

Tianning Su

Climate Analysis Group, Lawrence Livermore National Laboratory, Livermore, United States

Email: su10@llnl.gov; Homepage: <https://devarding.github.io/>

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
2014 President's Fellowship for Undergraduate Research, Peking University
2012 National First Place in 28th China Mathematical Olympiad

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. et al. Constraining Effects of Aerosol-Cloud Interaction by Accounting for Coupling between Cloud and Land Surface. Under 2nd round review for *Science Advances*
2. Su, T. and Zhang, Y. Deep Learning Driven Simulations of Boundary Layer Cloud over the US Southern Great Plains. Under Review for *Geoscientific Model Development* [[Link](#)]
3. Su, T. and Zhang, Y. Deep-Learning-derived Planetary Boundary Layer Height from Conventional Meteorological Measurements. *Atmospheric Chemistry and Physics* (Under Revision with Positive Reviews) [[Link](#)]
4. Roldán, N.†, Su, T.*, Li, Z.*. Refining Planetary Boundary Layer Height Retrievals from Micropulse-lidar at Multiple ARM Sites Around the World. *Journal of Geophysical Research: Atmospheres* (Under Revision with Positive Reviews) (†supervised student, *corresponding author)
5. Su, T. et al. 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](#)]
6. Su, T., and Z. Li, 2024: Decoding the dialogue between clouds and land, *Eos* [[Link](#)] ([DOE ASR Highlight](#))
7. 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](#))
8. Su, T., Li, Z., Zheng, Y., Wu, T., Wu, H., and Guo, J., 2022a. Aerosol-boundary layer interaction modulated entrainment process. *npj Climate and Atmospheric Science*. [[Link](#)] ([DOE ASR Highlight](#))
9. Su, T., Zheng, Y. and Li, Z., 2022b. 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](#))
10. Su, T., Li, Z. and Kahn, R., 2020a. 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](#)]
11. Su, T. et al., 2020b. 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](#))

12. Su, T. et al., 2020c. Abnormally shallow boundary layer associated with severe air pollution during the COVID-19 lockdown in China. *Geophysical Research Letters*. [[Link](#)]
13. Su, T., Laszlo, I., Li, Z., Wei, J. and Kalluri, S., 2020d. 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](#))
14. 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](#))
15. Su, T. et al., 2017a. 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](#)]
16. Su, T. et al., 2017b. An intercomparison of AOD-converted PM_{2.5} concentrations using different approaches for estimating aerosol vertical distribution. *Atmos. Environ.* [[Link](#)]
17. Su, T. et al., 2017c. 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](#)]
18. 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](#)]
19. 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:

20. 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](#)]
21. 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](#)]
22. 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](#)]
23. 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](#)]
24. 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](#)]
25. 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](#)]

26. 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](#)]
27. 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](#)]
28. 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](#)]
29. 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](#)]
30. 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](#)]
31. 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](#)]
32. 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](#)]
33. 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](#)]
34. 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:
Tying in High Resolution E3SM with ARM Data (THREAD), 2023 – 2026, Participant
- Department of Energy, Atmospheric System Research: DE-SC0022919
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
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