

Supplementary Materials

Table S1. Summary of abbreviations.

Mp	A general term for the predictor variables used in this paper
ML	Machine learning
CV	Cross-validation
ACEs	Anthropogenic CO ₂ emissions
IS	Impervious surface
NL	Nighttime lighting
RN	Density of the road network for transportation
ERA5	Fifth-generation atmospheric reanalysis dataset
V10	10m north–south wind speed
U10	10m east–west wind speed
D2M	Dew point temperature
T2M	2m temperature
dXCO ₂	Difference between CO ₂ concentration and background value

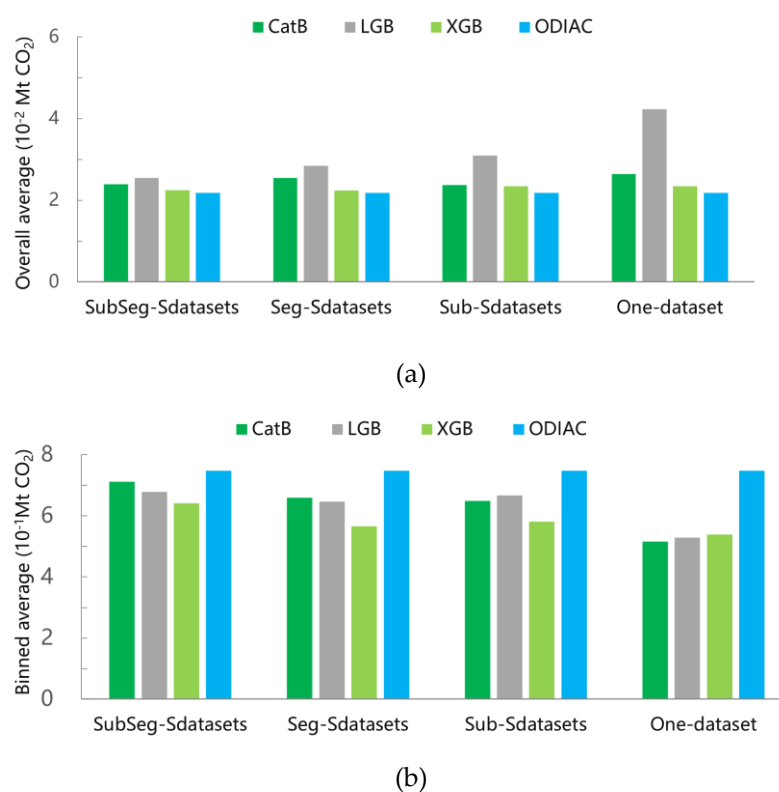


Figure S1. Comparison of average predicted ACEs in 2021 based on the four training datasets (Sub-Seg-Sdatasets, Seg-Sdatasets, Sub-Sdatasets, One-Sdataset) combined with three ML algorithms (CatB, LGB, XGB) and ODIAC in the study area, where (a) is the overall mean of predicted ACEs and ODIAC in 2021, (b) is averaged ACEs for ODIAC values ranging from 0.6–0.8 MtCO₂.

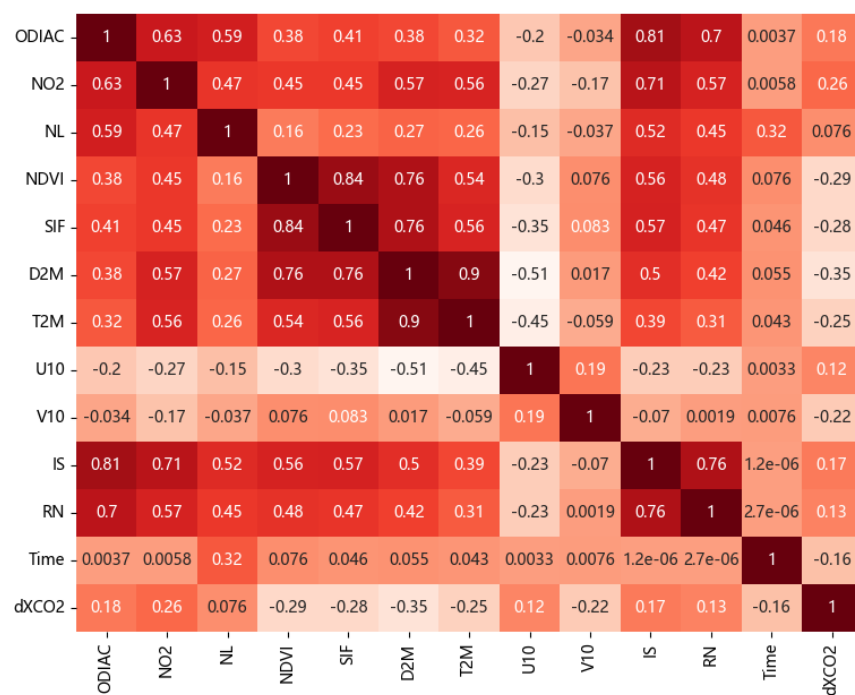


Figure S2. Heat map of the correlations among variables.