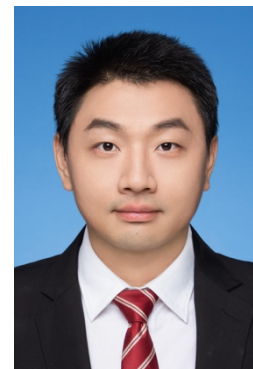# Wei Cao

Postdoc Fellow
Planetary Environmental and Astrobiological Research Laboratory
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EMPLOYMENT

2021/05–Present **SUN YAT-SEN UNIVERSITY**	Postdoc Fellow
2018/01–2021/03 **BEIJING INSTITUTE OF TECHNOLOGY-ZHUHAI CAMPUS**	Lecturer

EDUCATION

2014/09-2017/08 **MACAU UNIVERSIRY OF SCIENCE AND TECHNOLOGY**	Space Information Technology, Ph.D
2011/09-2014/06 **MACAU UNIVERSIRY OF SCIENCE AND TECHNOLOGY**	Computer and Communication Technology, MS
2007/09-2011/06 **MACAU UNIVERSIRY OF SCIENCE AND TECHNOLOGY**	Electronic Information Science, BS

RESEARCH INTERESTS

My research focuses on the study of recognition and analysis methods for similar targets, mainly applied in the scenarios of laser equipment and remote sensing terrain data obtained by satellites. My main research approach is developing high-performance algorithms for target identification and extraction based on the physical mechanisms of the similar targets in real scene, further demonstrate their application value.

TEACHING (SELECTED)

Summer 2018/2019/2020: Data Structures/Python Programming/Routing & Switching Technology, Beijing Institute of Technology-Zhuhai Campus, undergraduate students, Chinese

Spring 2019/2020/2021: Computer Network/Cloud Computing, Beijing Institute of Technology-Zhuhai Campus, undergraduate students, Chinese

FUNDING

- 2024/01 – 2026/12: The global distribution and emplacement mechanism of light plains formed by the lunar Orientale basin. **The National Natural Science Foundation of China**. Fund: RMB 30,0000. Project Number: 42302263. Investigator.
- 2022/12 – 2024/12: Recognition technology of background secondaries formed by the lunar Orientale basin: A new approach based on high-degree multi-wavelet. **The fellowship of the China Posdoctoral Science Foundation. Fund**: RMB 8,0000. Project Number: 2022M723575. Investigator.
- 2019/05 – 2021/06: Novel data processing algorithm of terrestrial planet's topographies and the related application. Guangdong Provincial College Innovative. Fund: RMB 5,0000. Project Number: 2018KQNCX346. Principle Investigator.

RESEARCH PAPERS (Last five years)

- ■ **The first order or corresponding author**
  - **W. Cao**, Z. Cai*, and B. Ye, (2018). Measuring multiresolution surface roughness using V-system, *IEEE Transactions on Geoscience and Remote Sensing*, 56(3): 1,497-1,506. doi: 10.1109/TGRS.2017.2764519.
  - **W. Cao** and Z. Cai*, (2018). Improved multiscale roughness algorithm for lunar surface. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, 11(07): 2,336-2,345. doi: 10.1109/JSTARS.2018.2822297.
  - **W. Cao**, Z. Meng*, X. Dong, J. Lei, M. Xie, J. Yang, and Z. Cai, (2021). Reunderstanding geomorphological features in Chang'e-5 sampling region based on multiscale roughness model. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, 14: 9,106-9,116. doi: 10.1109/JSTARS.2021.3110731.
  - **W. Cao**, Z. Xiao*, R. Xu, Y. Wang, (2022). Extracting Background Secondary Craters Based on Fusion of Multiscale and Multifacies Crater Topography Information. *IEEE Transactions on Geoscience and Remote Sensing*, 60: 4511516. doi: 10.1109/TGRS.2022.3195201.
  - **W. Cao**, Z. Xiao*, F. Luo, Y. Ma, R. Xu, (2023). Comparison of Topographic Roughness of Layered Deposits on Mars. *Remote Sensing*, 15, 2272. doi:10.3390/rs15092272.

- ■ **Other orders**

- A. Li, Z. Cai*****, and **W. Cao**, (2017). Corrrelation analysis between lunar roughness and land-surface parameters using BPNN. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, 10(12): 5,647-5,656. doi: 10.1109/JSTARS.2017.2746899.
- J. Li*****, **W. Cao**, and X. Tian, (2018). Topographic surface roughness analysis based on image processing of terrestial planet. *Cluster Computing*. doi: 10.1007/s10586-018-1943-3.
- B. Ye, Z. Cai*****, T. Lan, and **W. Cao**, (2019). A novel stitching method for dust and rock analysis based on Yutu rover panoramic imagery. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, 12(11): 4,457-4,466. doi: 10.1109/JSTARS.2019.2947281.
- Z. Meng, S. Chen*****, Y. Zheng, W. Cheng, Y. Zhu, Z. Cai, Y. Zhang, **W. Cao**, and L. Hou, (2020). Mare deposits identification and feature analysis in Mare Australe based on CE-2 CELMS data. *Journal of Geophysical Research: Planets*, 125: e2019JE006330. doi: 10.1029/2019JE006330.
- J. Tang, Q. Su, B. Su, S. Fong, **W. Cao**, and X. Gong*****, (2020). Parallel ensemble learning of convolutional neural networks and local binary patterns for face recognition. *Computer Methods and Programs in Biomedicine*, 197: 105622. doi: 10.1016/j.cmpb.2020.105622.
- J. Yuan, **W. Cao**, Z. Cai*****, and B. Su, (2021). An underwater image vision enhancement algorithm based on contour bougie morphology. *IEEE Transactions on Geoscience and Remote Sensing*, 59(10): 8117-8128. doi: 10.1109/TGRS.2020.3033407.
- Z. Meng*****, J. Lei, Z. Xiao, **W. Cao**, W. Cheng, X. Feng, and J. Ping, (2022). Re-evaluating influence of rocks on microwave thermal emission of luanr regolith using CE-2 MRM data. *IEEE Transactions on Geoscience and Remote Sensing*, 60: 4505112. doi: 10.1109/TGRS.2021.3112673.
- J. Yuan, Z. Cai*****, and **W. Cao**, (2022). TFBCF: Real-World underwater image textural enhancement model based on blurriness and color fusion. *IEEE Transactions on Geoscience and Remote Sensing*, 60: 4204315. doi: 10.1109/TGRS.2021.3110575.
- B. Ye, Z. Cai*****, T. Lan, and **W. Cao**, (2022). Modeling of crater group representation based on V-system. *IEEE Transactions on Geoscience and Remote Sensing*, 60: 4703512. doi: 10.1109/TGRS.2021.3105282.
- R. Chen, Z. Cai*, **W. Cao**, (2022). MFFN: An underwater sensing scene image enhancement method based on multi-scale feature fusion network. *IEEE Transactions on Geoscience and Remote Sensing*, 60:4205612. doi:10.1109/TGRS.2021.3134762.
- J. Huang, Z. Wu*, J. Cui, Y. Hao, **W. Cao**, (2022). Topographic Gravity Waves Observed in the Martian Thermosphere: A Statistical Perspective From a 1-D Full-Wave Model. *Journal of Geophysical Research: Space Physics*, 127, e2022JA030846. doi: 10.1029/2022JA030846.
- Y. Ma, Z. Xiao*, F. Luo, **W. Cao**, R. Xu, (2023). SHARAD observations for layered ejecta deposits formed by late-Amazonian-aged impact craters at low latitudes of Mars. *Icarus*, 404, 115689. doi: 10.1016/j.icarus.2023.115689.

PATENTS

- Z. Cai and **W. Cao**. Omnidirectional roughness algorithm for topographic signature analysis of lunar craters. 18/01/2017, Australia, 2017100063.
- Z. Cai and **W. Cao**. Method for improving calculations of surface roughness. 2018-02-22, Australia, 2018100231.
- Z. Cai and **W. Cao**. Omnidirectional roughness algorithm for topographic signature analysis of lunar craters. 16/01/2019, U.S., 10,354,398 B2.
- Z. Cai and **W. Cao**. Method for improving calculations of surface roughness. 03/03/2020, U.S., 10,580,150 B2.
- **W. Cao** and Z. Xiao. A system for analyzing roughness of Martian impact crater based on box-counting dimension. 02/11/2022, China, 2022SR1451408.

SELECTED AWARDS

- **Scientific and Technological R&D Award for Postgraduates,** the Chief Executive of the Macao Special Administrative Region, 2016
- **(3/4) Science and Technology Award,** the Chief Executive of the Macao Special Administrative Region, 2018