remote sensing

# Supplementary Materials

## Analyzing pixel-level relationships between Luojia 1-01 nighttime light and urban surface features by separating the pixel blooming effect

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**Table S1:** Spatial Durbin model and the equations of its total/direct/indirect effect.
**Table S2:** Estimation results of OLS and SDM models.

**Table S1:** Spatial Durbin model and the equations of its total/direct/indirect effect.

| Name | Equation |
|---|---|
| Spatial Durbin model | $Y = \rho WY + X\beta + WX\theta + al_N + \varepsilon$ |
| Total effect | $\bar{M}(r)_{total} = n^{-1} l_N' S_r(W) l_N$ |
| Direct effect | $\bar{M}(r)_{direct} = n^{-1} tr[S_r(W)]$ |
| Indirect effect | $\bar{M}(r)_{indirect} = \bar{M}(r)_{total} - \bar{M}(r)_{direct}$ |
| -- | $S_r(W) = (I_N - \rho W)^{-1}(I_N \beta_r + W\theta_r)$ |

Where $Y$ is the dependent variable. $X$ is the independent variable. $W$ represents the adjacent relationship of pixels. $WY$ is the average of the neighboring pixels' $Y$. $\rho$ is the coefficient of $WY$. $\beta$ is the coefficient to be estimated for the $X$. $WX$ is the average of the neighboring pixels' $X$. $\theta$ is the coefficient of $WX$. $N$ is the sample size. $a$ is the constant. $l_N$ is the unit vector. $I_N$ is the identity matrix. $\varepsilon$ represents the error term. $X_r$ representing the $r$-th independent variable $X$. $\bar{M}(r)_{total}$ is the total effect of $X_r$. $\bar{M}(r)_{direct}$ is the direct effect of $X_r$. $\bar{M}(r)_{indirect}$ is the total effect of $X_r$.

**Table S2:** Estimation results of OLS and SDM models

| **Model** | **OLS** | **SDM** | | **SDM** | | |
|---|---|---|---|---|---|---|
| Variable | X | X | WX | Total effect | Direct effect | Indirect effect |
| Constant | 0.197*** | 0.027*** | | | | |
| Residential | 0.035*** | -0.004* | -0.009 | -0.137** | -0.011** | -0.127* |
| Commercial | 0.197*** | 0.019*** | -0.01*** | 0.098*** | 0.023*** | 0.075** |
| Industrial | -0.020*** | -0.002 | -0.006 | -0.073* | -0.005 | -0.068* |
| Transportation facilities | 0.088*** | 0.011*** | 0.018*** | 0.299*** | 0.025*** | 0.273*** |
| Road1 | 0.140*** | 0.038*** | 0.011*** | 0.508*** | 0.061*** | 0.447*** |
| Road2 | 0.170*** | 0.028*** | 0.036*** | 0.662*** | 0.059*** | 0.603*** |
| Road3 | 0.113*** | 0.03*** | 0.024*** | 0.567*** | 0.057*** | 0.51*** |
| Road4 | 0.069*** | 0.022*** | 0.005 | 0.285*** | 0.035*** | 0.25*** |
| Road5 | 0.051*** | 0.016*** | 0.002 | 0.184*** | 0.024*** | 0.16*** |
| Water | -0.906*** | -0.036*** | -0.048*** | -0.879*** | -0.078*** | -0.8*** |
| Vegetation | -0.359*** | -0.03*** | -0.061*** | -0.958*** | -0.077*** | -0.881*** |
| $\rho$ | -- | 0.903*** | | | -- | |

1)* represents p-value<0.1; ** represents p-value<0.05; *** represents p-value<0.01.