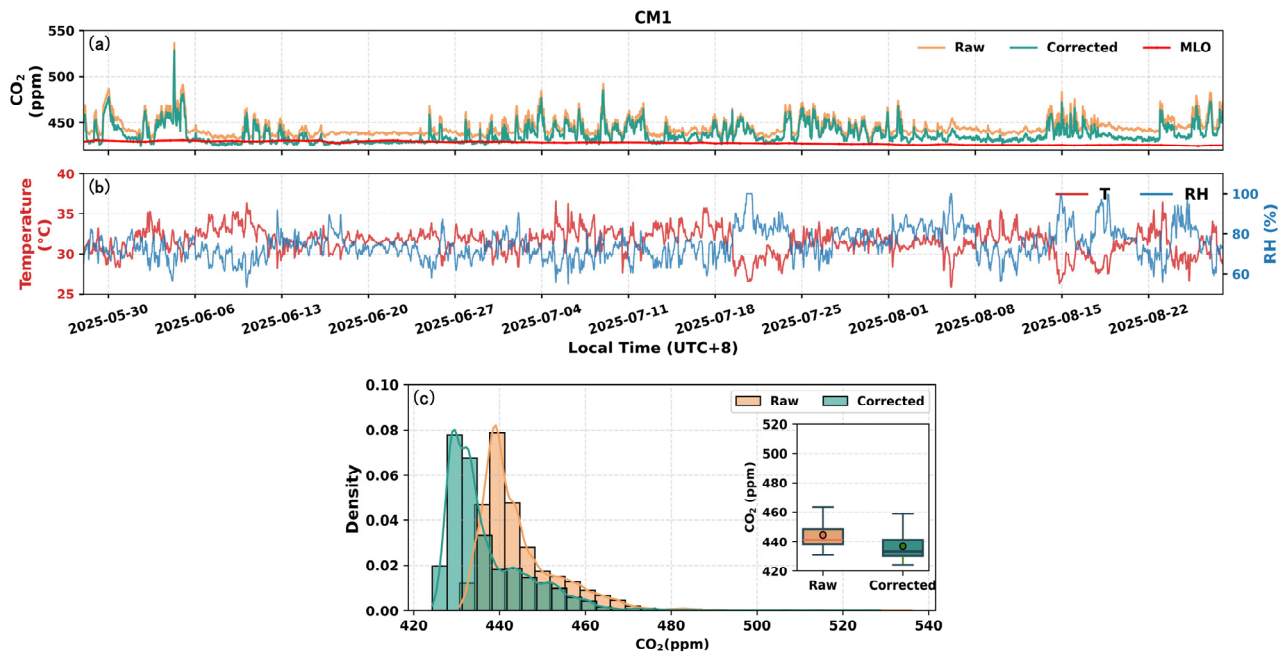


Figure S4: Offshore buoy observation results of CM1. (a) Hourly moving average time series of CO₂ concentrations from CM1 before correction (orange line) and after correction (green line), together with daily mean CO₂ series from Mauna Loa Observatory (MLO, red line). (b) Time series of ambient temperature (T, red line) and relative humidity (RH, blue line). (c) Histograms and boxplots showing the distributions of CO₂ concentrations before (orange bars) and after correction (green bars).

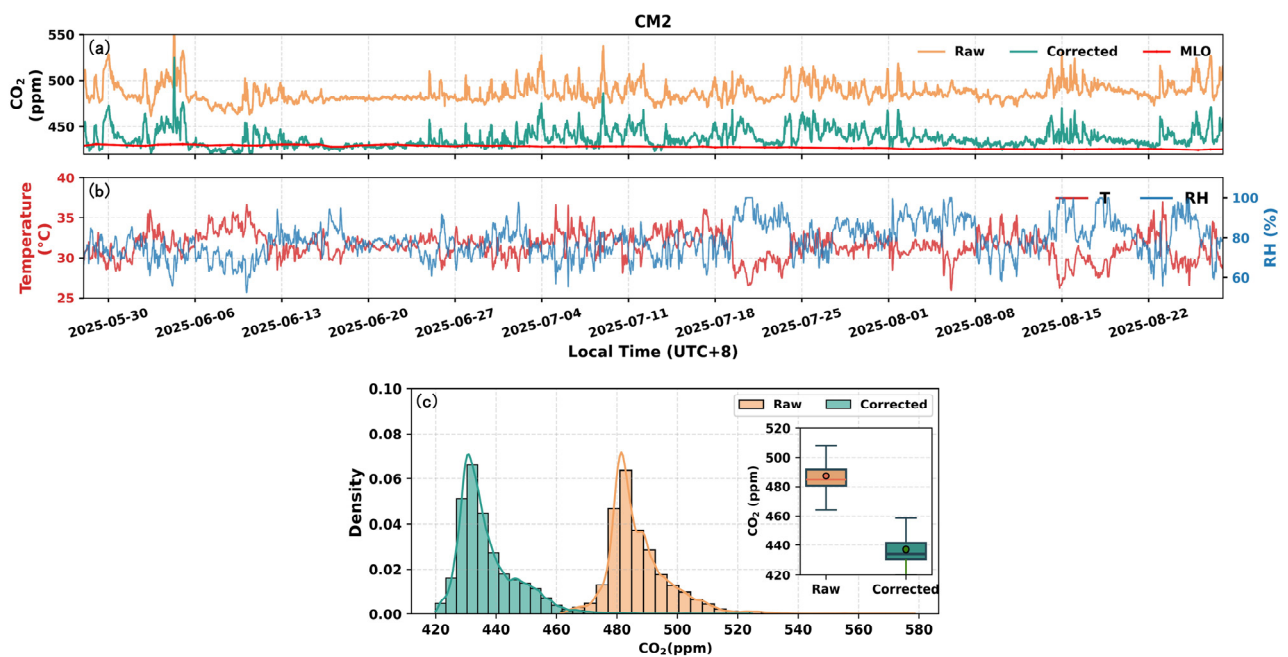


Figure S5: Offshore buoy observation results of CM2. (a) Hourly moving average time series of CO₂ concentrations from CM2 before correction (orange line) and after correction (green line), together with daily mean CO₂ series from Mauna Loa Observatory (MLO, red line). (b) Time series of ambient temperature (T, red line) and relative humidity (RH, blue line). (c) Histograms and boxplots showing the distributions of CO₂ concentrations before (orange bars) and after correction (green bars).

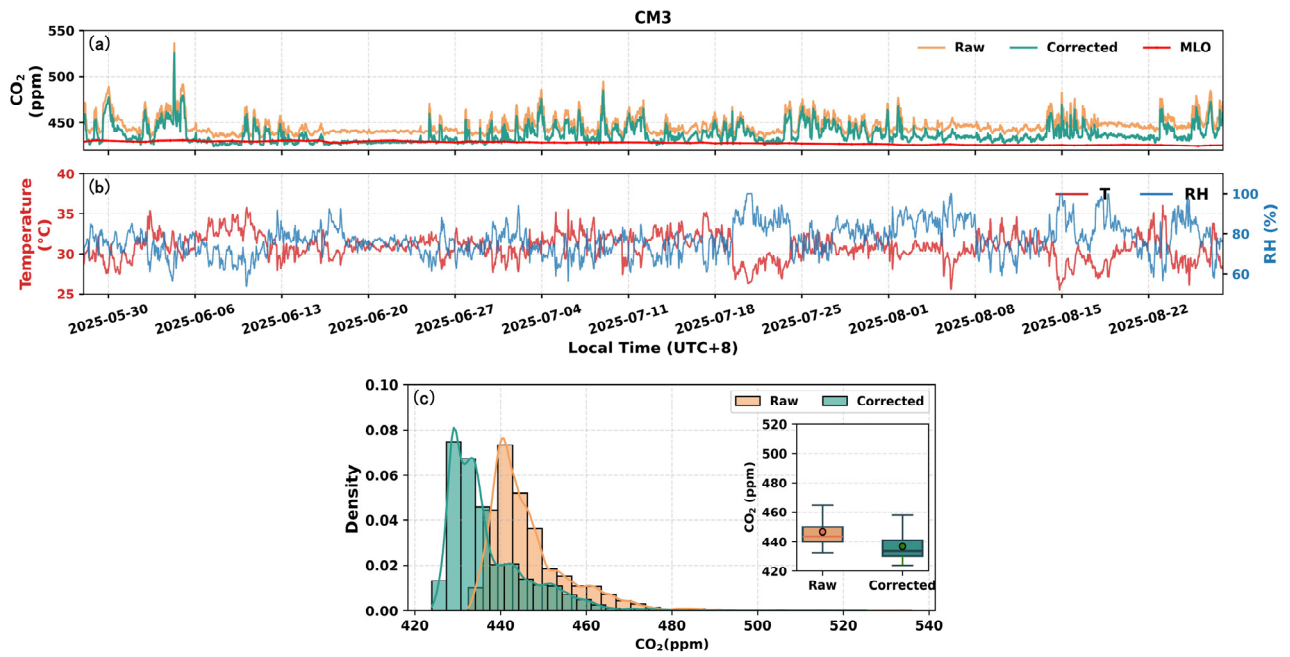


Figure S6: Offshore observation results of CM3. (a) Hourly moving average time series of CO₂ concentrations from CM3 before correction (yellow line) and after correction (green line), together with daily mean CO₂ series from Mauna Loa Observatory (MLO, red line). (b) Time series of ambient temperature (T, red line) and relative humidity (RH, blue line). (c) Histograms and boxplots showing the distributions of CO₂ concentrations before (orange bars) and after correction (green bars).