Hengheng Zhang

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Ph.D. in Atmospheric Physics Karlsruhe Institute of Technology (KIT)
Karlsruhe Shangqiu, Henan April 04, 1992

Highly-motivated Ph.D. student in atmosphere with good experience of filed campaign and data analysis. Proficient in LIDAR retrieval algorithm and program, and enthusiastic about computer technology. Now I am doing my research work at Institute of Meteorology and Climate Research Atmospheric Aerosol Research (IMK-AAF) at Karlsruhe Institute of Technology (KIT) using 3-D Scanning LIDAR with financial support of MOSES Project. **During my Ph.D study, I proposed a method to retrieved lidar ratio based on scanning elastic aerosol lidar.** The details information about this method can be found in here.

Competences & Languages

Programming	Python, Matlab
Tools	Latex, Markerdown,Git.
Data Analysis	Pandas; xarray; numpy; Matplotlib; Cartopy; Folium.
Languages	**English** — reading & writing (good); listening & speaking (good)

Education

present October 2019	School of Physics, **Karlsruhe Institute of Technology (KIT)** Ph.D. (candidate; to graduate in the May, 2023.) in Atmosphere Physics
June 2019 September 2016	School of Atmosphere Physics, **Nanjing University of Information Science and Technology** Master of Science in Atmosphere Remote Sensing and Sounding
June 2016 September 2012	School of Physics and optoelectronic, **Nanjing University of Information Science and Technology** Bachelor of Engineering in Optical Information Science and Technology

Research Experience

- **Saharan dust plume investigation by remote sensing, in-situ measurement and transportation model**
  4 Saharan dust cases were investigated combing remote sensing (lidar & sun photometer), in-situ measurement (OPC & APS), and transportation model (ICON-ART) to study dust plume proprieties and to validate model output in the western of Germany.
- **Study the boundary layer dynamic and its correlation with boundary layer aerosol**
  The boundary layer dynamic and urban air quality were studies by remote sensing (scanning aerosol lidar, wind lidar, and radiometer), radiosonde, ground in-situ measurement, and UAV measurement. Those observation data was used to validate large eddy simulation (PALM-4U).
- **Validate lidar retrieval and developed 3D-Scanning aerosol analysis software.**
  Validated LIDAR retrieval method using different software (including Raymetrics, Single Calculus Chain (SCC, Earlinet) and my own software) and got consistent results. Then the lidar retrievals were validated by radiosonde COBALD measurement and in-situ measurement. Finally, an automatic data analysis software was developed based python.
- **Proposed a method to retrieve LIDAR ratio based on scanning elastic LIDAR.**
  The LIDAR ratio can be retrieved from elastic scanning or multiple angle LIDAR by using Klett-Fernald method. The details can be found in publication: `Comparison of Scanning LiDAR with Other Remote Sensing Measurements and Transport Model Predictions for a Saharan Dust Case`.
- **Constructed an innovative multiple-field-of-view Lidar system to study multiple-scattering of cloud.**
  Proposed a new method to retrieve liquid cloud microphysical properties based on multiple scattering by using Monte Carlo method and used a MFOV Lidar system to valid this method.

Project

- **Participated in research projects: "Module Observation Solution for Earth System (MOSES)" (Ph.D financial support project).**
  Under the Financial support of MOSES project, I studied **Saharan dust plume, the evolution of boundary layer and its impact of surface level aerosol concentrations in the downtown of Stuttgart as well as the vertical aerosol distribution in the city of Jülich** combining a scanning aerosol LIDAR, in situ measurements. I also participated in Swabian MOSES at Rottenburg to study hydrological extrems and heat wave in 2021 as well as several field campaign conducted in Karlsruhe.
- **Participated in research projects: "Atmospheric Profiling Synthetic Observation System (APSOS)" (Master thesis financial support project).**
  Took part in this research work firstly in Golmud, Qinghai Province (altitude: 2800 m) in 2015. From then on, I have often conducted field experiments in Huainan, Anhui Province and Yangbajing, Tibet (altitude: 4300 m), mainly maintaining the Lidar system and improving the detectability of the Lidar system, especially for aerosol-cloud-water vapor Lidar system developed by IAP, CAS.

Publications

- **Zhang, H.**, Wagner, F., Saathoff, H., Vogel, H., Hoshyaripour, G., Bachmann, V., Förstner, J., Leisner, T., "*Comparison of Scanning LiDAR with Other Remote Sensing Measurements and Transport Model Predictions for a Saharan Dust Case,*" 2022, Remote Sensing.
- **Zhang, H.**, Huang, W., Shen, X., Ramisetty, R., Leisner, T., Saathoff, H., "*Boundary layer dynamics, aerosol composition, and air quality in the urban background of Stuttgart in winter,*" 2022, International Laser Radar Conference (ILRC30).
- **Zhang, H.**, Bu, L., Gao, H., Huang, X., Kumar, R., Shan, C., Wang, J., Gu, J., Lian, X., Zheng, Q., Zhu, J. & Wu, X.-P., "*Retrieving homogeneous liquid cloud microphysical properties using multiple-field-of-view lidar,*" 2019, Journal of Applied Remote Sensing.
- Michael Kunz et.al., "*Swabian MOSES 2021: An interdisciplinary field campaign for investigating convective storms and their event chains,*" 2022, in Frontiers in Earth Science.
- Xie, J., Huang, X., Bu, L., **Zhang, H.**, Mustafa, F., "*Detection of Water Cloud Microphysical Properties Using Multi-scattering Polarization Lidar,*" 2020, Meteorology and Atmospheric Physics.
- Dai, Y., Pan, W., Hu, X., Bai, Z., Ban, C.,**Zhang, H.**, Che, Y., "*An approach for improving the NRLMSISE-00 model using a radiosonde at Golmud of the Tibetan Plateau,*" 2020,Current Optics and Photonics.
- (and 3 more AGU Fall meeting abstract)