Jonghyuk Lee

Current position: Postdoctoral Researcher (2022.05. ~ Present)

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Education

Mar. 2013 ~ Feb. 2022	**Yonsei University** Department of Atmospheric Sciences	Seoul, Korea

Thesis: Development of a cloud top height retrieval algorithm using simultaneous observations from the Himawari-8 and FengYun-4A geostationary satellites
Advisor: Dong-Bin Shin

Ph.D. in Atmospheric Sciences

Mar. 2007 ~ Feb. 2013	**Yonsei University** Department of Atmospheric Sciences	Seoul, Korea

B.S. in Atmospheric Sciences

Research Interests

- Machine learning-based spatiotemporal gap-filling and global XCO_2 estimation
- Estimations of greenhouse gas emission characteristics using ground-based FTIR measurements and satellite measurements
- Satellite-based global monitoring and carbon cycle analysis of atmospheric CO_2
- High-resolution climate variables downscaling for physical climate risk assessment

Peer-Reviewed Publications

1. **Lee, J.**, S. Jeong, Y. J. Kim, S. Roh, J. Kim, and H. Jin (2025): Synergy of multiple-satellite measurements to fill the gap of global XCO_2. *Journal of Geophysical Research: Atmospheres,* 130(16), e2024JD042809. https://doi.org/10.1029/2024JD042809

2. **Lee, J.**, S. Jeong, H. Park, J. Hong, J. Kim, M. M. Frey, I. Morino, H. Ohyama, F. Hase, M. Mermigkas, M. Zhou, Y. Té, and C. M. Roehl (2024): Emission characteristics of greenhouse gases and air pollutants in Northern Hemisphere cities: Comprehensive assessment using ground-based Fourier Transform Spectrometers. *Journal of Geophysical Research: Atmospheres*, 129(12), e2023JD040562. https://doi.org/10.1029/2023JD040562

3. Park, H., S. Jeong, M. K. Sha, **J. Lee,** and M. M. Frey (2024): Comparisons of greenhouse gas observation satellite performances over Seoul using a portable ground-based spectrometer. *Geophysical Research Letters,* 51(14), e2024GL109334. https://doi.org/10.1029/2024GL109334

4. **Lee, J.**, and D.-B. Shin (2022): Impacts of increasing CO_2 concentration on one-dimensional variational (1D-Var) temperature retrievals from AIRS measurements. *Asia-Pacific Journal of Atmospheric Sciences*, 58(4), 577-589. https://doi.org/10.1007/s13143-022-00276-3

5. **Lee, J.**, and D.-B. Shin (2021): Algorithm for improved stereoscopic cloud-top height retrieval based on visible and infrared bands for Himawari-8 and FY-4A. *Remote Sensing*, 13(24), 4993. https://doi.org/10.3390/rs13244993

6. **Lee, J.**, D.-B. Shin, C.-Y. Chung, and J. Kim (2020): A cloud top-height retrieval algorithm using simultaneous observations from the Himawari-8 and FY-2E satellites. *Remote Sensing*, 12(12), 1953. https://doi.org/10.3390/rs12121953

Peer Reviewer Experiences (In the alphabetical order)

- Asia-Pacific Journal of Atmospheric Sciences (2023)
- Atmosphere (2025)
- Environmental Research (2024)
- Remote Sensing of Environment (2023)
- Remote Sensing (2025)

Technical Skills & Experiences

- **Satellite-based remote sensing measurements**
  - GHG satellites: OCO-2/OCO-3, GOSAT/GOSAT-2, Sentinel-5P TROPOMI
  - Meteorological satellites: Himawari-8, FY-2E, FY-4A, AIRS, AMSU-A
- **Ground-based FTIR remote sensing measurements**
  - TCCON (IFS125HR)
  - COCCON (EM27/SUN)
- **Programming languages**
  - Proficient: Python, IDL, Fortran 90

- Basic: MATLAB
- **Machine learning applications**
    - Spatiotemporal gap-filling for satellite-based XCO_2 measurements
    - Super-resolution for physical climate risk assessment

Conference Presentations

1. **Lee, J.**, S. Jeong, Y. J. Kim, S. Roh, J. Kim, and H. Jin, 2025: A machine learning approach to fill the gap in global XCO_2 using multiple satellite measurements, 21st International Workshop on Greenhouse Gas Measurements from Space (IWGGMS-21), Takamatsu, Japan, 9-12 June 2025.

2. **Lee, J.**, S. Jeong, Y. J. Kim, J. Hong, Y.-R. Lee, H. Park, J. Kim, and S. Kim, 2024: Global mapping of XCO_2 from OCO-2 and TROPOMI measurements based on machine learning techniques: The new way to generate XCO_2 data from incomplete sampling, COSPAR 2024 45th Scientific Assembly, Busan, Korea, 13-21 July 2024.

3. **Lee J.**, S. Jeong, H. Park, J. Kim, and J. Hong, 2023: Analyzing greenhouse gas emissions characteristics using the COllaborative Carbon Column Observing Network (COCCON), NDACCIRWG-TCCON-COCCON Annual Meeting 2023, Brussels, Belgium, 12-16 June 2023.

4. **Lee J.**, D.-B. Shin, J. Kim, and C.-Y. Chung, 2019: Development of a cloud top height retrieval algorithm from two geostationary satellites, Himawari-8 and FY-2E, The EGU General Assembly 2019, Vienna, Austria, 7-12 April 2019.

5. **Lee J.**, D.-B. Shin, J. Kim, and C.-Y. Chung, 2018: A prototype cloud top height retrieval algorithm from two geostationary satellites, 9th Workshop of the International Precipitation Working Group (IPWG-9), Seoul, Korea, 29-31 October 2018.

6. **Lee, J.**, and D.-B. Shin, 2017: Uncertainty of temperature sounding caused by the variation of CO concentration, The 21th international TOVS Study Conference (ITSC-21), Darmstadt, Germany, 29 September-5 December 2017.

7. **Lee, J.**, and D.-B. Shin, 2015: Bias correction for AMSU-A radiance data assimilation in KMA numerical weather prediction system, 2015 EUMETSAT Meteorological Satellite Conference, Toulouse, France, 21-25 September 2015.

Awards

- Encouragement Award, the 5th Student Competition in Research using Meteorological Satellite, Korea (Nov. 2019)
- Best Poster Presentation Award, Korean Meteorological Society Fall Meeting, Korea (Oct.

2018)

Teaching Experiences

- **Teaching Assistant**, Department of Atmospheric Sciences, Yonsei University
    - Exploring the Atmosphere (Fall 2017)
    - Atmospheric Physics (Spring 2015)
    - Satellite Meteorology (Spring 2013)