remote sensing

MDPI

Supplementary Material for

Prediction of land surface temperature considering future land use change effects under climate change scenarios in Nanjing City, China

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Supplementary Tables

Table S1. Spatial driving factors of the land use change in this study. Note: CLCD, China land cover dataset [1]; DEM, digital elevation model; LULC, land use and land cover.

Categories	Data	Year	Original resolution	Data resource
LULC data	Land use and land cover data	1990–2020	30 m	CLCD dataset
Socioeconomic driver	Population	2019	1000 m	https://www.resdc.cn
	GDP	2019	1000 m	
	Distance to governments	2020	30 m	https://lbs.amap.com
	Distance to train stations			
	Distance to highways			OpenStreetMap https://www.openstreetmap.org
	Distance to primary roads			
	Distance to secondary roads			
	Distance to tertiary roads			
	Distance to trunk roads			
	Distance to railroads	2020		https://www.webmap.cn
	Distance to residents	2020		
	Distance to water	2020		LULC in 2020
	Nighttime lights	2020		https://eogdata.mines.edu/products/vnl/
Climatic and environmental driver	DEM	2019	30 m	ASTER GDEM 30 M dataset
	Slope			
	Soil types	1995	30 m	https://www.resdc.cn
	Average annual temperature	1990–2020	1000 m	http://www.geodata.cn
	Average annual precipitation			

Table S2. Calculation of the potential driving factor of LST (land surface temperature).

Driving factors	Abbreviations	Calculation formula	References
Normalized difference vegetation index	NDVI	$= (\rho_{NIR} - \rho_{Red}) / (\rho_{NIR} + \rho_{Red})$	[2]
Normalized difference built-up index	NDBI	$= (\rho_{SWIR1} - \rho_{NIR}) / (\rho_{SWIR1} + \rho_{NIR})$	[3]
Soil adjusted vegetation index	SAVI	$= (1 + L) * (\rho_{NIR} - \rho_{Red}) / (\rho_{NIR} + \rho_{Red} + L), L = 0.5$	[4]
Modified normalized difference Water Index	MNDWI	$= (\rho_{Green} - \rho_{SWIR1}) / \rho_{Green} + \rho_{SWIR2})$	[5]
Tasseled cap transformation (greenness)	TCG	$= (-0.1603 * \rho_{Blue}) + (-0.2819 * \rho_{Green}) + (-0.4934 * \rho_{Red}) + (0.7940 * \rho_{NIR}) + (-0.002 * \rho_{SWIR1}) + (-0.1446 * \rho_{SWIR2})$	[6]
Tasseled cap transformation (wetness)	TCW	$= (0.0315 * \rho_{Blue}) + (0.2021 * \rho_{Green}) + (0.3102 * \rho_{Red}) + (0.1594 * \rho_{NIR}) + (-0.6806 * \rho_{SWIR1}) + (-0.6109 * \rho_{SWIR2})$	[6]
Impervious surface distribution density	ISDD	$= \frac{\sum_{i=1}^{n} B_{si} \times (1 - \frac{D_i}{2r})}{\sum_{i=1}^{n} (1 - \frac{D_i}{2r})}$	[7]
Cropland distribution density	CDD		

Forest distribution density	FDD
Water distribution density	WDD

Note: ρ_{Blue} represents the blue spectrum; ρ_{Green} represents the green spectrum; ρ_{Red} represents the red spectrum; ρ_{NIR} represents the near-infrared spectrum; ρ_{SWIR1} represents the short-wavelength infrared 1 spectrum; and ρ_{SWIR2} represents the short-wavelength infrared 2 spectrum.

Supplementary Figures

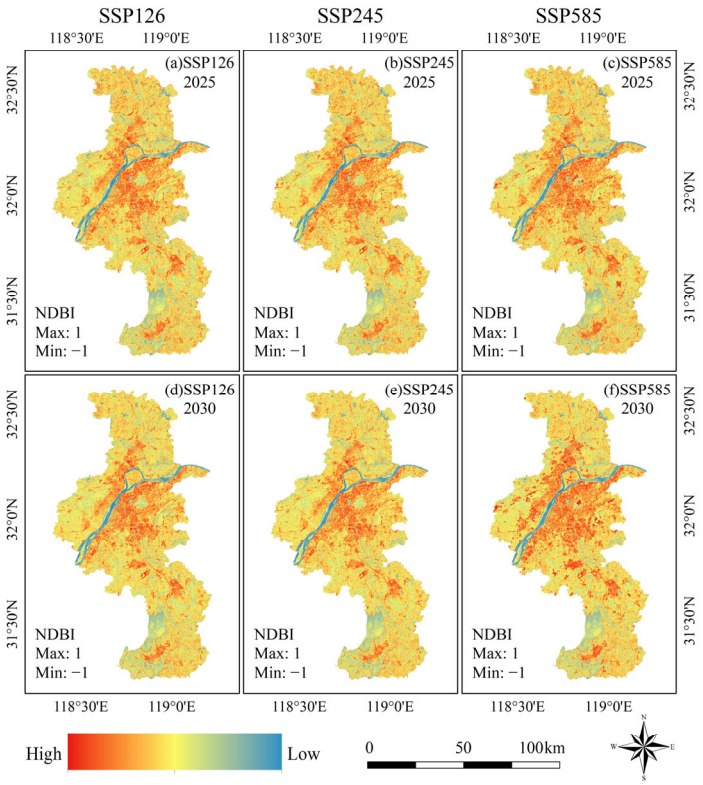

Figure S1. Simulation of NDBI (normalized difference built-up index) in Nanjing under different climate change scenarios.

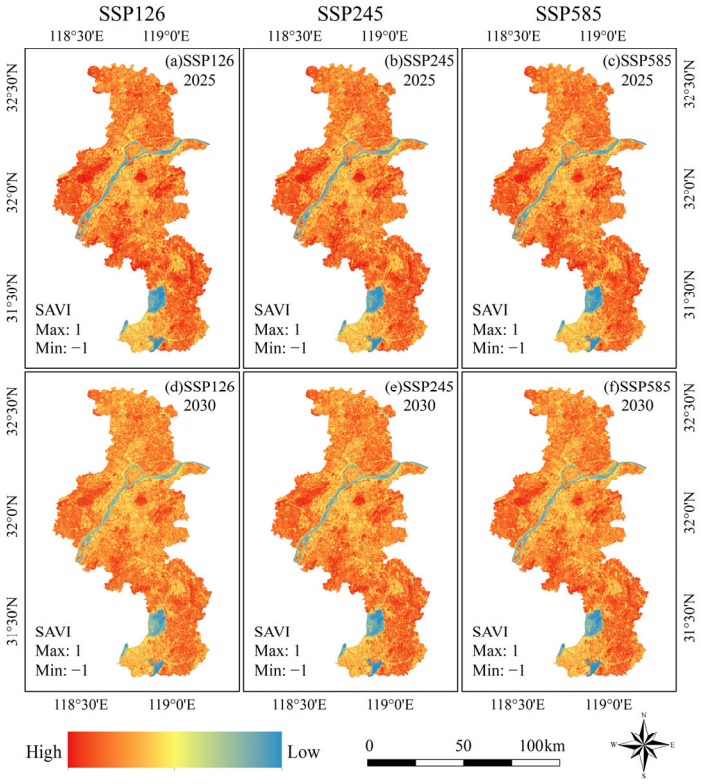

Figure S2. Simulation of SAVI (soil-adjusted vegetation index) in Nanjing under different climate change scenarios.

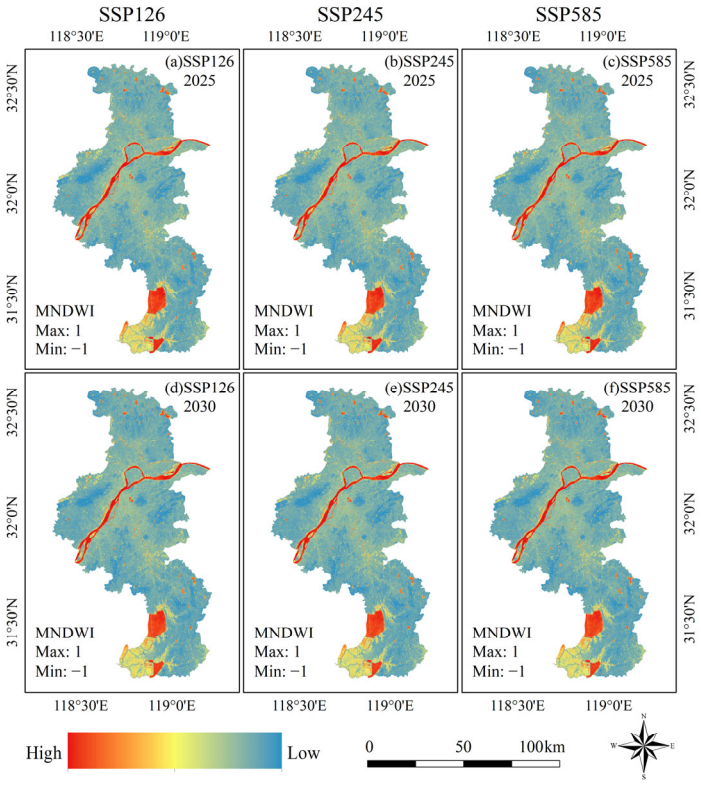

Figure S3. Simulation of MNDWI (modified normalized difference water index) in Nanjing under different climate change scenarios.

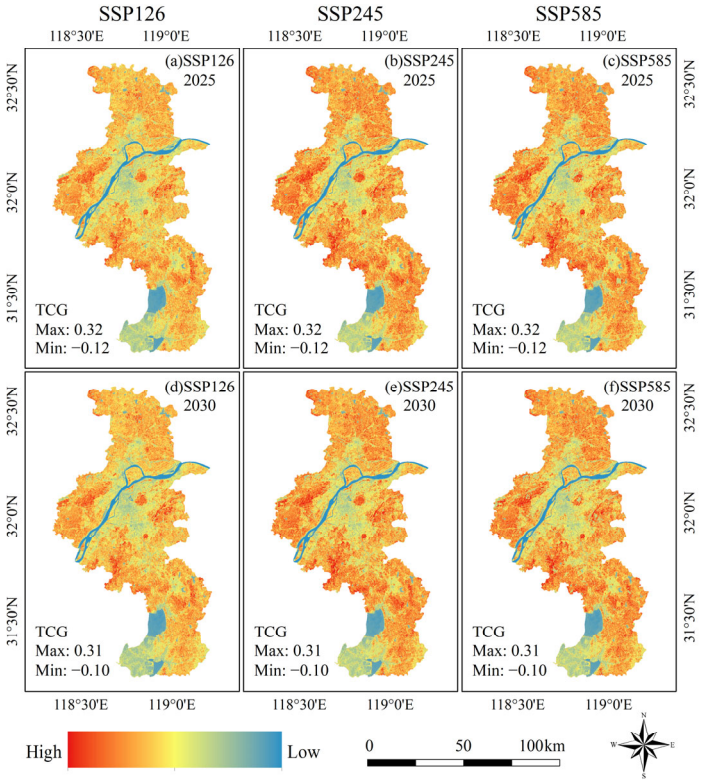

Figure S4. Simulation of TCG (tasseled cap greenness) in Nanjing under different climate change scenarios.

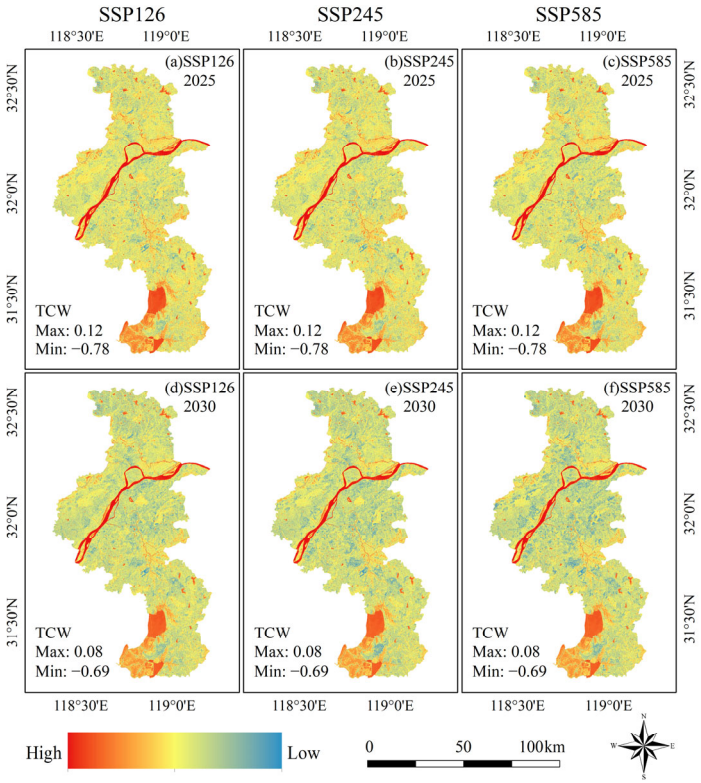

Figure S5. Simulation of TCW (tasseled cap wetness) in Nanjing under different climate change scenarios.

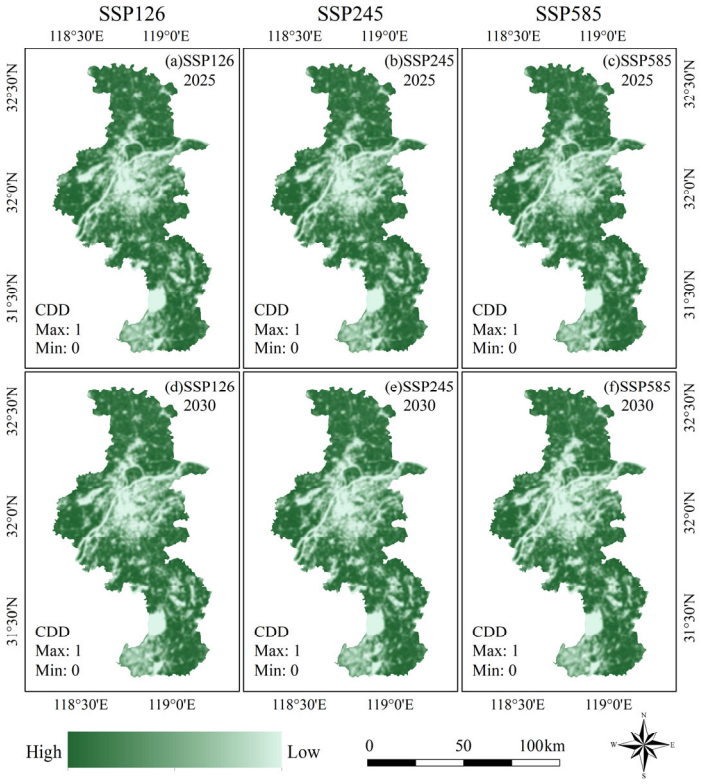

Figure S6. Simulation of CDD (cropland distribution density) in Nanjing under different climate change scenarios.

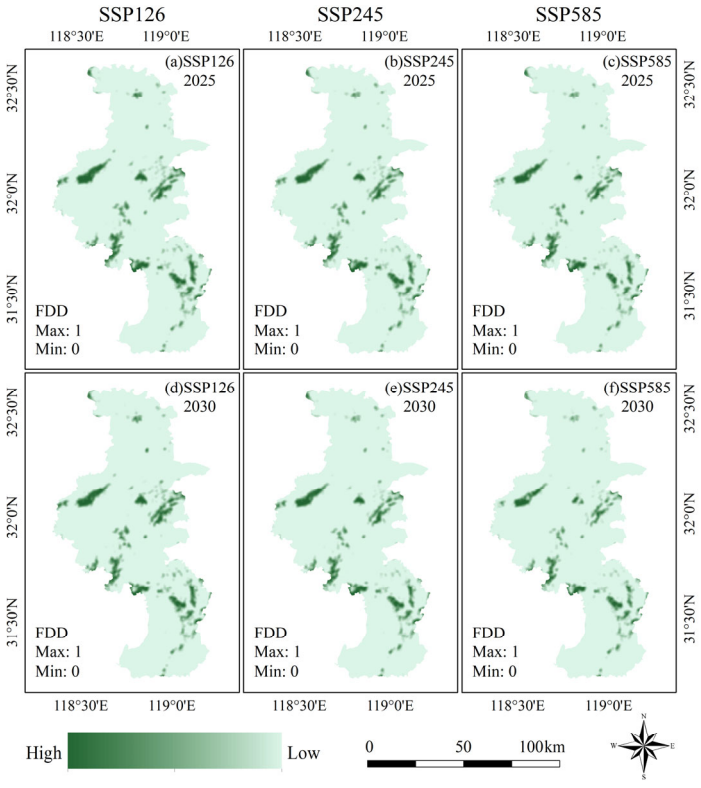

Figure S7. Simulation of FDD (forest distribution density) in Nanjing under different climate change scenarios.

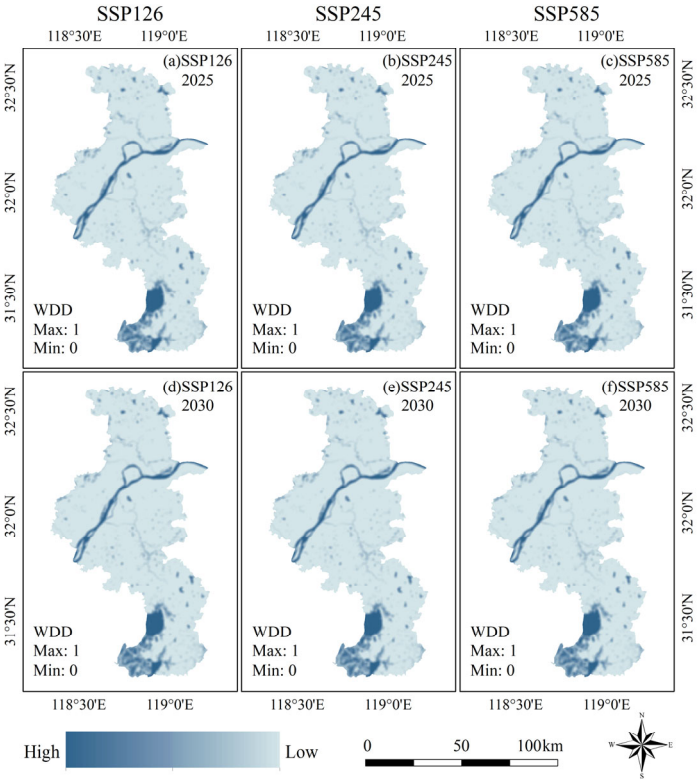

Figure S8. Simulation of WDD (water distribution density) in Nanjing under different climate change scenarios.

References

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