John M. Christoph - Curriculum Vitae

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Education

Ph.D in Exploration Systems Design Defense January 2023

School of Earth & Space Exploration (SESE), Arizona State University, Tempe, AZ
Candidacy attained Sept 2018, GPA 3.40 iPOS, 3.23 cumulative

B.S. Cum Laude in Geology Graduated May 2016

College of William & Mary, Williamsburg, VA
GPA 3.40 within major, 3.26 cumulative

Publications

Peer-Reviewed Articles

Space weathering effects in troilite by simulated solar wind hydrogen and helium ion irradiation, **J. M. Christoph**, G. M. Minesinger, C. Bu, C. A. Dukes, & L. T. Elkins-Tanton, *JGR-Planets* 2022

Characterizing fracture surfaces on metallic impact crater ejecta, **J. M. Christoph**, T. Sharp, S. Marchi, & L. T. Elkins-Tanton, in preparation for peer review

Laser ablation of iron meteorites driving thermo-mechanical breakdown, **J. M. Christoph**, M. Loeffler, T. Sharp, & L. T. Elkins-Tanton, in preparation for peer review

Psyche Topography and Geomorphology Investigation, R. Jaumann, J. Bell, C. Polanskey, C. Raymond, D. Bercovici, B. Bills, W. Bottke, **J. M. Christoph**, et al. *Space Science Reviews* 2021 in review

Meeting Abstracts

Surface Processes on Metal Worlds: Space Weathering, Micro-Impacts, & Regolith Formation in Meteoritic Metal. **J. M. Christoph**, L. T. Elkins-Tanton, and M. J. Loeffler. AGU Fall Meeting 2022 Oral Presentation

How to Make Metal Regolith: Fracture Mechanics in Ejecta from Impacts into Meteoric Iron. **J. M. Christoph**, S. Marchi, T. Sharp, and L. T. Elkins-Tanton, LPSC 2022 Oral Presentation

Laboratory Simulations of Troilite Space Weathering by Solar Wind Ion Irradiation: Surface, Composition, and Spectral Effects. **J. M. Christoph**, C. Bu, G. M. Minesinger, C. A. Dukes, & L. T. Elkins-Tanton, LPSC 2021 Oral Presentation

Characterizing Ejecta Fragments from Impact Experiments into Meteoric Iron using Scanning Electron Microscopy (SEM). **J. M. Christoph**, T. Sharp, S. Marchi, & L. T. Elkins-Tanton, LPSC 2021 Poster

Modeling the Effect of Solar Wind Ion Irradiation of Troilite with SDTrimSP – Implications for (16) Psyche. G. M. Minesinger, **J. M. Christoph**, C. A. Dukes, C. Bu, & L. T. Elkins-Tanton, LPSC 2021 Oral Presentation

Space Weathering of Metallic Asteroid Surfaces, **J. M. Christoph** & L. T. Elkins-Tanton, The Main Belt 2019 Oral Presentation

Rare Earth Elements in CO and CV Chondrite Components, D. S. Ebel, E. J. Crapster-Pregont, M. E. Gemma, & **J. M. Christoph**, Goldschmidt 2018 Oral Presentation

The Science Case for Spaceborne Radar Observations at Io, **J. M. Christoph** & D. A. Williams, LPSC 2017 Poster

Spatial and Temporal relationships among low shield volcanoes in the Ceraunius Fossae region of Tharsis: the last gasp of Martian volcanism, **J. M. Christoph** & W. B. Garry, LPSC 2017 Oral Presentation

Synthetic Aperture Radar instrument concept for subsurface geological observations of Io, **J. M. Christoph** & D. A. Williams, LPSC 2017 Poster

Experience Beyond Dissertation

Lead Instructor: Inquiry-Based Learning Fall 2021
Arizona State University – Interplanetary Initiative
- Facilitated online independent research course for multidisciplinary undergraduate students
- Taught students how to find peer-reviewed primary source literature to answer their own questions about Earth & space science & engineering, as well as related areas of social science & humanities
- Graded & provided feedback on weekly paper summaries, monthly oral presentations, & final projects

Transportation Commission Member Jan. 2020 – Dec. 2022
City of Tempe, AZ
- Appointed to municipal public service position because of work with local advocacy organizations
- Reviewed proposals by city, county, & state agencies to upgrade regional transportation infrastructure: roads, sidewalks, bike paths, bus routes, rail lines, transit stations, rideshare networks, & micro-mobility
- Advocated policy changes to City Council, e.g. speed limit reductions & transit-oriented zoning
- Developed subject matter expertise in transportation & urban planning outside my academic background

Campus Workers Union Steering Committee Feb. 2021 – July 2021
United Campus Workers of Arizona, CWA Local 7065
- Elected student representative of wall-to-wall labor union for faculty, staff, & student workers at ASU
- Organized graduate students & staff within my university department to expand our union membership
- Crafted actionable demands to improve student workers' pay, healthcare, & safety during COVID-19

Director – Open House Committee Fall 2018 – Summer 2021
Arizona State University – SESE
- Organized semesterly public events for science outreach within my university department
- Coordinated event logistics among exhibitors, guest speakers, facilities staff, media, & volunteers

Teaching Assistant – Geology & Astronomy Fall 2014 – Spring 2016, Spring 2018, Fall 2019
Arizona State University and College of William & Mary
- Prepared & graded exams for introductory astronomy lecture courses
- Supervised laboratory instruction of introductory geological principles
- Held office hours to provide feedback for students

Arctic Ice Management Project Nov. 2016 – Dec. 2017
Arizona State University – SESE
- Investigated potential geoengineering mechanisms to conserve Arctic sea ice pack in the face of anthropogenic global warming
- Developed CAD & real-world models to test saltwater flow system for wind-powered ice pump buoys
- Constructed prototype apparatus for experiments in -20°C cold room simulating Arctic conditions

Senior Honors Thesis Research in Geology May 2015 – May 2016
College of William & Mary
- Investigated spatial and temporal relationships among low shield volcanoes in Tharsis region of Mars
- Used QGIS, JMARS, and Google Earth to process and spatially analyze orbital spacecraft imagery

Physical Sciences NSF REU Intern June 2015 – Dec 2015
American Museum of Natural History, New York, NY
- Investigated complementarity relationships in trace element compositions of chondrules, CAIs, and matrix in CV-type carbonaceous chondrite meteorites
- Mapped major elements in meteorite thick sections using Electron Probe Micro-Analyzer (EPMA)
- Measured trace element abundance data with Laser Ablation ICP-MS

Analytical Planetary Chemistry Intern June 2014 – Aug. 2014
Pheasant Memorial Lab, Institute for Study of Earth's Interior, Okayama University
- Investigated trace element chemistry, mineral phases, and radiometric ages of two LL type meteorite samples using laboratory wet chemistry, ICP-MS, TIMS, and SEM

Freshman Honors Research in Chemistry Oct. 2012 – May 2013
College of William & Mary

- Rebuilt, maintained, & operated cyclic voltammetry equipment to perform experiments studying electrochemical properties of aqueous organometallic solutions

Spirit of Innovation Awards Finalist Nov. 2011 – Mar. 2012
Conrad Foundation
- Led student team which developed high-level mission architecture, concept of operations, & business plan for commercial robotic asteroid mining operation

Virginia Aerospace Science & Technology Scholar Dec. 2010 – July 2011
Virginia Space Grant Consortium
- Collaborated with 40 other Virginia high school students to develop detailed concept of operations proposal for a human Mars mission at NASA Langley Research Center

Skills

Laboratory Instrumentation
Electron Microscopy Techniques:
- Thermo-Scientific Helios 5 UX: SEM/FIB, EDS, automatic image mosaic mapping & 3D reconstruction
- FEI XL-30: field-emission environmental SEM
- SNE-4500M: SEM, EDS
- Cameca SX100: Electron Probe Micro-Analyzer (EPMA)
- Bruker Dimension 3000: Scanning Probe / Atomic Force Microscopy (SPM/AFM)

X-Ray Techniques:
- PHI Versaprobe III: X-Ray Photoelectron Spectroscopy (XPS), ion sputtering
- Bruker SMART APEX II: X-ray crystallography
- Energy-Dispersive X-ray Spectroscopy (EDS/EDX) on SEM (see above)

Ion Beam:
- Focused Ion Beam (FIB) on Helios 5 UX SEM (see above), gallium liquid metal ion source
- PHI-560: highly customized 0.5-25 keV beamline, compressed gas ion source, *in-situ* XPS
- IBeAM: custom-built 1.7 MeV tandem accelerator beamline, compressed gas ion source RBS, PIXE
- SRIM/TRIM: software simulation of ion interactions with solids

Optical Techniques:
- Laser Ablation: LA-ICP-MS, micrometeoroid impact simulation
- Nicolet iS20: Fourier Transform Infrared (FTIR) Spectrometer
- Petrographic optical microscopy

Mass Spectrometry:
- Thermal Ionization (TIMS)
- Inductively Coupled Plasma (ICP-MS)

General Lab Techniques:
- EM sample prep: polishing, mounting, carbon-coating, decontamination
- Benchtop chemistry: preparing solutions, acid leaching, distillation, column separation, etc.
- Cyclic voltammetry & other electrochemical techniques

Information Technology
- Python – Basic programming skill for data analysis, plotting, & calculation
- ArcMap & QGIS – Geographic Information System for analysis of geospatial data & mapmaking
- JMARS – Geographic Information System for planetary science applications
- ImageJ, Inkscape, Adobe Illustrator, GIMP, & LISPIX – Image processing software
- Microsoft Office & LaTeX – Text editing & document preparation
- SolidWorks, OpenSCAD, & Sketchup – CAD and three-dimensional drafting

Languages
- Academically fluent in English, conversationally proficient in German
- Have studied French, Latin, Italian, Japanese, Russian