Xuezhi Cang

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Education:

2021	Ph.D. in Geography. Northern Illinois University, DeKalb, IL. Dissertation: A "Warm" or "Cold" Early Mars: Evidence from Valley Networks
2021	M.S., Computer Science. Northern Illinois University, DeKalb, IL
2014	M.S., Geographic Information System. Capital Normal University, China. Thesis: Monocular Visual Simultaneous Localization and Mapping
2010	B.S., Geography Information System. Nanjing Normal University, China. Thesis: Large watershed extraction method-using Poyang lake as an example

Research Interests:

Spatial data science, Geo-computation with HPC, Spatial statistics, Geo-visualization, fluvial geomorphology, hydrology, and open-source Geographic Information System (GIS) and Remote Sensing (RS) software,

Peer-reviewed Publications:

Full presentation list and link: https://scholar.google.com/citations?user=a3OHfGUAAAAJ&hl=en

2019 **Cang, X**., Luo, W., 2019. Noachian Climatic Conditions on Mars Inferred from Valley Network Junction Angles. Earth and Planetary Science Letters. 526, p.115768. (IF = 4.637)

Luo, W., Howard, A.D., **Cang, X.**, 2019. Comment on "The volume of water required to carve the Martian valley networks: Improved constraints using updated methods." Icarus (IF = 3.565)

2018 **Cang, X.**, Luo, W., 2018. Spatial association detector (SPADE). Int. J. Geogr. Inf. Sci. 32, 2055–2075. (IF = 3.545)

2017 Luo, W., **Cang, X.**, Howard, A.D., 2017. New Martian valley network volume estimate consistent with ancient ocean and warm and wet climate. Nat. Commun. 8, 15766. (IF = 11.878)

2016 Luo, W., Jasiewicz, J., Stepinski, T., Wang, J., Xu, C., **Cang, X.**, 2016. Spatial association between dissection density and environmental factors over the entire conterminous United States. Geophys. Res. Lett. 43, 692–700. (IF = 4.578)

2015 Li, H., Zhang, A., Hu, S., Huang, H., **Cang, X**., Sun, W., 2015. New Remote Sensing Image Subpixel Registration of Spatial and Frequency Domain. J. Chinese Comput. Syst. 36, 591–596. (in Chinese)

2010 **Cang, X**., Tang, G., Zhong, T., Li, R., 2010. Classification of Peaks and Digital Expression of Their Spatial Pattern. J. Nanjing Norm. Univ. (Natural Sci. Ed). 33, 136–140. (in Chinese)

Li, R., Teng, F., **Cang, X**., Tang, G., Li, F., 2010. Design of XU Xiake Travel Scientific Popularization Electronic Map. Geomatics World 3. (in Chinese)

Conference Presentations:

2023 **Cang, X**., 2023 Stream Fusion between Consecutive Watersheds, in: 2023 AAG annual Meeting.

2022 **Cang, X.**, 2022 Drainage Maturity: an Indicator Measuring the Duration and Intensity of Fluvial Process by Comparing the Flow Direction Configurations of Real World Landscape and of Optimal Channel Network, in: 2022 AGU Fall Meeting.

2020 **Cang, X.**, Luo, W., 2020. Hack's law of Mars Valley Networks, in: 2020 AGU Fall Meeting.

2019 **Cang, X.**, Luo, W., 2019. Utilizing Valley Network Junction Angle to Estimate the Duration of "Warm" Mars, in: 50th Lunar and Planetary Science Conference (2019).

2017 **Cang, X.**, Luo, W., 2017. Frequency Distribution of Junction Angles of Valley Networks on Mars Consistent with an Early Warm Climate, in: Fourth International Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life.

2016 **Cang, X.**, Luo, W., 2016. Spatial Association between Valley Density and Environmental Factors over the whole of Conterminous China, in: The 33rd International Geographical Congress.

Cang, X., Luo, W., 2016. An Improved Spatial Association Estimator under the Geographical Detector Model Using Monte Carlo Simulation, in: 2016 AGU Fall Meeting.

2015 **Cang, X.**, Luo, W., 2015. Area Measurement Errors in Equal-area Projection, in: 2015 AAG Annual Meeting.

2009 Zhong, T., **Cang, X.**, Li, R., Tang, G., 2009. Landform classification based on hillslope units from DEMs, in: 30th Asian Conference on Remote Sensing (ACRS) Proceedings

Book Chapter:

2018 Luo, W., Hartmann, J., Wang, F., Pingwen, H., Sysamouth, V., Li, J., **Cang, X.**, 2018. GIS in Comparative-Historical Linguistics Research: Tai Languages, in: Comprehensive Geographic Information Systems. Elsevier, pp. 157–180.

Research Experience:

2021 Sep -Now	**Postdoctoral Research Scholar** Advisor: Dr. Matthew Baker Project: Mapping Stream from High resolution Digital Elevation Model (DEM) University of Maryland Baltimore County, Baltimore, MD
2018 May – 2018 Aug	**Summer GIS Intern** Advisor: Zoe Zaloudek Project: Web mapping and data processing by using Python Illinois State water Survey, Champaign, IL
2014 Aug – 2018 May	**Research Assistant** Advisor: Dr. Wei Luo Project: Early mars geomorphology and spatial statistics Northern Illinois University, DeKalb, IL
2011 Sep – 2014 May	**Research Assistant** Advisor: Dr. Aiwu Zhang Project: Monocular Visual Simultaneous Localization and Mapping Capital Normal University, Beijing, China

Teaching Experience:

2018 Aug – 2020 May	**Teaching Assistant (Lab Instructor and Grader)** Courses: GIS, RS, hydrology, and spatial statistics Northern Illinois University, DeKalb, IL
2012 summer 2013 summer	**Teaching Assistant** Courses: summer GIS course, and summer RS course Capital Normal University, Beijing, China

Honors and Awards:

2020	Dissertation Completion Fellowship ($ 14,000)
2020	Richard E. Dahlberg Memorial Scholarship of Northern Illinois University ($ 300)
2019	Student Scholarship of Illinois GIS Association ($1,000)
2019	Outstanding Graduate Student Award of Northern Illinois University
2017	Great Journeys Graduate Assistantship ($ 16,000)
2018	Richard E. Dahlberg Memorial Scholarship of Northern Illinois University ($ 500)

Service:

From 2019	From 2019 Peer-review for the following journals: International Journal of Geographical Information Science, Computational Urban Science, and Journal of Geographical Systems
2014, 2015 and 2017	NIU STEMfest Volunteer

Technical Skills:

Geospatial data processing	• Familiar with geospatial data format and processing, such as Shapely, GeoPandas, GDAL etc, and developed vector and raster processing script by using open source libraries to accelerate the data processing speed. • Implemented the graph search algorithms, such as priority flooding algorithm, on raster and vector data.
HPC	• Implemented a parallel computation program to extract the stream order using Python multiprocessing library, and implemented a parallel computation program to simulate the optimal channel networks using Python scoop library. • Used the job scheduler execute my parallel computation program on the HPC • Developed a task assignment script to assess the health of HPC (High-Performance Computing) nodes and allocate computational tasks to nodes to optimize the data processing.
Python	• Familiar with GIS related Python libraries such as ArcPy and PySAL; • Build a novel spatial analysis method to measure the spatial relation by comparing the spatial heterogeneity (https://github.com/xuezhicang/SPADE). • Computed the freeze ranking and comparison of the pulled historical climate data from 1815 to 2017 for the MRCC; • Mapped more than 150 freeze related thematic maps automatically using ArcPy.Mapping; • Implemented a valley networks (VNs) extraction program by using ArcPy to the global Mars DEM dataset; • Implemented a river junction angle calculation and analysis program using ArcPy and scikit-learn to process millions of streams lines;
Google Earth Engine	• Build an interactive tool to visualize the global nighttime light and population from 2000 to 2020 using GEE JavaScript library (https://xuezhicang.users.earthengine.app/view/nighttimeandpopulation03).
Other programming language	• **MATLAB:** Implemented Zhang's calibration algorithm and computed the parameters of camera; Built Mono-vision SLAM using MATLAB; Applied bag-of-words model to detect loop closure. • **Web mapping:** familiar with ArcGIS WebAPI and Mapbox API; Built a HTML webpage visualizing pulled historical climate data using ArcGIS Web APIs. • **Others:** Used Java to implement the R-tree and KNN in Biological Image Classification and Annotation Tool; Implement several GIS spatial operations (overlapping, map projection, etc) using C++.
ArcGIS desktop	• More than 10-year experience; Taught ArcGIS Desktop labs in several universities; • Applied analysis tools of ArcGIS Desktop to complete several spatial research and published papers in human and physical geography research; • Developed an automatic mapping tool for saving half the manually work in a responsibility area mapping project;
Other GIS and RS software	• Familiar with image classification of remote sensing data using ERDAS, ENVI and Google Earth Engine; • Utilized several models in Grass GIS (such as Geomorphon) to process DEM data for research;

- Analyzed spatial data in GeoDa, Alteryx and Tableau for spatial calculation and visualization.