

**Christopher G Hughes**  
**Department of Geosciences**  
521 Lancaster Ave  
Roark 103  
Richmond KY 40475  
1-412-657-7396  
christopher.hughes@eku.edu

### **Education**

- August 2005 – April 2011, The University of Pittsburgh, Ph. D. from the **Department of Geology and Planetary Science**. Advisor: Dr. Michael Ramsey. Dissertation: Super-resolution of Thermal Infrared Data with Contemporaneous Visible and Near-Infrared Data
- August 2003 – August 2005, The University of Pittsburgh, Post-Baccalaureate in **Geology**
- May 1996, Dickinson College, B.S. in **Computer Science**

### **Appointments**

- August, 2016 - present, Assistant Professor at Eastern Kentucky University
- October, 2014 - present, Volunteer Research Faculty, SUNY University at Buffalo
- August, 2014 – June, 2016, Instructor at Clarion University of Pennsylvania
- September 2013 – August, 2014, Postdoctoral Associate at SUNY University at Buffalo
- January 2012 – January, 2013, Caltech Postdoctoral Scholar at NASA JPL
- May 2011 – December 2011, Postdoctoral Associate at University of Pittsburgh

### **Teaching Experience**

- Fall 2016: Instructor at Eastern Kentucky University for Geographic Information Systems (Undergraduate upper-level elective class)
- Fall, 2016: Instructor at Eastern Kentucky University for Great Moments In Earth History - 2 sections (introductory / general education class)
- Spring, 2016: Instructor at Clarion University for Advanced Remote Sensing (Undergraduate capstone course)
- Spring, 2016: Instructor at Clarion University for Historical Geology (Undergraduate major requirement class)
- Spring, 2016: Instructor at Clarion University for Basic Earth Science (Large introductory class)
- Fall, 2015: Instructor at Clarion University for Introductory Remote Sensing (Undergraduate upper-level elective class)
- Fall, 2015: Instructor at Clarion University for Basic Earth Science - 2 sections (Large introductory class)
- Summer, 2015: Instructor at Clarion University for **Field Methods In Geology** (Undergraduate field experience course)
- Spring, 2015: Instructor at Clarion University for **Advanced Remote Sensing** (Undergraduate capstone course)
- Spring, 2015: Instructor at Clarion University for **Historical Geology** (Undergraduate major requirement class)
- Spring, 2015: Instructor at Clarion University for **Basic Earth Science** (Large introductory class)
- Fall, 2014: Instructor at Clarion University for **Introductory Remote Sensing** (Undergraduate upper-level elective class)
- Fall, 2014: Instructor at Clarion University for **Basic Earth Science** -2 sections (Large introductory class; small introductory class)

- Spring, 2014: Instructor at SUNY Buffalo for **GIS for Geologists** (Graduate class)
- Spring, 2011: Instructor at University of Pittsburgh for **Advanced GIS** (Graduate class)
- Spring, 2011: Laboratory instructor at University of Pittsburgh for **Structural Geology** (Core major requirement class)
- Spring, 2010: Laboratory instructor at University of Pittsburgh for **Structural Geology** (Core major requirement class)
- Fall, 2009: Adjunct Faculty at Duquesne University for **Core Geology** (Large introductory class)
- Summer, 2009: Adjunct Faculty at Duquesne University for **Core Geology** (Introductory class)
- Spring, 2009: Adjunct Faculty at Duquesne University for **Core Geology** (Large introductory class)
- Spring, 2009: Laboratory instructor at University of Pittsburgh for **Structural Geology** (Core major requirement class)
- Fall, 2008: Adjunct Faculty at Duquesne University for **Core Astronomy (Planetary Geology)** (Large introductory class)
- Fall, 2008: Co-Instructor at University of Pittsburgh for **Remote Sensing** (Major/Graduate class)
- Fall, 2007: Instructor at University of Pittsburgh for **Remote Sensing** (Major/Graduate class)
- Fall, 2006: Laboratory instructor at University of Pittsburgh for **Mineralogy** (Core major requirement class)
- Fall, 2005: Laboratory instructor at University of Pittsburgh for **Mineralogy** (Core major requirement class)
- Spring, 2005: Laboratory instructor at University of Pittsburgh for **History of The Earth** (Undergraduate major requirement class)
- Fall, 2004: Teaching assistant at University of Pittsburgh for **Introductory Geology Lab** (Introductory lab class, separate from the choice of lecture class)

### Example Curriculum Development

- **Remote Sensing:** Put together module on the history of remote sensing, emphasizing the human and cultural aspects of a technical field. Integration of information from the humanities, in both this and other classes, has helped students retain technical and scientific information.
- **Introductory Geology / Basic Earth Science:** developed a theme of “What Does An Earth Scientist Do?” to use throughout a course. Examples jobs are represented by 1-2 slides of information, usually in a career field related to that day’s lecture topic. This theme demonstrates the diversity of the field to students, rather than constantly using the possibility of working outside as a selling point to attract majors. This was developed specifically to address low minority student enrollment within the earth sciences, as a job working outside may be viewed as menial labor within many cultures, and not approved of by family. Deliberate effort has been made to find examples of successful scientists that are not older, white, and male.
- **Introductory Geology / Basic Earth Science:** developed several small-effort (4-5 hour) assignments for students to perform during the semester. Assignments are generally focused on emphasizing getting students outside, benefitting society, and/or showing how earth science ties into large parts of our society and culture. Assignments range from *Earth Science In Your Major* to *Sing a Little, Dance a Little*, in which students express their creative side by producing creative works, including youtube-style videos, revolving around Earth Science.

### Undergraduate Student Research Supervision

- **Fall, 2016, Katlyn Sewell (Senior):** Maars on Mars: Ravi Vallis Region
- **Academic Year 2015-16, Caroline Dunkel (Junior) and Nathan Warner (Junior):** The Search for Maars on Mars, searching for volcanic landforms in the Martian polar regions with the JMars GIS system.

- **Academic Year 2015-16, Jenna Schreckengost (Junior):** A Spatial Database of 40+ Years of Clear-Sky Landsat Imagery Over Western Pennsylvania For Change-Detection, assembling a list of all clear Landsat images over Clarion, PA and a rural / agricultural region to the southeast.

### **Awards**

- 2010: Nominated for Elizabeth Baranger Excellence In Teaching Award at University of Pittsburgh
- 2006: Nominated for Elizabeth Baranger Excellence In Teaching Award at University of Pittsburgh
- 2005: NASA Planetary Geology and Geophysics Undergraduate Research Internship (PGGUR), NovaSol, Honolulu, HI

### **Service**

- Reviewer for JGR Planets, Computers and Geoscience, IEEE Geoscience and Remote Sensing, Icarus, Remote Sensing
- Faculty Advisor, ECU, AIPG student chapter (2016)
- University Committee Work (ECU): Student Disciplinary Committee Hearing Board (2016)
- Departmental Committee Work (ECU): recorder (2016)
- Faculty Advisor, Clarion University: undergraduate Geology and Environmental Geology majors (2014-16), Geoscience Club (2015-16)
- Departmental Committee Work (Clarion University): Academic (new courses, course modification review), Assessment, and Recruitment (2014-16)
- External reviewer, NASA PGG proposal review panel (2012)
- Executive Secretary, NASA PGG proposal review panel (2011)
- Intel ISEF Grand Awards Judge, Pittsburgh (2015)

### **Field and Wilderness Experience**

- Death Valley, California (sample collection, ground truthing)
- Lake Tahoe and Salton Sea (remote sensing equipment maintenance)
- Spring Mountains, NV (field mapping, fault mapping)
- Hawaii (FLIR of active lava)
- Owens Valley, CA and Reykjanes Peninsula, Iceland (water sample collection)
- Lunar Lake Playa, NV (clay and rock sample collection, field mapping, FLIR of site)
- Appalachian Trail (thru-hike of 2,168 miles, 2001)

### **Funding**

- Identifying Martian Maars Using Morphometry (CO-I, NASA, step one submitted 8/2016)
- Use of Arduino Microprocessors in the Natural Sciences Classroom (PI, Clarion University Faculty Development, \$950, awarded 12/2015)
- Factors Influencing Weathering Rates of Basaltic Lava Flows (PI, NASA, declined 9/2015)
- Compositional and Textural Analysis of Volcanic Deposits Using Super-Resolved Giga-pixel Thermal Infrared Data (Co-I, NSF, to be resubmitted 12/2016)

## Technical Skills

- GIS and Remote Sensing software suites: ArcGIS, ENVI, Google Earth, JMars, familiarity with GRASS
- Programming languages: Python, IDL, Fortran, C, Matlab, various scripting languages, familiarity with Perl, R, C++
- Unix (Linux, Solaris, various flavors of BSD, etc), Windows Operating System, Microsoft Office, Open Office

## Invited Talks

- 2016, Hughes, C. G., University of Pittsburgh, *Uncertainty, Undergraduates, and the Computational Geosciences*
- 2015, Hughes, C. G., SUNY Oswego, *Thermal Infrared Remote Sensing From Space*
- 2015, Hughes, C. G., Temple University, *The Geoinformatics of Thermal Infrared Remote Sensing*
- 2014, Hughes, C. G., SUNY University at Buffalo, *Rock-Breaking from Space: 21<sup>st</sup> Century Geology on Earth and Elsewhere*
- 2011, Hughes, C. G., University of Pittsburgh Johnstown, *Super-resolution of Martian chloride sites: a recorder of Martian paleoclimate*

## Peer Reviewed Publications

- 2016, **Hughes, C. G.**, G. C. Hulley, and S. J. Hook, Radiance Validation of MODIS MOD11 and MOD21 Land Surface Temperature (LST) Products Using Nine Pseudo-invariant Sites in the Southwestern United States, **Remote Sensing of Environment (in prep)**
- 2014, Rose, S. R., I. M. Watson, M. S. Ramsey, and **C. G. Hughes**, Accurate retrieval of multispectral infrared emissivity from thermally-mixed volcanic surfaces, **Remote Sensing of Environment**, 140, doi:10.1016/j.rse.2013.10.009
- 2013, Graettinger, A. H., M. K. Ellis, I. P. Skilling, K. Reath, M. S. Ramsey, R. J. Lee, **C. G. Hughes**, and D. W. McGarvie, *Remote sensing and geologic mapping of glaciovolcanic deposits in the region surrounding Askja (Dyngjufjöll) volcano, Iceland*, **International Journal of Remote Sensing**, 34, doi:10.1080/01431161.2013.817716
- 2012, Hulley G. C., **C. G. Hughes**, and S. J. Hook, Quantifying Uncertainties in Land Surface Temperature (LST) and Emissivity Retrievals from ASTER and MODIS Thermal Infrared Data, **JGR-Atmospheres**, 117, doi: 10.1029/2012JD018506
- 2012, **Hughes C. G.** and M. S. Ramsey, A radiometrically-accurate super-resolution approach to thermal infrared image data, **International Journal of Image and Data Fusion**, 4 (1), doi:10.1080/19479832.2012.711377
- 2011, Blewett, D. T., E. I. Coman, B. R. Hawke, J. J. Gillis-Davis, M. E. Purucker, and **C. G. Hughes**, *Lunar swirls: Examining crustal magnetic anomalies and space weathering trends*, **JGR-Planets**, 116, doi:10.1029/2010JE003656
- 2010, **Hughes, C. G.** and M. S. Ramsey, *Super-resolution of THEMIS thermal infrared data: Compositional relationships of surface units below the 100 meter scale on Mars*, **Icarus**, 208, doi:10.1016/j.icarus.2010.02.023
- 2007, Blewett D. T., B. R. Hawke, N. C. Richmond, and **C. G. Hughes**, *A magnetic anomaly associated with an albedo feature near Airy crater in the lunar nearside highlands*, **Geophys. Res. Lett.**, 34, L24206, doi:10.1029/2007GL031670.

## Other Publications

- 2012, Hulley, G., Hook, S., & Hughes, C. (2012a). MODIS MOD21 land surface temperature and emissivity algorithm theoretical basis document. Jet propulsion laboratory. California Institute of Technology, JPL Publication (12-17, August, 2012).

## Conference and Meeting Abstracts

- 2016, Graettinger, A. H., R. J. Lee, M. Weinell\*, C. G. Hughes *Compositional and Textural Analysis of Maar-Diatreme Volcanic Deposits at Hopi Buttes Volcanic Field (AZ) Using GigaPan Panoramic and Thermal Infrared Imagery*, AGU 2016 Fall Conference
- 2016, Dunkel, C.\*, N. Warner, and C. G. Hughes, *Exploration of Maars on Mars*, GSA Northeastern Section Conference
- 2016, Schrecengost, J.\* and C. G. Hughes, *Land Cover / Land Use Change Of Rural Western Pennsylvania*, GSA Northeastern Section Conference
- 2016, Warner, N.\*, C. Dunkel\*, and C. G. Hughes, *Finding Maars: Exploration of the Northern Polar Region of Mars*, GSA Northeastern Section Conference
- 2015, Hughes, C.G., *“What's A Geoscientist Do?”: A Student Recruitment And Education Tool*, AGU 2015 Fall Conference
- 2015, Malakar, N. K., G. C. Hulley, S. J. Hook, and C. G. Hughes, *Validation and Assessment of Heritage and New MODIS Land Surface Temperature and Emissivity Products for the Creation of Unified Earth System Data Records*, AGU 2015 Fall Conference
- 2015, Hughes, C.G., C. Dunkel\*, J. Schrecengost\*, N. Warner\*, *Undergraduate Student Researchers: An Underexploited GIS Research Resource*, 2015 Northwestern Pennsylvania GIS Conference
- 2014, Hughes, C.G., E.R. Stefanescu, A. Patra, M.I. Bursik, R. Madankan, S. Pouget, M. Jones, P. Singla, T. Singh, E.B. Pitman, D. Morton, P. Webley, *UQ -- Fast Surrogates Key to New Methodologies in an Operational and Research Volcanic Hazard Forecasting System*, AGU 2014 Fall Conference
- 2014, Webley, P., A. Patra, M.I. Bursik, E. B. Pitman, J. Dehn, T. Singh, P. Singla, E. R. Stefanescu, S. Pouget, M. Jones, D. Morton, C.G. Hughes, *Probabilistic volcanic ash cloud simulations: Characterizing the uncertainty and moving into the operational environment*, AGU 2014 Fall Conference
- 2014, Patra, A., C. Connor, P. Webley, M. Jones, S. Charbonnier, L. Connor, S. Gallo, M.I. Bursik, G.A. Valentine, C.G. Hughes, and H. Aghakhani, *Developing Sustainable Modeling Software and Necessary Data Repository for Volcanic Hazard Analysis -- Some Lessons Learnt*, AGU 2014 Fall Conference
- 2013, Hook, S.J., W. Johnson, B. Eng, G. C. Hulley, C. G. Hughes, C. Paine, S. Shoen, C. G. Hughes, and N. Vance, *The Hyperspectral Thermal Emission Spectrometer (HyTES) - Early Results*, IGARSS 2013
- 2012, Hughes, C. G., G. C. Hulley, and S. J. Hook, *Land Surface Temperature and Emissivity (LST&E) uncertainty analysis over nine pseudo-invariant sand dune sites in the US southwest*, AGU 2012 Fall Conference
- 2012, Hughes, C. G., G. C. Hulley, and S. J. Hook, *Land surface temperature and emissivity uncertainty analysis of the HypIRI instrument*, HypIRI Science Workshop
- 2012, Hughes, C. G., G. C. Hulley, and S. J. Hook, *Uncertainty Analysis of Land Surface Temperatures Derived from Spaceborne Thermal Infrared Sensors*, JPL Postdoc Poster Day
- 2011, Ellis, Mary, A. Graettinger, K. Reath, I. P. Skilling, M. S. Ramsey, C. G. Hughes, *Multiple Mapping Techniques of Glaciovolcanic Regions: Remote Sensing and Field Mapping of Askja (Dyngjufjoll), Iceland*, AGU 2011 Fall Conference

- 2011, Ramsey, M. S., C. G. Hughes, and A. Harris, *How will remote sensing of volcanic activity continue to evolve with HypsIRI data?*, HypsIRI Science Workshop
- 2011, Scheidt, S. P., C. G. Hughes, B. Craddock, M. S. Ramsey, and J. Zimbelman, *A simulated HypsIRI dataset using combined ASTER and AVIRIS data of the Ka'u Desert dunes for terrestrial mapping and planetary applications*, HypsIRI Science Workshop
- 2011, Hughes, C. G. and M. S. Ramsey, *Super-resolution of Martian Chloride Sites*, Lunar and Planetary Science Conference
- 2010, Ramsey, M. S. and C. G. Hughes, *Creation of radiometrically-accurate HypsIRI data using combined ASTER and AVIRIS data of arid land surfaces*, HypsIRI Science Workshop
- 2010, Hughes C. G., and M. S. Ramsey, *Super-resolution of Martian Chloride Sites and the Associated Mineral Assemblages*, Lunar and Planetary Science Conference
- 2009, Hughes, C.G., M. S. Ramsey, and J. L. Bandfield, *Detection of Small-Scale Mineral Deposits in Super-Resolved THEMIS TIR Data*, Lunar and Planetary Science Conference
- 2008, Hughes, C. G. and M.S. Ramsey, *Initial Results of Super-Resolving THEMIS Data*, Lunar and Planetary Science Conference
- 2007, Hughes, C. G., M. S. Ramsey, and H. Tonooka *Super-Resolving THEMIS Data for Improved Temperature, Composition, and Spatial Resolution*, Lunar and Planetary Science Conference
- 2006, Hughes, C. G. , D. T. Blewett, B. R. Hawke, and N. C. Richmond *Optical Maturity and Magnetic Studies of Lunar Swirls*, Lunar and Planetary Science Conference

\*Student researcher