Wu Yunzhao

SHORT BIO

I am Engaged in research planetary remote sensing, deep space exploration, and near Earth object defense. I have been a visiting scholar at Brown University, University of Maryland, University of Notre Dame, Indiana University at Polis, and German Space Agency (DLR). I am a member of the scientific team for China's lunar and asteroids exploration program. My research area covers reflectance and thermal radiation spectra, data processing, modeling and inversion, on-orbit radiometric calibration and science applications. I acquired funding from the Ministry of Education's New Century Excellent Talents Program, the National Natural Science Foundation's Original Exploration Project, and the National Natural Science Foundation's Outstanding Youth Program. We have produced element maps of the moon, photometric model, mineral composition of lunar elements, proposed new types of lunar highlands, and discovered that space weathering leads to a decrease in spectral slope which changed traditional opinion. I received awards including China Remote Sensing Excellent Achievement Award, Jiangsu Province Industry Excellent Scientific and Technological Progress Award, and Jiangsu Astronomical Society Science and Technology Award.

EDUCATION

(1) 2000 - 2005, Nanjing University, Geochemistry, PhD

(2) 1996- 2000, Nanjing University, Geology, Bs

RESEARCH

Lunar and planetary science, planetary remote sensing, reflectance and thermal emission spectroscopy, deep space exploration

VISITING SCHOLAR

2018/10—2019/10, German Aerospace Center (DLR) , visiting Scholar
2014/08—2015/01 University of Notre Dame, visiting Scholar
2013/02—2013/05 Brown University, Visiting Scholar
2013/01—2014/08 Indiana University –Purdue University (IUPUI), Visiting Scholar
2012/02—2012/03 University of Maryland, Visiting Scholar

TEACHING (ACADEMIC)

Principles and Applications of Remote Sensing

FDCT PROJECTS

1. Scientific Applications for China's Asteroid Exploration Program
2. Chang'e-4 data processing and application
3. Key Technologies for Satellite Calibration Based on Lunar Radiation Sources

PUBLICATIONS

1. Shu, M., Xu, T. Y., Cai, W., Wen, S. B., Jiao, H. Y., **Wu, Y. Z.*** (2024). Unveiling Illumination Variations During a Lunar Eclipse: Multi-Wavelength Spaceborne Observations of the January 21, 2019 Event. Remote Sensing. 16(22):4181. DOI: 10.3390/rs16224181.
2. Cai, W., Xu, T. Y., Shu, M., **Wu, Y. Z.*** (2024). Using the Moon for On-Orbit Absolute Radiometric Calibration of GaoFen-4 PMS. IEEE Transactions on Geoscience and Remote Sensing.62: 4601013.
3. Bian, C. F., Zhang, K. F., **Wu, Y. Z**. (2024). Mapping the spatial distributions of oxide abundances and Mg# on the lunar surface using multi-source data and a new ensemble learning algorithm. Planetary and Space Science, 245: 105894.
4. Lu, Y., Wang, W. W., Jiao，H. Y., Xu, T. Y., Chen, X. J., **Wu, Y. Z.*** (2024). Lunar south polar water cycle and water resources: Diurnal and spatial variations in surficial hydration from repeated Moon Mineralogy Mapper observations. Geophysical Research Letters, 51, e2023GL107499. https://doi.org/10.1029/2023GL107499.
5. Wang, W. W., Jin, Q., Chen, X., Jiao, H. Y., Cai, W., Lu, Y., Xu, T. Y., & **Wu, Y.Z.*** (2024). Character and spatial distribution of mineralogy at the lunar south polar region. Planetary and Space Science, 240, 105833. https://doi.org/10.1016/j.pss.2023.105833.
6. Yu, J. F., Zhao, H.*, Cloutis, E., Kurokawa, H., **Wu, Y. Z.*** (2024). Near-mid infrared spectroscopy of carbonaceous chondrites: Insights into spectral variation due to aqueous alteration and thermal metamorphism in asteroids. Icarus.
7. **Wu, Y. Z.**, Chai, Y. M., Lu,Y., Chen, X. J., Wang, W. W., Jin, Q. (2024). Visible and near-infrared spectral results of Chang'E-5 surficial and subsurface soils. Astronomy & Astrophysics. 682: A112. DOI: 10.1051/0004-6361/202347577.
8. Wang, P. Y., Cloutis, E., Zhang, X. P., Su, Y., **Wu, Y. Z.***. (2023). Quantitative Mineral of (99942) Apophis using reflectance spectroscopy. Meteoritics & Planetary Science.1399-1405.Shu M., Xu T.Y., Yan, L., Cai W., Yang S., Liu, C. B., Yang, H.Z., P. Zhang*, **Y. Wu***. Absolute radiometric calibration of PMS2 onboard Jilin-1 GP02 satellite using the Moon. IEEE Transactions on Geoscience and Remote Sensing. 2023, 61: 5405311.
9. Xu T., Cai W., Shu M., Zhang X., Zhang P., Liu C., Yang H. & **Y. Wu***. Disk-integrated and disk-resolved photometry of the Moon with GaoFen-4 space observations. Icarus. 2023, 405: 115696.
10. Wang, P. Y., Cloutis, E., Zhang, Q. W., **Y. Wu***. Quantitative Mineral Analysis of Ordinary Chondrites and Primitive Achondrites Using Reflectance Spectroscopy. Journal of Geophysical Research: Planets. 2022, 127: e2022JE007571.
11. Xu T. Y., Hapke B., Zhang X. P., **Y. Wu***, & Lu X. P. Spectrophotometry of the lunar regolith using the Chang'E-3 Panoramic Camera (PCAM). Astronomy & Astrophysics. 2022, 665, A15.
12. Lu Y., K. Edgett, B. Wu, Y. Wang, Z. Li, G. Michael, H. Yizhaq, Q. Jin, **Y. Wu***. Aeolian disruption and reworking of TARs at the Zhurong rover field site, southern Utopia Planitia, Mars. Earth and Planetary Science Letters. 2022, 595: 117785.
13. Duan A., **Y. Wu***, E. Cloutis, Jinfei YU, Shaolin Li, et al. Heating of carbonaceous materials: Insights into the effects of thermal metamorphism on spectral properties of carbonaceous chondrites and asteroids. Meteoritics & Planetary Science. 2021, 56: 2035-2046.
14. Lu Y., K. Edgett, **Y. Wu***. Ripples, transverse aeolian ridges, and dark-toned sand dunes on Mars: A case study in Terra Sabaea. Journal of Geophysical Research: Planets. 2021, 126:

e2021JE006953.
15. **Wu Y.**, Kührt, E., Grott, M., Qi Jin, et al. Chang'E-4 rover spectra revealing micro-scale surface thermophysical properties of the Moon. Geophysical Research Letters. 2021, 48(4): e2020GL089226.
16. **Wu Y.**, Q. Jin, C. Li, et al. Unveiling the secrets of the mid-infrared (3-5 μm) Moon. Geophysical Research Letters. 2021, 48(4): e2020GL088393.
17. Lu Y., **Y. Wu***, G. Michael, et al. Chronological sequence of the Chang'E-4 landing zone within Von Kármán crater. Icarus. 2021, 354: 114086.
18. Lu Y., **Y. Wu***, C. Li, et al. Seamless maps of major elements of the Moon: Results from high-resolution geostationary satellite. Research in Astronomy and Astrophysics. 2021, 21: 31.
19. Xu T., **Y. Wu**. In-Situ Spectrophotometric Properties from Chang'E 4 Rover Measurements. Lunar Planet. Sci. Conf. 2020, #1837.
20. Wang Z., **Y. Wu***, X. Zhang, Y. Lu. Mineralogy of northern nearside mare basalts. Research in Astronomy and Astrophysics. 2019, 19(4): 52(8pp).
21. **Wu Y.**, The 'super blood wolf Moon' from space. Nature Astronomy. 2019, 3(204).
22. **Wu Y.**, Z. Wang, Y. Lu. Space weathering of the Moon from in situ detection. Research in Astronomy and Astrophysics. 2019, 19(4): 51(10pp).
23. Lu Y., **Y. Wu***, G. Michael, et al. Young wrinkle ridges in Mare Imbrium: Evidence for very recent compressional tectonism. Icarus. 2019, 329: 24-33.
24. **Wu Y.**, Z. Wang, W. Cai, et al. The Absolute Reflectance and New Calibration Site of the Moon. The Astronomical Journal. 2018, 155(5): 213(18pp).
25. **Wu Y.**, B. Hapke. Spectroscopic observations of the Moon at the lunar surface. Earth and Planetary Science Letters. 2018, 484: 145-153.
26. **Wu Y.**, L. Li, X. Luo, et al. Geology, tectonism and composition of the northwest Imbrium region. Icarus. 2018, 303: 67-90.
27. Chen Y., C. Li, X. Ren, J. Liu, **Y. Wu***, et al. The thickness and volume of young basalts within Mare Imbrium. Journal of Geophysical Research: Planets. 2018, 123(2): 630-645.
28. Wang Z., **Y. Wu***, D. T. Blewett, et al. Submicroscopic metallic iron in lunar soils estimated from the in situ spectra of the Chang'E-3 mission. Geophysical Research Letters. 2017, 44(8): 3485-3492.
29. Zhang X., **Y. Wu***, Z. Ouyang, et al. Mineralogical Variation of the Late Stage Mare Basalts. Journal of Geophysical Research: Planets. 2016, 121(10): 2063-2080.
30. Zhang X., Z. Ouyang, **Y. Wu***, et al. Study of the continuum removal method for the Moon Mineralogy Mapper (M3) and its application to Mare Humorum and Mare Nubium. Research in Astronomy and Astrophysics. 2016, 16(7): 136-145.
31. Tang X, X. Luo, Y. Jiang, A Xu, Z. Wang, X. Zhang, Y. Chen, X. Zhang, W. Cai, **Y. Wu***. Estimation of lunar FeO abundance based on imaging by LRO Diviner. Research in Astronomy and Astrophysics. 2016, 16(2): 29-34.
32. Wang C., **Y. Wu**., R. Shi, et al. The improvement of cross-calibration of IIM data and band selection for the FeO inversion. Science in China Series G. 2013, 56 (11): 2216-2225.
33. **Wu Y.**, S. Besse, J. Li, et al. Photometric correction and in-flight calibration of Chang'E-1 Interference Imaging Spectrometer (IIM) data. Icarus. 2013, 222 (1): 283-295.
34. **Wu Y.** Major elements and Mg# of the Moon: Result from Chang'E-1 Interference Imaging

Spectrometer(IIM) data. Geochimica Et Cosmochimica Acta. 2012, 93: 214-234.
35. **Wu Y.**, B. Xue, B. Zhao, et al. Global Estimate of Lunar Iron and Titanium Contents from the Chang'E-1 IIM data. Journal of Geophviscal Research. 2012, 117: 1-23.
36. **Wu Y.**, Y. Zheng, Y. Zou, et al. A preliminary experience in the use of Chang'E-1 IIM data. Planetary and Space Science. 2010, 58(14):1922-1931.
37. 黄小桐，吴昀昭，等，硅质小行星矿物定量反演研究，空间科学与试验学报，2024.
38. 黄海涛，**吴昀昭***，王立，矫恒越，李彦昭，雷开宇. 潜在威胁小行星矿物定量反演. 深空探测学报(中英文). 2024, 11(6):605-612.
39. 张沁葳，张鹏飞，王鹏越，姜特，卢瑜，韩慧杰，庞荣华，李阳，张昊，**吴昀昭***. 太空风化对硅酸盐小行星反射光谱的影响. 天文学报. 2024.
40. 黄海涛，**吴昀昭***. 木星特洛伊小行星研究综述. 地球与行星物理论评(中英文), 2024, 55(02): 175-183.
41. 余金霏，赵海斌，**吴昀昭***. 基于碳质球粒陨石的小行星水蚀变光谱学研究. 深空探测学报（中英文）. 2023.
42. 胡柯, 杜文亮, 解延浩, **吴昀昭***. 基于月球的吉林一号卫星在轨辐射定标研究. 中国空间科学技术, 2023:1-9.
43. **吴昀昭***, 徐天弈, 温世博, 矫恒越, 徐小萌, 秦楠楠等. 小行星目标特性遥感探测. 空间碎片研究. 2021, 21(4), 11.
44. 段阿晨，**吴昀昭***，Cloutis E. A.，李少林，赵海斌，季江徽. 碳质球粒陨石有机物红外光谱研究. 天文学报. 2021, 62(2): 13-21.