

Stanford



Zhuo Zheng

Postdoctoral Scholar, Computer Science

Bio

BIO

My research interests are Earth Vision and AI4Earth, especially multi-modal and multi-temporal remote sensing image analysis and their real-world applications.

First-author representative works:

- Our Change family: ChangeStar (single-temporal learning, ICCV 2021), ChangeMask (many-to-many architecture, ISPRS P&RS 2022), ChangeOS (one-to-many architecture, RSE 2021), Changen (generative change modeling, ICCV 2023)
- Geospatial object segmentation: FarSeg (CVPR 2020) and FarSeg++ (TPAMI 2023), LoveDA dataset (NeurIPS Datasets and Benchmark 2021)
- Missing-modality all weather mapping: Deep Multisensory Learning (first work on this topic, ISPRS P&RS 2021)
- Hyperspectral image classification: FPGA (first fully end-to-end patch-free method for HSI, TGRS 2020)

STANFORD ADVISORS

- Stefano Ermon, Postdoctoral Faculty Sponsor

LINKS

- Homepage: <https://zhuozheng.top/>

Publications

PUBLICATIONS

- **Changen2: Multi-Temporal Remote Sensing Generative Change Foundation Model** *IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE*
Zheng, Z., Ermon, S., Kim, D., Zhang, L., Zhong, Y.
2025; 47 (2): 725-741
- **Single-Temporal Supervised Learning for Universal Remote Sensing Change Detection** *INTERNATIONAL JOURNAL OF COMPUTER VISION*
Zheng, Z., Zhong, Y., Ma, A., Zhang, L.
2024
- **FarSeg++: Foreground-Aware Relation Network for Geospatial Object Segmentation in High Spatial Resolution Remote Sensing Imagery.** *IEEE transactions on pattern analysis and machine intelligence*
Zheng, Z., Zhong, Y., Wang, J., Ma, A., Zhang, L.
2023; PP
- **Scalable Multi-Temporal Remote Sensing Change Data Generation via Simulating Stochastic Change Process**
Zheng, Z., Tian, S., Ma, A., Zhang, L., Zhong, Y., IEEE

IEEE COMPUTER SOC.2023: 21761-21770

- **ChangeMask: Deep multi-task encoder-transformer-decoder architecture for semantic change detection** *ISPRS JOURNAL OF PHOTOGRAMMETRY AND REMOTE SENSING*
Zheng, Z., Zhong, Y., Tian, S., Ma, A., Zhang, L.
2022; 183: 228-239
- **Building damage assessment for rapid disaster response with a deep object-based semantic change detection framework: From natural disasters to man-made disasters** *REMOTE SENSING OF ENVIRONMENT*
Zheng, Z., Zhong, Y., Wang, J., Ma, A., Zhang, L.
2021; 265
- **Deep multisensor learning for missing-modality all-weather mapping** *ISPRS JOURNAL OF PHOTOGRAMMETRY AND REMOTE SENSING*
Zheng, Z., Ma, A., Zhang, L., Zhong, Y.
2021; 174: 254-264
- **Change is Everywhere: Single-Temporal Supervised Object Change Detection in Remote Sensing Imagery**
Zheng, Z., Ma, A., Zhang, L., Zhong, Y., IEEE
IEEE.2021: 15173-15182
- **FPGA: Fast Patch-Free Global Learning Framework for Fully End-to-End Hyperspectral Image Classification** *IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING*
Zheng, Z., Zhong, Y., Ma, A., Zhang, L.
2020; 58 (8): 5612-5626
- **HyNet: Hyper-scale object detection network framework for multiple spatial resolution remote sensing imagery** *ISPRS JOURNAL OF PHOTOGRAMMETRY AND REMOTE SENSING*
Zheng, Z., Zhong, Y., Ma, A., Han, X., Zhao, J., Liu, Y., Zhang, L.
2020; 166: 1-14
- **Foreground-Aware Relation Network for Geospatial Object Segmentation in High Spatial Resolution Remote Sensing Imagery**
Zheng, Z., Zhong, Y., Wang, J., Ma, A., IEEE
IEEE.2020: 4095-4104
- **Remote sensing intelligent interpretation brain: Real-time intelligent understanding of the Earth.** *PNAS nexus*
Wan, Y., Zhang, C., Ma, A., Chen, Z., Sun, C., Wang, J., Zheng, Z., Bao, F., Zhang, L., Zhong, Y.
2025; 4 (6): pgaf182
- **Learning Temporal Consistency for High Spatial Resolution Remote Sensing Imagery Semantic Change Detection** *IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING*
Tian, S., Ma, A., Zheng, Z., Tan, X., Zhong, Y.
2025; 63
- **Towards transferable building damage assessment via unsupervised single-temporal change adaptation** *REMOTE SENSING OF ENVIRONMENT*
Zheng, Z., Zhong, Y., Zhang, L., Burke, M., Lobell, D. B., Ermon, S.
2024; 315
- **Unifying remote sensing change detection via deep probabilistic change models: From principles, models to applications** *ISPRS JOURNAL OF PHOTOGRAMMETRY AND REMOTE SENSING*
Zheng, Z., Zhong, Y., Zhao, J., Ma, A., Zhang, L.
2024; 215: 239-255
- **Global road extraction using a pseudo-label guided framework: from benchmark dataset to cross-region semi-supervised learning** *GEO-SPATIAL INFORMATION SCIENCE*
Lu, X., Zhong, Y., Zheng, Z., Wang, J., Chen, D., Su, Y.
2024
- **EarthVQANet: Multi-task visual question answering for remote sensing image understanding** *ISPRS JOURNAL OF PHOTOGRAMMETRY AND REMOTE SENSING*
Wang, J., Ma, A., Chen, Z., Zheng, Z., Wan, Y., Zhang, L., Zhong, Y.

2024; 212: 422-439

- **LoveNAS: Towards multi-scene land-cover mapping via hierarchical searching adaptive network** *ISPRS JOURNAL OF PHOTOGRAMMETRY AND REMOTE SENSING*
Wang, J., Zhong, Y., Ma, A., Zheng, Z., Wan, Y., Zhang, L.
2024; 209: 265-278
- **Adaptive Self-Supporting Prototype Learning for Remote Sensing Few-Shot Semantic Segmentation** *IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING*
Shen, W., Ma, A., Wang, J., Zheng, Z., Zhong, Y.
2024; 62
- **MAPCHANGE: ENHANCING SEMANTIC CHANGE DETECTION WITH TEMPORALINVARIANT HISTORICAL MAPS BASED ON DEEP TRIPLET NETWORK**
Liu, Y., Shi, S., Zheng, Z., Wang, J., Tian, S., Zhong, Y., IEEE
IEEE.2024: 7653-7656
- **LUWA Dataset: Learning Lithic Use-Wear Analysis on Microscopic Images**
Zhang, J., Fang, I., Wu, H., Kaushik, A., Rodriguez, A., Zhao, H., Zhang, J., Zheng, Z., Iovita, R., Feng, C., IEEE
IEEE COMPUTER SOC.2024: 22563-22573
- **EarthVQA: Towards Queryable Earth via Relational Reasoning-Based Remote Sensing Visual Question Answering**
Wang, J., Zheng, Z., Chen, Z., Ma, A., Zhong, Y.
edited by Dy, J., Natarajan, S., Wooldridge, M.
ASSOC ADVANCEMENT ARTIFICIAL INTELLIGENCE.2024: 5481-5489
- **Temporal-agnostic change region proposal for semantic change detection** *ISPRS JOURNAL OF PHOTOGRAMMETRY AND REMOTE SENSING*
Tian, S., Tan, X., Ma, A., Zheng, Z., Zhang, L., Zhong, Y.
2023; 204: 306-320
- **Explicable Fine-Grained Aircraft Recognition Via Deep Part Parsing Prior Framework for High-Resolution Remote Sensing Imagery.** *IEEE transactions on cybernetics*
Chen, D., Zhong, Y., Ma, A., Zheng, Z., Zhang, L.
2023; PP
- **Large-scale agricultural greenhouse extraction for remote sensing imagery based on layout attention network: A case study of China** *ISPRS JOURNAL OF PHOTOGRAMMETRY AND REMOTE SENSING*
Chen, D., Ma, A., Zheng, Z., Zhong, Y.
2023; 200: 73-88
- **Large-scale deep learning based binary and semantic change detection in ultra high resolution remote sensing imagery: From benchmark datasets to urban application** *ISPRS JOURNAL OF PHOTOGRAMMETRY AND REMOTE SENSING*
Tian, S., Zhong, Y., Zheng, Z., Ma, A., Tan, X., Zhang, L.
2022; 193: 164-186
- **Cross-sensor domain adaptation for high spatial resolution urban land-cover mapping: From airborne to spaceborne imagery** *REMOTE SENSING OF ENVIRONMENT*
Wang, J., Ma, A., Zhong, Y., Zheng, Z., Zhang, L.
2022; 277
- **GRE AND BEYOND: A GLOBAL ROAD EXTRACTION DATASET**
Lu, X., Zhong, Y., Zheng, Z., Chen, D., IEEE
IEEE.2022: 3035-3038
- **Cascaded Multi-Task Road Extraction Network for Road Surface, Centerline, and Edge Extraction** *IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING*
Lu, X., Zhong, Y., Zheng, Z., Chen, D., Su, Y., Ma, A., Zhang, L.
2022; 60
- **A Supervised Progressive Growing Generative Adversarial Network for Remote Sensing Image Scene Classification** *IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING*

-
- Ma, A., Yu, N., Zheng, Z., Zhong, Y., Zhang, L.
2022; 60
- **National-scale greenhouse mapping for high spatial resolution remote sensing imagery using a dense object dual-task deep learning framework: A case study of China** *ISPRS JOURNAL OF PHOTOGRAMMETRY AND REMOTE SENSING*
Ma, A., Chen, D., Zhong, Y., Zheng, Z., Zhang, L.
2021; 181: 279-294
 - **Cross-domain road detection based on global-local adversarial learning framework from very high resolution satellite imagery** *ISPRS JOURNAL OF PHOTOGRAMMETRY AND REMOTE SENSING*
Lu, X., Zhong, Y., Zheng, Z., Wang, J.
2021; 180: 296-312
 - **FactSeg: Foreground Activation-Driven Small Object Semantic Segmentation in Large-Scale Remote Sensing Imagery** *IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING*
Ma, A., Wang, J., Zhong, Y., Zheng, Z.
2022; 60
 - **Urban road mapping based on an end-to-end road vectorization mapping network framework** *ISPRS JOURNAL OF PHOTOGRAMMETRY AND REMOTE SENSING*
Chen, D., Zhong, Y., Zheng, Z., Ma, A., Lu, X.
2021; 178: 345-365
 - **A Spectral-Spatial-Dependent Global Learning Framework for Insufficient and Imbalanced Hyperspectral Image Classification** *IEEE TRANSACTIONS ON CYBERNETICS*
Zhu, Q., Deng, W., Zheng, Z., Zhong, Y., Guan, Q., Lin, W., Zhang, L., Li, D.
2022; 52 (11): 11709-11723
 - **GAMNet: Globally aware road detection network with multi-scale residual learning** *ISPRS JOURNAL OF PHOTOGRAMMETRY AND REMOTE SENSING*
Lu, X., Zhong, Y., Zheng, Z., Zhang, L.
2021; 175: 340-352
 - **RSNet: The Search for Remote Sensing Deep Neural Networks in Recognition Tasks** *IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING*
Wang, J., Zhong, Y., Zheng, Z., Ma, A., Zhang, L.
2021; 59 (3): 2520-2534
 - **COLOR: Cycling, Offline Learning, and Online Representation Framework for Airport and Airplane Detection Using GF-2 Satellite Images** *IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING*
Zhong, Y., Zheng, Z., Ma, A., Lu, X., Zhang, L.
2020; 58 (12): 8438-8449
 - **Edge-Reinforced Convolutional Neural Network for Road Detection in Very-High-Resolution Remote Sensing Imagery** *PHOTOGRAMMETRIC ENGINEERING AND REMOTE SENSING*
Lu, X., Zhong, Y., Zheng, Z., Zhao, J., Zhang, L.
2020; 86 (3): 153-160
 - **A NOVEL GLOBAL-AWARE DEEP NETWORK FOR ROAD DETECTION OF VERY HIGH RESOLUTION REMOTE SENSING IMAGERY**
Lu, X., Zhong, Y., Zheng, Z., IEEE
IEEE.2020: 2579-2582
 - **Multi-Scale and Multi-Task Deep Learning Framework for Automatic Road Extraction** *IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING*
Lu, X., Zhong, Y., Zheng, Z., Liu, Y., Zhao, J., Ma, A., Yang, J.
2019; 57 (11): 9362-9377
 - **S3NET: TOWARDS REAL-TIME HYPERSPECTRAL IMAGERY CLASSIFICATION**
Zheng, Z., Zhong, Y., IEEE
IEEE.2019: 3293-3296

- **POP-NET: ENCODER-DUAL DECODER FOR SEMANTIC SEGMENTATION AND SINGLE-VIEW HEIGHT ESTIMATION**

Zheng, Z., Zhong, Y., Wang, J., IEEE
IEEE.2019: 4963-4966

- **Deep Salient Feature Based Anti-Noise Transfer Network for Scene Classification of Remote Sensing Imagery** *REMOTE SENSING*

Gong, X., Xie, Z., Liu, Y., Shi, X., Zheng, Z.
2018; 10 (3)

- **COLOR: CYCLING OFFLINE LEARNING AND ONLINE REPRESENTING FOR REMOTE SENSING DATAFLOW**

Zheng, Z., Zhong, Y., IEEE
IEEE.2018: 4093-4096

- **Multi-channel Pose-aware Convolution Neural Networks for Multi-view Facial Expression Recognition**

Liu, Y., Zeng, J., Shan, S., Zheng, Z., IEEE
IEEE.2018: 458-465