Curriculum Vitae

Min-Gyu Seong

Senior Researcher
Environmental Planning Institute, Seoul National University, South Korea
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Education

2017. 9 – 2022. 8: Ph.D. (Climate Change)

Pohang University of Science and Technology, Pohang, Korea

Advisor: Prof. Seung-Ki Min

2014. 3 – 2016. 2: Master of Science (Atmospheric Sciences)

Kongju National University, Gongju, Korea

Advisor: Prof. Myoung-Seok Suh

2008. 3 – 2014. 2: Bachelor of Science (Atmospheric Sciences)

Kongju National University, Gongju, Korea

Honors: graduation with highest honor (rank: 1/48)

Research interests

Detection and attribution, Extreme event attribution, Compound extremes, Observational constraints, Bayesian analysis, AI-based terrestrial carbon cycle

Research highlights

One study published in the *Journal of Climate* (2021) revealed for the first time that greenhouse gas forcing can be separated from other external forcings, such as anthropogenic aerosols and natural forcings, in observed extreme temperature changes at a continental and regional scale. This result has made an important contribution to the IPCC Sixth Assessment Report released in 2021. Another study published in the *Journal of Climate* (2022) devised a new Bayesian attribution method which provides improved detectability of greenhouse gas forcing in extreme temperatures in case of strong collinearity between external forcing signals and low signal-to-noise ratios. I have also led an event attribution analysis for a recent study of record-high tropical cyclone frequency over East Asia, published in *Bulletin of the American Meteorological Society* (2021), where we have identified the remote influence of Indian monsoon convection.

Research Experience

- Postdoctoral Researcher, Environmental Research Institute, Pohang University of Science and Technology, Korea (Jul. 2022 – Aug. 2024)
- Visiting researcher at Canadian Centre for Climate Modelling and Analysis (CCCma), Environment and Climate Change Canada (ECCC), Victoria, BC, Canada (advisor: Dr. Nathan Gillett, Jan. – Feb. 2024)
- Graphics Developer for Chapter 3 of the IPCC Sixth Assessment Report (AR6) WG1
- Researcher, Environmental Research Institute, Pohang University of Science and Technology, Korea (Mar. 2017 – Aug. 2017)

Publications [International Journal Papers]

Seong, M.-G., Y.-G. Ham, and coauthors: A Physics-Aware Machine Learning Framework for Robust Future Projections of Terrestrial Carbon Fluxes over the Korean Peninsula. *In preparation.*

Park, I.-H., **Seong, M.-G.**, S.-W. Yeh, S.-K. Min, Y.-G. Ham, and G. Wang: Observed warming constraint reveals overestimation of future regional extreme heat in current climate projections. *Nat. Commun*. *Under revision.*

8. **Seong, M.-G.**, S.-K. Min, and X. Zhang, 2022: A Bayesian attribution analysis of extreme temperature changes at global and regional scales. *J. Climate,* 35(24), 4589−4603, https://doi.org/10.1175/JCLI-D-22-0104.1.

7. Jo, S., **M.-G. Seong**, S.-K. Min, J.-S. Kug, S.-W. Yeh, S.-I. An, S.-W. Son, and J. Shin, 2022: Hysteresis behaviors in East Asian extreme precipitation frequency to CO2 Pathway. *Geophys. Res. Lett.*, 49, e2022GL099814, https://doi.org/10.1029/2022GL099814.

6. Min, S.-K., S. Jo, **M.-G. Seong**, Y.-H. Kim, S.-W. Son, Y.-H. Byun, F. C. Lott, and P. A. Stott, 2022: Human contribution to the 2020 summer successive hot-wet extremes in South Korea. *Bull. Amer. Meteor. Soc.*, 103, S90-97, https://doi.org/10.1175/BAMS-D-21-0144.1.

5. Kurniadi, A., E. Weller, S.-K. Min, and **M.-G. Seong**, 2021: Independent ENSO and IOD impacts on rainfall extremes over Indonesia. *Int. J. Climatol.*, 41, 3640-3656. https://doi.org/10.1002/joc.7040.

4. **Seong, M.-G.**, S.-K. Min, Y.-H. Kim, X. Zhang, and Y. Sun, 2021: Anthropogenic greenhouse gas and aerosol contributions to extreme temperature changes during 1951-2015, *J. Climate*, 34, 857-870, https://doi.org/10.1175/JCLI-D-19-1023.1.

3. Min, S.-K., **M.-G. Seong**, D.-H. Cha, M. Lee, F. C. Lott, A. Ciavarella, P. A. Stott, M.-K. Kim, K.-O. Boo, and Y.-H. Byun, 2021: Has global warming contributed to the largest number of

typhoons affecting Korea in September 2019? *Bull. Amer. Meteor. Soc.*, 102, S51-S57, https://doi.org/10.1175/BAMS-D-20-0156.1.

2. Patra, A., S.-K. Min, and **M.-G. Seong**, 2020: Climate variability impacts on global extreme wave heights: Seasonal assessment using satellite data and ERA5 reanalysis. *J. Geophys. Res. Oceans*, 125, e2020JC016754. https://doi.org/10.1029/2020JC016754.
1. **Seong, M.-G.**, M.-S. Suh, and C. K, 2017: Intercomparison of prediction skills of ensemble methods using monthly mean simulated by CMIP5 models. *Asia-Pacific J. Amos. Sci.*, 53(3), 339-351, https://doi.org/10.1007/s13143-017-0039-y.

Publications [Domestic Journal Papers]

5. Jo, H.-S., Y.-G. Ham, S.-H. Oh, J.-G. Lee, **M.-G. Seong**, D. Jo, S. Lim, S.-Y. Kang, S.-Y. Jeong, H.-J. Lee, S. Lee, and G. Kwon, 2025: Recent Advances in AI-based Global Climate Modeling and Forecasting. *Atmosphere*, 35(4), 585-603, https://doi.org/10.14191/Atmos.2025.35.4.585.
4. Suh, M.-S., T.-J. Kim, J.-B. Ahn, S.-K. Min, D.-H. Cha, and **M.-G. Seong**, 2021: Projection of temperature changes for the mid 21st century using simulated temperature data by regional climate models over South Korea. *Journal of Climate Research*, 16(3), 211-228, https://dx.doi.org/10.14383/cri.2021.16.3.211.
3. **Seong, M.-G.**, C. K, and M.-S. Suh, 2015: Inter-comparison of prediction skills of multiple linear regression methods using monthly temperature simulated by multi-regional climate models. *Atmosphere*, 25(4), 669-683, https://doi.org/10.14191/Atmos.2015.25.4.669.
2. **Seong, M.-G.**, S.-G. Oh, and M.-S. Suh, 2014: Simulation skills of RegCM4 forced by ECHAM6 for fine-scale regional climate over South Korea. *Journal of Climate Research*, 9(4), 283-302, https://doi.org/10.14383/cri.2014.9.4.283.
1. **Seong, M.-G.**, and M.-S. Suh, 2014: Characteristic of infrared and water vapor imagery for the heavy rainfall occurred in the Korean peninsula. *Korean Journal of Remote Sensing*, **30(4)**, 465-480, https://doi.org/10.7780/kjrs.2014.30.4.5.

International Conference Presentations

11. Seong, M.-G., S.-K. Min, M. G. Donat, E. M. Fischer, and A. D. King: Assessing irreversible increase of hoy/dry and hot/wet compound extreme events in a post-net-zero climate. 15th International Meeting on Statistical Climatology (IMSC), Toulouse, France, Jun., 2024. (Oral)
10. Seong, M.-G., and S.-K. Min: Irreversibility of temperature-precipitation compound extreme events under SSP1-1.9 scenario. IRCC-KIST-IPRC Joint Workshop on Climate Change and Prediction, Honolulu, Hawaii, Jan., 2023. (Oral)

9. Seong, M.-G., and S.-K. Min: Irreversibility of temperature and precipitation-related compound extreme events under SSP1-1.9 scenario. Asia Oceania Geosciences Society (AOGS), online, Aug., 2022. (Oral)
8. Seong, M.-G., S.-K. Min, Y.-H. Kim, X. Zhang, and Y. Sun: Detecting anthropogenic greenhouse gas and aerosol influences on the observed changes in extreme temperatures during 1951-2015. American Geophysical Union 2021 Fall meeting (AGU 2021), online, Dec., 2021. (Poster)
7. Seong, M.-G., S.-K. Min, Y.-H. Kim, X. Zhang, and Y. Sun: Greenhouse gas and aerosol contributions to the observed global and regional changes in extreme temperature during 1951-2015. WCRP workshop on Extremes in Climate Prediction Ensembles (ExCPEns), online, Oct., 2021. (Poster)
6. Seong, M.-G., S.-K. Min, Y.-H. Kim, X. Zhang, and Y. Sun: Greenhouse gas and aerosol contributions to the observed global and regional changes in extreme temperature changes. European Geosciences Union General Assembly 2021 (EGU 2021), online, Apr., 2021. (Poster)
5. Seong, M.-G., and S.-K. Min: Attribution of global and regional changes in extreme temperature for 1951-2015. Institute of Advanced Studies in Climate Extremes and Risk Management, WCRP, Nanjing, China, Oct., 2019. (Oral)
4. Seong, M.-G., and S.-K. Min: A Bayesian detection and attribution analysis of extreme temperature changes. 14th International Meeting on Statistical Climatology (IMSC), Toulouse, France, Jun., 2019. (Oral)
3. Seong, M.-G., and S.-K. Min: Bayesian detection and attribution of extreme temperature changes. 4th NUIST-POSTECH-CITYU Joint Workshop on Climate Dynamics & Future Changes, 2018, Nanjing, China, Dec., 2018. (Poster)
2. Seong, M.-G., and S.-K. Min: A Bayesian attribution analysis of global and regional changes in extreme temperatures during 1951-2010. Stratosphere-troposphere Processes And their Role in Climate (SPARC) 2018 General Assembly 2018, Kyoto, Japan, Sep., 2018. (Poster)
1. Seong, M.-G., and S.-K. Min: A Bayesian attribution analysis of global and regional changes in extreme temperatures. Joint AMOS National Conference and the International Conference on South Hemisphere Meteorology and Oceanography (AMOS-ICSHMO 2018), Sydney, Australia, Feb., 2018. (Poster)

Award and Professional Training

- The outstanding participating graduate student, 2021 (Innovative Talent Education and Research Group for a Comfortable Environment in the 4th Industrial Revolution Society, BK21)
- Institute of Advanced Studies in Climate Extremes and Risk Management, WCRP, Nanjing, China, 21 October – 1 November 2019
- Outstanding Undergraduate Thesis Award, 2013

Skills and Techniques

- Artificial Intelligence: Machine learning (XGBoost, LightGBM), Deep learning (FFNN, CNN)
- Statistical analysis: optimal fingerprinting, Bayesian decision, Extreme value analysis, copulas, fraction of attributable risk, risk ratio
- Software: Python, R, NCL, Fortran, Linux shell script, GrADS, IDL