# Jasper Baur

New York, NY
jasperb@ldeo.columbia.edu

## EDUCATION

**Columbia University,** Department of Earth and Environmental Sciences          **May 2022 – May 2025** (expected)
PhD Candidate at the *Lamont-Doherty Earth Observatory*

**Columbia University**, Department of Earth and Environmental Sciences          **September 2020 – May 2022**
*Master of Arts*, at Lamont-Doherty Earth Observatory
Advisor: Dr. Einat Lev
Thesis: *Evolution and Dynamics of the Kīlauea Lower East Rift Zone Ahuʻailāʻau Lava Flow*

**Binghamton University**, **State University of New York**          **September 2016 –May 2020**
*Bachelor of Science in Geology, Double Minor in Graphic Design and GIS*
*Summa Cum Laude*, GPA 3.92/4.00

**University of Hawaii at Manoa**, School of Ocean and Earth Science and Technology          **Spring 2019**
*National Student Exchange Program,*
Dean's List: Spring 2019, GPA 4.0/4.0

## RESEARCH EXPERIENCE

**Demining Research Community**, de-mine.com          **July 2020 - Present**
*Cofounder, President*
- Founded non-profit organization to help bridge the gap between academic research and real-world applications for landmine and IED detection
- In charge of public outreach, connecting with NGOs, website and social media management, grant applications, planning fieldwork,
- Researching the use of drones with convolutional neural networks to detect scatterable landmines
- "Our mission at the Demining Research Community (DRC) is to research, develop, and field test cutting edge sensors and platforms to improve current demining technologies. We specialize in developing more efficient landmine and UXO detection methods by fusing unmanned aerial vehicles with remote sensing and machine learning."

**Physical Volcanology Group**, Lamont-Doherty Earth Observatory, NY          **September 2020 - Present**
*Graduate Research Assistant*
- Modeling fast channelized lava flows from the Kilauea 2018 eruption utilizing numerical models and drone footage for particle image velocimetry to determine spatial and temporal evolution of lava flow rheology

**AVERT – Anticipating Volcanic Eruptions in Real-Time**, Lamont-Doherty Earth Observatory          **March 2021 – Present**
*Graduate Student Researcher*
- Help geo-technicians install volcanic monitoring huts at Okmok and Cleveland Volcanoes in the Aleutian Islands in partnership with Alaska Volcano Observatory
- Investigating novel methods of volcanic plume detection from webcam imagery in the Aleutians to monitor volcanic activity and provide quantitative measurements on volcanic plume characteristics
- Generated 3D models of volcanic cones and conducted thermal surveys using structure-from-motion photogrammetry to assess tephra cone erosion rates

**Geophysical and Remote Sensing Laboratory**, Binghamton University, NY          **January 2017 – June 2020**
*Research Assistant*
- Developing a faster regional convolutional neural network to automate aerial plastic landmine detection
- Researched the use of RGB and thermal infrared sensing for surface and near surface plastic landmines detection
- Participated in the geophysical investigation of Mound Bottom archaeological site, Tennessee

**Imperial Barrel Award,** American Association of Petroleum Geology, Pittsburgh, PA          **December 2017- April 2018**
*Team member, GIS and Design specialist*
- Analyzed seismic and well log data to assess an offshore basin

**Biogeochemistry Laboratory,** Binghamton University, NY          **June 2017 - August 2017**
*Researcher*
- Funded by National Science Foundation's Pathways into Geosciences
- Analyzed the biogeochemical relationships in watersheds in Broome county with GIS

**Freshman Research Immersion**, Binghamton University, NY          **September 2016 - January 2017**

*Geospatial Remote Sensing Stream*
- Conducted "Remote Sensing Applications for Post-War Artifacts" research and poster talk

**Bermuda Institute of Ocean Sciences**, St. George's, Bermuda                    **June 2015 - July 2015**
*Natural Currents Energy Research Intern*
- Assisted in implementing the first wave energy deployment in Bermuda to create a more sustainable environment

## PUBLICATIONS

1. **Baur, J.**, Lev, E., Birnbaum, J., et al. (2022). Evolution and Dynamics of the Kīlauea lower East Rift Zone Ahuʻailāʻau Lava Flow. *Bulletin of Volcanology*. (In Prep)
2. Tuohy, M., **Baur, J.,** Steinberg, G., et al. Utilizing UAV-Based Hyperspectral Imaging (HSI) to Detect Explosive Remnants of War. *The Leading Edge*. (Submitted)
3. Moussallam, Y., Lee, HJ., Ding, S., …, **Baur, J**., et al. (2022). Temperature of the Villarica lava lake from 1963 to 2015 constrained by phase-equilibrium. *Journal of Petrology*. (Submitted)
4. Namiki, A., Lev, E., Birnbaum, J., & **Baur, J**. (2022). An experimental model of unconfined bubbly lava flows: Importance of localized bubble distribution. *Journal of Geophysical Research: Solid Earth*, *127*, e2022JB024139.
5. **Baur, J.**, Steinberg, G., Nikulin Ph D, A., Chiu Ph D, K., & de Smet Ph D, T. How to Implement Drones and Machine Learning to Reduce Time, Costs, and Dangers Associated with Landmine Detection. *The Journal of Conventional Weapons Destruction*, *25*(1), 29.
6. **Baur, J**., Steinberg, G., Nikulin, A., Chiu, K., & de Smet, T. S. (2020). Applying deep learning to automate UAV-based detection of scatterable landmines. *Remote Sensing*, *12*(5), 859.
7. Nikulin, A., De Smet, T. S., **Baur, J**., Frazer, W. D., & Abramowitz, J. C. (2018). Detection and identification of remnant PFM-1 'Butterfly Mines' with a UAV-based thermal-imaging protocol. *Remote Sensing*, *10*(11), 1672.
8. DeSmet, T., Nikulin, A., Frazer, W., **Baur, J**., Abramowitz, J., Finan, D., ... & Campos, G. (2018). Drones and" Butterflies": A Low-Cost UAV System for Rapid Detection and Identification of Unconventional Minefields. *The Journal of Conventional Weapons Destruction*, *22*(3), 10.

## PRESENTATIONS

**Society of Exploration Geophysics,** Summit on Drones and Geophysics, Virtual                    **October 2022**
- Keynote talk, "Utilizing UAV based imagery to identify and automate detection of surface lain mines and UXOs"

**Geological Society of America**, Connects, Denver, CO & Online                    **October 2022**
- Oral Presentation, "Spatial and Temporal variability of the 2018 Kīlauea Lower East Rift Zone Ahuʻailāʻau Lava Flow"

**Cities on Volcanoes**, IAVCEI, Crete, Greece & Virtual                    **June 2022**
- Lightning talk and E-poster, "Tephra Cone Morphology and Erosion inside Okmok's Caldera"

**American Geophysical Union** Fall Meeting, Washington D.C.                    **December 2021**
- E-poster and e-lightning talk, "Rheological Evolution of the Ahuʻailāʻau Fissure lavas during the 2018 Kīlauea lower East Rift Zone eruption"

**Geneva International Center for Humanitarian Demining and The United Nations Mine Action Service**

8th Mine Action Technology Workshop, Geneva, Switzerland                    **November 2021**
- Oral presentation, "Machine Learning Advances in Humanitarian Mine Action"

**First Year Colloquium**, LDEO and Columbia University                    **May 2021**
- Oral presentation, "Analyzing Kilauea Lava Flow Velocities through Drone Footage and Modeling"

**International Committee of the Red Cross and GICHD's** Webinar on the Use of AI and Remote Sensing in the Mine Action Center, Online                    **April  2021**
- Oral Presentation, "Guidelines for AI procedures - True color images for identification of landmines"

**American Geophysical Union** Fall Meeting, San Francisco                    **December 2019**
- Oral presentation, "Using a Convolutional Neural Network to Automate Detection of the PFM-1 plastic landmine"

**International Peace Day**, Binghamton University                    **September 2019**
- Educating peace organizations and the student body about the dangers posed by landmines

**American Geophysical Union** Fall Meeting, Washington D.C.                    **December 2018**
- Poster and e-lightning talk, "Improved Detection of Plastic Landmines with Aerial Polarized Thermal Imaging"

**Swissnex's Aerial Futures:** The Drone Frontier, Vendor and Invited Talk Boston, MA,                    **October 2018**
- "Aerial Humanitarians: Drones and Disaster Response"  Session

**Geological Society of America**, Northeastern Section Meeting, Burlington, VT,                    **March 2018**
- "Aerial Thermal Infrared Detection of PFM-1 Plastic Butterfly Mine"

**Robotics, Drones and Research possibilities**, New Paltz Middle School          **June 2018**
- Educational talk to New Paltz Middle School about scientific research and applications

**E-lightning Talk AGU** Fall Meeting, New Orleans, LA          **December 2017**
- "Catching PFM-1 Butterfly Mines"

**American Geophysical Union (AGU)** Fall Meeting, New Orleans, LA          **December 2017**
- Poster and e-lightning talk, "Detecting Plastic PFM-1 Landmines Using Thermal Infrared Sensing"

**Freshman Research Immersion Research Poster Session,** Binghamton University
- "Detecting PFM-1 Landmines Using Thermal Infrared Sensing"          **December 2017**
- "Remote Sensing Applications for Post-War Artifacts"          **December 2016**

## CERTIFICATIONS

Adult and Pediatric First Aid CPR AED, Frontline Health,          **May 2021 – May 2023**

Wilderness First Aid, Longleaf Wilderness Medicine,          **May 2021 – May 2023**

Basic Aircrew Member (with Hazmat), Interagency Aviation Training          **May 2021 – May 2024**
A100 Basic Aviation Safety, A110 Aviation Transportation of Hazardous Materials, A200 Mishap Review

FAA Part 107 Remote Pilot Certificate/ Drone Pilot,          **August 2018 - August 2024**

## TECHNICAL SKILLS

*Programming Languages*: Python (intermediate), Matlab (basic), R (basic)

*Software*: ArcGIS, QGIS, Adobe Illustrator and Photoshop, Agisoft Metashape, ENVI, Pix4DMapper

*Instruments*: UAS (quadcopter and hexicopter), FLIR Vue Pro, Photogrammetry, Parrot Sequoia, Trimble GeoExplorer 7

## FIELD EXPERIENCE

*Alaska Volcano Observatory and AVERT field season*, Mount Okmok, Umnak, AK   **July - August 2021, September 2022**
- Preformed geotechnical work with AVO including analog to digital (A2D) conversion of volcanic monitoring huts on Okmok, wiring huts power systems, installing seismometers, webcam, solar panels, BGAN, and VSAT in the harsh weather conditions of the Aleutians
- Ship based fieldwork, aboard the Alaska Volcano Observatories *Steadfast* research vessel
- In charge of helicopter photogrammetry surveys in thermal and visible wavelengths, and generating 3D models, DEM's and orthomosaics of volcanic cones inside the caldera
- Flew a gas flight in the caldera with scanning DOAS and multigas instruments, as well as measured diffuse degassing of $CO_2$ using flux meter

*DRC Field Campaign,* Oklahoma State University's Institute for Global Explosive Hazard Mitigation, OK   **June 2022**
- Organized field logistics, preparation, and operation for s successful field campaign
- Collected over 200 UAV flights acquiring data of 55 unique types of inert munitions at an explosives range.
- Data used to train a Faster Regional-CNN to automate detection of landmines and other munitions

*Geological Field Methods*, University of Hawaii at Manoa          **January - May 2019**
- Semester long field methods class that trains geology students how to be an effective field geologist to map and assess geologic features with hand lens, Brunton compass, notebook and handheld GPS
- Included 11-day mapping project in the Mojave Desert, with comprehensive geological report

*Geophysical Archeological Investigation,* Mound Bottom, Kingston Springs, TN          **May 2018**
- Used GPR, magnetometry, electromagnetic induction, resistivity and multispectral camera attached to UAVs to conduct a non-invasive assessment of archaeological remains of sight
- Processed geophysical data

*Near Surface Geophysical Survey,* Nantahala National Forest, Murphy, NC          **August 2017**
- Cultural Resource Management of two salvage archeological sites using Ground-Penetrating Radar and Magnetometry, operating quad-copter based photogrammetry

*Seismic Survey and Lacustrine Sampling,* Green Lakes State Park, NY          **June 2017 - July 2017**
- Set up and recorded seismic surveys between two lakes to analyze stratigraphy of the area
- Collected water samples of Green Lake to analyze cyanobacteria in a meromictic lake

## AWARDS

**Glen G. Bartle Class of 52' Award**, *Department of Geological Sciences at Binghamton University*          **May 2020**
- This award is given to one outstanding graduating senior in Geological Sciences who best

emulates Glen Bartle's ideal of academic excellence and service to the department

**Provost Award for Excellence in Undergraduate Research**, *Binghamton University* ($750)                    **April 2020**
- This award honors Binghamton University students who have excelled in research, scholarship and creative activities that extend beyond traditional course work
- Two awards are made each year to graduating seniors

**Barry Goldwater Scholar**, *Goldwater Scholarship and Excellence in Education Foundation* ($7500)          **April 2019**
- "The most prestigious undergraduate scholarship given in the natural sciences, engineering and mathematics" awarded annually to 400 STEM undergraduate students nationwide

**Segal Americorps Education Award**, *Americorps* ($1600)                    **August 2019**
- Earned by completing 450 hours of national service in an AmeriCorps program

**David Miller Young Scientist Scholarship**, *American Geophysical Union* ($1500)          **September 2018**
- Given to one undergraduate or graduate student a year internationally "for outstanding achievement and potential in geo-environmental sciences and environmental engineering"
- 1st undergraduate to ever receive award

**Tech Brief's Create the Future Design Contest 2018**, *NASA Tech Briefs*          **September 2018**
- Aerospace and Defense Category Winner
- Highly competitive award outcompeting NASA and other aerospace and defense organizations from over 800 entries from 60 countries

**World Labs 'Elevating Ideas 2018' competition Top 100**                    **October 2018**
- 'Detecting Plastic Landmines' Submission

**Chasing Genius Unlimited Innovation Finalist**, *National Geographic*          **March 2018**
- 2nd place overall out of over 5,000 submissions, selected by group of judges and voted by members

**Dean's List**, *Binghamton University*          **September 2016 – May 2020**
- Maintained over a 3.5 GPA all semesters in attendance

## GRANTS

**Graduate Research Fellowship Program,** National Science Foundation ($34,000 for 3 years)          **April 2020**
- "The NSF Graduate Research Fellowship Program recognizes and supports outstanding graduate students in NSF-supported science, technology, engineering, and mathematics disciplines who are pursuing research-based Master's and doctoral degrees at accredited United States institutions.
- "Fellows benefit from a three-year annual stipend of $34,000 along with a $12,000 cost of education allowance for tuition and fees"

**Dean's Fellow,** Columbia University          **September 2020 – May 2025**
- Compressive five-year funding package from the Graduate School of Arts and Sciences at Columbia University covering tuition, health services, and University fees
- An annual stipend of $41,520 for up to five years, provided by the Department of Earth and Environmental Sciences via fellowships, research grants to your dissertation advisor, and the Graduate School.

**Harpur High Impact Learning Endowment Grant,** BU Harpur Edge ($1000)          **March 2020**
- Funding assistance for research publication in the journal of Remote Sensing

**Freshman Research Immersion Undergraduate Research Fund,** BU Research Foundation ($1000)          **March 2020**
- Funding assistance for research publication in the journal of Remote Sensing

**Harpur High Impact Learning Endowment Grant**, Binghamton University ($1000)          **October 2019**
- Funding to attend AGU Fall Meeting 2019 in San Francisco, CA

**Undergraduate Conference Presentation Fund**, Binghamton University ($250)          **December 2018**

**Binghamton University Undergraduate Research Award** ($230)          **November 2018**

**Undergraduate Conference Presentation Fund**, Binghamton University ($300)          **December 2017**

**Harpur Edge Student Support Fund**, Binghamton University ($1000)          **December 2017**
- Funding to attend AGU Fall Meeting 2018 in New Orleans, LA

***Grants and Awards total***: $118,120 (Not including Dean's Fellowship)

## LEADERSHIP & INVOLVEMENT

**LDEO Colloquium Committee,** *Seismology, Geology, Tectonophysics Student Representative*          **Fall 2021 – Present**

- Help organize and host the largest invited talks at Lamont-Doherty Earth Observatory

**LDEO REU Program,** *Graduate Student Mentor*                                          **Summer 2022**
- Mentored two summer interns, providing advice and counseling on their research and career goals

**Binghamton University Fine Arts Society,** *Vice President*                     **Fall 2017 – Spring 2020**
- Organized campus events and inventory, ran drawing sessions, and conducted general interest meeting

**Binghamton University IEEE Mars Rover Society***, Team Member*          **Fall 2017 - Spring 2018**
- Participated in the science portion of the Binghamton University team entered
  in the Mars Society's University Rover Challenge

**Geology Club***, Team Member*                                                   **Spring 2017 – Spring 2020**
- Participated in field trips and student educational events

**Binghamton University Intramural Soccer League***, Team Captain*            **Fall 2016 – Fall 2019**
- Managed team practices and play games on Sundays or Wednesdays

**English Conversation Pair***, Participant*                                   **January 2017 - May 2017**
- Speak with international students every week to learn about other cultures and help
  acclimate international students to America

**New Paltz Mohonk Preserve***, Volunteer*                                **September 2014 - May 2016**
- Trail maintenance, collected litter, helped with catering events and posting up signs

## SELECTED MEDIA

***Scientific American***                                                      **September 10th, 2022**
- "To Clear Deadly Land Mines, Science Turns to Drones and Machine Learning" by Andrew Robinson and Dominic Smith
- Short Documentary about Demining Research Community's field work at OSU's Explosive Ordnance training range

***Columbia Climate School,*** *State of the Planet*                           **September 20th, 2021**
- "Harnessing Drones, Geophysics, and Artificial Intellegence to Root Out Land Mines" by Kevin Krajick

***Binghamton University National News Hits***                                        **March 15th, 2019**
- **Jasper Baur** and William Frazier, Binghamton University students, were featured in *Inverse.com*, *Electronic Component News*, and various other publications for their research which focuses on using thermal cameras attached to a drone to find landmines.
- Circulated over 7.2 Million times

***Inverse.com***                                                             **February 7th, 2019**
- "How Two College Students Hacked Consumer Drones to Find Landmines" by Danny Paez

***Scientific American***                                                       **December 28th, 2018**
- "Drones Used to Find Toy like "Butterfly" Land Mines" by Jeremey Hsu

***Der Spiegel Online***                                                        **December 17th, 2018**
- "Researchers are Using Drones to Combat Landmines (translated)" by Christopher Seidler

***PBS News Hour***                                                             **July 10th,  2018**
- "These Drone Projects are Saving Lives and Protecting Nature" by Larisa Epatko

## WORK EXPERIENCE

***Americorps Masonry Steward,*** Hyde Park, NY                               **May 2019 - August 2020**
- Preserving and maintaining stone walls at Vanderbilt Mansion National Historic Site and
  Home of Franklin D. Roosevelt National Historic Site with the National Park Service

***Chef Assistant and Caterer***, Hudson Valley, NY                          **December 2011 - Present**
- Food prep, server, dishwasher, and deliver customer service

***YMCA Camp Wiltmeet Camp Counselor***, New Paltz, NY                       **June 2013 - August 2016**
- Supervised and led 10 campers ages 4-10 through daily camp activities

## RELEVANT COURSEWORK

**Geology**: Magmatism and Volcanism, Earth's Surface Processes, Rock Record and Earth History, Earth Materials, Petrology, Geological Field Methods, Structural Geology, Sedimentology and Stratigraphy, Earth's Ocean and Atmosphere, Chemical Geology, Classical Volcanology
**Geophysics:** Earth's Dynamic Interior, Interior of the Earth, Environmental Geophysics, Applied Geophysics, Geodynamics
**Remote Sensing:** Geospatial Remote Sensing, UAV and Aerial Photography, Advanced Raster GIS and GPS,

Cartography and GIS, Remote Sensing, Global Assessment Remote Sensing
**Physics, Chemistry, Math**: Calculus based Physics I, Physics II, Chemical Principles (I and II), Calculus I and II, Quantitative Methods for Data Analysis, Applied Linear Algebra
**Programming**: Intro to Scientific Computing, Research Computing, Fundamentals of Computer Vision
**Graphic Design**: Intro to Graphic Design Principals, Graphic Design Software, Scientific Illustration

## PROFESSIONAL MEMBERSHIPS

| | |
|---|---|
| Phi Beta Kappa honor society, *member* | **September 2019 - Present** |
| Center for Advanced Environmental Remote Sensing, CAERS (*Founding Member).* | **February 2018 – May 2020** |
| American Geophysical Union (AGU) | **October 2017 - Present** |
| Geological Society of America  (GSA) | **December 2018 – Present** |

## REFERENCES

**Einat Lev**, PhD, einatlev@ldeo.columbia.edu
Lamont Associate Research Professor, Lamont Doherty Earth Observatory, 108G Seismology 61 Route 9W - PO Box 1000 Palisades NY 10964-8000 US

**Timothy S. de Smet**, PhD, tdesmet@binghamton.edu
Assistant Professor, Director of Geophysical and Remote Sensing Laboratory, Freshman Research Immersion Program, Department of Geological Sciences and Environmental Studies, Binghamton University, Science 1, G-56, Binghamton University, 4400 Vestal Parkway East, Binghamton, NY 13902-6000

**Alex Nikulin**, PhD, anikulin@binghamton.edu
Associate Professor of Energy Geophysics, Department of Geological Sciences and Environmental Studies
Binghamton University, Science 1, G-60C, 4400 Vestal Parkway East, Binghamton, NY 13902-6000