

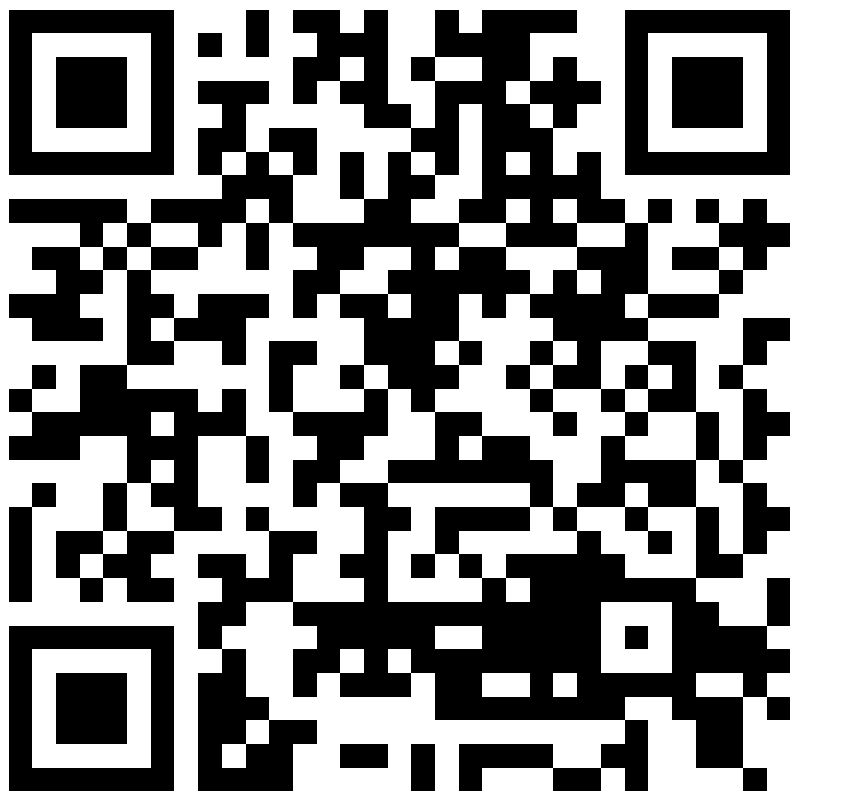
# Geo-AI-Based Assessment of 3-D Ultrafine Particle Distribution and Population Exposure: A Digital Twin Approach in Taichung, Taiwan

**Chia-Wei Hsu**<sup>1</sup>, Jun-Jun Su<sup>1</sup>, Rui-Zhen Yang<sup>1</sup>, Candra Wijaya<sup>2</sup>, Yu-Cheng Chen<sup>3</sup>, Shih-Chun Candice Lung<sup>4,5</sup>, Ta-Chih Hsiao<sup>4,6</sup>, Chao-Hung Lin<sup>1</sup>, Chih-Da Wu<sup>1,3,7,8,9</sup>

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E-mail : p68111509@gs.ncku.edu.tw  
Address : 70101 No.1-3, Daxue Rd., East Dist., Tainan City 701, Taiwan (R.O.C.)



<sup>1</sup> Department of Geomatics, National Cheng Kung University, Tainan, Taiwan <sup>2</sup> National Institute of Environmental Health Sciences, National Health Research Institutes, Miaoli, Taiwan <sup>3</sup> Graduate Institute of Environmental Engineering, National Taiwan University, Taipei, Taiwan <sup>4</sup> Innovation and Development Center of Sustainable Agriculture, National Chung Hsing University, Taichung City, Taiwan <sup>5</sup> Agricultural Engineering Research Center, Taoyuan, Taiwan <sup>6</sup> Research Center for Environmental Changes, Academia Sinica, Taipei, Taiwan <sup>7</sup> Research Center for Precision Environmental Medicine, Kaohsiung Medical University, Kaohsiung, Taiwan <sup>8</sup> Chronic Diseases and Health Promotion Research Center, Chang Gung University of Science and Technology, Chiayi, Taiwan <sup>9</sup> Research Center for Precision Environmental Medicine, Kaohsiung Medical University, Kaohsiung, Taiwan

## Introduction

### 2-D Estimation

Previously, researchers focused on 2-D air quality estimation.



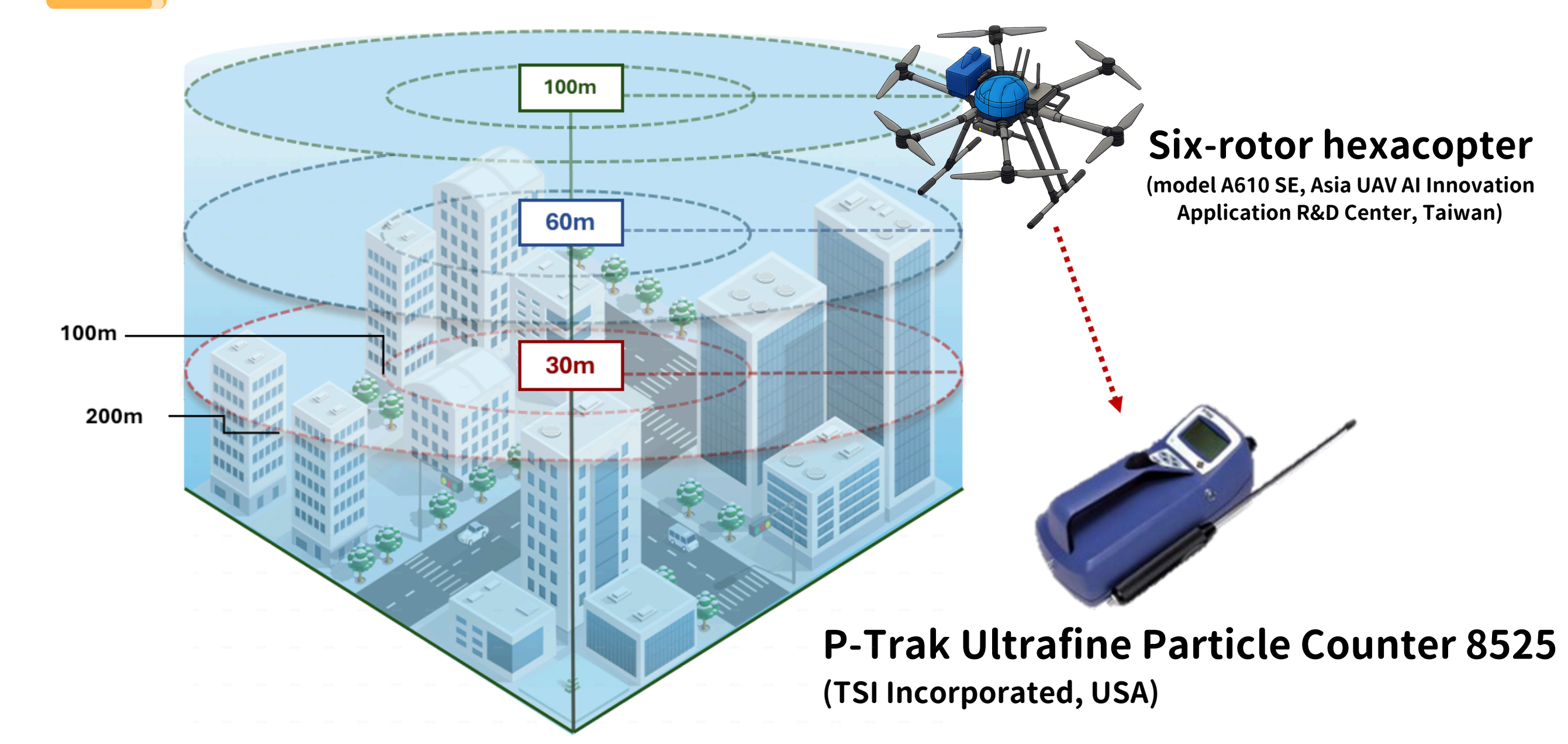
In Taichung, Taiwan, with large coal-fired power plants and dense high-rise buildings, assessing vertical variations in air pollution is crucial.

### 3-D Estimation

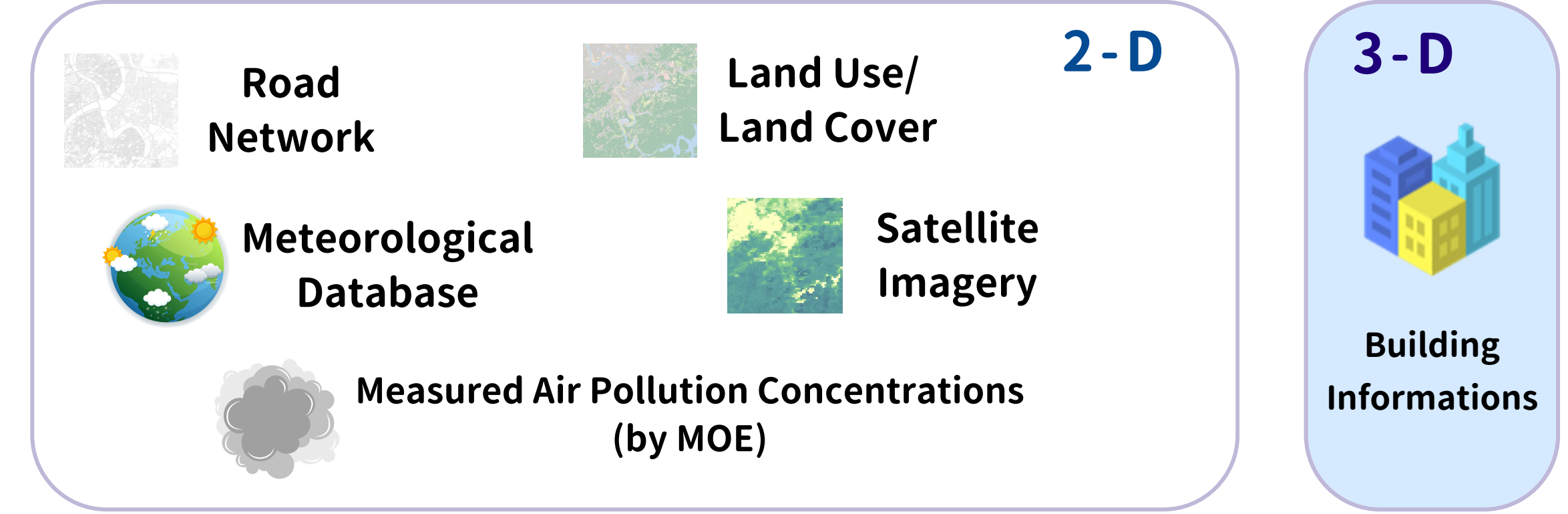
With a UAV and a Geo-AI model, we presented a 3-D air pollution distribution.

## Methodology

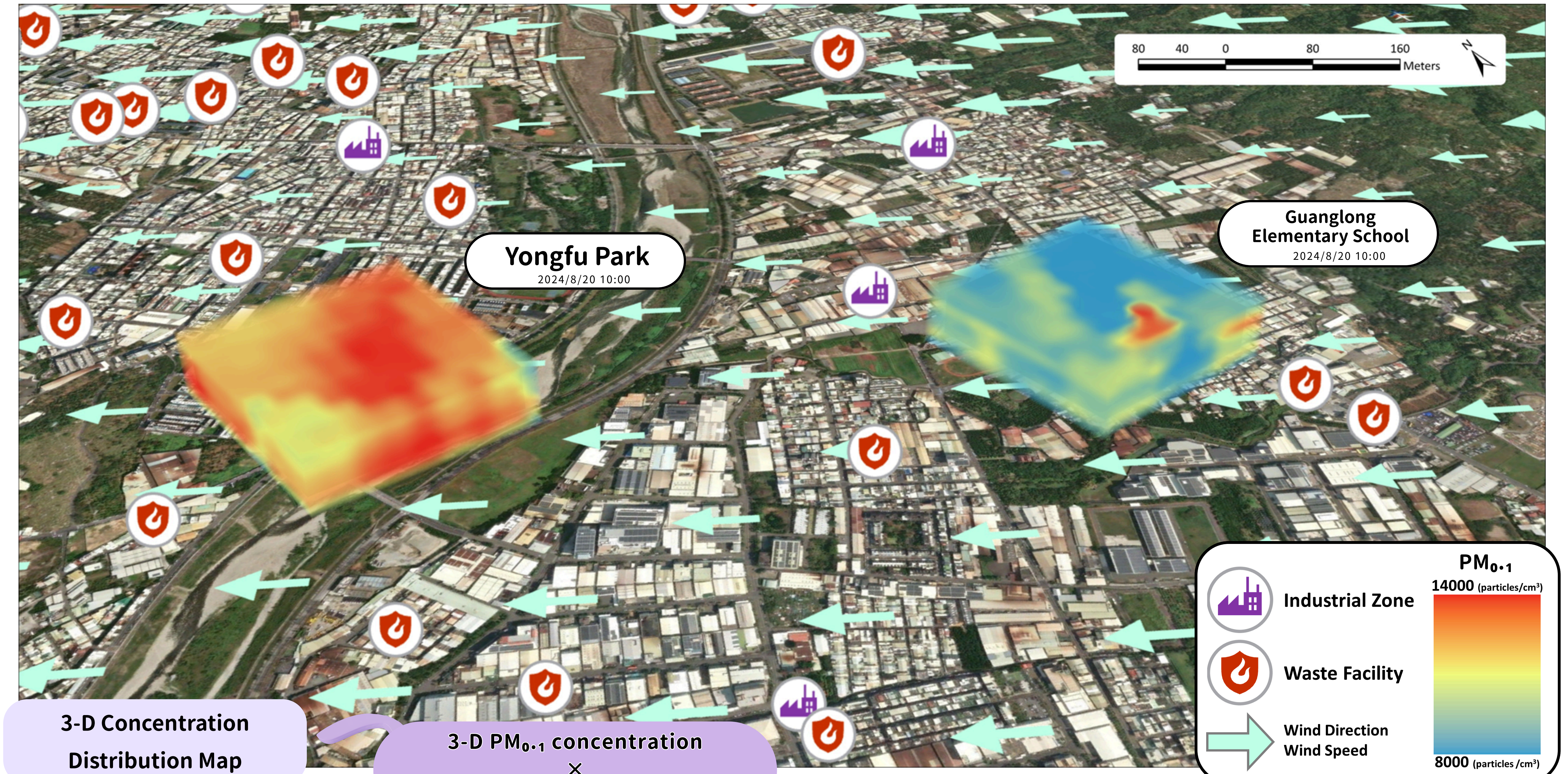
### 3-D UFPs Concentration Data (PM<sub>0.1</sub>)



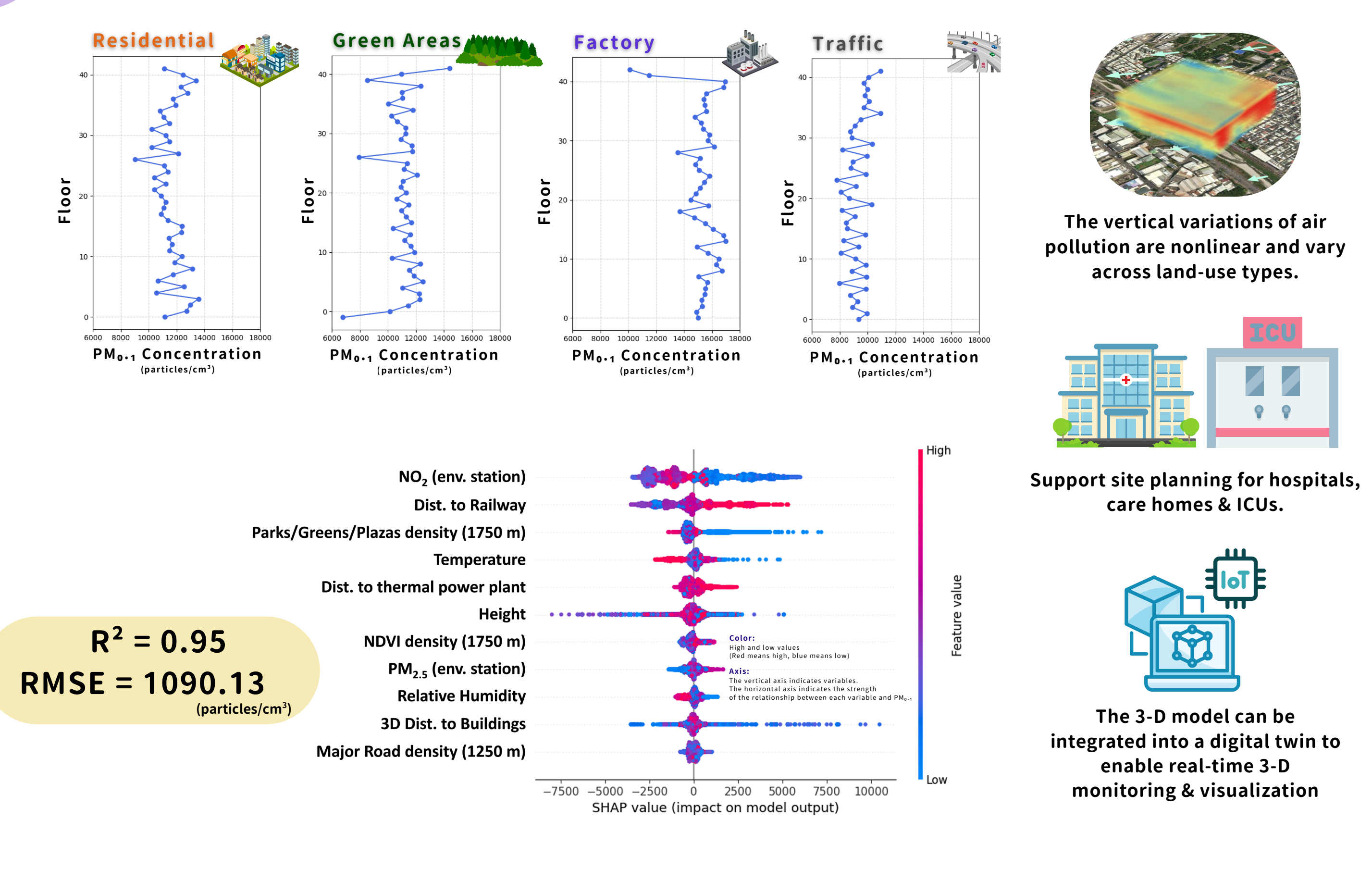
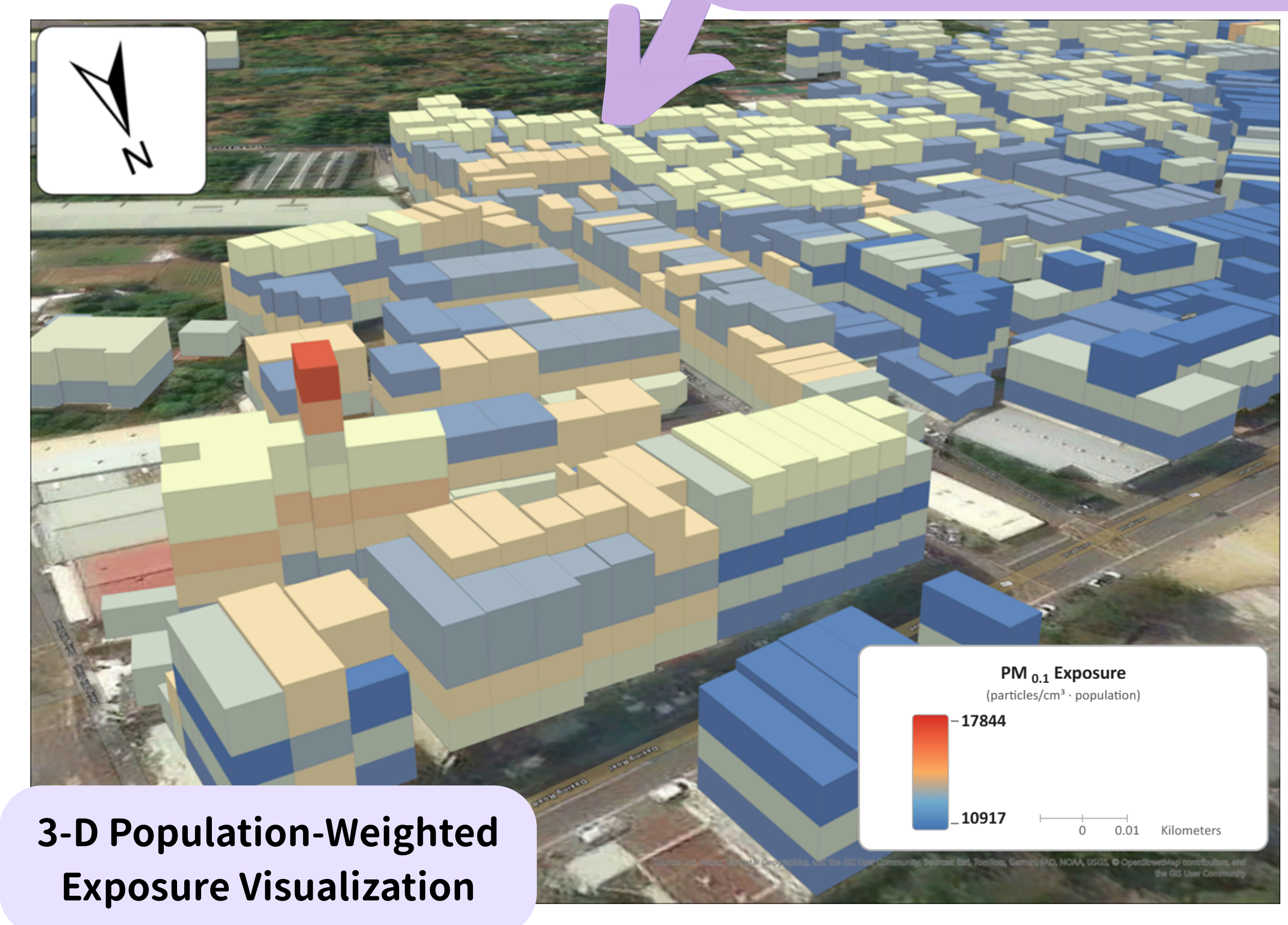
### Independent Variables



## Results

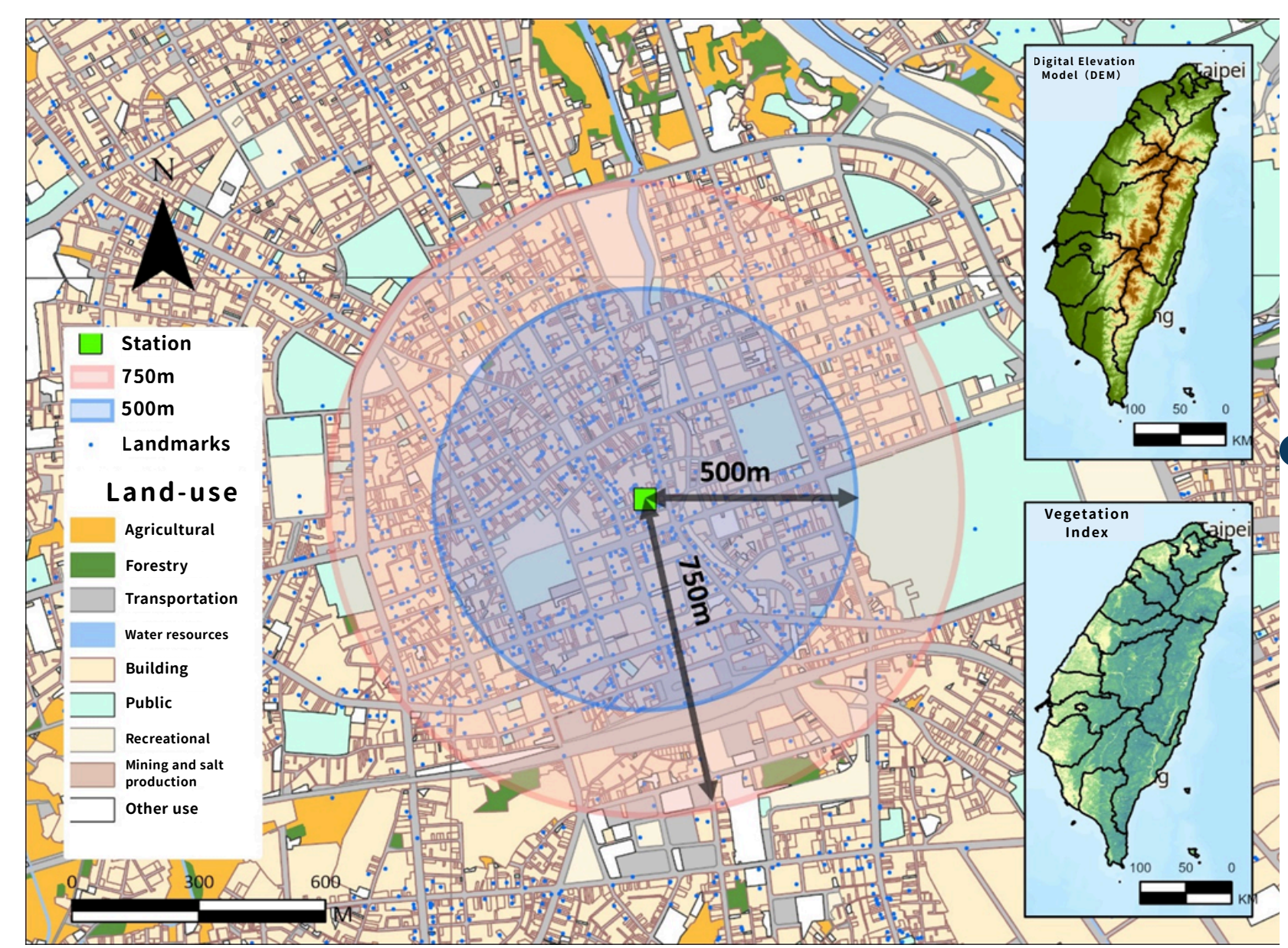


3-D Concentration Distribution Map  
3-D PM<sub>0.1</sub> concentration × Estimated population per floor



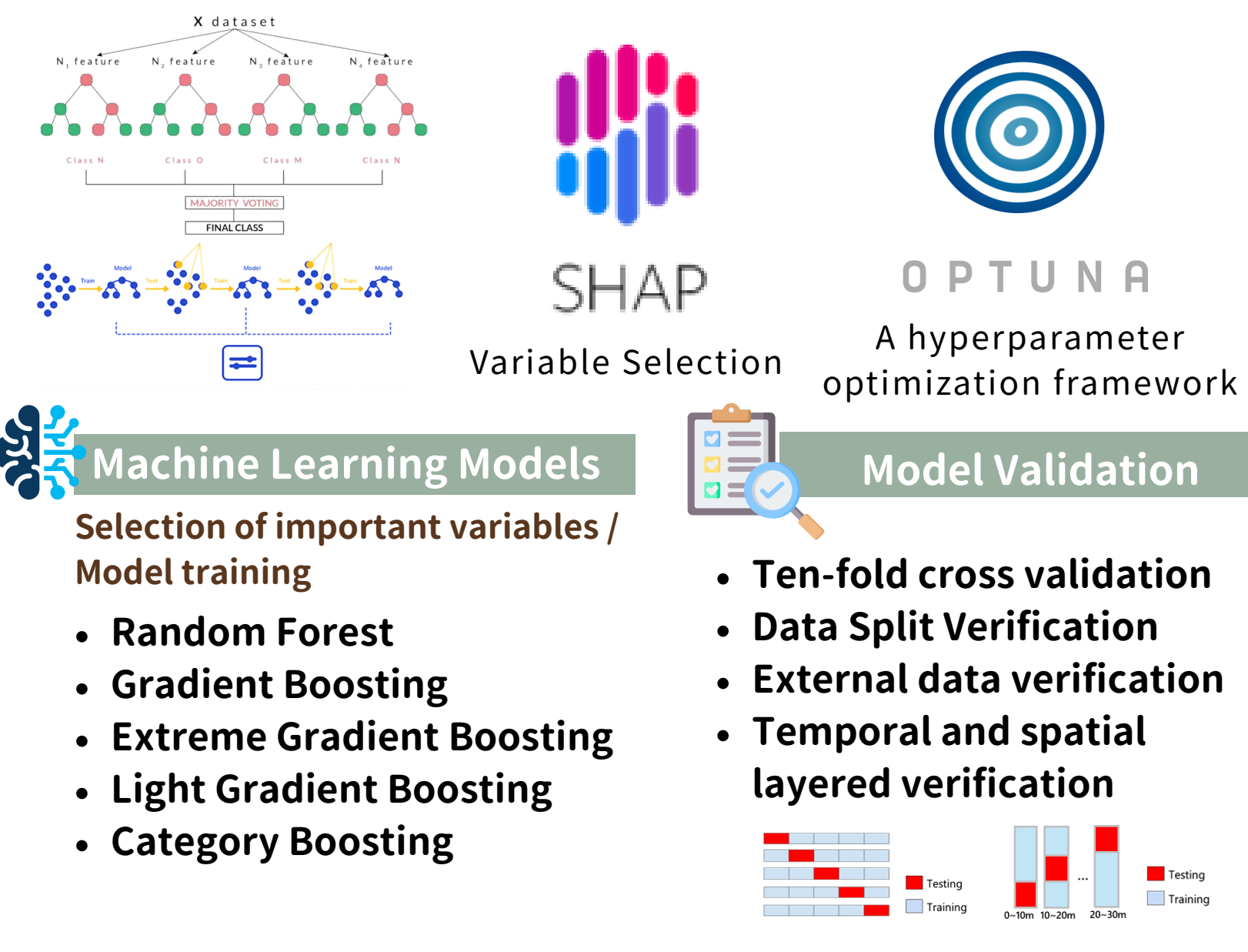
## GEO Geospatial Information Spatial Analysis

- Obtain comprehensive information on spatial environmental distributions
- Simulate spatiotemporal patterns and produce visualizations

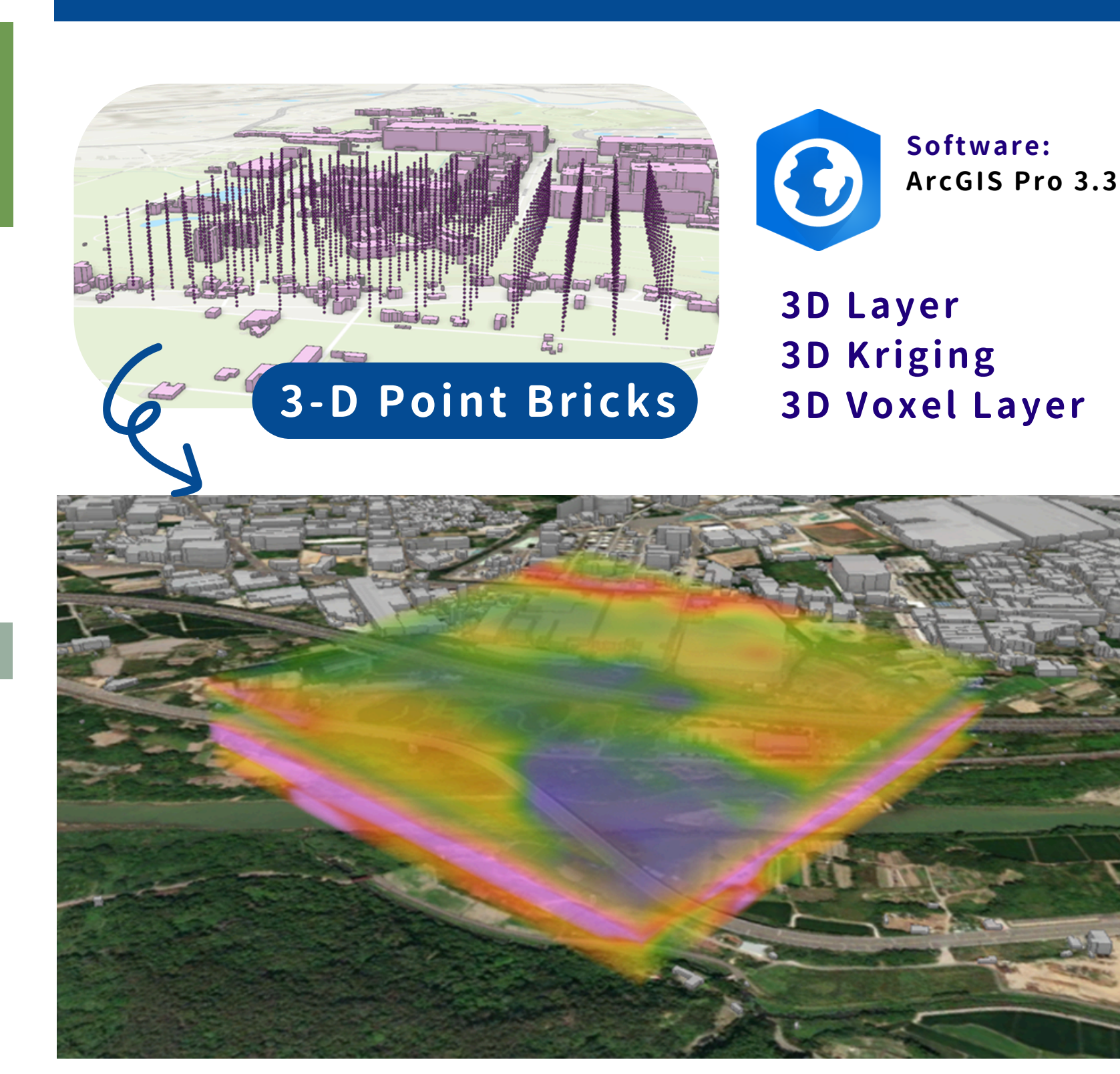


## AI Machine Learning Ensemble Learning

- High-accuracy modeling
- Handling complex nonlinear patterns



## 3-D Visualization



## Acknowledgements

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