Aaron Curtis

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Education

2018 – 2019	**JPL Postdoc, Robotic Climbers and Grippers (347M)**

- Created the Icy Terrain Generator, a synthetic terrain generator based on stochastic simulation of geological processes used by Europa Lander Sampling Autonomy team
- Led ultrasound non-destructive testing of ice and rock for Europa Lander Sampling team, and contributed to impact testing and other material properties campaigns
- Volcanologist on fumarole gas sampling quadcopter and time-delay fumarole sampler

2016 – 2018 NASA Postdoctoral Program Fellowship at JPL, Extreme Environment Robotics (347C)

- Completed electronics (PCB), software, and testing of anchoring systems for world's first climbing robot (IceWorm), with successful field trials in fumarolic ice caves of Mt. Erebus, Mt. Rainier and Mt. St. Helens
- Completed python software suite for cryovac ice gripper testbed
- Created digital elevation models and computed rover simulations for MoonDiver early stage mission formulation
- Co-PI on PEARL: Pattern Extraction for the Autonomous Recognition of Life
- Contributed to Journey to the Center of Icy Moons NIAC

2012 – 2016 New Mexico Institute of Mining and Technology

Ph.D Earth & Environmental Science

- Dissertation: Dynamics and global relevance of fumarolic ice caves on Erebus Volcano, Antarctica
- Coursework in geostatistics
- Short courses, including COMSOL Multiphysics intensive training, differential GPS course at UNAVCO, and LiDAR training

2009 – 2011 *MS Geochemistry*

- Independent study: Geothermal point sources identified in a fumarolic ice cave on Erebus volcano, Antarctica using fiber optic distributed temperature sensing
- Coursework in timeseries analysis, minerology and petrology, stable and radiogenic isotopes, electron microprobe analysis, machine shop, advanced volcanology, physical chemistry, Ecuador field course in volcano geophysics, Yellowstone field course in geophysics / geochemistry
- Led microbiological investigation of fumarolic ice cave samples

2005 – 2008 Cambridge University

BA Hons Geography (1st Class)

- Undergraduate dissertation on cave microclimates included design and construction of precision "micropsychrometer" humidity sensor
- Part Ib: dendrochronology project on cores from Arolla, Switzerland
- Part Ia: analytical chemistry investigation of water quality in Bin Brook
- Coursework in Quaternary science, biogeography, hydrology, earth observation, volcanology, coastal dynamics and glaciology

Experience and Responsibilities

October 2019 – Present	**JPL Software Systems Engineer II (Group 397P)** • Mars Science Laboratory (Curiosity) Rover Planner • Created and maintain the open source NASA Solar System Trek Mosaic Pipeline • Implementing prototypes and requirements docs for JPL Chief Data and Analytics Office
August 2018	**2018 Planetary Science Summer Seminar Command and Data Handling Chair** ● Participated in formulation of a mission to Uranus, focusing on Uranian satellites and the design of an infrared spectrometer ● Devised a novel C&DH strategy during JPL TeamX concurrent design session, allowing the mission data story to close
Fall 2015 – 2016	**Trail by Fire Expedition unmanned aerial vehicle specialist** ● Designed, built, obtained permissions, and operated volcano sensing UAV systems in cooperation with INGV (Instituto Nazionale di Geofisica e Vulcanologia) and several corporations ● Other expedition member roles include operation of direct sampling and remote sensing equipment, driving manual transmission on rugged Andean unimproved roads
Spring – Fall 2013	**Los Alamos National Laboratory / Engineering Institute** ● Team member for development and testing an unmanned aerial system for physical sample collection as participant in the LANL Science of Signatures Advanced Scholars Program ● Continued participation in UAS development as a Faculty Guest Researcher, including code development in C++, Java, and Python
Fall 2009 – Fall 2015	**Research Assistant, Mount Erebus Volcano Observatory** ● Seven austral Summers working on Erebus Volcano, in research and support roles • Maintained data stream from telemetered seismic network (including setup of three Earthworm servers) and administered Observatory website • Developed online database of fumarolic ice cave data for collaboration, resource protection • Collected gas samples and established gas and microclimate monitoring systems in fumarolic ice caves
Fall 2009 – 2013	**Teaching Assistant, New Mexico Institute of Mining and Technology** ● Presented original lectures and labs as co-instructor for Cave and Karst Science course ● Designed and evaluated labs and quizzes, led review sessions for: Introduction to Geology, Radiogenic Isotopes, Spaceship Earth, Volcanology
Winter 2008 – summer 2009	**National Park Service Sonoran Desert Network, Arizona** ● Vegetation mapping crew member. Off-trail fieldwork, plant identification, GIS work ● Created an online portal for viewing Sonoran Desert Network maps and data
Summers 2004-7 and winter 2007	**US Embassy, Stockholm** ● American Citizen Services Assistant; Consular Clerk; Financial Management Office Assistant. Handled secure documents (e.g. passports); customer and business liaison in delicate circumstances

Awards and Certification
- Solidworks Associate Certification, 2018
- FAA Remote Pilot Certificate, 2018
- Awarded NASA Postdoctoral Program Fellowship, 2016 – 2018
- Awarded Kay & Elise Brower Music Scholarship 2015
- Awarded New Mexico Space Grant Graduate Research Fellowship, 2010-2011 and 2012-2013
- Recipient of James Mitchell award (best presentation by early-career scientist) at International Congress of Speleology 2009
- Obtained funding from Royal Geographical Society, British Cave Research Association, and corporate sponsorship (nine firms) for Cambridge Austrian Cave Science Expedition and my undergraduate dissertation
- American Foreign Service Association Merit Award scholarship, 2005
- Won financial awards from the Worts Travelling Scholars Fund, the David Richards Travel Grant, and the Bedford Travel Grant, NASA JPL Travel Grant, NMT travel grant, and IAVCEI 2013 conference support

Selected Publications & Presentations
- [22 others], **A. Curtis.** (2020). "QUEST: A New Frontiers Uranus Orbiter Mission Concept Study" *Acta Astronautica* 170: 6-26 doi:10.1016/j.actaastro.2020.01.030
- J. Ashley, **A. Curtis**, [3 others] (2019) Morphometric comparison of Martian iron meteorite finds with curated terrestrial analog samples using 3d visualization and measurement techniques. *50th Lunar and Planetary Science Conference*
- **A. Curtis**, M. Martone, A. Parness. (2018) "Roving on Ice: Field Testing an Ice Screw End Effector and Sample Collection Tool" *Proceedings of the IEEE Aerospace Conference 2018,* Big Sky, Montana
- **A. Curtis**, P. Kyle (2017) "Methods for Mapping and Monitoring Global Glaciovolcanism." *Journal of Volcanology and Geothermal Research* 10.1016/j.jvolgeores.2017.01.017
- Y. Moussallam, P. Bani, **A. Curtis**, *et al.* (2016) "Sustaining Persistent Lava Lakes: Observations from High-Resolution Gas Measurements at Villarrica Volcano, Chile." *Earth and Planetary Science Letters* 10.1016/j.epsl.2016.09.012
- **A. Curtis** (2015) "Signatures of Fumarolic Ice Caves: Subsidence Cauldrons and Density Effects Observed at Erebus Volcano" *2nd International Planetary Caves Conference* Flagstaff, AZ
- H. Rotman, P. Kyle, D. Fee, **A. Curtis** (2015) "Frequency and Size of Strombolian Eruptions from the Phonolitic Lava Lake at Erebus Volcano, Antarctica: Insights from Infrasound and Seismic Observations on Bubble Formation and Ascent." *Geological Society of America Annual Meeting* Baltimore, MD
- D. Mascarenas, L. Ott, **A. Curtis**, *et al.* (2014). "Video: Remote Sensor Placement." *MobiSys '14*. New York, NY, USA. doi:10.1145/2594368.2602433.
- T. Fischer, **A. Curtis**, *et al.* (2013). "Gas Discharges in Fumarolic Ice Caves of Erebus Volcano, Antarctica. Oral Presentation" *Geological Society of America Annual Meeting* Denver, CO
- **A. Curtis**, P. Kyle (2011) "Geothermal point sources identified in a fumarolic ice cave on Erebus volcano, Antarctica using fiber optic distributed temperature sensing" *Geophysical Research Letters*, 38(16), L16802.
- **A. Curtis** (2010). "Instrumenting the fumarolic ice caves of Erebus Volcano." Oral presentation, *Polar Technology Conference* Albuquerque, NM.
- **A. Curtis** (2009) "Karst Micrometeorology of Two Caves on the Loser Plateau, Northern Calcareous Alps, Austria - Initial Results." *Die Höhle* 60: 10–20.
- **A. Curtis** (2008) "Science and Surveying: Totes Gebirge, Austria 2007" *Speleology* 10/11:6-10
- A. Parness, **A. Curtis**. (2017) "Rock and Ice Climbing Robots for Volcanology" Oral presentation, *IAVCEI 2017 Scientific Assembly* Portland, OR.

Selected programming languages and tools
- *Fluent:* Python, Javascript, HTML/CSS, MeteorJS, ReactJS, ThreeJS, pandas, git, docker, argo
- *Some experience:* Kubernetes, Matlab, SQL, GraphQL, qt, C, C++, Java, holoviews, bokeh, d3js