

Tianning Su

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EDUCATION

2016-2021 **Ph.D.** in Atmospheric Sciences, University of Maryland, College Park, USA,
Dissertation: Remote sensing of aerosol and the planetary boundary layer, and exploring
their interactions. [[Link](#)]

2012-2016 **B.S.** in Atmospheric Sciences, Peking University, China

PROFESSIONAL EXPERIENCE

2023-Present Climate Analysis Group, Lawrence Livermore National Laboratory, USA
Position: **Postdoctoral Research Staff Member**

2022-2023 Earth System Science Interdisciplinary Center, University of Maryland, USA
Position: **Postdoctoral Researcher**

HONORS & AWARDS

- 2022 Charles Caramello Distinguished Dissertation Award, UMD(Top 4 in all disciplines per year)([News](#))
- 2021 AOSC Best Dissertation Award, UMD
- 2021 Ann G. Wylie Dissertation Fellowship, UMD
- 2021 Outstanding Overseas Chinese Student Award
- 2020 Best Student Oral Presentation, 100th AMS Annual Meeting ([News](#))
- 2020 Helmut Landsberg Outstanding Peer Reviewed Publication Award, UMD
- 2020 Graduate School Summer Fellowship, UMD
- 2019 Green Fund Award, UMD
- 2016 Dean's Fellowship, UMD
- 2016 Excellent Thesis for Undergraduate Student, AOS, Peking University

PROFESSIONAL ACTIVITIES

- Panelist, NASA ROSES Panel review; Reviewer for proposals of NASA and NSF
- Reviewer for 22 *Peer-reviewed journals* (Total reviews: 103)
- Guest Editor for *Remote Sensing and Atmosphere*
- Primary Organizer for the Special Issue, *Remote Sensing of Aerosols, PBL, and Clouds* [[Link](#)]
- Board Member 2021-2023: *Chinese-American Oceanic and Atmospheric Association (COAA)*
- Member: *American Geophysical Union; American Meteorological Society*

RECENT INVITED TALKS

1. Coupling between cloud and land surface changes aerosol-cloud interactions, *AGU Annual Meeting 2023*, 12/2023. (Invited Oral Presentation)

2. Decoding the Dialogue Between Clouds and Land, *Stanford University, Earth System Science*, 11/2023. (In-person Seminar)
3. Coupling between aerosol, boundary layer, and cloud, *Lawrence Livermore National Laboratory, Climate Analysis Group*, 03/2023. (Virtual Seminar)
4. New remote sensing methods to determine PBL depth and coupling of continental clouds with surface from lidar, *NASA, the AeroCenter-Cloud Precipitation Center of GSFC*, 02/2022. (Virtual Seminar)

PUBLICATIONS: ([Google Scholar](#); [ResearchGate](#))

My research, centered on Planetary Boundary Layer, explores its interactions with clouds, aerosols, and land. I wish to offer a comprehensive view of its role in the climate system through a series of publications.

First authors / Corresponding author:

1. **Su, T.**, Zhang, Y., and Tian, J, 2024: Boundary-Layer-Coupled and Decoupled Clouds in Global Storm3 Revolving Models: Comparisons with Field Observations. Upon Submission to *JGR: Atmospheres*
2. **Su, T.** et al. 2024: Constraining Effects of Aerosol-Cloud Interaction by Accounting for Coupling between Cloud and Land Surface. *Science Advances* (Under 2nd round revisions)
3. **Su, T.** and Zhang, Y. 2024: Deep Learning Driven Simulations of Boundary Layer Cloud over the US Southern Great Plains. Under Discussion for *Geoscientific Model Development* [[Link](#)]
4. **Su, T.** and Zhang, Y. 2024: Deep-Learning-derived Planetary Boundary Layer Height from Conventional Meteorological Measurements. *ACP* (Under Revision with Positive Reviews) [[Link](#)]
5. Roldán, N.†, **Su, T.***, Li, Z.* 2024: Refining Planetary Boundary Layer Height Retrievals from Micropulse-lidar at Multiple ARM Sites Around the World. *JGR: Atmospheres* (Under Revision with Positive Reviews) (†supervised student, *corresponding author)
6. **Su, T.** et al. 2024: Observation and Reanalysis Derived Relationships Between Cloud and Land Surface Fluxes Across Cumulus and Stratiform Coupling Over the Southern Great Plains. *Geophysical Research Letters* (In Press) [[Link](#)]
7. **Su, T.** and Z. Li, 2024: Decoding the dialogue between clouds and land, *Eos* [[Link](#)] ([DOE ASR Highlight](#))
8. **Su, T.**, Li, Z., Zheng, Y., 2023. Cloud-surface coupling alters the morning transition from stable to unstable boundary layer. *Geophys. Res. Lett.* [[Link](#)] ([DOE ASR Highlight](#))
9. **Su, T.**, Li, Z., Zheng, Y., Wu, T., Wu, H., and Guo, J, 2022. Aerosol-boundary layer interaction modulated entrainment process. *npj Climate and Atmospheric Science*. [[Link](#)] ([DOE ASR Highlight](#))
10. **Su, T.**, Zheng, Y. and Li, Z, 2022. Methodology to determine the coupling of continental clouds with surface and boundary layer height under cloudy conditions from lidar and meteorological data. *Atmos. Chem. Phys.* [[Link](#)] ([Highlight in DOE ARM Annul Report](#); [DOE ASR Highlight](#))
11. **Su, T.**, Li, Z. and Kahn, R, 2020. A new method to retrieve the diurnal variability of planetary boundary layer height from lidar under different thermodynamic stability conditions. *Remote Sensing of Environment*. [[Link](#)] [[Dataset](#)]
12. **Su, T.** et al, 2020. The significant impact of aerosols vertical structure on lower-atmosphere stability and its critical role in aerosol-PBL interaction. *Atmos. Chem. Phys.* [[Link](#)] ([DOE ASR Highlight](#))
13. **Su, T.** et al, 2020. Abnormally shallow boundary layer associated with severe air pollution during the COVID-19 lockdown in China. *Geophysical Research Letters*. [[Link](#)]

14. Su, T., Laszlo, I., Li, Z., Wei, J. and Kalluri, S, 2020. Refining aerosol optical depth retrievals over land by constructing the relationship of spectral surface reflectances through deep learning: Application to Himawari-8. *Remote Sensing of Environment*. [[Link](#)] ([UMD Highlight](#))
15. Su, T., Li, Z. and Kahn, R, 2018. Relationships between the planetary boundary layer height and surface pollutants derived from lidar observations over China: regional pattern and influencing factors. *Atmos. Chem. Phys.* [[Link](#)] ([UMD Highlight](#))
16. Su, T. et al., 2017. An intercomparison of long-term planetary boundary layer heights retrieved from CALIPSO, ground-based lidar, and radiosonde measurements over Hong Kong. *J. Geophys. Res. Atmos.* [[Link](#)]
17. Su, T. et al., 2017. An intercomparison of AOD-converted PM2.5 concentrations using different approaches for estimating aerosol vertical distribution. *Atmos. Environ.* [[Link](#)]
18. Su, T. et al., 2017. The Evolution of Springtime Water Vapor Over Beijing Observed by a High Dynamic Raman Lidar System: Case Studies. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*. [[Link](#)]
19. Guo, J. +*, Su, T. +*. et al. 2019. Declining Summertime Local-Scale Precipitation Frequency Over China and the United States, 1981-2012: The Disparate Roles of Aerosols. *Geophys. Res. Lett.* (*corresponding author; +co-first author) [[Link](#)]
20. Guo, J.*, Su, T.*, et al. 2017. Declining frequency of summertime local-scale precipitation over eastern China from 1970 to 2010 and its potential link to aerosols. *Geophys. Res. Lett.* (*corresponding author) [[Link](#)]

Co-author:

21. Li, Z. and Su, T., 2024, Revealing the coupling process between aerosol, PBL, and cloud: Identification and mechanisms. In *AIP Conference Proceedings* (Vol. 2988, No. 1). AIP Publishing. [[Link](#)]
22. Wang, J., Su, H., Wei, C., Zheng, G., Wang, J., Su, T. et al. 2023. Black-carbon-induced regime transition of boundary layer development strongly amplifies severe haze. *One Earth*. [[Link](#)]
23. Xian, T., Guo, J., Zhao, R., Su, T. and Li, Z. 2023. The impact of urbanization on mesoscale convective systems in the Yangtze River Delta region of China: Insights gained from observations and modeling. *J. Geophys. Res. Atmos.* [[Link](#)]
24. Jin, X., Li, Z., Wu, T., Wang, Y., Su, T. et al, 2022. Differentiating the contributions of particle concentration, humidity, and hygroscopicity to aerosol light scattering at three large cities in China, *J. Geophys. Res. Atmos.* [[Link](#)]
25. Jin, X., Li, Z., Wu, T., Wang, Y., Cheng, Y., Su, T. et al, 2022. The different sensitivities of aerosol optical properties to particle concentration, humidity, and hygroscopicity between the surface level and the upper boundary layer in Guangzhou, China. *Science of The Total Environment*. [[Link](#)]
26. Zheng, Y., H. Zhang, D. Rosenfeld, S.S. Lee, T. Su, and Z. Li., 2021, Idealized large-eddy simulations of stratocumulus advecting over cold water. Part 1: Boundary layer decoupling, *Journal of the Atmospheric Sciences*. [[Link](#)]
27. Guo, J., Zhang, J., Yang, K., Liao, H., Zhang, S., Huang, K., Lv, Y., Shao, J., Yu, T., Tong, B., Li, J., Su, T. et al, 2021. Investigation of near-global daytime boundary layer height using high-resolution

radiosondes: First results and comparison with ERA-5, MERRA-2, JRA-55, and NCEP-2 reanalyses.

Atmospheric Chemistry and Physics. [[Link](#)]

28. Wei, J., Li, Z., Xue, W., Sun, L., Fan, T., Liu, L., **Su, T.** and Cribb, M., 2021. The ChinaHighPM10 dataset: generation, validation, and spatiotemporal variations from 2015 to 2019 across China. *Environment International*. [[Link](#)]
29. Wei, J., Li, Z., Lyapustin, A., Sun, L., Peng, Y., Xue, W., **Su, T.** and Cribb, M., Reconstructing 1-km-resolution high-quality PM_{2.5} data records from 2000 to 2018 in China: spatiotemporal variations and policy implications. *Remote Sensing of Environment*. [[Link](#)]
30. Guo, J., Chen, X., **Su, T.** et al. 2020. The climatology of lower tropospheric temperature inversions in China from radiosonde measurements: roles of black carbon, local meteorology, and large-scale subsidence. *Journal of Climate* [[Link](#)]
31. Han, W., Li, Z., Wu, F., Zhang, Y., Guo, J., **Su, T.** et al. 2020. The mechanisms and seasonal differences of the impact of aerosols on daytime surface urban heat island effect. *Atmos. Chem. Phys.* [[Link](#)]
32. Han, W., Li, Z., Guo, J., **Su, T.**, Chen, T., Wei, J. and Cribb, M., 2020. The Urban–Rural Heterogeneity of Air Pollution in 35 Metropolitan Regions across China. *Remote Sensing* [[Link](#)]
33. Wei, J., Li, Z., Sun, L., Peng, Y., Zhang, Z., Li, Z., **Su, T.** et al. 2019. Evaluation and uncertainty estimate of next-generation geostationary meteorological Himawari-8/AHI aerosol products. *Science of The Total Environment* [[Link](#)]
34. Chu, Y., Li, J., Li, C., Tan, W., **Su, T.** et al. 2019. Seasonal and diurnal variability of planetary boundary layer height in Beijing: Intercomparison between MPL and WRF results. *Atmospheric Research* [[Link](#)]
35. Li, J., Li, C., Zhao, C. and **Su, T.**, 2016. Changes in surface aerosol extinction trends over China during 1980–2013 inferred from quality-controlled visibility data. *Geophys. Res. Lett.* [[Link](#)]

TEACHING EXPERIENCE:

Teaching Assistant and Occasional Lecturer at University of Maryland:

AOSC 424: *Remote Sensing of the Atmosphere and Ocean*, 2021 (undergraduate-level course);

AOSC 625: *Remote Inference of Atmospheric Properties by Satellite*, 2021 (graduate-level course).

RESEARCH PROJECTS:

- Department of Energy, Science Focus Areas: (Related Papers: 1, 3, 4, 6)
Tying in High Resolution E3SM with ARM Data (THREAD), 2023 – 2026, Participant
- Department of Energy, Atmospheric System Research: DE-SC0022919: (Related Papers: 5, 6-8, 10)
Investigation of Surface-Cloud Coupling over Land Using ARM Observations and Model Simulations, 2022 – 2025, Participant and Key Contributor for Proposal
- National Science Foundation: AGS2126098: (Related Papers: 2, 6, 9, 10)
Impact of Surface-Cloud Coupling on Aerosol-Radiation- Cloud-Interactions for Boundary-layer Clouds over Land and Oceans, 2021 – 2024, Participant and Key Contributor for Proposal