Dataset of Electromagnetic Spectrum Data for Radio Map/Channel Map/RSSI Map

Note: This work is done by Nanjing University of Aeronautics and Astronautics.

Require the latest dataset please contact zhuqiuming@nuaa.edu.cn.

1. Received signal strength under urban scenario (RT-based method)

1.1 Simulation setup

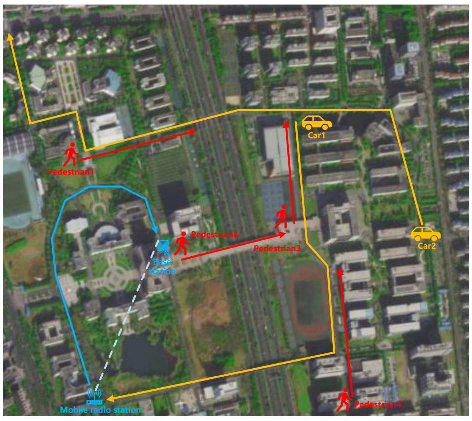

Fig. 1. Simulation scenario and trajectories.

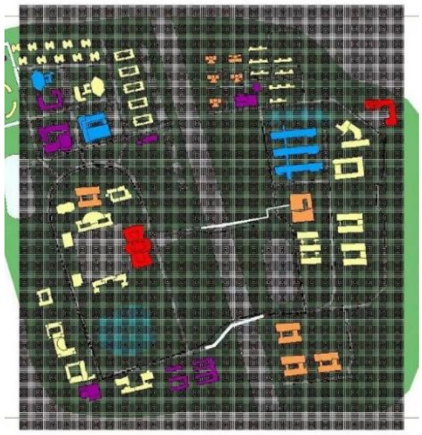

Fig. 2. Meshed map.

Table 1 Scenario parameters

Radiation sources (Transmit power: 0dBm Frequency: 2.45GHz)	Pedestrians	4
	Vehicles	2
	Base station (Directional antenna)	1
	Mobile radio	1
Velocity (Along the road)	Pedestrians	1m/s
	Vehicles	4-5m/s
	Base station.	0m/s
	Mobile radio	3-4m/s
Scenario size	1.25km*1.25km	
Simulation Duration	5min (300s)	
Update time	1s	
Grid resolution	5m*5m	
Height	Dynamic data	2m, 80m
	Static data (t=100s)	2m,10m,20m,30m, 40m,50m,80m
Data size	250*250*300	

1.2 Data Files

The RT-based simulation data files include two scenarios, dynamic scenario (radiation sources are moving) data at the height of 2m and 80m, and static scenario (radiation sources are fixed) data at the height of 2m, 10m, 20m, 30m, 40m, 50m, 80m.

The received signal strength data in the dynamic scenario is a .mat file in the format of a 250*250*300 tensor, where x, y represents the spatial grid dimension, z represents the time dimension, and the numerical value represents the signal strength in dBm. The file size at the height of 2m is 113MB, and the one at the height of 80m is 131MB.

The received signal strength data in the static scenario is a .mat file in the format of a 250*250 matrix, where *x*, *y* represents the spatial grid dimension, and the numerical value represents the signal strength in dBm. The data file sizes for the heights of 10m, 20m, 30m, 40m, and 50m are 363KB, 385KB, 400KB, 406KB, and 405KB, respectively.

1.3 Dataset visualizations

- **Dynamic scenario**

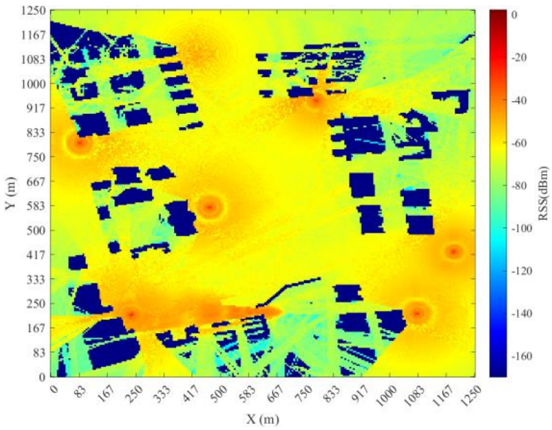

Fig. 3a. height = 2m, time = 1s.

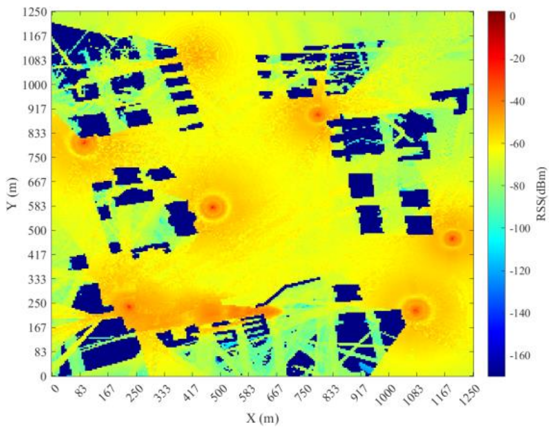

Fig. 3b. height = 2m, time = 10s.

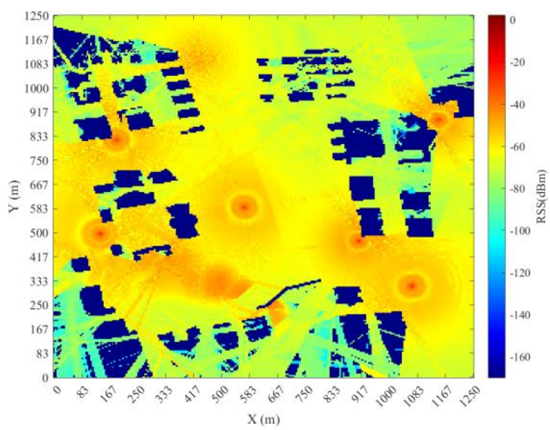

Fig. 3c height = 2m, time = 100s.

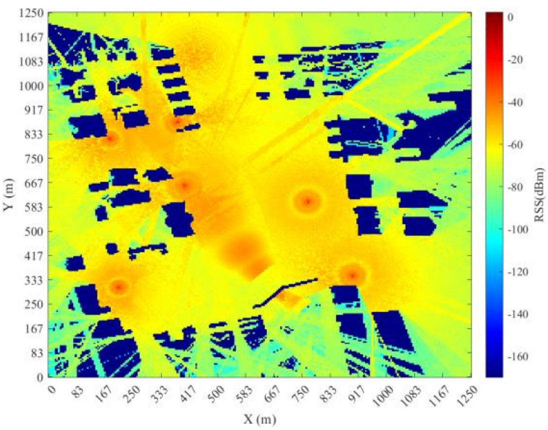

Fig. 3d height = 2m, time = 300s.

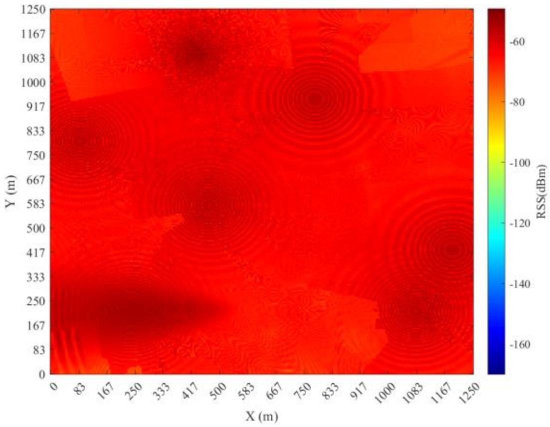

Fig. 4a height = 80m, time = 1s.

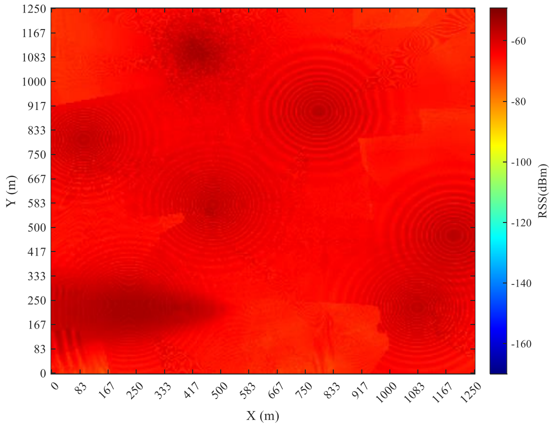

Fig. 4b height = 80m, time = 10s.

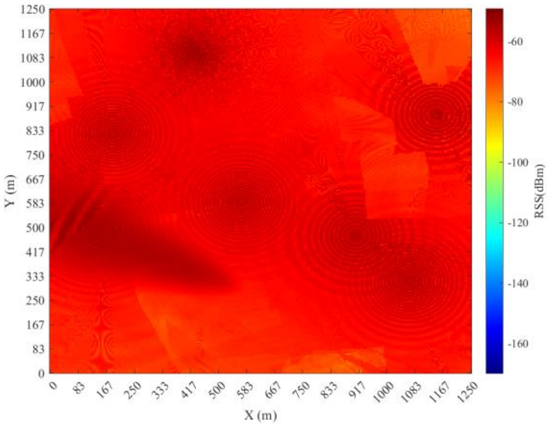

Fig. 4c height = 80m, time = 100s.

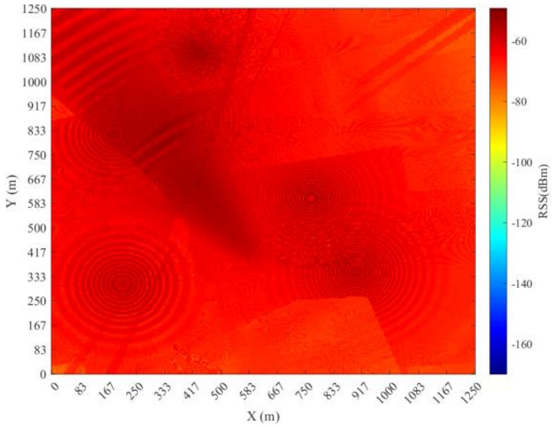

Fig. 4d height = 80m, time = 300s.

➢ **Static scenario (t = 100s)**

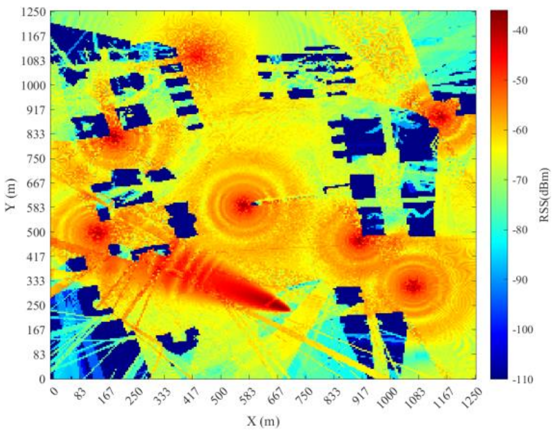

Fig. 5a height = 10m, time = 100s.

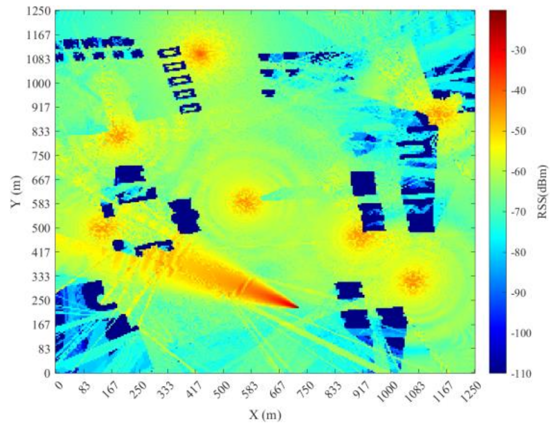

Fig. 5b height = 20m, time = 100s.

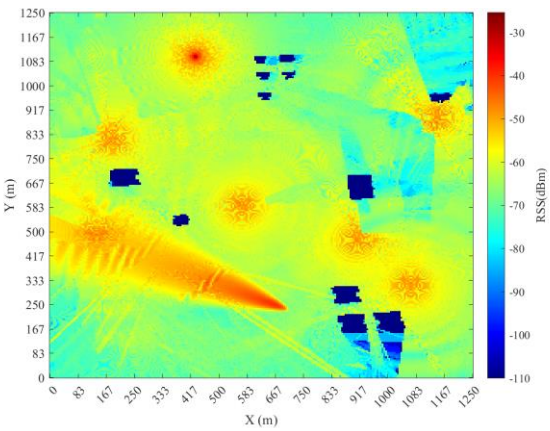

Fig. 5c height = 30m, time = 100s.

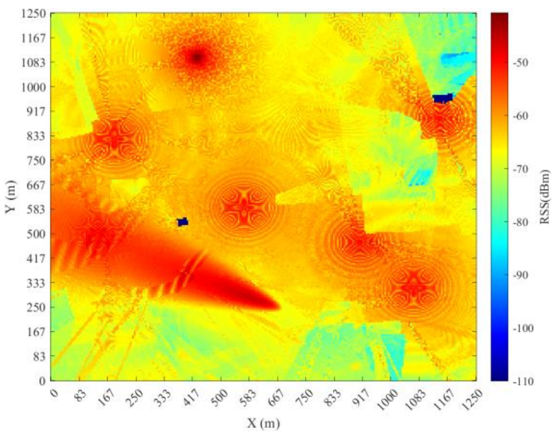

Fig. 5d height = 40m, time = 100s.

1.4 Recommended references

[1]. J. Wang, Q. Zhu, Z. Lin, J. Chen, G. Ding, Q. Wu, G. Gu, Q. Gao. “Sparse Bayesian Learning-Based Hierarchical Construction for 3D Radio Environment Maps Incorporating Channel Shadowing,” *IEEE Transactions on Wireless Communications*, early access, 2024, doi: 10.1109/TWC.2024.3416447.

[2]. Y. Zhao, Q. Zhu, Z. Lin, L. Guo, Q. Wu, J. Wang, W. Zhong. “Temporal prediction for spectrum environment maps with moving radiation sources,” *IET Communications*, vol. 17, no. 5, pp. 538–548, 2023.

[3]. Q. Gao, Q. Zhu, Z. Lin, Y. Zhao, J. Wang, W. Zhong, Y. Huang, Q. Wu. “Spatial Sensor Layout Optimization for Radio Environment Map Construction,” 2024 IEEE Globecom Workshops, 2024, for publication