

# Fransiska K. Dannemann Dugick

Geophysical Detection Programs  
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## EDUCATION

- Ph.D. Geophysics, Southern Methodist University, 2021  
*Enhancing infrasonic signal detection and event localization through advanced computational methods*
- M.S. Geophysics, Southern Methodist University, 2016  
*Improving infrasound signal detection and event location in the western US using atmospheric modeling*
- B.A. Geology, Colorado College, 2012  
*Carbon and nitrogen in headwater catchments: temporal and spatial dynamics of a bi-model precipitation system, Jemez Mountains, New Mexico*

## APPOINTMENTS

- 2021– Sandia National Laboratories  
Senior R&D Geoscience Engineer, Geophysical Detection Programs
- 2016–20 Los Alamos National Laboratory  
Graduate Research Assistant, Geophysics Group
- 2014–16 Southern Methodist University  
Graduate Research Assistant, Department of Earth Sciences
- 2012 National Earthquake Information Center, USGS  
Post-Bac Intern

## PUBLICATIONS

### Journal Articles

- 2022 **Dannemann Dugick, F.K.**, Blom, P., Stump, B., Hayward, C., Arrowsmith, S., Carmichael, J., and Marcillo, O. “Ground truth infrasonic events and location capability at the Utah Test and Training Range, Utah USA” *Geophysical Journal International*  
<https://doi.org/10.1093/gji/ggac027>
- 2021 Carmichael, J., Thiel, A.D., Blom, P.S., Walter, J.I., **Dannemann Dugick, F.K.**, Arrowsmith, S.J., and Carr, C.G. “Seismic networks sample tens of thousands of infrasonic pulses sourced at McAlester Army Ammunition Plant, Oklahoma and reveal multi-scale variability” *Bulletin of the Seismological Society of America*. <https://doi.org/10.1785/0120210145>

- 2021 **Dannemann Dugick, F. K.**, van der Lee, S., Prieto, G. A., Dybing, S. N., Toney, L., and Cole, H. M. "ROSES: Remote Online Sessions for Emerging Seismologists." *Seismological Research Letters*. <https://doi.org/10.1785/0220200421>
- 2021 Bird, E. J., Bowman, D. C., Seastrand, D. R., Wright, M. A., Lees, J. M., and **Dannemann Dugick, F. K.** "Monitoring changes in human activity during the COVID-19 shutdown in Las Vegas using infrasound microbarometers." *The Journal of the Acoustical Society of America*, 149(3), 1796-1802. <https://doi.org/10.1121/10.0003777>
- 2020 **Dannemann Dugick, F. K.**, Stump, B. W., Blom, P. S., Marcillo, O. E., Hayward, C. T., Carmichael, J. D., and Arrowsmith, S. "Evaluating factors influencing infrasonic signal detection and automatic processing performance utilizing a regional network." *The Journal of the Acoustical Society of America*, 148(6), 3509-3526. <https://doi.org/10.1121/10.0002650>
- 2020 Blom, P., Euler, G., Marcillo, O., and **Dannemann Dugick, F.** "Evaluation of a pair-based, joint-likelihood association approach for regional infrasound event identification." *Geophysical Journal International*, 221(3), 1750-1764. <https://doi.org/10.1093/gji/ggaar05>
- 2018 Blom, P., **Dannemann, F. K.**, and Marcillo, O. "Estimation of explosive yield using regional distance infrasound." *The Journal of the Acoustical Society of America*, 143(3), 1807-1807. <https://doi.org/10.1093/gji/ggy258>
- 2018 Park, J., Che, I.Y., Stump, B., Hayward, C., **Dannemann, F.**, Jeong, S., Kwong, K., McComas, S., Oldham, H.R., Scales, M.M. and Wright, V. "Characteristics of infrasound signals from North Korean underground nuclear explosions on 2016 January 6 and September 9." *Geophysical Journal International* 214(3), 1865-1885. <https://doi.org/10.1093/gji/ggy252>
- 2014 Jones, E. S., Hayes, G. P., Bernardino, M., **Dannemann, F. K.**, Furlong, K. P., Benz, H. M., and Villaseñor, A. "Seismicity of the Earth 1900-2012 Java and vicinity" (No. 2010-1083-N). US Geological Survey.
- 2013 Hayes, G.P., Bernardino, M., **Dannemann, F.**, Smoczyk, G., Briggs, R.W., Benz, H.M., Furlong, K.P. and Villaseñor, A. "Seismicity of the Earth 1900-2012 Sumatra and vicinity" (No. 2010-1083-L). US Geological Survey.

#### Manuscripts under Review

- 2022 **Dannemann Dugick, F.K.**, Berg, E.M., Koch, C., Arrowsmith, S.J., and Albert, S.A., "10 Years of Progress in Seismoacoustic Data Fusion" Under review.

#### Manuscripts in Preparation

- 2022 Wilson, T., **Dannemann Dugick, F.K.**, Bowman, D., Kim, K., and Blom, P "Acoustic Research under the Source Physics Experiment" *in preparation for submission to Seismica*.
- 2022 Wynn, N., **Dannemann Dugick, F.K.**, Carmichael, J., and Theil, A., "Evaluating Spatio-temporal Trends in Infrasound Propagation Using Seismo-acoustic Arrivals From Repeating Explosions" *in preparation for submission to the Bulletin of the Seismological Society of America*.
- 2022 Wilson, T., **Dannemann Dugick, F.K.**, and Bowman, D., "Infrasound from Low Magnitude Earthquakes" *in preparation for submission to the Bulletin of the Seismological Society of America*.

## Technical Reports

- 2022 Wynn, N. and **Dannemann Dugick, F.K.**, “Modeling Urban Acoustic Noise in the Las Vegas, NV Region.” *SAND-Report No. 2022-12878*. Sandia National Lab.(SNL-NM), Albuquerque, NM (United States).
- 2022 **Dannemann Dugick, F.K.** and Bowman, D.C. “Data Report: TurboWave I and II Data Release.” *SAND-Report No. 2022-4039*. Sandia National Lab.(SNL-NM), Albuquerque, NM (United States).
- 2021 **Dannemann Dugick, F.K.**, Albert, S., Averbuch, G. and Arrowsmith, A. “Establishing a baseline for infrasound signal detection and event localization utilizing the 2018 Dynamic Networks Experiment.” *SAND-Report No. 2021-14222*. Sandia National Lab.(SNL-NM), Albuquerque, NM (United States).
- 2017 **Dannemann, F.K.** and Marcillo, O.E. “Schema for the LANL infrasound analysis tool, infrapy” *LA-UR-17-23067*.
- 2017 “An Education in the Politics of Science.” *Seismological Research Letters* 89 (2A), 313–314. <https://doi.org/10.1785/0220180004>

## Open-Source Software Packages

- 2021 **Dannemann Dugick, F.**, Toney, L and Goerzen, C. “fdannemanndugick/roses2021” (Version vo). *Zenodo*. <https://doi.org/10.5281/zenodo.5750913>
- 2020 Toney, L., **Dannemann Dugick, F.** and Cole, H. “fdannemanndugick/roses2020” (v1.1). *Zenodo*. <https://doi.org/10.5281/zenodo.4818405>
- 2019 Blom, P., Webster, J., and **Dannemann Dugick, F.** “LANL-Seismoacoustics/infrapy vo.3.4” (vo.3.4). *Zenodo*. <https://doi.org/10.5281/zenodo.4463770>

## INVITED TALKS

- 2021 “Enhancing infrasonic signal detection and event location estimates utilizing ground truth events from the Utah Test and Training Range” University of Utah, Department of Geology and Geophysics. (virtual)
- 2021 “Best practices in open-source software development: Examples from seismology”, Colorado College, GY370: Numerical Methods in Geology. (virtual)
- 2018 “Infrasound and its applications to global security: Acoustics in a seismologist’s world” University of Michigan, Department of Mechanical Engineering. Oct 24

## GRANTS AND AWARDS

### Selected Research Grants

- 2021 Building an Electronic Geophysical Equipment Library (\$30K). SNL Center 6700 TechMOC. PI.
- 2021 Remote Online Sessions for Emerging Seismologists Cloud Computing Support (\$5K). Seismological Society of America. Co-PI with Liam Toney.
- 2021 Remote Online Sessions for Emerging Seismologists Cloud Computing Support (\$.5K). American Geophysical Union Seismology Section. Co-PI with Liam Toney.

- 2021      Infrasound Community Workshop Development Support (\$32K). SNL Division 6000 Program Development. PI.

### **Awards and Honors**

- 2022      Thunderbird Kudos Award for Strategy and Teaming
- 2021      Secretary of Energy Achievement Award, as part of the Source Physics Experiment, Phase II, Dry Alluvium Geology team at Los Alamos National Laboratory
- 2019      Los Alamos National Laboratory Spot Award
- 2015      Richard-Goodell Award for Outstanding Graduate Student Teaching

## **STUDENT RESEARCH ADVISEES**

### **Graduate Student Mentorship**

- 2021      Trevor Wilson, PhD, Oklahoma State University expected 2023 (primary research mentor, dissertation committee member)
- 2020      Miro Ronac Giannone, PhD, Southern Methodist University expected 2025 (external research mentor)

### **Undergraduate Student Mentorship**

- 2021      Nora Wynn, BA, Colorado College expected 2023 (primary research mentor)
- 2020      Elijah Bird, BS, UNC - Chapel Hill expected 2022 (secondary research mentor)

## **CONFERENCE ACTIVITY**

### **Sessions Organized**

- 2021      “Geophysical and Planetary Seismo-Acoustics: Capturing the Full Wavefield” American Geophysical Union Annual Conference. New Orleans, LA. Dec 13–17.
- 2021      “Applications and Advances in Explosion Seismology” American Geophysical Union Annual Conference. New Orleans, LA. Dec 13–17.
- 2020      “Geophysical and Planetary Acoustics: Natural to Anthropogenic on Earth and Beyond” American Geophysical Union Annual Conference. virtual. Dec 1–17.
- 2019      “Centennial Session: Forensic Seismology, Origins and Future” American Geophysical Union Annual Conference. San Francisco, CA Dec 9–13.

### **Sessions Chaired**

- 2022      “Recent Advances in Seismoacoustic Methods for Explosion Monitoring” Co-Convener. American Geophysical Union Annual Conference. Chicago, IL. Dec 12–16
- 2022      “Advances in Seismoacoustic Methods for Explosion Monitoring” Co-Convener. Seismological Society of America Annual Meeting. Seattle, WA. Apr 19–23.
- 2021      “Infrasound and the Seismo-Acoustic Wavefield” Co-Convener. Seismological Society of America Annual Meeting. virtual. Apr 19–23.
- 2021      “Analyses and Implications of the 4 August 2020 Beirut Explosion Series” Co-Convener. Seismological Society of America Annual Meeting. virtual. Apr 19–23.

## Conference Papers Presented

- 2022 **Dannemann Dugick, F. K.**, “Towards Inclusive Teaching Through Online Learning: An Example from ROSES” Presented at the Southern California Earthquake Center Annual Meeting, Palm Springs, CA, Sept. 11-14. (invited talk)
- 2022 Koch, C., **Dannemann Dugick, F. K.**, Berg, E., and Blom, P. “Arrival Time Based Seismoacoustic Source Location using a Bayesian Framework” Presented at the Seismological Society of America Annual Meeting, Seattle, WA, Apr. 19-23. (poster)
- 2022 Albert, A., Bowman, D., **Dannemann Dugick, F. K.** and Silber, E. “Verifying the Presence of an Acoustic Duct using Balloon-borne Infrasound” Presented at the Seismological Society of America Annual Meeting, Seattle, WA, Apr. 19-23. (talk)
- 2022 Wynn, N., **Dannemann Dugick, F. K.**, Carmichael, J., and Theil, A. “Evaluating spatio-temporal trends in infrasound propagation using seismo-acoustic arrivals from repeating explosions” Presented at the Seismological Society of America Annual Meeting, Seattle, WA, Apr. 19-23. (poster)
- 2021 **Dannemann Dugick, F. K.**, Wilson, T., Bowman, D.C., and Johnson, J. “Estimating the Magnitude of Completeness for Earthquake-Generated Infrasound Bulletins in Southern Nevada” Presented at American Geophysical Union Annual Meeting, hybrid, Dec 13-17. (poster)
- 2021 Wynn, N., **Dannemann Dugick, F. K.**, Carmichael, J., and Theil, A. “Evaluating spatio-temporal trends in infrasound propagation using seismo-acoustic arrivals from repeating explosions” Presented at American Geophysical Union Annual Meeting, hybrid, Dec 13-17. (poster)
- 2021 Berg, E., **Dannemann Dugick, F. K.**, Albert, S., Koch, C., and McKee, K. “Investigation of Ground-Coupled Airwave Applications on Seismo-Acoustics Stations” Presented at American Geophysical Union Annual Meeting, hybrid, Dec 13-17. (poster)
- 2021 Giannone, M.R., Arrowsmith, S., Stump, B.W., Hayward, C. and **Dannemann Dugick, F. K.** “Quantifying the Influence of Short Timescale Atmospheric Dynamics on Infrasound Propagation” Presented at American Geophysical Union Annual Meeting, hybrid, Dec 13-17. (poster)
- 2021 **Dannemann Dugick, F. K.**, van der Lee, S., Prieto, G. A., Dybing, S. N., Toney, L., and Cole, H. M. “Towards Inclusive Teaching Through Online Learning: An Example from ROSES” Presented at Seismological Society of America Annual Meeting, online, Apr 19–23. (invited talk)
- 2021 **Dannemann Dugick, F. K.** and Bowman, D.C. “Utilizing Advanced Acoustic Modeling Techniques to Inform Experimental Field Deployments.” Presented at Seismological Society of America Annual Meeting, online, Apr 19–23. (poster)
- 2021 Carmichael, J., Thiel, A., **Dannemann Dugick, F. K.**, Walter, J. I., and Blom, P. S. “Thousands of Explosion-Triggered Seismo-Acoustic Waveforms Over Oklahoma for Studying Multi-Scale Atmospheric Variability.” Presented at Seismological Society of America Annual Meeting, online, Apr 19–23. (talk)
- 2021 Bird, E. J., Bowman, D. C., Seastrand, D. R., Wright, M. A., Lees, J. M., and **Dannemann Dugick, F. K.** “Changes in Ambient Urban Infrasound During the COVID-19 Pandemic.” Presented at Seismological Society of America Annual Meeting, online, Apr 19–23. (talk)
- 2020 Carmichael, J., Thiel, A., **Dannemann Dugick, F. K.**, Walter, J. I., and Blom, P. S. “Nine

- Months of Seismic Network Records of Munition Disposal Reveal Multi-Scale Atmospheric Variability Controls on Near-Ground Explosion Monitoring Capabilities.” Presented at American Geophysical Union Annual Meeting, online, Dec 1–17. (talk)
- 2020 Bird, E. J., Bowman, D. C., Seastrand, D. R., Wright, M. A., Lees, J. M., and **Dannemann Dugick, F. K.** “Sources and Spatiotemporal Patterns of Anthropogenic Infrasound in Urban Areas.” Presented at American Geophysical Union Annual Meeting, online, Dec 1–17. (poster)
- 2020 Giannone, M. R., Arrowsmith, S., Stump, B. W., Hayward, C., **Dannemann Dugick, F. K.**, and Waxler, R. “Assessing the Temporal Coherency of the Stratosphere Using Infrasound Signals from Repeating Explosions.” Presented at American Geophysical Union Annual Meeting, online, Dec 1–17. (poster)
- 2020 **Dannemann Dugick, F. K.**, Stump, B. W., Blom, P. S., Hayward, C., Carmichael, J., Arrowsmith, S., and Marcillo, O. E. “Assessment of infrasound location capabilities using ground truth infrasonic events from the Utah Test and Training Range, Utah, USA.” Presented at American Geophysical Union Annual Meeting, online, Dec 1–17. (poster)
- 2019 **Dannemann, F. K.**, Blom, P. S., and Stump, B. W. “Refining Infrasonic Detection Algorithms using Ground Truth Events.” Presented at American Geophysical Union Annual Meeting, San Francisco, CA, Dec 9–13. (poster)
- 2019 Blom, P. S., Iezzi, A. M., and **Dannemann, F. K.** “Combining an Underground Explosive Source Model with the Rayleigh Integral to Predict Acoustic Signals from the Source Physics Experiment.” Presented at American Geophysical Union Annual Meeting, San Francisco, CA, Dec 9–13. (poster)
- 2018 Carmichael, J., Begnaud, M. L., Rowe, C. A., **Dannemann, F.**, and MacCarthy, J. “Establishing a Baseline Signal Detection Capability for the 2018 Dynamic Networks Data Processing and Analysis Experiment (DNE18).” Presented at American Geophysical Union Annual Meeting, Washington, DC, Dec 10–14. (poster)
- 2018 Blom, P.S., **Dannemann, F.K.** and Marcillo, O.E. “Bayesian characterization of explosive sources using infrasonic signals.” Presented at the 175th meeting of the Acoustical Society of America, Minneapolis, MN, May 7–11. (talk)
- 2018 **Dannemann, F.K.**, Blom, P.S. and Marcillo, O.E. “Improvements to infrasonic detection capabilities through application of a generalized least squares beamformer.” Presented at the 175th meeting of the Acoustical Society of America, Minneapolis, MN, May 7–11. (talk)
- 2017 **Dannemann, F.K.**, Blom, P.S. and Marcillo, O.E. “Improvements to infrasonic detection capabilities through application of a generalized least squares beamformer.” Presented at the CTBTO Infrasound Technology Workshop, Tromsø, Norway, Oct. 23–27 (talk)
- 2017 **Dannemann, F.K.**, Blom, P.S., Park, J., Marcillo, O.E., Stump, B.W. and Che, I.Y. “Improving infrasonic location estimates for underground nuclear explosions Improving infrasonic location estimates for underground nuclear explosions.” Presented at the 173rd meeting of the Acoustical Society of America, Boston, MA, Jun 25–29. (poster)
- 2016 **Dannemann, F.K.**, Park, J., Marcillo, O.E., Blom, P.S., Stump, B.W. and Hayward, C.H. “Improving infrasound detection and location catalogs in the Western US using atmospheric modeling” Presented at American Geophysical Union Annual Meeting, San Francisco, CA, Dec 12–16. (poster)
- 2016 **Dannemann, F.K.**, Park, J., Marcillo, O.E., Blom, P.S., Hayward, C.H. and Stump, B.W. “Improving infrasound detection and location catalogs in the Western US using atmospheric

- modeling” Presented at Seismological Society of America Annual Meeting, Reno, NV, Apr 20–22. (poster)
- 2015 Marcillo, O.E., Blom, P.S., Euler, G.G., MacCarthy, J., Park, J., Stump, B.W., Hayward, C. and **Dannemann, F.K.** “On the development and testing of a database-centric pipeline for the analysis of a regional infrasound network.” Presented at American Geophysical Union Annual Meeting, San Francisco, CA, Dec 14–18. (poster)

## TEACHING

### Remote Online Sessions for Emerging Seismologists (ROSES)

- 2021 Lead organizer
- 2020 Co-organizer

### Southern Methodist University

- 2014–16 Earthquakes and Volcanoes (Teaching Assistant)

### Colorado College

- 2014 Introduction to Geology (Paraprofessional)

## SERVICE

### Guest Editor

*Bulletin of the Seismological Society of America Special Issue on Seismoacoustics and Seismoacoustic Data Fusion*

### Academic Journal Peer Review

*Journal of the Acoustical Society of America*  
*Geophysical Research Letters*

### Service to Field

- 2018–20 EES Student Representative, WSST, Los Alamos National Laboratory
- 2017–20 Seismology Section Student Representative, American Geophysical Union

Updated September 2022