

Nicholas Ryan Hasson

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Institute of Northern Engineering

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PROFESSIONAL STATUS

- Doctoral Graduate Student, Research Assistant, University of Alaska Fairbanks, Aug. 2020 – present (2023)

EMPLOYMENT

- Research Assistant – University of Alaska Fairbanks, Water and Environmental Research Center
- Technical Research Assistant – University of Alaska Fairbanks, Geophysical Institute Permafrost Laboratory
- Environmental Scientist – BEM Systems Inc. (5/2023 – 8/2023)

INTEREST

- Climate change effects on permafrost ecosystems and carbon dynamics
- Environmental engineering and geophysics of permafrost ecosystems now thawing or thermokarst development
- Electrical resistivity tomography and geophysics using very low frequency electromagnetics (VLF-EM) or ERT

EDUCATION

- B.A., Geology, 2020 University of Alaska Fairbanks, Earth Systems Science concentration
- Ph. D, Geoscience University of Alaska Fairbanks, Geoscience concentration, 2025 (expected)
Research Advisor: Dr. Katey Walter Anthony

Thesis, “*Mapping permafrost and Thermokarst with electromagnetic induction for characterizing carbon emissions*”

Field/lab Courses:

- Permafrost Engineering & Environmental Geophysics, Alaska, UAF, 2022, 2023
- Incoherent Radar Scatter Summer School, Poker Flat Alaska, MIT/SRI, 2021
- Geophysics winter field school, Alaska, HAARP/SAGO, UAF, 2021
- Geophysics summer field school in Kamchatka, Russia, UAF, 2018
- Geophysics summer field schools in Altai Mountains, Russia, Tomsk State, 2017, 2018
- Geophysics summer field school, Yakutia, Russia, UAF, 2016
- Geophysics summer field school, Svalbard-Norway, UNIS, 2015

Field experience: +6 years of arctic field science and geophysical mapping in Alaska, Siberia, and Norway

PROJECTS

- NSF-AON: Tracking Carbon, Water, and Energy Balance of Arctic Landscape in Alaska and Siberia
- NSF-Navigating the New Arctic: Global impacts of changing Thermokarst lake environments
- DOE-Sandia Laboratory: Directed Research and Development Program on Biogeochemistry of Permafrost
- NASA-JPL ABoVE Methane imaging of hotspots survey (NG-AVIRIS) Phase 1, 2, 3
- DOE-Next Generation Ecosystems Experiment (NGEE) Bio-geophysics of Seward Peninsula
- NSF-Thermal State of Permafrost in North America and Russia: Global Terrestrial Network of Permafrost
- NSF-USArray Temperature Profilers at seismic stations across Alaska and Canada

HONORS AND AWARDS

- Graduate Research Assistantship (RA), Institute of Northern Engineering, UAF, 2020, 2021, 2022, 2023
- Top 100 most downloaded physics papers in 2022 – Scientific Reports – #1/100, 2023
- NSF SAGO Science Team Workshop Funding, HAARP, Alaska, 2021
- US Arctic Fulbright Conference Performance Recognition, Moscow, 2021
- US State Department Federal Internship Performance Recognition, D.C., 2020
- Alaska Undergraduate Research Scholar Awards: 2020, 2019, 2018
- Distinguished Polar Student Award, Harbin Institute of Technology, China, 2020
- Geophysical Society of Alaska Scholarship Award, 2019
- NIH Biomedical and Student Research Learning Award, 2019
- UAF Geophysics Field Camp Scholarship Award to Kamchatka, Russia, 2018
- Science and Technology Visa, Russian Federation, 2017 – 2020

SCIENTIFIC MEDIA INTERVIEWS AND NEWS

- PBS NOVA – “Arctic Sinkholes”, Documentary feature my VLF geophysics and [field interview](#)
- Grist Magazine – “Don’t Look Down” – about my VLF permafrost geophysics and field [interview](#)
- WIRED Magazine – “The Arctic’s Permafrost-Obsessed Methane Detectives” [interview](#)
- EOS – “Hunting for Methane Hotspots at the Top of the World” – [interview](#) about my VLF geophysics
- NASA Earth Expeditions – “Solving the arctics methane puzzle” [interview](#)
- Sandia National Laboratory – “Burping Bacteria” [News release](#) on our preliminary data
- National Geographic – “Scientist around the World” [interview \(live\)](#) on about climate change and permafrost
- American Geophysical Union – “Ice and Fire Podcast”, Earth’s Atmosphere as source of lunar water, [Interview](#)
- UAF Geophysical Institute – [paper press release](#) “Earth’s Atmosphere may be a source of some lunar water”
- Knowable Magazine – “The Race Against Radon” – radon emissions from permafrost [interview](#)
- Anchorage Daily Press – “The sinking feeling over much of Alaska” [interview](#) on impacts of permafrost thaw
- Russia-1 Documentary – “The miracle of Tunguska impact” interview and [documentary](#)
- BBC – “Skating on thin ice with Olympians Dean and Torvill” feature interview and [documentary](#)

PUBLICATIONS (peer-reviewed)

1. A. Pellerin, N. Lotem, E.E Russak, K. Walter Anthony, **N. Hasson**, and O.Sivan. (2022). Methane Production Controls in Thermokarst Lake sediment. *Global Change Biology*. doi.org/10.1111/gcb.16151
2. Kletetschka, G., Klokočník, J., **Hasson, N.**, Kostelecký, J., & Bezděk, A. (2022). Distribution of Water on the Moon from Gravity Aspects. *Scientific Reports*. doi.org/10.1038/s41598-022-08305-x
3. Puchkov A.V., Berezina E.V., Yakovlev E.Yu., **Hasson N.**, Druzhinin S.V., Tyshov A.S., Ushakova E.V., Koshelev L.S., Lapikov P.I. Radon Flux Density In Conditions Of Permafrost Thawing: Simulation Experiment. *Geography, Environment, Sustainability. Russian Geographical Society* (2022) ;15(3):5-18. doi.org/10.24057/2071-9388-2022-023
4. Elder, C. D., Thompson, D. R., Thorpe, A. K., Chandanpurkar, H., Hanke, P. J., **Hasson, N.**, Miller, C., et al. (2021). Characterizing methane emission hotspots from thawing permafrost. *Global Biogeochemical Cycles* doi.org/10.1029/2020GB006922
5. Puchkov, A. V., Yakovlev, E. Y., **Hasson, N.**, et al., (2021). Radon Hazard In Permafrost Conditions: Current State Of Research. *Geography, Environment, Sustainability. Russian Geographical Society*. doi.org/10.24057/2071-9388-2021-037

PUBLICATIONS (under-review)

6. Walter Anthony, K. M., P. Anthony, **N. Hasson**, C. Edgar, O. Sivan, E. Russak, O. Bergman, A. Kholodov, B. Minsely, N. Pastick, S. James, S. Zimov, E. Euskirchen, S. Bret-Harte. Methane emissions in dry upland permafrost soils.

PUBLICATIONS (drafted)

7. **Hasson, N.**, Elder, C., Walter Anthony K.M., Smallwood, C., Schambach, J., Jones, T., K. Rozmiarek, K., Anthony, P., Miller, C.E. Warm-discontinuous permafrost thaw forms extreme methane hotspots during the whole season. *In Manuscript*
8. Takac M., **Hasson, N.**, Kletetschka, Kavkova, G.,R., and Petrucha, V. UAV magnetometer survey over Tunguska event Epicenter. *In Manuscript*

PUBLISHED ABSTRACTS (1st AUTHOR) oral presentation*

9. **N. Hasson**, L. Farquharson, K.M. Walter Anthony, M. Nole, J. Frederick, C. Smallwood. Estimating century scale carbon emissions across a sub-aerial talik chronosequence in yedoma permafrost near Fairbanks Alaska. *AGU Fall Meeting Abstracts*, 2023
10. ***N. Hasson**, C. D. Elder, K. Walter Anthony, C. Miller, S. Peterson, P. Anthony, and R. Daanen (2022) Characterizing terrestrial thermokarst methane hotspots using Very Low Frequency radio-ohmic geophysics in abruptly thawing yedoma permafrost. *NASA ABoVE Science Team Meeting ASTM8*
11. ***N. Hasson**, K. Walter Anthony, C. D. Elder, C. Miller, B. Daflon, A. Kholodov, S. Rybakov, S. Peterson, P. Anthony, and R. Daanen. Methane emissions show exponential inverse relationship with electrical resistivity from discontinuous permafrost wetlands in Alaska. (2022) Vulnerability of Permafrost Carbon to Climate Change. *AGU Fall Meeting Abstracts* (B15E-06)
12. A. Kholodov and **N. Hasson**. Development of the process of Thermokarst at the Council research area. (2022) Twelfth Annual All-Hands Meeting, DOE Next-Generation Ecosystem Experiments: *NGEE Arctic Abstracts*
13. ***N. Hasson**, J. Guerard, G Kletetschka. Investigating Elevated Methane Emissions in Goldstream Valley Thermokarst Lakes Using Magnetic Susceptibility Signatures to Determine Presence of Iron (III) Oxides. (2019) International Arctic Research Center, Fairbanks, AK. *American Chemical Society Symposium*

PUBLISHED ABSTRACTS (CO-AUTHORED)

14. K. Kaytan, **N. Hasson**, and S. Rybakov. A Very-Low Frequency Survey on the Rainbow Ridge Rock Glacier, Alaska. *AGU Fall Meeting Abstracts*, 2023
15. C. Smallwood, J. Whiting, P. Miller, S. Kolker, J. Schambach, J. Sammon, J. Ricken, **N. Hasson**, K. Rozmiarak, T. Jones, K.M Walter Anthony, H. Bennett, M. Sanchez. Identifying key volatile ‘fingerprints’ of permafrost degradation and microbial rates of methane release. *AGU Fall Meeting Abstracts*, 2023
16. Mills, T., Flemings, P.B., Nole, M., Garret, R., D. Fukuyama, L.A, Bigler, L. Farquharson, **Hasson, N.**, C. Smallwood, M. Sanchez, J. Schambach, S. Kolker and J. Ricken. Flow and Index Properties of Permafrost Cores from Fairbanks, Alaska and Synthetic Permafrost Specimens. *AGU Fall Meeting Abstracts*, 2023
17. Elder, C. D., Thompson, D. R., Baskaran, L., Nitze, I., Grosse, G., **Hasson, N.**, Walter Anthony, K. M., and Miller, C. E.: The impacts of regional Arctic lake change on remotely sensed methane emission hotspots in Alaska, USA, *EGU General Assembly 2023*, Vienna, Austria, 24–28 Apr 2023, EGU23-10051, 2023.
18. K. Kaytan, **N. Hasson**, and S. Rybakov. A Very-Low Frequency Survey on the Rainbow Ridge Rock Glacier, Alaska. 6th European Conference on Permafrost 2023, Catalonia, Spain, 18-22 Jun 2023, ECOP-8075, 2023.
19. Jentsch, K. , van Delden, L. , Fuchs, M. , Hall, K. R. , Petrenko, V. , Elder, C. , Walter Anthony, K. , **Hasson, N.** and Treat, C. (2023): Methane fluxes from the Arctic - An expert survey of chamber measurement techniques. European Conference on Permafrost 2023, Catalonia, Spain, 18-22 Jun 2023, ECOP-8075, 2023.
20. C. D. Elder, D. R. Thompson, L. Baskaran, I. Nitze, G. Grosse, **N. Hasson**, M. J. Engram, N. Tyler, K.M. Walter Anthony, and C. E. Miller. Regional scale patterns of remotely sensed methane hotspots with respect to Arctic lake change and thermokarst geomorphology. *AGU Fall Meeting Abstracts* (B42D-04)
21. S. Rybakov, D. Nicolsky, V.E. Romanovsky, A. Kholodov, and **N. Hasson**. Using Electrical Resistivity Tomography, Temperature Dynamics and Very-Low-Frequency in Warm Discontinuous Permafrost Study. (2022) *AGU Fall Meeting Abstracts* (NS22B-0289)
22. M. Farina, M. Beck, J. Watts, W Christian, T, McDermott, **N. Hasson**, S. Powell, and R. Hatzepichler. Exploring fine-scale drivers of methane sources and sinks in a boreal wetland. (2022) *AGU Fall Meeting Abstracts* (B52I-0953)

23. C. Minions, J. Watts, C. Czimczik, S. Pedron, A. Kholodov, **N. Hasson**, G. Jimene, V. Brione, B. Gay, H. Genet, A. Mullen and S. Natali. Implications of Fire Disturbance on Soil Carbon Cycling and Permafrost in Black Spruce Forests of Interior Alaska: A Case Study at Hess Creek. *AGU Fall Meeting Abstracts* (B12K-1176)
24. C. Smallwood, P. Miller, J. Sammon, J. Whiting, J. Ricken, K.M Walter Anthony, J. Schambach, **N. Hasson**, C. Maio, A. Pellerin, O. Sivan, E. Miller, E. Eliani, T.R. Jones, K. Rozmiararak, J. Kustas, H. Bennett, T. Hogancamp and S. Kolker. Improving Biological Fidelity of Arctic Greenhouse Gas Emissions from Permafrost. (2022) *AGU Fall Meeting Abstracts* (B22E-1494).
25. A. Kholodov, A. Breen, and **N. Hasson**. Topographic effects on the above and below ground traits in tundra biome - a case study at the Seward Peninsula (2022) Twelfth Annual All-Hands Meeting, DOE Next-Generation Ecosystem Experiments: *NGEE Arctic Abstracts*
26. J. Knicely, **N.Hasson**, G. Kletetschka. KITE: A Novel Propulsion System for Characterizing Electrostatic Environment on Airless Solid Space Bodies. (2021). *International Astronautical Congress Abstract, Dubai*
27. A. Pellerin, N. Lotem, E.E Russak, **N. Hasson**, K. Walter Anthony and O.Sivan. Methane Production Controls in Thermokarst Lake sediment. (2021) *Goldschmidt Conference Abstract, European Association of Geochemistry*
28. Kletetschka, G., Klokočník, J., **Hasson, N.**, Kostelecký, J., & Bezděk, A. (2021). Location of Water Deposits in the Polar Regions of the Moon. *Lunar and Planetary Science Conference* (No. 2548, p. 1368).
29. D. Vondrak, R. Kavkova, V. Golias, M. Takac, R. Storc, E. Svecova, **N. Hasson**, C. Stanghellini, G. Stanghellini, L. Gasperini, D. Y. Rogozin, A.V. Meydus, E. Moroz, G. Kletetschka. Permafrost Destruction Due to Airburst in Terrestrial Environment over Tunguska Russia. (2020). *11th Planetary Crater Consortium 2020* (LPI. No. 2251).
30. D. Nicolsky, L.M. Farquharson, Z.V. Robert, **N. Hasson**, V.E. Romanovsky, T. Douglas, J. Schmidt. Permafrost hazard mapping in the discontinuous permafrost zone of Alaska. (2020) *AGU Fall Meeting Abstracts, NH036-02*
31. CD Elder, DR Thompson, AK Thorpe, H. Chandanpurkar, P. Hanke, **N Hasson**, S. James, B. Minsley, N. Pastick, D. Olefedt, K.W Anthony, and CE Miller. Characterizing Extreme Thermokarst Methane Emissions from the Air and the Ground in Interior Alaska with Implications for Large-scale Source Attribution. (2020) *AGU Fall Abstracts, B028-02*
32. M.D. Kavkova, G. Kletetschka, M. Takac, V. Petrucha, M. Dressler, **N. Hasson**. Concept of the High Precision In-Situ Measurements of the Four Magnetic Characteristics of the Lunar Near-Surface Without Touching the Regolith. (2020) *51st Lunar and Planetary Science Conference* (LPI. No. 2332).

DATA PUBLICATIONS & REPORTS

33. **N. Hasson et al.** Methane Emissions Show Exponential Inverse Relationship with Electrical Resistivity from Discontinuous Permafrost Wetlands in Alaska. (2022). *Oak Ridge National Laboratory Quarterly Report* pg. 11-13.
34. Romanovsky, V., Kholodov, A., Nicolsky, D., Wright, T., **Hasson, N.** (2020). Network of permafrost temperature observations in Russia, 2018-2019. *Arctic Data Center*. doi:10.18739/A2VQ2S99T
35. Romanovsky, V., Kholodov, A., Nicolsky, D., **Hasson, N.**, Wright, T. (2020). Thermal state of permafrost in North America – annually observed ground temperatures, 2019. *Arctic Data Center*. doi:10.18739/A20R9M47S.
36. Nicolsky, D. J., Romanovsky, V. E., Kholodov, A. L., Dolgikh, K., & **Hasson, N.** (2019). ABoVE: Soil Temperature Profiles at USArray Seismic Stations, Alaska, 2016-2018. *ORNL DAAC*. doi.org/10.3334/ORNLDAAC/1767
37. Romanovsky, V., Kholodov, A., **Hasson, N.**, Nicolsky, D., Wright, T. (2019). Thermal State of Permafrost in North America-continuously observed ground temperatures, 2015-2016. *Arctic Data Center*. doi:10.18739/A28911R1W

38. Romanovsky, V., Kholodov, A., Dolgikh, K., **Hasson, N.**, & Lane, T. (2019). Thermal State of Permafrost in North America—annually observed ground temperatures, 2018. *Arctic Data Center*. doi:10.18739/A2HX15Q8V
39. Romanovsky, V., Kholodov, A., Dolgikh, K., **Hasson, N.**, & Lane, T. (2019). Thermal State of Permafrost in North America—continuously observed ground temperatures, 2017–2018. *Arctic Data Center*. doi:10.18739/A2D795976
40. Romanovsky, V., Kholodov, A., Dolgikh, K., **Hasson, N.** (2019). Thermal State of Permafrost in North America—annually observed ground temperatures, 2017. *Arctic Data Center*. doi:10.18739/A20R9M42C
41. Romanovsky, V., Kholodov, A., Dolgikh, K., **Hasson, N.**, Nicolsky, D. (2019). Thermal State of Permafrost in North America—continuously observed ground temperatures, 2016-2017. *Arctic Data Center*. doi:10.18739/A24J09X6N
42. Romanovsky, V., Kholodov, A., Wright, T., **Hasson, N.** (2019). Thermal State of Permafrost in North America—annually observed ground temperatures, 2016. *Arctic Data Center*. doi:10.18739/A2W08WG7P

MISC.

43. P. Jaspe and **N. Hasson**. Director of Photography and science advisor on film “*Protospaceman*” in Tromso Norway. TBD
44. G. Kletetschka and **Hasson**. Electrostatic Multi-Wall Carbon Nanotube Torque Sensor. *Alaska Office of Intellectual Property and Commercialization (OIPC) UA 509-21 G. Stage 1 2020*
45. **N. Hasson** (2022) "Thawing permafrost and carbon sinks". *Makers Red Box Teachers Guide in the E.U.*. Pg. 195
46. E. Eds. Rasch, M., Egevang, C., Jørgensen, T, et al. *Images of Arctic Science 2020*. Danish Centre for Environment and Energy, Denmark. (2020). International Network for Terrestrial Research and Monitoring in the Arctic (INTERACT).

SYNERGETIC OUTREACH

- Journal Peer Reviewer: The Cryosphere – EGU (2023), Gases – MDPI (2022)
- 2021-CREEL Permafrost Tunnel (US Army) Competent Person (CP) UAF Tunnel guide, Fox, Alaska
- Guided Tour for Department of Energy Directors, Fox Alaska
 - Guided Tour for UAF Chancellors and Staff, Fox Alaska
 - Guided Tour for UAF Climate Scholars Program, Fox Alaska
- 2020-21 North American Representative of Permafrost Young Researchers Network (PYRN)
- 2020-21 Member Committee of United States Permafrost Association Representative of PYRN
- 2020-21 United States Council Member of Association of Polar Early Career Scientist (APECS)
- 2021- Author/Contributor on ELF-VLF-LF Network Group
- 2020- Managing social media for Geophysical Institute Permafrost Laboratory (GIPL)

SELECT TECHNICAL EDUCATION

2022	Fairbanks, Alaska	Permafrost Tunnel CP Training, Cold Regions Research & Engineering Lab
2022	Fairbanks, Alaska	Science Team Meeting 8, NASA ABoVE research highlights and workshop
2021	HAARP	Modulating VLF/ELF sources for experimental ERT geophysics
2021	Fairbanks, Alaska	Certified Person (CP) at US Army Permafrost Tunnel-CRREL
2021	Fairbanks, Alaska	Incoherent Radar Scatter Certification at Poker Flat, Summer w/ MIT/SRI
2021	HAARP	Engineering site assessment for permafrost geohazards using VLF geophysics
2020	D.C. Virtual	Machine learning analysis of scientific text for State Department (VSFS)
2019-21	NASA, JPL	Arctic Boreal Vulnerability Experiment characterizing extreme methane seeps
2019-21	State of Alaska	Field scientist for Water and Environmental Research Center Projects
2018	Kamchatka, Russia	International geophysics field school at Mutnovksy and Gorely volcanoes
2018	Arkhangelsk, Russia	International Russian language school at Northern Arctic Federal University

2017-18	Siberia, Russia	International alpine-ecology field school in Altai Mountains, Aktru Tomsk U.
2018	NASA, Goddard	Pandora Atmosphere Chem workshop/ESS-31, HCHO detection
2017	NASA, JPL	Planetary science workshop on Mars/early-employment seminar, Pasadena
2016	Siberia, Russia	International permafrost geohazards and hydrology field school in Yakutsk
2016	Tromso, Norway	Summer internship as Arctic nature and outdoor guide at City Camp
2015	Svalbard, Norway	International permafrost geohazards and climate change field school/UNIS

LANGUAGES

- Python, Jupyter Notebook, Inversions (EMTOMO, PyGMT, VLF2DMF, etc.) Artificial Intelligence/Machine learning, MATLAB, ArcGIS, Microsoft office, Adobe
- English (native speaker, US Citizen), Russian language (elementary, A1)

SELECT EXPEDITIONS

2023	Kuskokwim/YK Delta	Relocation site survey geophysics for village of Yupik village Kwigillingnok
2023	Alaska North Slope	Winter coring, permafrost carbon flux, and wetland dynamics
2023	Fairbanks, AK	Winter coring campaign (34 m sediments) on UAF-Sandia projects
2022	Teller/Nome, AK	DOE-Arctic VLF geophysics and carbon flux coupling w/ tundra biome
2022	Barrow, AK	Ice-wedge polygon ERT, VLF, and carbon flux coupling near NOAA baseline
2022	Hess Creek, AK	Flux study on post-fire permafrost carbon and watershed environment
2022	Rainbow Ridge, AK	Subsurface VLF geophysics atop Rock Glacier alpine watershed and landslide
2022	Seward Penn, AK	Comparative geophysics (ERT,VLF) and carbon flux coupling Berkely lab
2021	Vault Creek, AK	Comparative Near-surface-geophysics: VLF-ERT at Vault Creek, etc.
2021	Gakona, Alaska	Modulating VLF/ELF waves at HAARP for subsurface geophysics
2021	Noatak NW Arctic	VLF geophysics-data for NOVA PBS “Exploding Sinkholes” Documentary
2021	Arctic Northslope	Summer permafrost installations, VLF geophysics, Deadhorse-Prudhoe Bay
2021	Arctic Northslope	Summer permafrost carbon flux observations and VLF geophysics, NSF AON
2021	Alaska range	Winter alpine permafrost carbon, coring, snow survey, and VLF geophysics
2020	Dalton Hwy, North Slope	Winter permafrost carbon monitoring and VLF geophysics, NSF AON
2020	Alaska range	Summer alpine permafrost carbon, coring, snow survey, and VLF geophysics
2020	Interior lakes, Alaska	Winter permafrost isotopic and CH4 flux sampling of thermokarst lake
2019	Western Siberia, Russia	Field geologist, Tunguska impact zone expedition, airborne geophysics
2018	Central Siberia, Russia	Student assistant, visiting research stations on climate change Altai-Tomsk
2018	Interior lakes, Alaska	Winter field assistant installing near surface seismic for USGS
2016	Utah desert	Rehabbing space analogues at Mars Desert Research Facility (MDRS)
2016	Eastern Siberia, Russia	Permafrost Geophysics school Eastside of Lena river in Yakutia
2014	Western Iceland	Volcanology field research along Hekla, landmannalaugar, and Vik

SCIENTIFIC PRESENTATIONS AND COURSE LECTURES †

Vulnerability of Permafrost Carbon to Climate Change III Oral. *AGU Fall Meeting*, Chicago, IL

‡ UAF Engineering with Environmental Geophysics: “Geophysical surveys using VLF-EM in Alaska”

‡ UAF Honors College Climate Scholars field lecture: “Reading Permafrost Landscapes,” Fairbanks, AK

NASA Science Team Meeting, Characterizing hotspots of methane using VLF radio fields, Fairbanks, AK

‡ UAF Honors College Climate Scholars field lecture: “Permafrost Tunnel and Climate Tour,” Fox Tunnel, AK

Presentation, *Detecting Geohazards in Near-Surface-Earth by ELF/VLF Modulation*, HAARP Facility, AK

INE WERC Student department seminar, *Novel Permafrost Geophysics*, Fairbanks, AK

INE WERC Seminar, *Permafrost Geophysics: Very low Frequency Method*, Fairbanks AK

‡ UAF Honors College Climate Scholars: “*Permafrost carbon emissions*,” University of Alaska Fairbanks, Fairbanks, AK

Russian Fulbright Symposium, *Permafrost carbon and Paris agreement* at US Embassy, Moscow, Russia

Presentation *Arctic Northern Sea Route* at Harbin Institute of Technology, Harbin, China

‡ Guest panelist on *Research Methods for Geoscience*, class course at University of Alaska Fairbanks

Presentation on *Magnetotactic bacteria* at Charles University Prague, Czech Republic, EU
Presentation on climate change and permafrost at high-school, Prague, Czech Republic, EU
Presentation/interview at Russian space agency Institute of Biomedical Space Problems, Moscow, Russia
Presentation on "*New frontiers in Permafrost*" at UAF Geoscience seminar series, Fairbanks, AK
Presentation on permafrost carbon and methane emissions at Tsinghua University, Beijing, China
Presentation on permafrost at Center for Global Change, Chinese Academy of Science, Beijing, China