

Kyeore (Holly) Han

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CURRENT POSITION

NASA Postdoctoral Fellow

Jet Propulsion Laboratory
Earth Surface and interior Group, Earth Science Section
Advisor: Dr. Surendra Adhikari

01/2024 -
Pasadena, CA, USA

Visiting scientist

Los Alamos National Laboratory

01/2024 -
Los Alamos, NM, USA

EDUCATION

McGill University

Doctor of Philosophy, Earth and Planetary Sciences

Thesis title: On modelling and physics of ice-age ice sheet-sea level-solid Earth interactions

Advisor: Dr. Natalya Gomez

2021
Montreal, QC, Canada

University of Toronto

Honours Bachelor of Science, Physics Specialist and Math Minor

2015
Toronto, ON, Canada

PROFESSIONAL EXPERIENCE

Postdoctoral Research Associate

Los Alamos National Laboratory

Fluid Dynamics and Solid Mechanics Group, Theoretical Division (T-3)

Topic: Developing a regional sea-level projection capability within the ice-sheet model component of the US Energy Exascale Earth System Model (E3SM) improving projections of Antarctic Ice Sheet contribution to sea level.

Advisors: Dr. Matthew Hoffman & Dr. Xylar Asay-Davis

08/2021 - 12/2023
Los Alamos, NM, USA

Senior Undergraduate Research Project

University of Toronto, Department of Physics

Topic: explored the effect of the nonlinear inertial term in numerical dynamo models by performing sensitivity tests in the Compute Canada HPC system

Advisor: Dr. Sabine Stanley (now at Johns Hopkins University)

2014-2015
Toronto, ON, Canada

Geophysics Fieldwork Assistant

University of Toronto, Department of Earth Science

Topic: Assisted measuring electro-resistivity on and under the surface of Lake Ogilvie in Ontario, Canada

Advisor: Dr. Bernd Milkereit

2013
Toronto, ON, Canada

PUBLICATIONS

Journal Articles

Published & Peer-reviewed

Total citations: 91

8. Roffman, J., Gomez, N., Yousefi, M., **Han, H.K.**, and Nowicki, S. Spatial and temporal variability of twenty-first century sea-level changes. *Geophysical Journal International*, 235, 1, 342-352. <https://doi.org/10.1093/gji/ggad170>
7. Wan, J.X.W., Gomez, N., Latychev, K. and **Han, H.K.** Resolving glacial isostatic adjustment (GIA) in response to modern and future ice loss at marine grounding lines in West Antarctica. *The Cryosphere* (2022), 16, 2203-2223. <https://doi.org/10.5194/tc-16-2203-202>
6. **Han, H.K.**, Gomez, N., and Wan, J.X.W. Capturing the Interactions Between Ice Sheets, Sea Level and the Solid Earth on a Range of Timescales: A new "time window" algorithm. *Geoscientific Model Development* (2022), 15, 1355-1373, <https://doi.org/10.5194/gmd-15-1355-202>

5. **Han, H.K.**, Gomez, N., Pollard, D., and R.M. DeConto. Modeling Northern Hemispheric ice sheet dynamics, sea level change and solid Earth deformation through the last glacial cycle. *Journal of Geophysical Research: Earth Surface* (2021), 126, 4, e2020JF006040, <https://doi.org/10.1029/2020JF006040>
4. Gomez, N., Weber, M., Clark, P.U., Mitrovica, J.X., and **Han, H.K.** Antarctic ice dynamics amplified by Northern Hemisphere sea-level forcing. *Nature* (2020), 587, 600-606, <https://doi.org/10.1038/s41586-020-2916-2>
3. Hayden, A., Wilmes, S., Gomez, N., Green, M., Pan, L., **Han, H.K.**, and Golledge, N. Multi-century impacts of ice sheet retreat on sea level and ocean tides in Hudson Bay. *Journal of Geophysical Research: Oceans* (2020), 125, e2019JC015104, <https://doi.org/10.1029/2019JC015104>
2. Pollard, D., Gomez, N., R.M. DeConto., and **Han, H.K.** Estimating modern elevations of Pliocene shorelines using a coupled ice sheet-earth-sea level model. *Journal of Geophysical Research: Earth Surface* (2018), 123, 9, 2279-2291, <https://doi.org/10.1029/2018JF004745>
1. **Han, H.K.**, and Gomez, N. The impact of water loading on postglacial decay times in Hudson Bay. *Earth Planet. Sci. Lett.* (2018), 489, 1-10, <https://doi.org/10.1016/j.epsl.2018.02.043>

In progress

- (under review in Nature Comms.) Lowry, D., **Han, H.K.**, Golledge, N., Gomez, N., Johnson, K., and McKay, R. Ocean cavity regime shift reversed West Antarctic grounding line retreat in the late Holocene. (2023), 16, 2203-2223. <https://doi.org/10.21203/rs.3.rs-3340271/v1>
- (in prep) **Han, H.K.**, Hoffman, M., Asay-Davis, X., Hillebrand, T., and Perego, M. (Paper 1, on coupled ice sheet-glacial isostatic modeling for the Antarctic Ice Sheet following the ISMIP6-2300 experimental protocol)
- (in prep) **Han, H.K.**, Hoffman, M., Asay-Davis, X., Hillebrand, T., and Perego, M. (Paper 2, on the effect of glacial isostatic adjustment on ocean forcing underneath the Antarctic ice shelf cavities)

Other published materials (outreach & non-academic)

Book

- *20s, a story of a free spirit*, 2010, *Reading Times*, ISBN : 9788996353423. (Comment: Published in South Korea, I wrote this of 336 pages to share my experience and associated philosophical enlightenment I gained from walking in the Himalayas and studying abroad in Canada)

Articles

- Travel diary series ([episode 1...](#) [episode 8](#)) on the long-distance bicycle trip (i.e., "move") from Montreal (QC, Canada) to Los Alamos (NM, USA), DailyWhy Newspaper (in Korean), summer 2021
- Op-ed: [How the Korean society should move forward: an opinion on destructive public responses to bullying in school](#), DailyWhy Newspaper (in Korean), 02/24/2021,
- [Life of a Climate Scientist](#) interview blog series, European Geosciences Union (EGU) Blogs, Climate: Past, Present and Future (CL) Division, 2021

PRESENTATIONS

Talks

- The West Antarctic Ice Sheet (WAIS) Workshop (Colorado, USA). *Coupled ice sheet-sea level modeling for improving projections of Antarctic Ice Sheet's contribution to sea-level change: simulation results following the new ISMIP6-2300 experimental protocol*, 09/2022
- (invited) SIAM Conference on Mathematical and Computational Issues in the Geosciences (Virtual). *Capturing the Interactions between Ice Sheets, Sea Level and Solid Earth on a Range of Timescales: A New "Time Window" Algorithm for Sea-Level Models*, 06/2021
- (invited) Korea Polar Research Institution (KOPRI) - Ice Sheet and Sea Level Changes TEAM (Incheon, South Korea). *Modelling Northern Hemispheric Ice Sheet Dynamics, solid Earth deformation and sea level change during the last glacial cycle*, 01/2020
- American Geophysical Union (AGU) Fall meeting (San Francisco, USA). *Modelling Northern Hemispheric Ice Sheet Dynamics, solid Earth deformation and sea level change during the last glacial cycle*, 12/2019
- Glacial Isostatic Adjustment, Ice Sheets, and Sea-level Change – Observations, Analysis, and Modelling Workshop (Ottawa, Canada). *Modelling Northern Hemispheric Ice Sheet Dynamics, solid Earth deformation and sea level change during the last glacial cycle*, 09/2019

- The congress of International Union for Quaternary Research (INQUA; Dublin, Ireland). *Modelling Northern Hemispheric Ice Sheet Dynamics, solid Earth deformation and sea level change during the last glacial cycle*, 07/2019
- International Union of Geodesy and Geophysics (IUGG; Montreal, Canada). *Modelling Northern Hemispheric Ice Sheet Dynamics, solid Earth deformation and sea level change during the last glacial cycle*, 07/2019
- (invited) "Snapshot" lunch seminar, Department of Earth Science, University of Bergen (Bergen, Norway). *Modelling ice sheet-sea level-solid Earth interactions in the Northern Hemisphere over the last glacial cycle*, 09/2018

Posters

- AGU Fall meeting (Chicago, USA). *Impact on Projections of the Antarctic Ice Sheet due to Regional Sea Level Interactions with Ice Flux and Ice-Shelf Basal Melt: Coupled Ice Sheet-Sea Level Model Results following the New ISMIP6-2300 Experimental Protocol*, 12/2022
- World Climate Research Programme (WCRP) Sea Level Conference (Singapore). *Impact On Projections Of The Antarctic Ice Sheet Due To Regional Sea Level Interactions With Ice Flux And Ice-Shelf Basal Melt: Coupled Ice Sheet-Sea Level Model Results Following The New ISMIP6-2300 Experimental Protocol*, 07/2022
- AGU Fall meeting (Washington D.C., USA). *Modelling Short-term Ice sheet - Sea level - Solid Earth Interactions within a Glacial-cycle Timescale simulation*, 12/2018
- AGU Fall meeting, (San Francisco, USA). *The impact of water loading on postglacial decay times in Hudson Bay*, 12/2016
- PALeo constraints on SEA level rise 2 (PALSEA2) meeting (Oregon, USA). *The impact of water loading on postglacial decay times in Hudson Bay*, 09/2016

AWARDS, GRANTS AND HONOURS

Funding

- Los Alamos National Laboratory, Institutional Computing (02/2023). Awarded 1 million core hours for use on LANL supercomputers. Project title: Ensemble projections of the Antarctic Ice Sheet contribution to regional sea-level change under future climate-change scenarios.
Role: Principal Investigator. Co-PIs: Matthew Hoffman and Trevor Hillebrand

Scholarship & Fellowship (selecting merit-based only)

Total known amount: 40,975 CAD

- Eric Mountjoy Fellowship (560 CAD, 09/2019-08/2020). McGill University, Department of Earth and Planetary Sciences
- Geraldine Elizabeth Davidson Fellowship (4,065 CAD, 09/2019-08/2020). McGill University, Department of Earth and Planetary Sciences
- J. B. Lynch Fellowship (15,000 CAD, 09/2018-08/2019). McGill University, Faculty of Science, Department of Earth and Planetary Sciences
- Geraldine Elizabeth Davidson Fellowship (2,500 CAD, 09/2017-08/2018). McGill University, Department of Earth and Planetary Sciences
- Differential Fee Waivers for international students (10,500 CAD, 09/2016-08/2017). McGill University, Faculty of Science
- Murata Family Fellowship (6,850 CAD, 09/2016-08/2017). McGill University, Earth and Planetary Sciences
- The Hymie and Roslyn Mida Student Award in Theoretical Physics (1000 CAD, 08/2015). University of Toronto, Faculty of Arts and Science
- Don Salt Scholarship (500 CAD, 03/2015), Canadian Exploration Geophysical Society (KEGS)
- John. J. Sebisty Scholarship (amount lost track, 11/2014), University of Toronto, St. Michael's college, Office of the President

Travel grants

Total estimated amount: 3000 CAD

- SCAR-SERCE Glacial Isostatic Adjustment, Ice Sheets, and Sea-level Change – Observations, Analysis, and Modelling Workshop (Ottawa, Canada), 09/2019
- Advanced Climate Dynamics Courses Summer School (Finse, Norway), 09/2018

- The Polar Earth Observing Network (POLENET) Glacial Seismology Workshop (Colorado, USA), 06/2017
- The Polar Earth Observing Network (POLENET) Glacial Isostatic Adjustment (GIA) Training School (Ohio, USA), 09/2015

Awards

- Academic All-Canadian (awarded by the Canadian Governor General, 2016), Canadian Interuniversity Sport (CIS; now rebranded as U-Sport)
- Academic All-Star (2015-2016 and 2016-2017), Réseau du sport étudiant du Québec (RSEQ)
- Principal's Student-Athlete Honour Roll (2015-2016 and 2016-2017), McGill University

Other Honours

- Sports Hall of Fame inductee (2019), Niagara Christian Collegiate (Ontario, Canada)

PROFESSIONAL SERVICE

Conferences

- Co-organizer, 2023 American Geophysical Union (AGU). Session title: "Investigations of ice sheets, solid Earth and sea level from a glacial isostatic adjustment perspective", 12/2023
- Primary session organizer, 2023 European Geosciences Union (EGU) General Assembly. Session title: "Advances in investigations of glacial isostatic adjustment and its role in the Earth system", 04/2023
- Primary session organizer, chair and Outstanding Student Paper Award (OSPA) liaison, 2022 AGU Fall meeting. Session title: "Observations and models of interactions between ice sheets solid Earth and sea level toward constraining modern and future sea-level changes", 12/2022
- Session chair, 2022 WCRP Sea Level Conference. Session title: "Coastal sea-level variability", 07/2022

Working Group

- Affiliated member, World Climate Research Programme (WCRP) Safe Landing Climates Lighthouse Activity Sea Level Rise Working Group (WG), since 09/2022

Reviews

Journals

- *Geophysical Research Letters*
- *Earth and Planetary Science Letters*
- *The Cryosphere*
- *Nature*
- *Geology*

Reports

- Expert Reviewer, the Second Order Draft (SOD) of the Working Group I (WGI) contribution to the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6), 2020

RELEVANT SKILLS

Computer languages

- Fortran: developed algorithms in a sea-level model and an ice-sheet model (MPAS Albany-Landice Model; MALI, the landice component of the US Department Energy's Energy Exascale Earth System Model), and implemented coupling schemes for coupled ice sheet-sea level modeling
- Python: developed test cases for pre-processing model input data and post-processing model output data for the ISMIP6 (Ice Sheet Model intercomparison for CMIP6) participation; implemented code enhancement and bug fixes (e.g., in ice-model mesh generation tool, mapping-file generation tool, etc.)
- Matlab: used for model inputs/outputs analysis
- Others: Bash/Unix/csh

High-performance computing (HPC)

- ran numerous serial- and parallel-model simulations
- used workload managers such as Slurm and PBS
- performed tests for model development, pre- and post-process model inputs/outputs

Development tools

- git and GitHub: maintainer of sea-level model repository, contributor to the USDOE ice-sheet model (MALI) repository, and COMPASS, which is a framework that accommodates various test-case workflows for the model components of the Energy Exascale Earth System Model (E3SM)

RELEVANT WORKSHOPS AND TRAINING SCHOOLS

- Advanced Climate Dynamics Courses (Finse, Norway). Course topic: Hemispheric Asymmetry in Climate, 09/2018
- POLENET/SERCE Glacial Seismology Training School (Fort Collins, USA), 09/2017
- POLENET/SERCE Glacial Isostatic Adjustment Training School (Gibraltar Island, USA), 09/2015

TEACHING AND MENTORING

Guest lectures

- "Numerical Modeling in Earth Science" senior undergraduate course, a lecture on the subject of modeling ice sheets and sea level, Colorado College, 12/2022
- "Environment and Resource Management" Grade 12 class, a lecture on climate change and environment, Niagara Christian Collegiate, 09/2021

Teaching

- (Teaching Assistant; TA) Earth System Processes (ESYS 220), Department of Earth System Sciences, McGill university, 01/2019-04/2019
- (TA) General Geology (EPSC 221), Department of Earth and Planetary Sciences, McGill university, 09/2019-12/2019
- (Head TA), Understanding Planet Earth (EPSC 201), Department of Earth and Planetary Sciences, McGill university, 01/2018-04/2018
- (TA) The Earth System (ESYS 104), Department of Earth System Sciences, McGill university, 02/2017-04/2017
- (TA) Earth Physics (EPSC 320), Department of Earth and Planetary Sciences, McGill university, 09/2016-12/2016 and 09/2017-12/2017
- (TA) Earthquakes and Earth Structure (EPSC 330), 3rd year undergraduate course, Department of Earth and Planetary Sciences, McGill university, 01/2016-04/2016
- (TA) Earth Inference (EPSC 340), Department of Earth and Planetary Sciences, McGill university, 09/2015-12/2015 and 09/2019-12/2019
- (undergraduate TA) "Canadian Association of Physicists (CAP) high school workshop", University of Toronto, 03/2014

Mentoring

- (Co-mentoring) Yaris Eidenbenz, Grade 11, Los Alamos High School, 08/2021-02/2022
- (Co-mentoring) Tomas Milla-Koch, Senior undergraduate, McGill University, 09/2019-12/2019
- (Co-mentoring) Morgane Flament, Senior undergraduate intern at McGill University, Institut Polytechnique UniLaSalle, 07/2018-10/2018

Outside the classroom

- Science instructor, Inspiring Girls Expedition (IGE) - Girls on Ice, Kootenay Expedition program (11-days outdoor excursion leading high-school young adults), 08/2022
- Head coach, University of Toronto Taekwondo Organization (UTTO) Competitive Team, University of Toronto, 2013-2014
- Master instructor, Taekwondo, Fitness and Recreational Program, HartHouse, University of Toronto, 2013-2014
- Master instructor, Black Belt World (BBW) Taekwondo school (Toronto, Canada), 2011-2012

Outreach

- Early Career Researcher Volunteer, 2023 United Nations Climate Change Conference (Conference of the Parties of the UNFCCC; COP28, in Dubai, UAE), through an NGO International Climate Cryosphere Initiative (ICCI). 12/2023
- Science workshop presenter, "Ice Sheet Dynamics" session, GEAR UP New Mexico Girls STEM Pathways conference (Albuquerque, NM, USA), 02/2023
- Science workshop presenter, "Arctic Sea Ice" session, STEM Pathways for Girls Workshop for students in 5th-8th grades (Santa Fe, NM, USA), 11/2022
- Invited speaker, a talk on "the reality of climate change and a guided direction for the citizens", co-hosted by Osan Federation for Environmental Movements and Osan Citizen's Solidarity (Osan city, Gyeonggi province, South Korea), 07/2022
- General Judge, Los Alamos Public Schools District Science Fair (Los Alamos, NM, USA), 11/2022
- Invited teacher, a lecture in Grade 3 class on the environment and climate of the Earth, Voyageur Memorial Elementary School, Cree indigenous community of Mistissini, Quebec, 12/2020
- Invited speaker, a talk on "my story of finding passion and direction in life through walking in the Himalayas and studying Earth science, TOMorrowAispiresToday (TOMATO) Project, 06/2018
- Volunteer athlete, Bougez avec Laurent Duvenrny-Tardif, Organizing activities and teaching children soccer (Montreal, QC, Canada), 2017
- Physics experiments demonstrator, "Science Rendezvous", Department of Physics, University of Toronto, 05/2014

Leadership

- Sustainability Committee, Student Initiative Group, Earth and Planetary Sciences Department, Department of Earth and Planetary Sciences, McGill University, 2019-2020
- McGill Intramural Sports Supervisor and Soccer League Coordinator, McGill Athletics and Recreation, McGill University, 2019-2020
- Departmental representative, Adams Club: Society of Earth and Planetary Graduates, Department of Earth and Planetary Sciences, McGill University, 2017-2018
- Social representative, Adams Club: Society of Earth and Planetary Graduates, Department of Earth and Planetary Science, McGill University, 2015-2016
- Vice president, "Physics and Astrophysics Student Union (PASU)", Department of Physics, University of Toronto, 2014-2015

Other forms of giving back

- Holly Han Scholarship Fund (200 CAD/yr, established in 2020), Niagara Christian Collegiate (Ontario, Canada). Comment: I established this scholarship in my high school to start giving back what I can to the community I benefited from, and to inspire youth through a message reflected in the scholarship requirement: *"The Holly Han Scholarship will be awarded each year to a student who demonstrates exceptional spirit and strength of character, who works diligently to overcome personal challenges, and who strives for consistent improvement and progress in academic studies, and/or athletics"*