

# Jason Laura

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## Education

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### Arizona State University

Tempe, AZ

Ph.D.

Aug. 2012 – Dec. 2015

Dissertation: "A Taxonomy of Parallel Vector Spatial Analysis Algorithms"

### The Pennsylvania State University

State College, PA

M.A.

Jan. 2011 - Aug. 2012

Thesis: "Penn State Lunar Lion Landing Site Selection Process as a Competitor in the Google Lunar X Prize"

### The Pennsylvania State University

State College, PA

Certificate in Geographic Information Systems

Sept. 2009 - Jan. 2011

Specializing in Spatial Database Design and Remote Sensing

### Montclair State University

Montclair, NJ

B.A.

Sept. 2000 - Jan. 2006

Music Education / German Minor, Magna Cum Laude, Teaching Certificate (K-12)

## Professional Experience

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### U.S. Geological Survey

Flagstaff, AZ

Software Lead

Oct. 2018 –

Software lead for all Astrogeology Science Center software including the Integrated System for Imagers and Spectrometers (ISIS). Oversaw the transition of the software to an open source project. Managing a development team of approximately 10 developers working on over two dozen independent projects each fiscal year.

### U.S. Geological Survey

Flagstaff, AZ

EDGE Research Scientist

Dec. 2017 –

Research focusing on Planetary Spatial Data Infrastructure, the application of Computer Vision and photogrammetry techniques to planetary data, parallel computing, and distributed systems for Big Data analysis. Led the creation of a six member research development team that consistently delivered for both research science and business projects.

### U.S. Geological Survey

Flagstaff, AZ

Shoemaker Post-Doctoral Fellow

Dec. 2015 – Dec. 2017

Research focusing on the integration of image matching techniques to support large homogeneous planetary remotely sensed data and classic photogrammetric techniques, thermal modeling of the Mars surface using spatial statistical analysis methods, the application of Big Data technologies to planetary science data, and Planetary Spatial Data Infrastructure (PSDI) .

**U.S. Geological Survey****Flagstaff, AZ***Geographer**Dec. 2013–Dec. 2015*

Developed custom geospatial tools for planetary data analysis including spectral calculators, image manipulation and processing software, geovisualization tools, geologic process models, and statistical analysis tools in Python, C++, VB.NET, and Fortran.

**Vehicle Data Science Corp****Oakland, CA***Consultant**Aug. 2013–Dec. 2013*

Spatial RDBMS design and deployment in a distributed, big data processing environment to support spatial analysis of GPS data. Open- source plugin development to support ESDA in Quantum GIS.

**U.S. Geological Survey****Flagstaff, AZ***Contractor**June 2012–Dec. 2013*

Developed custom geospatial tools for planetary data analysis including spectral calculators, image manipulation and processing software, geovisualization tools, geologic process models, and statistical analysis tools in Python, C++, VB.NET, and Fortran.

**Springfield Public Schools****Springfield, NJ***Director of Bands**Feb. 2006–June 2012*

Extensive pedagogical experience directing three performing ensembles totaling over 100 performers. Worked to develop and implement multiple curriculum including a music technology lab.

## Major Research Interests

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- Planetary Spatial Data Infrastructure and Spatial Data Infrastructure
- Geospatial Cyberinfrastructure and spatially aware Big Data
- Distributed geospatial information processing
- Photogrammetry, sensor models, bundle adjustment, image matching
- Parallelization of geocomputation algorithms
- Open source geospatial tool development
- Application of terrestrial geospatial analytics and GISystems to planetary data

## Peer Reviewed Publications

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- [1] Jason R. Laura and Ross A. Beyer. “Knowledge Inventory of Foundational Data Products in Planetary Science”. In: *The Planetary Science Journal* 2.1, 18 (Feb. 2021), p. 18. DOI: 10.3847/PSJ/abcb94.
- [2] J. R. Laura, J. Mapel, and T. Hare. “Planetary Sensor Models Interoperability Using the Community Sensor Model Specification”. In: *Earth and Space Science* 7 (June 2020), p. 00713. DOI: 10.1029/2019EA000713.
- [3] J. R. Laura, M. T. Bland, R. L. Fergason, T. M. Hare, and B. A. Archinal. “Framework for the Development of Planetary Spatial Data Infrastructures: A Europa Case Study”. In: *Earth and Space Science* 5.9 (Sept. 2018), pp. 486–502. DOI: 10.1029/2018EA000411.
- [4] J. Laura, K. Rodriguez, A. C. Paquette, and E. Dunn. “AutoCNet: A Python library for sparse multi-image correspondence identification for planetary data”. In: *SoftwareX* 7 (2018), pp. 37–40. DOI: 10.1016/j.softx.2018.02.001.

- [5] Timothy J. Naegeli and Jason Laura. "Back-projecting secondary craters using a cone of uncertainty". In: *Computers and Geosciences* 123 (Feb. 2018), pp. 1–9. DOI: 10.1016/j.cageo.2018.10.011.
- [6] J. Laura, T. M. Hare, L. R. Gaddis, R. L. Fergason, J. A. Skinner, J. J. Hagerty, and B. A. Archinal. "Towards a Planetary Spatial Data Infrastructure". In: *ISPRS International Journal of Geo-Information* 6.6 (2017). ISSN: 2220-9964. DOI: 10.3390/ijgi6060181. URL: <http://www.mdpi.com/2220-9964/6/6/181>.
- [7] J. Laura and S.J. Rey. "Spatial data analytics on heterogeneous multi- and many-core parallel architectures." In: *Encyclopedia of GIS*. Ed. by S. Shekhar and H. Xiong. Springer, 2017.
- [8] J. Laura, J. A. Skinner, and M.A. Hunter. "Large Crater Clustering tool". In: *Computers & Geosciences* 105 (2017), pp. 81–90. ISSN: 0098-3004. DOI: <http://dx.doi.org/10.1016/j.cageo.2017.04.011>. URL: <http://www.sciencedirect.com/science/article/pii/S0098300416304022>.
- [9] S. J. Rey, P. Stephens, and J. Laura. "An evaluation of sampling and full enumeration strategies for Fisher Jenks classification in big data settings". In: *Transactions in GIS* 21.4 (2017), pp. 796–810. ISSN: 1467-9671. DOI: 10.1111/tgis.12236. URL: <http://dx.doi.org/10.1111/tgis.12236>.
- [10] J. Laura, W. Li, S.J. Rey, and L. Anselin. "Parallelization of a regionalization heuristic in distributed computing platforms – a case study of parallel-p-compact-regions problem". In: *International Journal of Geographical Information Science* 29.4 (2015), pp. 536–555. DOI: 10.1080/13658816.2014.987287. eprint: <http://dx.doi.org/10.1080/13658816.2014.987287>. URL: <http://dx.doi.org/10.1080/13658816.2014.987287>.
- [11] S.J. Rey, L. Anselin, X. Li, R. Pahle, J. Laura, W. Li, and J. Koschinsky. "Open Geospatial Analytics with PySAL". In: *ISPRS International Journal of Geo-Information* 4.2 (2015), p. 815. ISSN: 2220-9964. DOI: 10.3390/ijgi4020815. URL: <http://www.mdpi.com/2220-9964/4/2/815>.
- [12] J. Laura and S.J. Rey. "Improved Parallel Optimal Choropleth Map Classification". In: *Modern Accelerator Technologies for Geographic Information Science*. Ed. by X. et al. Shi. New York: Springer Science+Business Media, 2014, pp. 197–212.
- [13] J. Laura and J. Rey S. "Improved Algorithms for Binary Spatial Adjacency". In: *Proceedings of the Python in Science Conference* (2014).
- [14] J. R. Laura, L. R. Gaddis, R. B. Anderson, and I. Anece. "Introduction to the Python Hyperspectral Analysis Tool (PyHAT)". In: *Machine Learning in Planetary Science; Chapter* (accepted).

## Proceedings & Presentations

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- [1] L. A. Adoram-Kershner, B. H. Wheeler, J. R. Laura, R. L. Fergason, and D. P. Mayer. "Automated Kaguya TC and MRO CTX Stereo DEM Generation". In: *LPI Contributions*. Vol. 2549. LPI Contributions. June 2021, p. 7021.

- [2] R. L. Fergason, M. A. Hunter, J. R. Laura, and T. M. Hare. "Analysis Ready Data Available Through the SpatioTemporal Asset Catalog (STAC) Specification: Investigating the Application to Planetary Data". In: *LPI Contributions*. Vol. 2549. LPI Contributions. June 2021, p. 7023.
- [3] T. M. Hare, B. J. Thomson, L. R. Gaddis, J. Stopar, B. A. Archinal, J. R. Laura, and Mapsit Steering Committee. "Building a Lunar Spatial Data Infrastructure (SDI)". In: *LPI Contributions*. Vol. 2549. LPI Contributions. June 2021, p. 7054.
- [4] J. Mapel, A. M. Annex, K. M. Aye, R. A. Beyer, J. Laura, and V. Silva. "The Planetary Software Organization and Open Source Software Governance". In: *LPI Contributions*. Vol. 2549. LPI Contributions. June 2021, p. 7029.
- [5] K. Rodriguez, K. D. Lee, A. C. Paquette, A. R. Sanders, and J. R. Laura. "ISIS Test Data Reduction". In: *LPI Contributions*. Vol. 2549. LPI Contributions. June 2021, p. 7064.
- [6] J. R. Laura. "A Completed Planetary Spatial Data Infrastructure Foundational Data Product Knowledge Inventory". In: *Lunar and Planetary Science Conference*. Lunar and Planetary Science Conference. Mar. 2020, p. 1600.
- [7] J. A. Mapel, L. A. Adoram-Kershner, J. R. Laura, and L. Weller. "Quantitative Analysis of Control Networks in Planetary Imagery". In: *Lunar and Planetary Science Conference*. Lunar and Planetary Science Conference. Mar. 2020, p. 2712.
- [8] J. Radebaugh, B. J. Thomson, B. Archinal, R. Beyer, D. DellaGiustina, C. Fassett, L. Gaddis, S. Goossens, J. Hagerty, T. Hare, J. Laura, P. Mouginis-Mark, A. Nass, A. Patthoff, J. Stopar, S. Sutton, and D. Williams. "Seeing Clearly the Ground Beneath Our Feet: A Planetary Spatial Data Infrastructure". In: *Lunar and Planetary Science Conference*. Lunar and Planetary Science Conference. Mar. 2020, p. 2775.
- [9] M. T. Bland, B. A. Archinal, D. A. Cook, G. Cushing, K. L. Edmundson, R. L. Fergason, L. R. Gaddis, D. M. Galuszka, J. J. Hagerty, K. E. Herkenhoff, T. M. Hare, M. A. Hunter, J. R. Laura, D. P. Mayer, M. P. Milazzo, B. L. Redding, E. D. Smith, M. Velasco, and L. A. Weller. "The USGS Astrogeology Data Products Portfolio: Supporting Planetary Spatial Data Infrastructure". In: *4th Planetary Data Workshop*. Vol. 2151. June 2019, p. 7076.
- [10] M. T. Bland, B. A. Archinal, D. A. Cook, G. Cushing, K. L. Edmundson, R. L. Fergason, L. R. Gaddis, D. M. Galuszka, J. J. Hagerty, K. E. Herkenhoff, T. M. Hare, M. A. Hunter, J. R. Laura, D. P. Mayer, M. P. Milazzo, B. L. Redding, E. D. Smith, M. Velasco, and L. A. Weller. "The USGS Astrogeology Data Products Portfolio: Supporting Planetary Spatial Data Infrastructure". In: *4th Planetary Data Workshop*. Vol. 2151. June 2019, p. 7076.
- [11] M. T. Bland, L. A. Weller, D. P. Mayer, K. L. Edmundson, B. A. Archinal, J. A. Mapel, J. R. Laura, R. L. Fergason, and T. L. Becker. "A New Global Shape Model of Enceladus from a Dense Photogrammetric Control Network". In: *Lunar and Planetary Science Conference*. Lunar and Planetary Science Conference. Mar. 2019, p. 1090.

- [12] L. R. Gaddis, J. Laura, T. Hare, E. Gault, A. Paquette, and T. Thatcher. "PyHAT 2019 Update: The Hyperspectral Data Analysis Tools for Planetary Science (Formerly Known as PySAT)". In: *4th Planetary Data Workshop*. Vol. 2151. June 2019, p. 7107.
- [13] T. M. Hare, J. R. Laura, J. Mapel, K. L. Berry, K. Rodriguez, and A. C. Paquette. "The Community Sensor Model Standard Update". In: *4th Planetary Data Workshop*. Vol. 2151. June 2019, p. 7019.
- [14] L. P. Keszthelyi, J. Laura, A. E. Huff, and W. L. Jaeger. "Geologic Mapping of Athabasca Valles, Mars: Now and Again". In: *2019 Annual Meeting of Planetary Geologic Mappers*. Vol. 2154. June 2019, p. 7006.
- [15] J. R. Laura, M. T. Bland, R. L. Fergason, T. M. Hare, B. A. Archinal, and A. Naß. "Framework for the Development of a Europa Planetary Spatial Data Infrastructure". In: *Lunar and Planetary Science Conference*. Lunar and Planetary Science Conference. Mar. 2019, p. 2317.
- [16] J. R. Laura, R. L. Fergason, and ASC Development Team. "Software Development Changes at the USGS Astrogeology Science Center". In: *4th Planetary Data Workshop*. Vol. 2151. June 2019, p. 7087.
- [17] J. A. Mapel, K. Berry, A. Paquette, K. Rodriguez, S. Stapleton, T. M. Hare, and J. R. Laura. "The Abstraction Layer for Ephemerides Library". In: *4th Planetary Data Workshop*. Vol. 2151. June 2019, p. 7085.
- [18] A. Naß, K. Asch, S. van Gasselt, J. Laura, T. Hare, J. Skinner, A. P. Rossi, S. Besse, S. Erard, T. Roatsch, and R. Jaumann. "Earth Data Infrastructures as a Basis for a Map and Information Library in the Domain of Planetary Sciences". In: *Lunar and Planetary Science Conference*. Lunar and Planetary Science Conference. Mar. 2019, p. 2559.
- [19] Andrea Nass, Kristine Asch, Stephan van Gasselt, Jason Laura, Trent Hare, Jim Skinner, Angelo Pio Rossi, Sebastien Besse, Stéphane Erard, Thomas Roatsch, and Ralf Jaumann. "Towards a concept for a Planetary Science Data Library based on a Spatial Data Infrastructure Model". In: *EPSC-DPS Joint Meeting 2019*. Vol. 2019. Sept. 2019, EPSC-DPS2019–1264.
- [20] C. H. Okubo, M. A. Hunter, S. W. Akins, M. S. Bailen, G. E. Cushing, C. M. Fortezzo, T. A. Gaither, A. L. Gullikson, T. M. Hare, J. R. Laura, J. A. Skinner, and T. N. Titus. "Initial Development of the Planetary Geoscience Map Gateway". In: *4th Planetary Data Workshop*. Vol. 2151. June 2019, p. 7035.
- [21] J. Radebaugh, B. J. Thomson, B. Archinal, R. Beyer, D. DellaGuistina, C. Fassett, L. Gaddis, J. Hagerty, T. Hare, J. Laura, S. Lawrence, E. Mazarico, A. Nass, A. Pathoff, J. Skinner, S. Sutton, and D. Williams. "A Roadmap for Planetary Spatial Data Infrastructure". In: *Lunar and Planetary Science Conference*. Lunar and Planetary Science Conference. Mar. 2019, p. 1667.
- [22] A. R. Sanders, S. Akins, D. P. Mayer, E. A. Bovre, J. Laura, and L. Gaddis. "Unified Planetary Coordinates Database Refactor". In: *4th Planetary Data Workshop*. Vol. 2151. June 2019, p. 7090.

- [23] R. B. Anderson, N. Finch, S. M. Clegg, T. Graff, R. V. Morris, and J. Laura. "The Python Spectral Analysis Tool (PySAT) for Powerful, Flexible, and Easy Preprocessing and Machine Learning with Point Spectral Data". In: *Planetary Science Informatics and Data Analytics Conference*. Vol. 2082. LPI Contributions. Apr. 2018, p. 6045.
- [24] L. R. Gaddis, J. Laura, R. B. Anderson, T. Hare, R. Klima, F. Morgan, C. Viviano-Beck, N. Finch, A. Paquette, K. Rodriguez, and A. Sanders. "Update on PySAT: A Spectral Data Analysis Tool for Planetary Science". In: *Lunar and Planetary Science Conference*. Vol. 49. Lunar and Planetary Science Conference. Mar. 2018, p. 1535.
- [25] L. Gaddis, J. Laura, and R. Arvidson. "The Role of the Planetary Data System in a Planetary Spatial Data Infrastructure". In: *Lunar and Planetary Science Conference*. Vol. 49. Lunar and Planetary Science Conference. Mar. 2018, p. 1540.
- [26] L. M. Glaspie, L. R. Gaddis, L. Keszthelyi, M. Hunter, J. Laura, B. Horgan, J. Stopar, S. Lawrence, and M. P. Milazzo. "Alphonsus Crater: Influence of Topography on Eruption Dynamics and Mineral Distribution". In: *Lunar and Planetary Science Conference*. Vol. 49. Lunar and Planetary Science Conference. Mar. 2018, p. 1559.
- [27] J. J. Hagerty, J. R. Laura, A. Hayes, R. Jaumann, P. Schultz, J. Spray, T. Watters, and D. A. Williams. "The Role of the NASA Regional Planetary Image Facility Network in a Planetary Spatial Data Infrastructure (PSDI)". In: *Lunar and Planetary Science Conference*. Vol. 49. Lunar and Planetary Science Conference. Mar. 2018, p. 2225.
- [28] T. M. Hare and J. R. Laura. "A Sandbox Environment for the CSM Standard and SPICE". In: *Planetary Science Informatics and Data Analytics Conference*. Vol. 2082. LPI Contributions. Apr. 2018, p. 6040.
- [29] L. Keszthelyi, J. Hagerty, S. Akins, B. Archinal, M. Bailen, M. Bland, K. Edmundson, R. Fergaons, T. Hare, R. Hayward, M. Hunter, J. Laura, S. Sides, and M. Velasco. "Update on the NASA-USGS Planetary Spatial Data Infrastructure Inter-Agency Agreement". In: *Planetary Science Informatics and Data Analytics Conference*. Vol. 2082. LPI Contributions. Apr. 2018, p. 6054.
- [30] J. R. Laura. "Sparse Multi-Image Control Using AutoCNet: CTX". In: *Lunar and Planetary Science Conference*. Vol. 49. Lunar and Planetary Science Conference. Mar. 2018, p. 2750.
- [31] J. R. Laura, B. Archinal, M. T. Bland, L. R. Gaddis, J. J. Hagerty, T. M. Hare, and J. A. Skinner. "Planetary Spatial Data Infrastructure Foundational Data Product Knowledge Inventory". In: *Lunar and Planetary Science Conference*. Vol. 49. Lunar and Planetary Science Conference. Mar. 2018, p. 1426.
- [32] J. Laura, R. E. Arvidson, and L. R. Gaddis. "The Relationship Between Planetary Spatial Data Infrastructure and the Planetary Data System". In: *Planetary Science Informatics and Data Analytics Conference*. Vol. 2082. LPI Contributions. Apr. 2018, p. 6005.

- [33] S. Piqueux, C. S. Edwards, R. L. Fergason, J. Laura, A. Weintraub, P. R. Christensen, and H. H. Kieffer. "Improving Thermal Model Capability for the Planetary Science Community". In: *Lunar and Planetary Science Conference*. Vol. 49. Lunar and Planetary Science Conference. Mar. 2018, p. 1027.
- [34] R. B. Anderson, N. Finch, S. M. Clegg, T. G. Graff, R. V. Morris, J. Laura, and L. R. Gaddis. *The Python Spectral Analysis Tool (PySAT): A Powerful, Flexible, Preprocessing and Machine Learning Library and Interface*. Dec. 2017.
- [35] R. B. Anderson, N. Finch, S. Clegg, T. Graff, R. V. Morris, and J. Laura. "Python Spectral Analysis Tool (PySAT) for Preprocessing, Multivariate Analysis, and Machine Learning with Point Spectra". In: vol. 1986. June 2017, p. 7061.
- [36] B. A. Archinal, J. Laura, T. L. Becker, M. T. Bland, and R. L. Kirk. *Foundational Data Products for Europa: A Planetary Spatial Data Infrastructure Example*. Dec. 2017.
- [37] B. A. Archinal, J. Laura, R. L. Kirk, T. M. Hare, L. R. Gaddis, and J. Hagerty. *Foundational Data Products Needed to Support Planetary Spatial Data Infrastructure*. Oral Presentation at LPSC. Mar. 2017.
- [38] T. L. Becker, K. L. Edmundson, S. Sides, T. M. Hare, and J. R. Laura. "Looking to 2050: The USGS Integrated Software for Imagers and Spectrometers (ISIS)". In: *Planetary Science Vision 2050 Workshop*. Vol. 1989. LPI Contributions. Feb. 2017, p. 8218.
- [39] R. L. Fergason, J. R. Laura, and T. M. Hare. "THEMIS-Derived Thermal Inertia on Mars: Improved and Flexible Algorithm". In: *Lunar and Planetary Science Conference*. Vol. 48. Lunar and Planetary Science Conference. Mar. 2017, p. 1563.
- [40] R. L. Fergason, J. Laura, T. M. Hare, R. Otero, and L. A. Edgar. *Developing a Planetary Spatial Data Infrastructure for Evaluating Landing Sites and Performing Surface Operations for the Mars 2020 Lander*. Dec. 2017.
- [41] L. R. Gaddis, J. Laura, R. B. Anderson, T. Hare, R. Klima, F. Morgan, C. Viviano-Beck, and N. Finch. "Introduction to PySAT: A Spectral Analysis Tool for Planetary Science". In: vol. 1986. June 2017, p. 7060.
- [42] L. R. Gaddis, J. Laura, R. B. Anderson, T. Hare, R. Klima, F. Morgan, C. Viviano-Beck, and N. Finch. "PySAT: Spectral Data Analysis Tool for Planetary Science". In: *Lunar and Planetary Science Conference*. Vol. 48. Lunar and Planetary Science Conference. Mar. 2017, p. 2548.
- [43] L. R. Gaddis, J. Laura, T. Hare, and J. Hagerty. "The NASA Planetary Data System's Cartography and Imaging Sciences Node and the Planetary Spatial Data Infrastructure (PSDI) Initiative". In: vol. 1986. June 2017, p. 7124.
- [44] T. M. Hare, J. R. Laura, I. R. Humphreys, T. J. Wilson, M. A. Hahn, M. R. Shepherd, and S. C. Sides. "A Sandbox Environment for the Community Sensor Model Standard". In: vol. 1986. June 2017, p. 7130.

- [45] Z. Haugaard, D. Ohn, C. Philabaum, K. Rodriguez, M. Shepard, J. R. Laura, and T. Hare. "Improved Access to Kaguya Hyperspectral Data". In: vol. 1986. June 2017, p. 7102.
- [46] L. Keszthelyi, J. Hagerty, S. Akins, B. Archinal, M. Bailen, M. Bland, K. Edmundson, R. Fergason, T. Hare, R. Hayward, M. Hunter, J. Laura, S. Sides, and M. Velasco. "The NASA-USGS Planetary Spatial Data Infrastructure Inter-Agency Agreement". In: vol. 1986. June 2017, p. 7097.
- [47] J. R. Laura, R. L. Fergason, J. Skinner, L. Gaddis, T. Hare, and J. Hagerty. "Envisioning a Planetary Spatial Data Infrastructure". In: *Planetary Science Vision 2050 Workshop*. Vol. 1989. LPI Contributions. Feb. 2017, p. 8110.
- [48] J. R. Laura, L. R. Gaddis, T. M. Hare, and J. J. Hagerty. *The Role of Technology in a Planetary Spatial Data Infrastructure*. June 2017.
- [49] J. R. Laura, J. J. Hagerty, T. N. Titus, and T. M. Hare. *Toward a Venus Spatial Data Infrastructure (VSDI)*. Nov. 2017.
- [50] J. R. Laura, K. Rodriguez, and A. C. Paquette. *Sparse Multi-Image Control: The AutoCNET Library*. Oral Presentation at PDW3. June 2017.
- [51] J. R. Laura, K. Rodriguez, and A. C. Paquette. *Sparse Multi-Image Control: The AutoCNET Library*. Poster Presented at LPSC. Mar. 2017.
- [52] K. Rodriguez, J. Laura, R. Fergason, and R. Bogle. "Improved Data Analysis Tools for the Thermal Emission Spectrometer". In: vol. 1986. June 2017, p. 7107.
- [53] B. Archinal, E. Lee, L. Weller, J. Richie, K. Edmundson, J. Laura, M. Robinson, E. Speyerer, A. Boyd, E. Bowman-Cisneros, R. Wagner, and A. Nefian. "Controlling High-Resolution LROC NAC Polar Mosaics to LOLA Track Data". In: *Annual Meeting of the Lunar Exploration Analysis Group*. Vol. 1960. LPI Contributions. Nov. 2016, p. 5044.
- [54] T. M. Hare, J. Laura, and L. R. Gaddis. *Interoperable Methods in Planetary Research for Geospatial Data Analysis*. Poster Presented at LPSC. Mar. 2016.
- [55] J. R. Laura. *At the Intersection of GIScience and Planetary Science*. Oral Presentation at LPSC. Mar. 2016.
- [56] J. Laura and R. L. Fergason. "Modeling martian thermal inertia in a distributed memory high performance computing environment". In: *2016 IEEE International Conference on Big Data (Big Data)*. 2016, pp. 2919–2928.
- [57] J. Laura and R. L. Fergason. *Modeling martian thermal inertia in a distributed memory high performance computing environment*. Oral Presentation at IEEE Big Data. Dec. 2016. DOI: 10.1109/BigData.2016.7840942.



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- [59] R. B. Anderson, S. M. Clegg, T. Graff, R. V. Morris, and J. Laura. "Generation of a Database of Laboratory Laser-Induced Breakdown Spectroscopy (LIBS) Spectra and Associated Analysis Software". In: *Second Planetary Data Workshop*. Vol. 1846. LPI Contributions. June 2015, p. 7053.
- [60] B. Archinal, E. Lee, L. Weller, J. Richie, K. Edmundson, J. Laura, M. Robinson, E. Speyerer, A. Boyd, E. Bowman-Cisneros, R. Wagner, and A. Nefian. "Update on High-Resolution Geodetically Controlled LROC Polar Mosaics". In: *Annual Meeting of the Lunar Exploration Analysis Group*. Vol. 1863. LPI Contributions. Oct. 2015, p. 2040.
- [61] K. L. Edmundson, J. C. Backer, J. M. Barrett, K. J. Becker, T. L. Becker, D. A. Cook, S. Lambright, J. R. Laura, E. M. Lee, K. A. Oyama, S. C. Sides, T. L. Sucharski, and L. A. Weller. "An Integrated Photogrammetric Control Environment for Planetary Cartography". In: *Lunar and Planetary Science Conference*. Vol. 46. Lunar and Planetary Science Conference. Mar. 2015, p. 1454.
- [62] R. L. Fergason, J. R. Laura, and T. M. Hare. "THEMIS-Derived Thermal Inertia: Improvements to a Fundamental Dataset". In: *Lunar and Planetary Science Conference*. Vol. 46. Lunar and Planetary Science Conference. Mar. 2015, p. 1807.
- [63] L. R. Gaddis, J. Barrett, J. Laura, and M. Milazzo. "USGS ISIS Tools Supporting Lunar SELENE "Kaguya" Data from Terrain Camera, Multiband Imager and Spectral Profiler Instruments". In: *Second Planetary Data Workshop*. Vol. 1846. LPI Contributions. June 2015, p. 7040.
- [64] L. R. Gaddis, J. Laura, B. Horgan, B. R. Hawke, and T. Giguere. "Oppenheimer Crater Floor Deposits: Compositional Analyses with Kaguya Spectral Profiler Data". In: *Lunar and Planetary Science Conference*. Vol. 46. Lunar and Planetary Science Conference. Mar. 2015, p. 2059.
- [65] J. R. Laura, T. M. Hare, L. R. Gaddis, and R. L. Fergason. *Python for Planetary Data Analysis*. Poster Presented at PDW2. June 2015.
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## University Courses Taught

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### Arizona State University

Tempe AZ

#### *Mathematics for GIS*

*Fall 2015, Fall 2016, Spring 2017, Fall 2017*

A mathematics primer for quantitative geographers with emphasis shifted to focus on the underlying mathematical methods that support spatial analysis including linear algebra, computational geometry, graph and set theory, probability, and introductory statistics.

### Arizona State University

Tempe AZ

#### *Programming for GIS*

*Spring 2016*

A Python programming course focusing on spatial data handling and algorithm implementation; taught in Python. Enrollment from geography and computer science departments.