

# CURRICULUM VITAE

University of Idaho

**NAME:** Xiaogang Ma

**DATE:** July 12, 2022

**RANK OR TITLE:** Associate Professor

**DEPARTMENT:** Computer Science

**OFFICE LOCATION AND CAMPUS ZIP:**

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**DATE OF FIRST EMPLOYMENT AT UI:** August 14, 2016

**DATE OF TENURE:** June 10, 2022

**DATE OF PRESENT RANK OR TITLE:** June 10, 2022

**EDUCATION BEYOND HIGH SCHOOL:**

**Degrees:**

2012–2014	Sloan DCO Data Science Postdoctoral Fellow, Tetherless World Constellation, Rensselaer Polytechnic Institute
11/2011	Ph.D., Earth Systems Science & GIScience, ITC, University of Twente, Enschede, Netherlands
12/2009	Dr.Eng. (with distinction), Geoinformatics Engineering, China University of Geosciences, Wuhan, China
06/2002	B.Eng. (with distinction), Land Resources Management, China University of Geosciences, Wuhan, China

**EXPERIENCE:**

**Teaching, Extension and Research Appointments:**

2022–present	Associate Professor, Department of Computer Science, University of Idaho
2016–2022	Assistant Professor, Department of Computer Science, University of Idaho
2018–present	Affiliate Faculty, Department of Geological Sciences, University of Idaho
2016–present	Visiting Scientist, Tetherless World Constellation, Rensselaer Polytechnic Institute
2019–present	Chair, Awards Committee, International Association for Mathematical Geosciences
2021–present	Topic Editor, Big Earth Data, Taylor & Francis
2019–present	Associate Editor, Applied Computing & Geosciences, Elsevier
2017–present	Associate Editor, Computers & Geosciences, Elsevier
2015–present	Editorial Board Member, Data Science Journal, CODATA
2014–present	Editorial Board Member, Earth Science Informatics, Springer
2020–2021	Member, NASA Planetary Data Ecosystem Independent Review Board
2018–2020	Vice-Chair/Chair/Past Chair, Geoinformatics Division, Geologic Society of America
2017–2019	Member, Technical Advisory Committee, NSF-funded Interdisciplinary Earth Data Alliance, Columbia University
2014–2016	Associate Research Scientist, Tetherless World Constellation, Rensselaer Polytechnic Institute
2012–2014	Sloan DCO Data Science Postdoctoral Fellow, Tetherless World Constellation, Rensselaer Polytechnic Institute
2013	Adjunct Faculty, Dept. of Earth & Environmental Sciences, Rensselaer Polytechnic Institute
2011–2012	Researcher, Earth Systems Science, ITC, University of Twente, the Netherlands
2008	Visiting Scientist, Geodata Interoperability, Geological Survey of Canada and York University

**TEACHING ACCOMPLISHMENTS:**

**Areas of Specialization:**

- Data science
- Semantics, knowledge graph and data interoperability
- Exploratory data analytics and visualization
- Programming language
- Geoinformatics

**Courses Taught:** (number of enrollments is shown with each semester)

*Full Semester Courses*

- CS 120: Computer Science I F18 (30)
- CS 479/579: Data Science S17 (5); S18 (37); S19 (45); S20 (24)
- CS 489/589: Semantic Web and Open Data F17 (16); F19 (17); F20 (7); F21(6)
- ISEM 301: The Beauty of Data Science S17 (20); S18 (22)
- EARTH 4750: GIS in the Sciences (at Rensselaer Polytechnic Institute): S13 (15)

*Directed Studies*

- CS 502: DS Semantic eScience S17 (1); S18 (6); F18 (4); F19 (1)
- CS 502: DS Data Analytics in R S20 (3)

*Student Research and Projects*

- CS 600: Doctoral Research and Dissertation F16 (1); S17 (1); F17 (1); S18 (4); F18 (9); S19 (7); F19 (6); S20 (6); F20 (6); S21 (6); SU21 (1); F21 (4)
- CS 500: Master's Research and Dissertation S17 (1); F17 (1); S18 (1)
- CS 580: Graduate Project SU18 (1); F18 (5); S19 (3); F19 (4); S20 (6); F20 (4); SU20 (1); S21 (2)
- CS 598: Industrial Internship SU18 (1)

**Students / Scholars Advised:** (UI-University of Idaho; RPI-Rensselaer Polytechnic Institute; CS-Computer Science)

*Undergraduate Students*

- About 6 undergraduate students per semester at UI

*Postdoctoral Fellows*

- Dr. Xiang Que (05/2022 to present)
- Dr. Sanaz Salati (12/2021 to present)
- Dr. Chao Fan (05/2021 to present)
- Dr. Chao Ma (02/2019 to 01/2021), now full professor at Chengdu University of Technology, China

*Graduate Students (\* denotes non-thesis master)*

Advised to completion of degree - major professor

1. Raed Alsini, Ph.D., CS, UI, 05/2021, now faculty member at King Abdulaziz University, Saudi Arabia
2. Ashwag Alharbi\*, M.Sc., CS, UI, 05/2021
3. Shrooq Algarni\*, M.Sc., CS, UI, 05/2021
4. Omar Alghushairy, Ph.D., CS, UI, 05/2021, now faculty member at University of Jeddah, Saudi Arabia
5. Ashrf Althbiti, Ph.D., CS, UI, 05/2021, now faculty member at Taif University, Saudi Arabia
6. Abdullah Alowairdhi, Ph.D., CS, UI, 12/2020
7. Amruta Kale\*, M.Sc., CS, UI, 12/2020, enrolled as NSF-supported PhD student at UI
8. Chunnan Zhang\*, M.Sc., CS, UI, 12/2020
9. Wei Shi\*, M.Sc., CS, UI, 12/2020
10. Manjunath Mulinti\*, M.Sc., CS, UI, 08/2020
11. Lamyaa Alharbi\*, M.Sc., CS, UI, 05/2020
12. Samarth Subramanya\*, M.Sc., CS, UI, 05/2020
13. Bhargav Rao\*, M.Sc., CS, UI, 05/2020
14. Abhinav Prabhu Adarapuram\*, M.Sc., CS, UI, 05/2020
15. Adhar Singh\*, M.Sc., CS, UI, 05/2019
16. Rohit Yadav\*, M.Sc., CS, UI, 05/2019
17. Fatemh Almeman\*, M.Sc., CS, UI, 12/2018, enrolled as PhD student at Cardiff University, UK
18. Chama Salil Reddy\*, M.Sc., CS, UI, 12/2018, now software engineer at Quadgen Wireless Solutions Inc.

19. Bhuwan Madhikarmi, M.Sc., CS, UI, 05/2018, first job as data scientist at Washington State University

Advised to completion of degree – co-major professor

1. Chengbin Wang, Ph.D., Geoinformatics, China University of Geosciences, 06/2018, now associate professor at China University of Geosciences

Served on graduate committee

1. Jianzhong Gui, Ph.D., Electrical Engineering, UI, expected 05/2023
2. Kingsley Wiafe-Kwakye, CS, University of Maine, expected 12/2022
3. Joel Oduro-Afryie, Ph.D., CS, UI, expected 12/2022
4. Mazen Gazzan, Ph.D., CS, UI, expected 12/2022
5. Emily Forsberg, Ph.D., Geological Sciences, UI, expected 12/2022
6. Khalid Al Makdi, Ph.D., CS, UI, expected 12/2022
7. Sultan Almalki, Ph.D., CS, UI, expected 12/2022
8. Fahad Alqahtani, Ph.D., CS, UI, expected 12/2022
9. Qianli Li, Ph.D., Electrical Engineering, UI, 05/2022
10. Edward Flathers, Ph.D., Natural Resources and Geoinformatics, UI, 05/2022
11. Yu-Li (Peter) Lin, M.Sc., Environmental Science, UI, 05/2022
12. Naif Rajkhan, Ph.D., CS, UI, 05/2022
13. Amal Alghamdi, Ph.D., CS, UI, 05/2022
14. Tami Alghamdi, Ph.D., CS, UI, 05/2022
15. Alaa Edris, Ph.D., CS, UI, 05/2022
16. Abdullah Alajlan, Ph.D., CS, UI, 05/2022
17. Mohammed Aleisa, Ph.D., CS, UI, 05/2022
18. Hamad Al Salem, Ph.D., CS, UI, 12/2021
19. Anirudh Prabhu, Ph.D., CS, RPI, 06/2021
20. Amal Alghamdi, M.Sc., CS, UI, 07/2021
21. Yu Guo, M.Sc., Electrical Engineering, UI, 05/2021
22. Jiaqiao Shi, M.Sc., CS, UI, 05/2021
23. Longze Li, M.Sc., CS, UI, 05/2020
24. Xin Mou, Ph.D., CS, UI, 12/2018, now senior software engineer at Lucid
25. Afnan Alsharif, M.Sc., CS, UI, 12/2017

Currently advising as major professor

1. Chenhao Li, Ph.D., CS, UI, expected 12/2024
2. Jiyin Zhang, Ph.D., CS, UI, expected 12/2024
3. Amruta Kale, Ph.D., CS, UI, expected 05/2023
4. Rayan Alshamrani, Ph.D., CS, UI, expected 05/2023
5. Fatimah Alkomah, Ph.D., CS, UI, expected 05/2023

Other graduate students who conducted part of their work under my supervision

1. Tzu-Hua (Matt) Yang, M.Sc., CS, UI (2019-2020), now at Micron
2. Vignesh Muralidharan, M.Sc., CS, UI (2018-2019), now at Emory University
3. Travis DeVault, Ph.D., CS, UI (TA for Spring 2019)
4. Seema Kamod, M.Sc., CS, UI (TA for Fall 2018)
5. Homaja Marisetty, M.Sc., CS, UI (TA for Spring 2018, RA for Summer 2018)
6. Olivier Bizimana, M.Sc., CS, UI (RA for Spring 2017), now at Intel
7. Apurva Sinha, M.Sc., CS, RPI (2015), now at Charles River Development
8. Congrui Li, Ph.D., CS, RPI (2015-2016)
9. Sophie Kolankowski, M.Sc., Geoinformatics, RPI (2015-2016), now at Tyler Technologies
10. Sumithra Gnanasekar, M.Sc., CS, RPI (2014), now at Oracle
11. Lakshmi Chenicheri, M.Sc., CS, RPI (2014), now at Deloitte
12. Ahmed Eleish, M.Sc. and Ph.D., CS, RPI (2014-2016)
13. Hao Zhong, Ph.D., CS, RPI (2014-2016)
14. Anirudh Prabhu, Ph.D., CS, RPI (2013-2016)
15. Chengcong Du, M.Sc., CS, RPI (2013), now at Expedia
16. Anusha Akkiraju, M.Sc., CS, RPI (2013), now at Oracle
17. Jun Xu, M.Sc., CS, RPI (2013), now at Snap

18. Boliang Zhang, M.Sc., CS, RPI (2013), enrolled as PhD student at RPI
19. Harsha Venkata, M.Sc., CS, RPI (2013), now at Facebook
20. Mengyu Yin, M.Sc., CS, RPI (2013), now at CMU
21. Krishna Aradhi, M.Sc., CS, RPI (2013), now at Percolate
22. Han Wang, Ph.D., CS, RPI (2012-2016), now at Amazon
23. Benno Lee, Ph.D., CS, RPI (2012-2016)
24. Linyun Fu, Ph.D., CS, RPI (2012-2015), now at Twitter
25. Yu Chen, Ph.D., CS, RPI (2012-2015), now at Twitter
26. Jin Guang Zheng, Ph.D., CS, RPI (2012-2015), now at Memect
27. Eric Rozell, M.Sc., CS, RPI (2012-2014), now at Microsoft

#### *Undergraduate Research Interns*

1. Chris McVickar (NSF REU intern, 2021 Summer)
2. Tyler Clemens, CS, UI (NSF REU intern, 2020 Fall)
3. Ronald Crump, CS, UI (NSF REU intern, 2020 Summer and Fall)
4. Can Cai, CS, UI (2019-2020)
5. Tim Sonnen, CS, UI (NSF MURI intern, Summer and Fall 2017), now at Chief Architect
6. Ali Nendick, CS, RPI (2012-2014)

#### *Highschool Student Research*

1. Kaleo Sato, CS Summer Camp, RPI (Summer 2015), enrolled by UC Irvine
2. Stephen Moon, CS Summer Camp, RPI (Summer 2015), enrolled by Harvard University

#### *Visiting Scholars at UI*

1. Haifeng Lian, Professor, Fujian Agriculture and Forestry University, China, 08/2019-08/2020
2. Rongbin Tang, PhD student, China University of Geosciences, Beijing, 08/2019-08/2020
3. Xiang Que, Lecturer, Fujian Agriculture and Forestry University, China, 12/2018-12/2019
4. Li Sun, Associate Professor, Chinese Academy of Geological Sciences, 09/2017-12/2017
5. Chengbin Wang, PhD student, China University of Geosciences, Wuhan, 09/2016-09/2017

#### **Student and Advisee Awards and Honors:**

- 2022 PhD student Rayan Alshamrani received \$4,000 Data Access Grant from the Institute for Modeling Collaboration and Innovation at the University of Idaho
- 2021 PhD student Ashrf Althbiti received two Publication Awards from the University of Idaho Graduate and Professional Student Association (GPSA)
- 2020 Undergraduate REU intern Ronald Crump won First Place in the University of Idaho Data Science Competition
- PhD student Rayan Alshamrani received a waiver of open access fee (\$5,200) from the Patterns Journal (Cell Press) to publish his literature review
- PhD students Omar Alghushairy and Raed Alsini received Travel Award from the University of Idaho Graduate and Professional Student Association (GPSA) (Omar-two awards, Raed-one award)
- 2019 Postdoctoral researcher Dr. Chao Ma received the ESIP 2019 Funding Friday Award (\$5,000)
- Collaborating MSc Student Matt Yang received the International Tuition Scholarship at University of Idaho
- PhD student Rayan Alshamrani awarded Best Poster at the 2019 University of Idaho Computer Science Industrial Advisory Board Meeting
- PhD student Abdullah Alowairdhi awarded the ESIP Lab Research Grant (\$7,000)
- PhD students Rayan Alshamrani, Ashrf Althbiti and Abdullah Alowairdhi awarded US2TS2019 travel grant from Sloan
- 2018 PhD student Ashrf Althbiti awarded US2TS2018 travel grant from NSF
- PhD student Abdullah Alowairdhi, MSc students Chama Salil Reddy and Homaja Marisetty received scholarship from Idaho EPSCoR program
- 2017 Visiting PhD student Chengbin Wang awarded Elsevier and IAMG Research Grant (\$2,000)
- Visiting PhD student Chengbin Wang awarded USGS travel grant for USGS-DTDI workshop
- Collaborating PhD student Xin Mou awarded USGS travel grant for USGS-DTDI workshop
- Collaborating PhD student Xin Mou's paper was selected as Finalist of Demo Paper Track at 2017 IEEE International Conference on Data Engineering (ICDE)
- MSc students Bhuwan Madhikarmi and Olivier Bizimana received scholarship from Idaho EPSCoR

program  
Undergraduate student Tim Sonnen awarded MURI undergraduate research internship twice from from Idaho EPSCoR program

### **Courses Developed:**

- Data Science (CS 479/579)  
A 3-credit course that combines a skill-set of data collection, data management, data analytics, data visualization and result communication using supporting cyberinfrastructure and information technology. It is selected as a core course for the Data Analytics certificate program at the University of Idaho.
- Semantic Web and Open Data (CS 489/589)  
A 3-credit course that introduces the technological framework of the Semantic Web and Linked Open Data, as well as associated research topics and opportunities for large scale data integration, reasoning and analysis.
- The Beauty of Data Science (ISEM 301)  
A 1-credit general education course for junior and sophomore. The course offers an overview of key topics in a data life cycle, and demonstrates how data science facilitates interdisciplinary collaboration.
- Computer Science I (CS 120)  
A four-credit course including topics of fundamental programming constructs, algorithms, and problem solving, fundamental data structures, overview of programming languages, virtual machines, introduction to language translation, declarations and types, abstraction mechanisms, object-oriented programming.
- Spatial Data Analysis (developed at CS 400/500 level, not taught yet)  
A 4-credit course. Key topics include: map projections, reference frames, multivariate analysis, correlation analysis, regression, interpolation, extrapolation, and kriging. Database concepts of building a spatial database, SQL, spatial query, and integration of graphic and tabular data are also covered.

### **Non-credit Classes, Workshops, Seminars, Invited Lectures, etc.:**

- 2022, Semantics in the Open Science Network, The 2022 EarthCube Annual Meeting, San Diego, CA [15-minute lightning talk for a panel]
- 2022, Knowledge Graph Construction and Application in Geosciences - An Illustration with the Deep-Time Knowledge Graph, The First Workshop on Geospatial Knowledge Graphs at The Knowledge Graph Conference 2022, New York. [One hour]
- 2021, A vision for the DDE data science. Short course organized by the IUGS Commission for Geoscience Information and the Deep-time Digital Earth Data Standards Working Group. [40 minutes]
- 2021, Incorporate temporal topology in the deep-time knowledge base. Session – Spatial Data Handling for Smart Cities and Earth System. 19<sup>th</sup> International Conference on Spatial Data Handling and Geographic Intelligence. [30 minutes]
- 2021, X-Informatics: making data science down to earth in the real world. ESIP 2021 Summer Meeting Special Plenary Session to Honor Prof. Peter Fox. [15 minutes presentation and 30 minutes discussion]
- 2021, Using a 3D visual matrix to explore the co-relationship between elements and mineral species, Department of Physics Seminar, University of Idaho. [50 minutes presentation and 10 minutes discussion]
- 2021, Provenance in Earth and Environmental Sciences. Earth Observation and Digital Earth Seminar Series No. 214, Aerospace Information Research Institute, Chinese Academy of Sciences. Virtual Seminar. [1 hour presentation and 1 hour discussion]
- 2020, Provenance Documentation and Trustworthy AI in Earth and Environmental Sciences. International Workshop on Big Earth Data and Mathematical Geosciences, Wuhan, China. [30 minutes]
- 2020, Provenance documentation and reproducible science: Experience from a few recent projects. IBEST Lunch Talk, University of Idaho. [30 minutes]
- 2020, Deep time knowledge graph and smart deep time dataset search. 2020 DDE and IODP Open Data Workshop. [20 minutes]
- 2020, A new structure for version control in a deep time knowledge graph. 2020 Deep-time Digital Earth Knowledge System Workshop. [30 minutes]
- 2020, A new structure for representing and tracking version information in a deep time knowledge graph. ESIP Semantic Technology Committee Telecon. [30 minutes]

- 2019, Ideas about a Geochemical Data Repository from the Perspective of Semantic Web. Webinar for the NSF Geobiology and Low-Temperature Geochemistry Program. [One hour]
- 2019, Towards a machine-readable knowledge base of deep time. The Fifth Deep-time Digital Earth (DDE) Working Group Seminar, Kunshan, China [Plenary Keynote Talk – 45 minutes]
- 2019, Why we need a machine-readable knowledge base of deep time and our approach to build it. Carnegie Institution for Science – Geophysical Laboratory, Washington, DC. [Invited Seminar – One hour]
- 2019, Geoinformatics and Geo-Data Science in Practice. The 644th Session of the Xiangshan Science Conference, Deep-time Digital Earth: International Workshop on Paleogeography Reconstruction and Deep-time Big Data, Beijing, China. [Invited Plenary Seminar – 45 minutes]
- 2018, Data Science for Complex Systems: Cross-Disciplinary Collaborations from Elements to Ecosystems, Biology of Vector-borne Diseases (BVBD) Summer Course, Moscow, ID.
- 2018, Geo-Data Science: Leveraging Geoscience Research with Geoinformatics, Semantics and Open Data, UI-WSU Geology Seminar, Moscow, ID. [45 minutes]
- 2017, Weaving a Knowledge Network for a Research Program using Semantic Web Technologies. University of Idaho Library Workshop, Moscow, ID. [45 minutes]
- 2017, Open Science, FAIR Data and Data Standards. Workshop for Research Data Management at the 67th Annual Meeting of the American Crystallographic Association, New Orleans, LA.
- 2017, Guest lecture, CS 400/501 SEM: Contemporary Issues in CS, Moscow, ID.
- 2016, Guest lecture, CS 400/501 SEM: Contemporary Issues in CS, Moscow, ID.
- 2016, Expressivity and Reasoning: Examples in Geologic Time and Mineral Observations. 2016 ESIP Summer Meeting, Durham, NC.
- 2016, Recent examples of data science for geosciences. China University of Geosciences, Wuhan, China.
- 2016, SEM+: a tool for concept mapping in geoscience. Ontology Summit: GeoScience and Semantic Interoperability Session, 2016-03-31.
- 2015, Geoinformatics in the Semantic Web. IAMG'15 Conference, Freiberg, Germany. [Andrei B. Vistelius Research Award Lecture]
- 2015, Science 3.0: Open Science in an Open World. Global Young Academy Annual Meeting, Montebello, QC, Canada.
- 2015, An entity linking service for documents and datasets in Earth and environmental sciences, ESIP Testbed Showcase Webcast.
- 2015, Exploring the Web of Data for Earth and Environmental Sciences, McGill University, Montreal, Canada.
- 2015, Geodata sharing and application in the Semantic Web. China University of Geosciences, Wuhan, China.
- 2014, Why Data Science Matters. SciDataCon2014, New Delhi, India. [ICSU-WDS Data Stewardship Award Lecture]
- 2014, A formal geologic time model and its application for harmonizing heterogeneous geoscience information. The Deep-Time Data Workshop, San Francisco, CA.
- 2014, Deep-Time Data Infrastructure. The Deep-Time Data Workshop, San Francisco, CA.
- 2014, Deep-Time Data Infrastructure: A Socio-technical System. The Deep-Time Data Workshop, San Francisco, CA.
- 2014, Capturing and Presenting Provenance of Global Change Research. Tetherless World Constellation TWed Talk Series 2014 Fall, Troy, NY.
- 2014, Deep Carbon Virtual Observatory: Leveraging data science to facilitate earth science research. DCO EPC Workshop. Los Angeles, CA.
- 2014, A Golden Spike Information Portal Enabled by Semantic Technologies and Data Visualization. Webinar - NSF EarthCube Collaboration and Cyberinfrastructure for Paleogeosciences.
- 2014, Why Data Science Matters and What We Can Do With It. DCO Summer School 2014. Big Sky, MT.
- 2014, Experience in Ontology Engineering with the Global Change Information System. April 2014 Webinar of ESIP Semantic Web Cluster.
- 2014, Deep Earth Computer: A Platform for Linked Science of the Deep Carbon Observatory Community. 2014 Deep Carbon Observatory Early Career Scientist Workshop, San José, Costa Rica.
- 2014, Technologies and Functionalities of the Platform for Linked Science of the Deep Carbon Observatory Community. 2014 Deep Carbon Observatory Early Career Scientist Workshop, San José, Costa Rica.
- 2014, Data Sharing and Interoperability in the Deep Carbon Observatory. EarthCube Data Facilities Workshop, Arlington, VA.

- 2013, A Use Case-Driven Iterative Method for Building a Provenance-Aware GCIS Ontology. ESIP 2013 Summer Meeting, Chapel Hill, NC.
- 2013, Data Management Plans for the Deep Carbon Observatory: What, Why and How? Deep Carbon Observatory International Science Meeting, Washington, DC.
- 2013, Deep Energy Science Discovery using DCO's Data Infrastructure, Management, and Science Network. DCO – Deep Energy Workshop, Manchester, UK.
- 2012, Geo-Informatics and the Semantic Web. Webinar for Purdue University.
- 2011, Ontology Spectrum for Geological Data Interoperability. China University of Geosciences, Wuhan, China.
- 2010, Development of a SKOS-based Multilingual Thesaurus for Automatic Translation of Geological Time Scale Terms in Online Geological Maps. In: IUGS-CGI and OneGeology-Europe International Geoscience Language Workshop, Berlin, Germany.
- 2010, Building and Using Geoscience Thesauri. Geological Survey of the Netherlands, TNO, Utrecht, Netherlands.

#### Honors and Awards in Educational and Outreach Activities:

2019	Invited Seminar at The 644th Session of the Xiangshan Science Conference, Beijing
2017	Guest Professor at China University of Geosciences, Wuhan
2016	Invited Panelist, International Data Week, Denver, CO
2015	NSF-EarthCube Distinguished Lecturer

#### SCHOLARSHIP ACCOMPLISHMENTS:

##### Publications, Exhibitions, Performances, Recitals: (\* denotes student or postdoc advisees)

##### Refereed/Adjudicated:

##### *Refereed Journal Papers*

1. \*Ma, C., Morrison, S.M., Muscente, A.D., Wang, C., **Ma, X.**, 2022. Incorporate temporal topology in a deep-time knowledge base to facilitate data-driven discovery in geoscience. *Geoscience Data Journal*. In Press.
2. \*Li, C., \*Zhang, J., \*Kale, A., \*Que, X., \*Salati, S., **Ma, X.**, 2022. Toward Trust-Based Recommender Systems for Open Data: A Literature Review. *Information*, 13(7), 334. doi:10.3390/info13070334
3. Chen, Q., Cui, Z., Liu, G., Yang, Z., **Ma, X.**, 2022. Deep convolutional generative adversarial networks for modeling complex hydrological structures in Monte-Carlo simulation. *Journal of Hydrology*. 610, 127970. doi:10.1016/j.jhydrol.2022.127970.
4. \*Alkomah, F., **Ma, X.**, 2022. A Literature Review of Textual Hate Speech Detection Methods and Datasets. *Information*, 13(6), 273. doi:10.3390/info13060273.
5. He, Y., Zhou, Y., Wen, T., Zhang, S., Huang, F., Zou, X., **Ma, X.**, Zhu, Y., 2022. A Review of Machine Learning in Geochemistry and Cosmochemistry: Method Improvements and Applications. *Applied Geochemistry*, 140, 105273. doi:10.1016/j.apgeochem.2022.105273.
6. \*Kale, A., Nguyen, T., Harris Jr., F.C., \*Li, C., \*Zhang, J., **Ma, X.**, 2022. Provenance documentation to enable explainable and trustworthy AI: A literature review. *Data Intelligence*. In Press. doi:10.1162/dint\_a\_00119.
7. **Ma, X.**, 2022. Knowledge graph construction and application in geosciences: A review. *Computers & Geosciences*, 161, 105082. doi:10.1016/j.cageo.2022.105082.
8. Muscente, A.D., Martindale, R.C., \*Prabhu, A., **Ma, X.**, Fox, P., Hazen, R.M., Knoll, A.H., 2022. Appearance and disappearance rates of Phanerozoic marine animal paleocommunities. *Geology*, 50(3), 341-345. doi:10.1130/G49371.1.
9. Sun, Z., Sandoval, L., Crystal-Ornelas, R., Mousavi, S.M., Wang, J., Lin, C., Cristea, N., Tong, D., Carande, W.H., **Ma, X.**, Rao, Y., Bednar, J.A., Tan, A., Wang, J., Purushotham, S., Gill, T.E., Chastang, J., Howard, D., Holt, B., Gangodagamage, C., Zhao, P., Rivas, P., Chester, Z., Orduz, J., John, A., 2022. A Review of Earth Artificial Intelligence. *Computers & Geosciences*, 159, 105034. doi:10.1016/j.cageo.2022.105034.
10. He, Z., Zhang, C., **Ma, X.**, Liu, G., 2021. Hexadecimal aggregate approximation representation and classification of time series data. *Algorithms*, 14(12), 353; doi:10.3390/a14120353.
11. Brantley, S., Wen, T., Agarwal, D., Catalano, J., Schroeder, P.A., Lehnert, K., Varadharajan, C., Pett-Ridge, J., Engle, M., Castronova, A.M., Hopper, R., **Ma, X.**, Jin, L., McHenry, K., Aronson, E., Shaughnessy, A.R., Derry, L.A., Richardson, J., Bales, J., Pierce, E.M., 2021. A Vision for the Future Low-Temperature Geochemical Data-scape. *Computers & Geosciences*, 157, 104933. doi:10.1016/j.cageo.2021.104933.
12. Wang, C., Hazen, R.M., Cheng, Q., Stephenson, M.H., Zhou, C., Fox, P., Shen, S., Oberhansli, R., Hou, Z., **Ma, X.**, Feng, Z., Fan, J., \*Ma, C., Hu, X., Luo, B., Wang, J., 2021. The Deep-time Digital Earth Program: Data-driven

- Discovery in the Geosciences. National Science Review, 8(9), nwab027. doi:10.1093/nsr/nwab027 [open access]
13. Kong, C., Tian, Y., **Ma, X.**, Weng, Z., Zhang, Z., Xu, K., Landslide susceptibility assessment based on different machine learning methods in Zhaoping county of eastern Guangxi. *Remote Sensing*, 13(18), 3573. doi:10.3390/rs13183573. [open access]
  14. Cui, Z., Chen, Q., Liu, G., Mariethoz, G., **Ma, X.**, 2021. Hybrid Parallel Framework for Multiple-point Geostatistics on Tianhe-2: A Robust Solution for Large-scale Simulation. *Computers & Geosciences*. 157, 104923. doi:10.1016/j.cageo.2021.104923
  15. Cui, Z., Chen, Q., Liu, G., **Ma, X.**, Que, X., 2021. Multiple-point geostatistical simulation based on conditional conduction probability. *Stochastic Environmental Research and Risk Assessment*, 35, 1355–1368. doi:10.1007/s00477-020-01944-4.
  16. \*Que, X., \*Ma, C., **Ma, X.**, Chen, Q., 2021. Parallel Computing for Fast Spatiotemporal Weighted Regression. *Computers & Geosciences*, 150, 104723. doi:10.1016/j.cageo.2021.104723.
  17. \*Alsini, R., Almakrab, A., Ibrahim, A., **Ma, X.**, 2021. Improving the Outlier Detection Method in Concrete Mix Design by Combining Isolation Forest and Local Outlier Factor. *Construction and Building Materials*. 270, 121396. doi:10.1016/j.conbuildmat.2020.121396.
  18. \*Alghushairy, O., \*Alsini, R., Soule, T., **Ma, X.**, 2021. A review of local outlier factor algorithms for outlier detection in big data streams. *Big Data and Cognitive Computing*, 5(1), 1. doi:10.3390/bdcc5010001. [open access]
  19. \*Que, X., \*Ma, C., **Ma, X.**, Chen, Q., 2020. A Spatiotemporal Weighted Regression Model (STWR v1.0) for Analyzing Local Non-stationarity in Space and Time. *Geoscience Model Development*, 13, 6149-6164. doi: 10.5194/gmd-13-6149-2020. [open access]
  20. \*Alshamrani, R., \*Althbiti, A., Alshamrani, Y., **Ma, X.**, 2020. Model-Driven Decision-Making in Multiple Sclerosis Research: Existing Works and Latest Trends. *Patterns*, 1(8), 100121. doi:10.1016/j.patter.2020.100121 [open access]
  21. He, Z., Long, S., **Ma, X.**, Zhao, H., 2020. A boundary distance-based symbolic aggregate approximation method for time series data. *Algorithm*. 13(11), 284. doi: 10.3390/a13110284. [open access]
  22. **Ma, X.**, \*Ma, C., Wang, C., 2020. A new structure for representing and tracking version information in a deep time knowledge graph. *Computers & Geosciences*, 145(12), 104620. [open access]
  23. \*Chen, Q., Liu, G., **Ma, X.**, Li, X., He Z., 2020. 3D stochastic modeling framework for Quaternary sediments using multiple-point statistics: a case study in Minjiang Estuary area, Southeast China. *Computers & Geosciences*. 136(3), 104404.
  24. He, Z., Liu, G., **Ma, X.**, \*Chen, Q., 2019. GeoBeam: A Distributed Computing Framework for Spatial Data. *Computers & Geosciences*, 131 (10), 15-22.
  25. Zeng, Y., Su, Z., Barmpadimos, I., Perrels, A., Poli, P., Boersma, K.f., Frey, A., **Ma, X.**, de Bruin, K., Gossen, H., Timmermans, W., 2019. Towards a Traceable Climate Service: Assessment of Quality and Usability of Essential Climate Variables. *Remote Sensing*, 11(10), 1186. [open access]
  26. \*Chen, Q., Liu, G., **Ma, X.**, Zhang, J., Zhang, X., 2019. Conditional multiple-point geostatistical simulation for unevenly distributed sample data. *Stochastic Environmental Research and Risk Assessment*. 33, 973-987.
  27. Hazen, R.M., Downs, R.T., \*Eleish, A., Fox, P., Gagne, O., Golden, J.J., Grew, E.S., Hummer, D.R., Hystad, G., Krivovichev, S.V., Li, C., Liu, C., **Ma, X.**, Morrison, S.M., \*Pan, F., Pires, A.J., \*Prabhu, A., Ralph, J., Rumyon, S.E., \*Zhong, H., 2019. Data-driven discovery in mineralogy: Recent advances in data resources, analysis, and visualization. *Engineering*, 5 (3), 397-405. [invited review article]
  28. **Ma, X.**, 2019. Geo-Data Science: Leveraging Geoscience Research with Geoinformatics, Semantics and Open Data. *Acta Geologica Sinica (English Edition)*, 93(s1), 44-47. [article for invited keynote talk | open access]
  29. Morrison, S.M., Prabhu, A., \*Eleish, A., \*Pan, F., \*Zhong, H., Huang, F., Fox, P., **Ma, X.**, Ralph, J., Golden, J.J., Downs, R., Liu, C., Runyon, S.E., Hazen, R.M., 2019. Application of Advanced Analytics and Visualization in Mineral Systems. *Acta Geologica Sinica (English Edition)*, 93(s1), 55-55. [short article for invited keynote talk | open access]
  30. \*Chen, Q., Mariethoz, G., Liu, G., Comunian, A., **Ma, X.**, 2018. Locality-based 3-D multiple-point statistics reconstruction using 2-D geological cross-sections. *Hydrology and Earth System Sciences*, 22, 6547-6566.
  31. \*Chen, Q., Liu, G., **Ma, X.**, Yao, Z., Tian, Y., 2018. A virtual globe-based integration and visualization framework for aboveground and underground 3D spatial objects. *Earth Science Informatics*, 11 (4), 591-603.
  32. **Ma, X.**, \*Fu, L., West, P., Fox, P., 2018. Ontology Usability Scale: Context-aware metrics for the effectiveness, efficiency and satisfaction of ontology uses. *Data Science Journal*, 17, 10. [open access]
  33. He, Z., **Ma, X.**, 2018. A distributed indexing method for timeline similarity query, *Algorithms*, 11 (4), 41. [open access]
  34. \*Wang, C., **Ma, X.**, Chen, J., 2018. The application of data pre-processing technology in the geoscience big data. *Acta Petrologica Sinica*, 34 (2), 303-313. [open access | in Chinese with English abstract].



35. \*Chen, Q., Liu, G., **Ma, X.**, Mariethoz, G., He, Z., Tian, Y., Weng, Z., 2018. Local curvature entropy-based 3D terrain representation using a comprehensive Quadtree. *ISPRS Journal of Photogrammetry and Remote Sensing*, 139, 30-45.
36. \*Wang, C., **Ma, X.**, Chen, J., 2018. Ontology-driven data integration and visualization for exploring regional geologic time and paleontological information. *Computers & Geosciences*, 115, 12-19.
37. \*Wang, C., **Ma, X.**, Chen, J., Chen, J., 2018. Information extraction and knowledge graph construction from geoscience literature. *Computers & Geosciences*, 112, 112-120.
38. **Ma, X.**, Hummer, D., Golden, J.J., Fox, P.A., Hazen, R.M., Morrison, S.M., Downs, R.T., \*Madhikarmi, B.L., Wang, C., Meyer, M.B., 2017. Using Visual Exploratory Data Analysis to Facilitate Collaboration and Hypothesis Generation in Cross-Disciplinary Research. *International Journal of Geo-Information* 6 (11), 368. [open access | feature paper]
39. **Ma, X.**, 2017. Linked Geoscience Data in practice: where W3C standards meet domain knowledge, data visualization and OGC standards. *Earth Science Informatics*, 10(4), 429-441.
40. \*Chen, Q., Liu, G., **Ma, X.**, Li, X., He, Z., 2017. Fractal generator for efficient production of random planar patterns and symbols in digital mapping. *Computers & Geosciences*, 105, 91-102.
41. **Ma, X.**, West, P., Zednik, S., Erickson, J., \*Eleish, A., \*Chen, Y., \*Wang, H., \*Zhong, H., Fox, P., 2017. Weaving a knowledge network for Deep Carbon Science. *Frontiers in Earth Science*, 5, 36. [open access | special issue of early career scientist contributions to the Deep Carbon Observatory]
42. **Ma, X.**, Erickson, J., Zednik, S., West, P., Fox, P., 2016. Semantic specification of data types for a world of Open Data. *ISPRS International Journal of Geo-Information*, 5(3), 38. [open access]
43. \*Zheng, J.G., \*Fu, L.Y., **Ma, X.**, Fox, P., 2015. SEM+: Tool for discovering concept mapping in Earth science related domain. *Earth Science Informatics* 8 (1), 95-102.
44. **Ma, X.**, Fox, P., Narock, T., Wilson, B., 2015. Editorial: Semantic eScience. *Earth Science Informatics* 8 (1), 1-3.
45. **Ma, X.**, Fox, P., Tilmes, C., Jacobs, K., Waple, A., 2014. Capturing provenance of global change information. *Nature Climate Change* 4 (6), 409-413.
46. **Ma, X.**, \*Zheng, J.G., Goldstein, J., Zednik, S., \*Fu, L., Duggan, B., Aulenbach, S., West, P., Tilmes, C., Fox, P., 2014. Ontology engineering in provenance enablement for the National Climate Assessment. *Environmental Modelling & Software* 61, 191-205.
47. **Ma, X.**, Fox, P., \*Rozell, E., West, P., Zednik, S., 2014. Ontology dynamics in a data life cycle: challenges and recommendations from a geoscience perspective. *Journal of Earth Science* 25 (2), 407-412.
48. **Ma, X.**, Fox, P., Mayernik, M.S., 2014. Strengthening an Interagency Network for Geoscience Data Sets: Report of Geodata 2014 Workshop. *Eos, Transactions American Geophysical Union* 95 (45), 411-411.
49. Tilmes, C., Fox, P., **Ma, X.**, McGuinness, D., Privette, A.P., Smith, A., Waple, A., Zednik, S., \*Zheng, J., 2013. Provenance representation for the National Climate Assessment in the Global Change Information System. *IEEE Transactions on Geoscience and Remote Sensing* 51 (11), 5160-5168.
50. **Ma, X.**, Fox, P., 2014. A jigsaw puzzle layer cake of spatial data. *Eos, Transactions American Geophysical Union* 95 (19), 161-161.
51. **Ma, X.**, Fox, P., 2013. Recent progress on geologic time ontologies and considerations for future works. *Earth Science Informatics* 6 (1), 31-46.
52. He, Z., Kraak, M.-J., Huisman, O., **Ma, X.**, Xiao, J., 2013. Parallel indexing technique for spatio-temporal data. *ISPRS Journal of Photogrammetry and Remote Sensing* 78, 116-128.
53. **Ma, X.**, Carranza, E.J.M., Wu, C., van der Meer, F.D., 2012. Ontology-aided annotation, visualization and generalization of geological time scale information from online geological map services. *Computers & Geosciences* 40 (3), 107-119.
54. **Ma, X.**, Asch, K., Laxton, J.L., Richard, S.M., Asato, C.G., Carranza, E.J.M., van der Meer, F.D., Wu, C., Duclaux, G., Wakita, K., 2011. Data exchange facilitated. *Nature Geoscience* 4 (12), 814-814.
55. **Ma, X.**, Carranza, E.J.M., Wu, C., van der Meer, F.D., Liu, G., 2011. A SKOS-based multilingual thesaurus of geological time scale for interoperability of online geological maps. *Computers & Geosciences* 37 (10), 1602-1615.
56. **Ma, X.**, Wu, C., Carranza, E.J.M., Schetselaar, E.M., van der Meer, F.D., Liu, G., Wang, X., Zhang, X., 2010. Development of a controlled vocabulary for semantic interoperability of mineral exploration geodata for mining projects. *Computers & Geosciences* 36 (12), 1512-1522.
57. **Ma, X.**, Carranza, E.J.M., van der Meer, F.D., Wu, C., Zhang, X., 2010. Algorithms for multi-parameter constrained compositing of borehole assay intervals from economic aspects. *Computers & Geosciences* 36 (7), 945-952.
58. **Ma, X.**, Wang, X., Wu, C., Ju, F., 2007. Metadata hierarchy in integrated geoscientific database for regional mineral prospecting. *Geo-spatial Information Science* 10 (3), 223-227.

*Refereed Conference Papers*

1. \*Li, W., **Ma, X.**, Wang, X., Wu, L., Xie, Z., 2022. Stratigraphic Knowledge Graph (StratKG) - Construction and Spatio-Temporal Analysis based on Multi-source Data. The First Workshop on Geospatial Knowledge Graphs at The Knowledge Graph Conference 2022, New York, 3pp.
2. \*Althbiti, A., \*Alshamrani, R., Alghamdi, T., Lee, S., **Ma, X.**, 2021. Addressing Data Sparsity in Collaborative Filtering Based Recommender Systems Using Clustering and Artificial Neural Network. In: Proceedings of CCWC 2021: The 11th Annual Computing and Communication Workshop and Conference (Virtual), Las Vegas, NV, USA, pp.217-226.
3. \*Althbiti, A., \*Algarni, S., Alghamdi, T., **Ma, X.**, 2021. A Personalized Academic Advisory Recommender System (PAARS): A Case Study. Proceedings of the 4th International Conference on Information and Computer Technologies (ICICT), Kahului, Maui Island, HI, USA. pp. 270-278.
4. Chen, Q., Liu, G., Liu, J., Cui, Z., **Ma, X.**, 2020. CPU-MIC Acceleration of Multiple-point Statistical Simulation on Tianhe-2. Proceedings of the 22nd IEEE International Conference on High Performance Computing and Communications (HPCC 2020), Cuvu, Fiji. pp.700-707.
5. \*Althbiti, A., **Ma, X.**, 2020. Social Network Influencers' Data Augmenting Recommender Systems. In: Proceedings of The 2020 International Conference on Computational Science and Computational Intelligence, Las Vegas, NV, USA. pp.287-291.
6. \*Althbiti, A., \*Alshamrani, R., **Ma, X.**, 2020. A Literature Review of Data Mining Techniques Used in Collaborative Filtering Recommender Systems. In: Proceedings of The 2020 International Conference on Computational Science and Computational Intelligence, Las Vegas, NV, USA. pp.424-430.
7. \*Alowairdhi, A., **Ma, X.**, 2020. Utilizing fuzzy logic for assessing "FAIRness" of a digital resource. In: Proceedings of The 2020 International Conference on Computational Science and Computational Intelligence, Las Vegas, NV, USA. pp. 358-363.
8. \*Alghushairy, O., \*Alsini, R., **Ma, X.**, 2020. An Efficient Local Outlier Factor for Data Stream Processing: A Case Study. In: Proceedings of The 2020 International Conference on Computational Science and Computational Intelligence, Las Vegas, NV, USA. pp.1525-1528.
9. \*Alsini, R., \*Alghushairy, O., **Ma, X.**, Soule, T., 2020. A Grid Partition-based Local Outlier Factor by Reachability Distance for Data Stream Processing. In: Proceedings of The 2020 International Conference on Computational Science and Computational Intelligence, Las Vegas, NV, USA. pp. 369-375.
10. \*Alghushairy, O., \*Alsini, R., **Ma, X.**, Soule, T., 2020. Improving the Efficiency of Genetic-based Incremental Local Outlier Factor Algorithm for Network Intrusion Detection. In: Proceedings of the 22nd International Conference on Artificial Intelligence and The 4th International Conference on Applied Cognitive Computing. Las Vegas, NV, USA. pp.1011-1027.
11. \*Alsini, R., \*Alghushairy, O., **Ma, X.**, Soule, T., 2020. A Grid Partition-based Local Outlier Factor for Data Stream Processing. In: Proceedings of the 22nd International Conference on Artificial Intelligence and The 4th International Conference on Applied Cognitive Computing. Las Vegas, NV, USA. pp.1047-1060.
12. \*Alghushairy, O., \*Alsini, R., **Ma, X.**, Soule, T., 2020. A Genetic-Based Incremental Local Outlier Factor Algorithm for Efficient Data Stream Processing. Proceedings of the ICCDA 2020 Conference, San Jose, CA. pp. 38-49. doi: 10.1145/3388142.3388160.
13. Wyborn, L., Cox, S., Hudson, S., **Ma, X.**, 2018. The role of the International Science Council and CODATA in Enabling Global Transdisciplinary Integration of Data in Support of New Research Horizons. International Data Week 2018, Gaborone, Botswana. 3pp.
14. \*Mou, X., Jamil, H., **Ma, X.**, 2017. VisFlow: A visual database integration and workflow querying system. Proceedings of the 33rd IEEE International Conference on Data Engineering (ICDE 2017). San Diego, CA, USA. 2pp. [Finalist of Demo Paper Track]
15. \*Wang, H., \*Zheng, J.G., **Ma, X.**, Fox P., Ji, H., 2015. Language and Domain Independent Entity Linking with Quantified Collective Validation. Proceedings of the Conference on Empirical Methods in Natural Language Processing (EMNLP2015). 10 pp. [Best Paper Nomination]
16. **Ma, X.**, 2015. Geoinformatics in the Semantic Web. In: Schaeben, H., Delgado, R.T., van den Boogaart, K.G., van den Boogaart, R. (eds.) Proceedings of IAMG 2015, Freiberg, Germany, pp 18-26. [Andrei B. Vistelius Award Invited Article]
17. Tilmes, C., Wolfe, R.E., Duggan, B., Aulenbach, S., Goldstein, J.C., **Ma, X.**, Zednik, S., 2015. Supporting Trust with Provenance of the Findings of the National Climate Assessment. In: Proceedings of the Method Workshop at ISWC 2015, Bethlehem, PA. 4 pp.
18. **Ma, X.**, West, P., Erickson, J., Zednik, S., \*Chen, Y., \*Wang H., \*Zhong H., Fox, P., 2015. From data portal to knowledge portal: Leveraging semantic technologies to support interdisciplinary studies. In: Proceedings of the Diversity++ Workshop at ISWC 2015, Bethlehem, PA. 6 pp.

19. **Ma, X.**, \*Chen, Y., \*Wang, H., Erickson, J.S., West, P., Fox, P., 2014. Deep Carbon Virtual Observatory: A cyber-enabled platform for linked science. In: Proceedings of SciDataCon2014, New Delhi, India, 3 pp.
20. **Ma, X.**, Carranza, E.J.M., Wu, C., van der Meer, F.D., 2011. Practicing an ontology spectrum for geological data interoperability. In: Proceedings of IAMG 2011, Salzburg, Austria, 14 pp.
21. **Ma, X.**, Carranza, E.J.M., van der Meer, F.D., Wu, C., 2010. Integrating data-flow analysis and object-oriented analysis for compositing of borehole metal-grade intervals. In: Proceedings of IAMG 2010, Budapest, Hungary, 9 pp.
22. Liu, G., Wu, C., **Ma, X.**, Wang, Y., Tian, F., 2009. Approach for interoperability of multi-source geological hazard data based on ontology and GeoSciML. In: Proceedings of Geoinformatics'09, Fairfax, USA, 7 pp.
23. **Ma, X.**, Wu, C., Wang, K., Zhang, X., 2007. Point-source database theory and its application in database architecture design of Digital Mine. In: Proceedings of IAMG2007 conference, Beijing, China, pp. 421–424.
24. Guo, Y., **Ma, X.**, Wang, K., Xue, B., 2007. Research and application of urban water distribution network management information system based on GIS. In: Proceedings of IAMG2007 conference, Beijing, China, pp. 355–358.
25. Wang, K., **Ma, X.**, Wang, X., Hu, S., 2007. Data dictionary based design of land change investigation database management system. In: Proceedings of IAMG2007 conference, Beijing, China, pp. 454–457.
26. Wang, X., Chen, Y., Xia, Q., Wang, Y., Ju, F., **Ma, X.**, Zuo, R., 2007. Design and developing of basic database for resources evaluation of national important mineral zones of China. In: Proceedings of IAMG2007 conference, Beijing, China, pp. 314–318.
27. **Ma, X.**, Wu, C., Zhang, D., Wang, K., 2006. The integrated application of kriging method and 3D-GIS in Digital Mine. In: Proceedings of IAMG2006 conference, Liege, Belgium, 6 pp.
28. Wang, K., Cheng, Q., **Ma, X.**, 2006. Efficient utilization of GIS and spatial statistics achieved by using spatial weighting statistics method. In: Proceedings of IAMG2006 conference, Liege, Belgium, 6 pp.
29. **Ma, X.**, Wu, C., Wang X., Chen, Y., Wang, Y., 2005. Centralized management approach and database development of multisource geoscientific information, In: Proceedings of IAMG2005 conference, Toronto, Canada, pp. 1006–1011.
30. Wang, X., Zhao, W., Zuo, R., **Ma, X.**, 2005. Three-related geology observing point model in computer-aided regional geological survey. In: Proceedings of IAMG2005 conference, Toronto, Canada, pp. 917–922.

#### *Edited Books and Journal Special Issues*

1. **Ma, X.**, Fox, P., Narock, T., Wilson, B., (Eds.) 2015. Semantic e-Science. Special Issue of Earth Science Informatics, Volume 8, Issue 1, 146 pp.

#### **Peer Reviewed/Evaluated:**

##### *Peer-Reviewed Book Chapters and Books*

1. **Ma, X.**, 2021. Big Data. Encyclopedia of Mathematical Geosciences. Springer, Cham, Switzerland. In Press. [Invited Category-A Article: Deep Review of a Domain]
2. \*Alowairdhi, A., **Ma, X.**, 2021. FAIR Data Principles. Encyclopedia of Mathematical Geosciences. Springer, Cham, Switzerland. In Press.
3. Wang, C., **Ma, X.**, 2021. Digital Geological Mapping. Encyclopedia of Mathematical Geosciences. Springer, Cham, Switzerland. In Press.
4. Chen, Q., Liu, G., **Ma, X.**, Zhang, J., 2021. Three Dimensional Geologic Modeling. Encyclopedia of Mathematical Geosciences. Springer, Cham, Switzerland. In Press.
5. Wang, C., **Ma, X.**, 2021. Text Mining. Encyclopedia of Mathematical Geosciences. Springer, Cham, Switzerland. In Press.
6. Chen, Q., Liu, G., **Ma, X.**, Que, X., 2021. Spatial Analysis. Encyclopedia of Mathematical Geosciences. Springer, Cham, Switzerland. In Press.
7. **Ma, X.**, 2021. Data Science for Geosciences: Recent Progress and Future Trends from the Perspective of a Data Life Cycle. In: GSA Special Papers - Recent Advancement in Geoinformatics and Data Science. Geological Society of America, Boulder, CO. In Press.
8. Que, X., **Ma, X.**, Ma, C., Liu, F., Chen, Q., 2021. Spatiotemporal Weighted Regression. In: Encyclopedia of Mathematical Geosciences. Springer, Cham, Switzerland. In Press.
9. \*Wang, C., **Ma, X.**, 2020. Text Mining to Facilitate Domain Knowledge Discovery. In: Abu-Taieh, E., (ed.) Cyberspace. IntechOpen, London. 13pp. [open access] <https://dx.doi.org/10.5772/intechopen.85362>
10. \*Althbiti, A., **Ma, X.**, 2020. Machine Learning. In: Schintler, L.A., McNeely, C.L. (eds.) Encyclopedia of Big Data. Springer, Cham, Switzerland. [https://doi.org/10.1007/978-3-319-32001-4\\_539-1](https://doi.org/10.1007/978-3-319-32001-4_539-1)
11. \*Althbiti, A., **Ma, X.**, 2019. Collaborative Filtering. In: Schintler, L.A., McNeely, C.L. (eds.) Encyclopedia of Big Data. Springer, Cham, Switzerland. 5pp. [https://doi.org/10.1007/978-3-319-32001-4\\_274-1](https://doi.org/10.1007/978-3-319-32001-4_274-1)

12. \*Alowairdhi, A., **Ma, X.**, 2019. Data Brokers and Data Services. In: Schintler, L.A., McNeely, C.L. (eds.) Encyclopedia of Big Data. Springer, Cham, Switzerland. 5pp. [https://doi.org/10.1007/978-3-319-32001-4\\_298-1](https://doi.org/10.1007/978-3-319-32001-4_298-1)
13. \*Alghushairy, O., **Ma, X.**, 2019. Data Storage. In: Schintler, L.A., McNeely, C.L. (eds.) Encyclopedia of Big Data. Springer, Cham, Switzerland. 5pp. [https://doi.org/10.1007/978-3-319-32001-4\\_323-1](https://doi.org/10.1007/978-3-319-32001-4_323-1)
14. \*Alsini, R., **Ma, X.**, 2019. Data Streaming. In: Schintler, L.A., McNeely, C.L. (eds.) Encyclopedia of Big Data. Springer, Cham, Switzerland. 5pp. [https://doi.org/10.1007/978-3-319-32001-4\\_324-1](https://doi.org/10.1007/978-3-319-32001-4_324-1)
15. \*Alshamrani, R., **Ma, X.**, 2019. Deep Learning. In: Schintler, L.A., McNeely, C.L. (eds.) Encyclopedia of Big Data. Springer, Cham, Switzerland. 5pp. [https://doi.org/10.1007/978-3-319-32001-4\\_533-1](https://doi.org/10.1007/978-3-319-32001-4_533-1)
16. **Ma, X.**, 2018. Spatial Data. In: Schintler, L.A., McNeely, C.L. (eds.) Encyclopedia of Big Data. Springer, Cham, Switzerland. 5pp. [http://dx.doi.org/10.1007/978-3-319-32001-4\\_192-1](http://dx.doi.org/10.1007/978-3-319-32001-4_192-1)
17. **Ma, X.**, 2018. Metadata. In: Schintler, L.A., McNeely, C.L. (eds.) Encyclopedia of Big Data. Springer, Cham, Switzerland. 5pp. [http://dx.doi.org/10.1007/978-3-319-32001-4\\_135-1](http://dx.doi.org/10.1007/978-3-319-32001-4_135-1)
18. **Ma, X.**, 2018. Visualization. In: Schintler, L.A., McNeely, C.L. (eds.) Encyclopedia of Big Data. Springer, Cham, Switzerland. 5pp. [http://dx.doi.org/10.1007/978-3-319-32001-4\\_202-1](http://dx.doi.org/10.1007/978-3-319-32001-4_202-1)
19. **Ma, X.**, 2018. Data Repository. In: Schintler, L.A., McNeely, C.L. (eds.) Encyclopedia of Big Data. Springer, Cham, Switzerland. 5pp. [http://dx.doi.org/10.1007/978-3-319-32001-4\\_59-1](http://dx.doi.org/10.1007/978-3-319-32001-4_59-1)
20. **Ma, X.**, 2018. Data-Information-Knowledge-Action Model. In: Schintler, L.A., McNeely, C.L. (eds.) Encyclopedia of Big Data. Springer, Cham, Switzerland. 5pp. [http://dx.doi.org/10.1007/978-3-319-32001-4\\_64-1](http://dx.doi.org/10.1007/978-3-319-32001-4_64-1)
21. **Ma, X.**, 2018. Data Science for Geoscience: Leveraging Mathematical Geosciences with Semantics and Open Data. In Sagar, B.S.D., Cheng, Q., Agterberg, F.D. (eds.) Handbook of Mathematical Geosciences: Fifty Years of IAMG. Springer, Cham, Switzerland. pp. 687-702. [open access | invited article]
22. **Ma, X.**, Beaulieu, S.E., \*Fu, L., Fox, P., Di Stefano, M., West, P., 2017. Documenting Provenance for Reproducible Marine Ecosystem Assessment in Open Science. In: Diviacco, P., Graves, H.M., Leadbetter, A. (eds.) Oceanographic and Marine Cross-Domain Data Management for Sustainable Development. IGI Global, Hershey, PA, USA, pp. 100-126.
23. **Ma, X.**, \*Fu, L., Fox, P., Liu, G., 2016. An integrated golden spike information portal enabled by data visualization and semantic web technologies. In: Raju, N.J. (ed.) Geostatistical and Geospatial Approaches for the Characterization of Natural Resources in the Environment. Springer, Cham, Switzerland, pp. 829-833.
24. **Ma, X.**, \*Chen, Y., \*Wang, H., \*Zheng J.G., \*Fu, L., West, P., Erickson, J.S., Fox, P., 2015. Data visualization in the Semantic Web. In: Narock, T., Fox, P., (eds.) The Semantic Web in Earth and Space Science: Current Status and Future Directions. IOS Press, Berlin. pp. 149–167. [invited article]
25. Wu, C., Liu G., Tian, Y., Mao, X., He, Z., Zhang, X., Liu, J., Weng, Z., Zhang, Z., Li, X., Li, Z., Xu, K., Kong, C., Li, X., Qi, G., **Ma, X.**, 2014. An Outline of Geological Information Science and Technology. Science Press, Beijing, China. 521 pp. [in Chinese]
26. **Ma, X.**, 2011. Ontology Spectrum for Geological Data Interoperability. PhD thesis, University of Twente, Enschede, The Netherlands, 184 pp. ISBN: 978-90-6164-323-4.

#### *Peer-Reviewed Conference/Workshop Presentations*

1. Hummer, D., **Ma, X.**, Que, X., Zhang, S., Liu, C., Hazen, R., Golden, J., Downs, R., 2022. A Quantitative Goldschmidt classification using correlations of mineral-forming elements. The 23rd General Meeting of the International Mineralogical Association, Lyon, France.
2. Prabhu, A., Morrison, S., Hazen, R., Wong, M., **Ma, X.**, Williams, J., Lehnert, K., Ralph, J., Downs, R., Walter, M., McGuinness, K., Lafuente, B., Krivovivhev, S., Fox, P., 2022. Mineral Informatics: New challenges for the next decade of mineral exploration. The 23rd General Meeting of the International Mineralogical Association, Lyon, France.
3. Lehnert, K., Morrison, S., Prabhu, A., **Ma, X.**, 2022. Optimizing the Value of Today's Mineral Data for Tomorrow's Science. The 23rd General Meeting of the International Mineralogical Association, Lyon, France.
4. Ralph, J., **Ma, X.**, Prabhu, A., Martynov, P., 2022. Building OpenMindat for FAIR mineralogical data access. EarthCube 2022 Annual Meeting, San Diego, CA. Poster.
5. **Ma, X.**, Ralph, J., Prabhu, A., Morrison, S.M., Hazen, R.M., 2022. OpenMindat: Transforming crowd-sourcing data into scientific discoveries in geoscience. EarthCube 2022 Annual Meeting, San Diego, CA. Poster.
6. **Ma, X.**, Sheneman, L., Robison, B., Harris, F., Shi, X., Lin, Y., 2021. Framework vs System: Our experience with the TickBase project. AGU Fall Meeting 2021, New Orleans, LA.
7. Sun, Z., Alnaim, A., **Ma, X.**, 2021. Geoweaver: Open new door to intuitive manageable AI workflow for geoscientists. GSA 2021 Annual Meeting, Portland, OR.
8. **Ma, X.**, 2021. Temporal topology for nominal and numerical entities in the deep-time knowledge base. GSA 2021 Annual Meeting, Portland, OR.

9. Que, X., **Ma, X.**, Ma, C., Chen, Q., Liu, F., 2021. Spatiotemporal Weighted Regression for Exploring Processes with Spatial Heterogeneity in the Rate of Change of Responses. The 18th Annual Meeting of the Asia Oceania Geosciences Society (AOGS2021). Virtual meeting.
10. Sun, Z., Di, L., Burgess, A., Magill, A.B., Cristea, N., Tong, D., **Ma, X.**, 2021. Using Geoweaver to Remember Jupyter Notebook History. ESIP Winter Meeting 2021 (Virtual). Poster.
11. Sun, Z., Di, L., Burgess, A., Magill, A.B., Cristea, N., Tullis, J., Tong, D., **Ma, X.**, 2020. Geoweaver: Connecting Dots for Artificial Intelligence in Geoscience. AGU Fall Meeting 2020.
12. Wang, C., Hazen, R.M., Cheng, Q., Stephenson, M.H., Zhou, C., Fox, P., Shen, S., Oberhansli, R., Hou, Z., **Ma, X.**, Feng, Z., Fan, J., \*Ma, C., Hu, X., Luo, B., Wang, G., Schiffries, C., 2020. The Deep-time Digital Earth Program: Data-driven Discovery in the Geosciences. AGU Fall Meeting 2020.
13. \*Ma, C., **Ma, X.**, \*Kale, A., \*Crump III, R., 2020. Knowledge graphs for global and regional geologic time scales and an associated R package. AGU Fall Meeting 2020.
14. **Ma, X.**, \*Ma, C., \*Kale, A., \*Crump III, R., 2020. Approaches to improve semantic description and reasoning capability in the deep time knowledge base. GSA 2020 Annual Meeting. [Invited Presentation]
15. Hummer, D., **Ma, X.**, Que, X., Zhang, S., Liu, C., Hazen, R., Golden, J., Downs, R., 2020. Towards Quantitative Scales of Lithophilicity, Chalcophilicity and Hydrophilicity Using Statistical Correlations Among the Mineral-Forming Elements. Goldschmidt 2020 (virtual meeting). doi: 10.46427/gold2020.1113.
16. **Ma, X.**, \*Ma, C., 2020. Deep Time Knowledge Base: Improving Data Interoperability and Facilitating Reproducible Workflows. NSF CSSI PI Meeting, Seattle, WA. Lightning Talk and Poster.
17. \*Ma, C., **Ma, X.**, Que, X., 2020. Deep-time Climate Database and Tailored Spatio-temporal Tools. ESIP Winter Meeting 2020. Bethesda, MD. Poster.
18. Morrison, M.M., \*Eleish, A., \*Prabhu, A., Narkar, S., \*Pan, F., \*Huang, F., Fox, P., Hystad, G., Liu, C., Buongiorno, J., Zhang, S., **Ma, X.**, Ralph, J., Krivovichev, S.V., Giovannelli, D., Runyon, S.E., Hummer, D., Golden, J.J., Downs, R.T., Hazen, R.M., 2019. Exploring carbon mineralogy and mineral evolution through deep time with advanced analytics and visualization. AGU Fall Meeting 2019, San Francisco, CA, USA.
19. Hazen, R.M., Morrison, M.M., Zhang, S., Boujibar, A., \*Prabhu, A., Fox, P., \*Eleish, A., \*Huang, F., Liu C., \*Ma, C., **Ma, X.**, Large, R.R., Gregory, D., Howell, S., Nittler, L.R., 2019. Data-driven discovery in mineralogy: Insights from natural kind clustering. AGU Fall Meeting 2019, San Francisco, CA, USA.
20. \*Wang, C., **Ma, X.**, Chen, J., 2019. Text Mining to Facilitate Geoscience Knowledge Discovery. AGU Fall Meeting 2019, San Francisco, CA, USA.
21. **Ma, X.**, 2019. Deep Time Knowledge Base: Facilitate Data Integration through Machine-Readable Geologic Time Concepts. Deep Carbon 2019 Conference, Washington, DC. Poster.
22. **Ma, X.**, 2019. Data visualization in mineral evolution studies. GSA 2019 Annual Meeting, Phoenix, AZ, Oral Presentation. [INVITED]
23. Morrison, M.M., \*Eleish, A., \*Prabhu, A., Narkar, S., \*Pan, F., \*Huang, F., Fox, P., Zhang, S., Howell, S., **Ma, X.**, Ralph, J., Golden, J.J., Downs, R.T., Hazen, R.M., 2019. Characterizing carbon mineralogy and formational environments through deep time with advanced analytics and visualization. GSA 2019 Annual Meeting, Phoenix, AZ, Oral Presentation.
24. **Ma, X.**, 2019. A knowledge base of deep time to assimilate multi-disciplinary datasets in the study of co-evolving geosphere and biosphere. IAMG 2019 Annual Meeting, State College, PA, Oral Presentation.
25. \*Que, X., **Ma, X.**, 2019. Fast geographically weighted regression for large scale spatiotemporal data. ESIP 2019 Summer Meeting, Tacoma, WA. Poster.
26. \*Ma, C., **Ma, X.**, Que, X., 2019. Deep time climate data. ESIP 2019 Summer Meeting, Tacoma, WA. Poster.
27. **Ma, X.**, \*Ma, C., 2019. Towards a machine-readable knowledge base of deep time: challenges, current progress, and future work. ESIP 2019 Summer Meeting, Tacoma, WA. Poster.
28. \*Alowairdhi, A., **Ma, X.**, 2019. Towards an implementable framework of FAIR principles for Earth science data management and stewardship. ESIP 2019 Summer Meeting, Tacoma, WA. Poster.
29. **Ma, X.**, 2019. Using a three-dimensional Klee diagram to show co-relationships among minerals and elements. Research Computing and Data Science Symposium, Moscow, ID. Poster Presentation and Demo.
30. \*Aljohani, A., \*Althbiti, A., \*Alshamrani, R., **Ma, X.**, 2019. Payment methods preference predication. Research Computing and Data Science Symposium, Moscow, ID. Poster Presentation.
31. \*Alghushairy, O., \*Alsini, R., **Ma, X.**, Soule, T., 2019. Genetic Algorithm-based local outlier detection in data stream mining. Research Computing and Data Science Symposium, Moscow, ID. Poster Presentation.
32. \*Alowairdhi, A., **Ma, X.**, 2019. Towards an implementable framework of FAIR principles for Earth science data management and stewardship. Research Computing and Data Science Symposium, Moscow, ID. Poster Presentation.
33. \*Althbiti, A., \*Alshamrani, R., \*Aljohani, A., **Ma, X.**, 2019. Prediction of the classes of Arabic idioms from rating records. Research Computing and Data Science Symposium, Moscow, ID. Poster Presentation.

34. \*Althbiti, A., \*Alshamrani, R., \*Aljohani, A., **Ma, X.**, 2019. Personalized course recommender system based on content approach. Research Computing and Data Science Symposium, Moscow, ID. Poster Presentation.
35. \*Alshamrani, R., \*Althbiti, A., \*Aljohani, A., **Ma, X.**, 2019. Leveraging early indicators for evaluating students' final grades. Research Computing and Data Science Symposium, Moscow, ID. Poster Presentation.
36. \*Alowairdhi, A., **Ma, X.**, 2019. Towards an implementable framework of FAIR principles for Earth science data management and stewardship. US2TS2019: The Second U.S. Semantic Technologies Symposium, Durham, NC. Poster Presentation.
37. \*Althbiti, A., **Ma, X.**, 2019. Semantic prediction of the attribute of Arabic idioms from rating records. US2TS2019: The Second U.S. Semantic Technologies Symposium, Durham, NC. Poster Presentation.
38. \*Alshamrani, R., **Ma, X.**, 2019. Predicting Students' final outcomes by analyzing early indicators. US2TS2019: The Second U.S. Semantic Technologies Symposium, Durham, NC. Poster Presentation.
39. **Ma, X.**, 2019. A Method for Concept and Attribute Versioning in the Geologic Time Ontology. US2TS2019: The Second U.S. Semantic Technologies Symposium, Durham, NC. Oral Presentation.
40. **Ma, X.**, 2019, Geo-Data Science: Leveraging Geoscience Research with Geoinformatics, Semantics and Open Data. International Forum on Deep-time Digital Earth (DDE) Big Science Program, Beijing, China. [Plenary Keynote Talk – 25 minutes]
41. Roever, C., Sheneman, L., Blair, C., **Ma, X.**, Bogar, A., 2018. Using Graph Networks to Manage Cross-institution, Cross-discipline Research Programs, Science of Team Science Conference (SciTS 2018), Galveston, TX, USA. Poster [SciTS Meritorious Contribution Award]
42. \*Zhong, H., Huang, F., \*Prabhu, A., \*Pan, F., \*Eleish, A., **Ma, X.**, Fox, P.A., Keck DTDI Team, 2018. The Analytics Pipeline: Data Acquisition the Information Era. The 4D Workshop: Deep-time Data Driven Discovery and the Evolution of Earth, Washington, DC, USA. Poster Presentation.
43. Huang, F., \*Zhong, H., \*Eleish, A., \*Prabhu, A., \*Pan, F., **Ma, X.**, Hao, J., Fox, P.A., Keck DTDI Team, 2018. The Analytics Pipeline: Data Processing and Preparation. The 4D Workshop: Deep-time Data Driven Discovery and the Evolution of Earth, Washington, DC, USA. Poster Presentation.
44. **Ma, X.**, Fox, P., Hazen, R., Hummer, D., Golden, J., Downs, R., Hystad, G., Muscente, A.D., 2018. A Justification on the Need to Build a Machine-Readable Knowledge Base of Deep Time. The 4D Workshop: Deep-time Data Driven Discovery and the Evolution of Earth, Washington, DC, USA. Poster Presentation.
45. Golden, J.J., Pires, A.J., Rolf, J., Hystad, G., Morrison, S.M., **Ma, X.**, Hummer, D., Liu, C., Downs, R.T., Hazen, R.M., 2018. The Mineral Evolution Database and data model derived visualizations. The 4D Workshop: Deep-time Data Driven Discovery and the Evolution of Earth, Washington, DC, USA. Poster Presentation.
46. \*Prabhu, A., Fox, P.A., \*Zhong, H., \*Eleish, A., **Ma, X.**, Zednik, S., Morrison, S.M., Moore, E.K., Muscente, D., Meyer, M., Hazen, R.M., 2017. Visualizing Complex Environments in the Geo- and BioSciences. AGU Fall Meeting 2017, New Orleans, LA, IN31D-02.
47. \*Zhong, H., **Ma, X.**, \*Prabhu, A., \*Eleish, A., \*Pan, F., Parsons, M.A., Ghiorso, M.S., West, P., Zednik, S., Erickson, J.E., \*Chen, Y., \*Wang, H., Fox, P.A., 2017. Thermodynamic Data Rescue and Informatics for Deep Carbon Science. AGU Fall Meeting 2017, New Orleans, LA, Poster IN23D-0115.
48. **Ma, X.**, 2017. Doing geoinformatics with a web of data. GSA Annual Meeting, Seattle, WA, USA.
49. **Ma, X.**, Fox, P., \*Kolankowski, S., Hummer, D., Hazen, R.M., Golden, J.J., Meyer, M., 2017. Leveraging Data Science for Geoscience: Experience from the Deep Time Data Infrastructure. AbSciCon2017, Mesa, AZ, USA. [INVITED]
50. Morrison, S.M., Downs, R.T., Golden, J.J., Pires, A.J., Fox, P.A., **Ma, X.**, Zednik, S., \*Eleish, A., \*Prabhu, A., Hummer, D., Liu, C., Meyer, M., Ralph, J., Hystad, G., Hazen, R.M., 2016. Exploiting mineral data: applications to the diversity, distribution, and social networks of copper mineral. AGU Fall Meeting, San Francisco, CA, USA.
51. \*Kolankowski, S., Fox, P., **Ma, X.**, \*Prabhu, A., 2016. Deep Time Data Infrastructure: Integrating our current geologic and biologic databases. AGU Fall Meeting, San Francisco, CA, USA.
52. **Ma, X.**, 2016. Semantic eScience: Leveraging Informatics and Semantic Web for Science. Idaho EPSCoR Annual Meeting, Coeur d'Alene, ID.
53. Hummer, D.R., Hazen, R.M., **Ma, X.**, Golden, J.J., Downs, R.T., Liu, C., Morrison, S.M., Meyer, M., 2016. Quantifying and visualizing earth's mineral chemistry through geologic time. GSA Annual Meeting, Denver, Colorado, USA.
54. Morrison, S.M., Downs, R.T., Golden, J.J., Pires, A.J., Fox, P., **Ma, X.**, Zednik, S., \*Eleish, A., \*Kolankowski, S., Hummer, D., Liu, C., Meyer, M., Ralph, J., Hystad, G., Hazen, R.M., 2016. Social network of copper minerals: a mineral ecology study. GSA Annual Meeting, Denver, Colorado, USA.
55. \*Kolankowski, S., Fox, P., **Ma, X.**, Zednik, S., 2016. Deep Time Data Infrastructure: integrating our current geologic and biologic databases. GSA Annual Meeting, Denver, Colorado, USA.
56. **Ma, X.**, Hummer, D., Hazen, R.M., Golden, J.J., Fox, P., Meyer, M., 2016. Showing co-relationships between elements and minerals in a three-dimensional matrix. GSA Annual Meeting, Denver, Colorado, USA.

57. Meyer, M., Downs, R.T., Falkowski, P.G., Fox, P., Hazen, R.M., Knoll, A.H., Sverjensky, D.A., Golden, J.J., Hao, J., Hystad, G., Hummer, D., Jelen, B., \*Kolankowski, S., Liu, C., **Ma, X.**, Moore, E.K., Morrison, S.M., Muscente, A.D., Pires, A.J., Zednik, S., \*Zhong, H., 2016. The co-evolution of the geo- and biospheres: an integrated program for data-driven, abductive discovery in the earth sciences. GSA Annual Meeting, Denver, Colorado, USA.
58. Morrison, S.M., Downs, R.T., Golden, J.J., Pires, A.J., Fox, P., **Ma, X.**, Zednik, S., \*Eleish, A., \*Kolankowski, S., Liu, C., Hummer, D., Meyer, M., Ralph, J., Hystad, G., Hazen, R.M., 2016. Mineral Ecology: social network analysis and sociograms of mineral connections, distributions, and segmentation. GSA Annual Meeting, Denver, Colorado, USA.
59. Hummer, D., Hazen, R., **Ma, X.**, Golden, J., Downs, R., 2016. Constraints on the Mineral Evolution of Planetary Crusts Using Statistical Correlations and Anti-Correlations Among the Mineral-Forming Elements. Goldschmidt 2016, Yokohama, Japan. Abstract No. 1207.
60. **Ma, X.**, \*Zheng, J.G., \*Wang, H., Fox, P., 2015. Illuminate Knowledge Elements in Geoscience Literature. AGU Fall Meeting 2015, San Francisco, CA. Oral presentation. [INVITED]
61. \*Kolankowski, S.M., Fox, P., **Ma, X.**, 2015. Database Integration: An Initial Step Towards the Deep-Time Data Infrastructure. AGU Fall Meeting 2015, San Francisco, CA. Poster.
62. West, P., Zednik, S., Fu, L., **Ma, X.**, Fox, P., 2015. Determining Fitness-For-Use of Ontologies Through Change Management, Versioning and Publication Best Practices. AGU Fall Meeting 2015, San Francisco, CA. Poster.
63. **Ma, X.**, Erickson, J.S., West, P., Zednik, S., Fox, P., 2015. Semantic Specification of Data Type Information in the Deep Carbon Observatory Data Portal. AGU Fall Meeting 2015, San Francisco, CA. Poster.
64. \*Kolankowski, S.M., **Ma, X.**, Fox, P., 2015. Deep-Time Data Infrastructure: Integrating Our Current Geologic Databases. GSA 2015: Annual Meeting of the Geological Society of America 2015, Baltimore, MD. Poster.
65. **Ma, X.**, Erickson, J.S., West, P., Zednik, S., Fox, P., DCO-DS team, 2015. Adoption of RDA DTR and PID in the Deep Carbon Observatory Data Portal. RDA Sixth Plenary Meeting, Paris, France. Oral Presentation.
66. **Ma, X.**, \*Zheng, J.G., 2015. Linking Geoscience Entity Mentions to the Web of Data. ESIP Summer Meeting 2015, Pacific Grove, CA. Poster.
67. **Ma, X.**, 2015. Space and Time in Geology: Modeling and Encoding. Vespucci Institute 2015: Spatial ontologies for eScience. Bar Harbor, ME. Oral Presentation.
68. **Ma, X.**, Erickson, J.S., West, P., Zednik, S., Fox, P., \*Wang, H., \*Chen, Y. 2015. Formal Specification of Data Types in the Deep Carbon Observatory Data Portal. DCO International Science Meeting 2015, Munich, Germany. Poster.
69. \*Wang, H., \*Chen, Y., West, P., Erickson, J.S., **Ma, X.**, Fox, P. 2015. Beyond a Data Portal: A Collaborative Environment for the Deep Carbon Science Communities. DCO International Science Meeting 2015, Munich, Germany. Poster.
70. Fox, P., Erickson, J.S., West, P., **Ma, X.** 2015 Enabling the Science Network of DCO - Status and directions. DCO International Science Meeting 2015, Munich, Germany. Poster.
71. **Ma, X.**, Erickson, J., West, P., Zednik, S., Fox, P., 2015. Data types and persistent identifiers in the Deep Carbon Observatory Data Portal. RDA Fifth Plenary Meeting, San Diego, CA. Poster.
72. Zednik, S., **Ma, X.**, Erickson, J., West, P., Fox, P., 2015. Adoption of RDA DTR and PID in Deep Carbon Observatory Data Portal. RDA Fifth Plenary Meeting, San Diego, CA. Oral Presentation.
73. **Ma, X.**, 2014. Knowledge evolution in distributed geoscience datasets and the role of semantic technologies. AGU Fall Meeting 2014, San Francisco, CA. Oral Presentation. [INVITED]
74. \*Fu, L., **Ma, X.**, West, P., Beaulieu, S., Di Stefano, M., Fox, P., 2014. Towards a common provenance model for research publications. AGU Fall Meeting 2014, San Francisco, CA. Poster.
75. Zednik, S., Fox, P., \*Fu, L., West, P., **Ma, X.**, 2014. Linked Vocabulary API for the Earth Sciences Community. AGU Fall Meeting 2014, San Francisco, CA, USA, Abstract No. IN32A-07. Oral Presentation.
76. \*Wang, H., \*Chen, Y., West, P., Erickson, J.S., **Ma, X.**, Fox, P., 2014. DCO-VIVO: A collaborative data platform for the Deep Carbon Science Communities. AGU Fall Meeting 2014, San Francisco, CA. Poster.
77. **Ma, X.**, \*Chen, Y., \*Zheng J.G., \*Fu, L., \*Wang, H., Fox, P., 2014. Encoding meanings into maps and visualization: an example of semantically enhanced geologic map service. 2014 AAG Annual Meeting, Tampa, FL. Oral Presentation.
78. \*Fu, L., **Ma, X.**, \*Zheng, J., Goldstein, J., Duggan, B., West, P., Aulenbach, S., Tilmes, C., Fox, P., 2014. Ontology development for provenance tracing in National Climate Assessment of the US Global Change Research Program. EGU General Assembly 2014, Vienna, Austria. Poster.
79. \*Wang, H., \*Chen, Y., **Ma, X.**, West, P., Erickson, J.S., Hazen, R., Schiffries, C., Fox, P., 2014. User-aware multi-dimensional data exploration for Deep Carbon Observatory. EGU General Assembly 2014, Vienna, Austria. Poster.



80. **Ma, X.**, Fox, P., Tilmes, C., Beaulieu, S., West, P., \*Fu, L., \*Zheng, J. 2014. Deliberations of reusing the PROV Ontology for provenance capture in Earth and environmental sciences. ESIP 2014 Winter Meeting, Washington, DC. Poster presentation.
81. \*Zheng, J., **Ma, X.**, Zednik, S., Fox, P. 2014. Semantic similarity computation and concept mapping in Earth and environmental science. ESIP 2014 Winter Meeting, Washington, DC. Poster. [INVITED]
82. **Ma, X.**, \*Zheng, J.G., Goldstein, J., Duggan, B., \*Xu, J., \*Du, C., \*Akkiraju, A., Aulenbach, S., Tilmes, C., Fox, P., 2013. Ontology development for provenance tracing in National Climate Assessment of the US Global Change Research Program. AGU Fall Meeting 2013, San Francisco, CA. Oral Presentation.
83. **Ma, X.**, Branch, D.B., Wegner, K., 2013. A justification for semantic training in data curation frameworks development. AGU Fall Meeting 2013, San Francisco, CA. Poster.
84. \*Zheng, J.G., **Ma, X.**, Fox, P.A., 2013. Semantic similarity computation and concept mapping in earth and environmental science. AGU Fall Meeting 2013, San Francisco, CA. Poster.
85. \*Wang, H., \*Chen, Y., **Ma, X.**, Erickson, J.S., West, P., Fox, P., 2013. Semantically-enabled knowledge discovery in the Deep Carbon Observatory. AGU Fall Meeting 2013, San Francisco, CA. Poster.
86. \*Chen, Y., \*Wang, H., **Ma, X.**, Erickson, J.S., West, P., Fox, P., 2013. Indexable computation as a service in Deep Carbon Observatory. AGU Fall Meeting 2013, San Francisco, CA. Poster.
87. **Ma, X.**, \*Zheng, J.G., Goldstein, J., Aulenbach, S., Tilmes, C., Fox, P., 2013. Ontology engineering for provenance enablement in the third National Climate Assessment. ESIP 2013 Summer Meeting, Chapel Hill, NC. Poster.
88. **Ma, X.**, Fox, P., 2013. Form interoperability to interactivity: a test of exploratory visualization with semantic web technologies. ESIP 2013 Winter Meeting, Washington, DC. [INVITED]
89. **Ma, X.**, Fox, P., 2012. Exploratory visualization of earth science data in a Semantic Web context. AGU Fall Meeting 2012, San Francisco, CA. Oral Presentation.
90. **Ma, X.**, Fox, P., 2012. Beyond an image: using ontology and visualization to enrich Web Map Service for geosciences. ESIP 2012 Summer Meeting, Madison, WI. Poster.
91. **Ma, X.**, Carranza, E.J.M., Wu, C., van der Meer, F.D., 2011. Combining ontology and data visualization techniques to generate interactive map legends for online geological maps. EGU General Assembly 2011, Vienna, Austria, Poster.
92. **Ma, X.**, 2010. Modelling and approaching pragmatic interoperability of distributed geoscience data. EGU General Assembly 2010, Vienna, Austria, Oral Presentation.
93. **Ma, X.**, Wu, C., Liu, G., 2008. Application of 3D GIS to improve the effect of kriging method in ore reserves estimation and mining. In: Proceedings abstracts of the joint annual meeting GAC-MAC-SEG-SGA, Québec, Canada, ISBN 978-1-897095-5, p. 102. Poster.
94. **Ma, X.**, Wu, C., van der Meer, F.D., Carranza, E.J.M., 2008. Standardization of data elements: a primary step for a geological and mineral ontology. In: Abstracts of the 33rd IGC International Geological Congress, Oslo, Norway, 1p. Poster.

#### Other:

1. \*Kale, A., **Ma, X.**, 2022. Provenance Documentation to Enable Explainable and Trustworthy AI. TickBase Project Annual Meeting, Coeur d'Alene, ID. Poster.
2. \*Li, C., **Ma, X.**, 2022. Text Mining Towards a Controlled Vocabulary for Tick-borne Disease. TickBase Project Annual Meeting, Coeur d'Alene, ID. Poster.
3. **Ma, X.**, 2021. X-Informatics: Bring data science down to earth in real-world applications. University of Idaho Artificial Intelligence Workshop, Moscow, ID. Oral Presentation.
4. \*Ma, C., **Ma, X.**, \*Crump III, R., Kale A.S., Clemens, T., 2020. Knowledge graphs for global and regional geologic time scales and an associated R package. GIS Day at University of Idaho. Oral Presentation.
5. \*Ma, C., \*Que, X., **Ma, X.**, 2019. Spatiotemporal weighted regression in geographic process. GIS Day at University of Idaho. Oral Presentation.
6. **Ma, X.**, 2019. A Knowledge Base of Deep Time to Assimilate Multi-disciplinary Datasets in the Study of Co-Evolving Geosphere and Biosphere. GIS Day at University of Idaho. Oral Presentation.
7. **Ma, X.**, 2019. Towards a machine-readable knowledge base of deep time: challenges, current progress, and future work. GIS Day at University of Idaho. Poster.
8. \*Que, X., \*Ma, C., **Ma, X.**, 2019. Parallel Computing of Spatiotemporal Weighted Regression for Analyzing Large Scale Data in Geospatial Processes. GIS Day at University of Idaho. Poster.
9. \*Alowairdhi, A., **Ma, X.**, 2019. Toward an implementable framework of FAIR principles for Earth science data management and stewardship (Findable, Accessible, Interoperable, and Reusable). GIS Day at University of Idaho. Poster.



10. \*Tang, R., Fu, M., **Ma, X.**, 2019. Spatial analysis of driving forces of karst rocky desertification. GIS Day at University of Idaho. Poster.
11. **Ma, X.**, Erickson, J., Zednik, S., West, P., Fox, P., 2015. RDA Adoption Project Report: Deploying Research Data Alliance Data Type Registry and Persistent Identifier Information Types in the Deep Carbon Observatory Data Portal. 8pp. [http://tw.rpi.edu/media/latest/DTR-PIT-project\\_report\\_final.pdf](http://tw.rpi.edu/media/latest/DTR-PIT-project_report_final.pdf)
12. West, P., Fox, P., Zednik, S., **Ma, X.**, \*Eleish, A., \*Zhong, H., 2015. The Deep Carbon Observatory Ontology. <http://info.deepcarbon.net/schema>.
13. Tilmes, C., Fox, P., Wolfe, R., Zednik, S., **Ma, X.**, 2015. The Global Change Information System Ontology (V. 2.0). <https://data.globalchange.gov/gcis.owl>.
14. **Ma, X.**, Tilmes, C., Fox, P., 2013. The Global Change Information System Ontology (V. 1.2). <http://dx.doi.org/10.13140/2.1.3930.3045>.
15. **Ma, X.**, Beaulieu, S., Fox, P., West, P., Futrelle, J., Di Stefano, M., Fu, L., Du, C., 2014. The ECOOP Provenance Ontology. <https://github.com/tetherless-world/ecoop/blob/master/prov/ecoopProv.ttl>.
16. **Ma, X.**, 2014. Open science in an open world. ITC News Magazine, (3-4), 26–27.

#### Refereed/Adjudicated (currently scheduled or submitted):

1. Prabhu, A., Morrison, S., Fox, P., **Ma, X.**, Wong, M., Williams, J., McGuinness, K., Krivovivhev, S., Lehnert, K., Ralph, J., Lafuente, B., Downs, R., Walter, M., Hazen, R., 2022. What is Mineral Informatics? Under Review.
2. \*Alshamrani, R., **Ma, X.**, 2021. Using Knowledge Graph to Improve Informed Multiple Sclerosis Diagnosis and Treatment. Under Review.
3. \*Ma, C., \*Kale, A., **Ma, X.**, 2021. A Knowledge Graph and Service for Regional Geologic Time Standards. Under Review.
4. Kong, C., Wang, J., **Ma, X.**, Tian, Y., Zhang, Z., Xu, K., 2021. Optimization of random forest model for assessing and predicting geological hazards susceptibility in Lingyun County. Under Review.
5. Wang, C., Li, Y., Chen, J., **Ma, X.**, 2021. A named entity annotation schema for geological literature mining in the domain of porphyry copper deposits. Under review.
6. \*Alowairdhi, A., **Ma, X.**, 2020. A logical perspective on the implementation of the FAIR data principles, Under review.
7. **Ma, X.**, \*Madhikarmi, B.L., Hummer, D., Golden, J.J., Fox, P.A., Hazen, R.M., Morrison, S.M., Downs, R.T., Meyer, M.B., 2019. A Three-Dimensional Heat Map Matrix for Showing Co-relationships in Network Analysis. In Preparation.

#### Presentations and Other Creative Activities:

- See Non-credit Classes, Workshops, Seminars, Invited Lectures, etc. under the Teaching Accomplishments.

**Grants and Contracts Awarded:** (>\$9.86 million at University of Idaho (since 2016), in which >\$8.44 million as Lead/Sole PI)

#### ▪ Active

UIIdaho P3-R1 Initiative Grant: Postdoctoral Fellowship for Research on Cyberinfrastructure, Data Science, and Artificial Intelligence, <b>Sole PI: Ma, X.</b> , 11/2021–10/2023	\$133,324.00
NSF IIA-2019609 (Supplement): Integrating Big Data with Individual-Level Data to Improve Modeling and Prediction of Rocky Mountain Spotted Fever Dynamics in Native American Communities, <b>Lead PI: Ma, X.</b> Sub-Awardee: Lin, Y. (University of New Mexico), 09/2021–08/2024	\$399,983.00
NSF IIA-2019609 (Supplement): Establish a Smooth Data Life Cycle to Accelerate the Study of Tick-Borne Disease Dynamics, <b>Sole PI: Ma, X.</b> , 09/2021–08/2024	\$199,487.00
UIIdaho P3-R1 Initiative Grant: Postdoctoral Fellowship for Research on Data Science and Geoinformatics, <b>Sole PI: Ma, X.</b> , 09/2021–12/2023	\$149,684.00
NSF ICER-2126315: EarthCube Capabilities: OpenMindat - Open Access and Interoperable Mineralogy Data to Broaden Community Access and Advance Geoscience Research, <b>Sole PI: Ma, X.</b> , 09/2021–08/2024	\$792,475.00
NSF IIA-2054737: NSF EPSCoR Workshop: Artificial Intelligence (AI) with No-Boundary Thinking (NBT) to Foster Collaborations in Research, Education and Training, PI: Huang, X. (Arkansas State University), <b>Senior Personnel: Ma, X.</b> , et al., 04/2021–03/2022	\$49,999.00
UIIdaho P3-R1 Initiative Grant: PhD RA Scholarships for Research on Data Science and Geoinformatics, <b>Sole PI: Ma, X.</b> , 03/2021–12/2023	\$174,508.00

NASA 80NSSC21M0028: GeoWeaver: Building an Open-Source Platform for Enabling Ad Hoc Management, Open Sharing, and Robust Reuse of NASA Earth Data-driven Hybrid AI Workflows, PI: Sun, Z. (George Mason U.), <b>Co-PI: Ma, X.</b> , Tong, D. (George Mason University), Burgess, A. (ESIP), 09/2020–09/2023	\$870,785.00 (\$56,234.00 to Dr. Ma)
NSF IIA-2019609: RII Track-2 FEC: Leveraging Big Data to Improve Prediction of Tick-Borne Disease Patterns and Dynamics, <b>Lead PI: Ma, X.</b> , Co-PIs: Robison, B. (University of Idaho), Harris, F. (University of Nevada Reno), Shi, X. (Dartmouth College), 09/2020–08/2024	\$5,830,709.00
NSF REU: Supplement of Undergraduate Research Interns to NSF OAC CSSI #1835717, <b>Sole PI: Ma, X.</b> , 06/2020–11/2022	\$23,400.00
NSF OAC-1835717: Elements: Software: HDR: A knowledge base of deep time to facilitate automated workflows in studying the co-evolution of the geosphere and biosphere, <b>Sole PI: Ma, X.</b> , 12/2018–11/2022	\$596,975.00
<b>▪ Completed</b>	
NIH COBRE P20GM104420 sub-grant through IMCI Data Access Grant at University of Idaho: Enhancing the Shared Decision-Making Experience of Multiple Sclerosis Via Model-Driven Decision Support, <b>PI: Ma, X.</b> , 04/2022–05/2022	\$4,000.00
UI Idaho College of Engineering Grant: Enrollment Data Analysis, <b>PI: Ma, X.</b> , 05/2021–07/2021	\$6,240.00
ESIP Funding Friday: A paleoclimate database. PI: Ma, C. (postdoc), <b>Co-PI: Ma, X.</b> , 07/2019–01/2020	\$5,000.00
ESIP Lab Program: FAIRTool.org toward better Earth science data stewardship, PI: Alowairdhi, A. (PhD student), <b>Co-PI: Ma, X.</b> , 02/2019–08/2019	\$7,000.00
Elsevier - Artificial Intelligence Journal: Grant to Support Attendees of 2019 U.S. Semantic Technologies Symposium (US2TS), <b>PI: Ma, X.</b> , 01/2019–12/2019	\$3,300.00
Sloan: Defining the Future of the IGSN as a Global Persistent Identifier for Material Samples, PI: Lehnert, K. (Columbia U.), co-PIs: Klump, J. (CSIRO), Wyborn, L. (U. of Sydney), <b>Non-paid Collaborator: Ma, X.</b> , et al., 08/2018–07/2020	\$384,633.00
NSF IIA-1301792 sub-grant through Idaho EPSCoR: Support cyberinfrastructure research in MILES program (2018 fall), <b>PI: Ma, X.</b> , 08/2018–11/2018	\$12,366.00
NSF IIA-1301792 sub-grant through Idaho EPSCoR: Support cyberinfrastructure research in MILES program (2018 summer), <b>PI: Ma, X.</b> , 05/2018–08/2018	\$7,546.00
Sloan: U.S. Semantic Technologies Symposium, <b>PI: Ma, X.</b> , Co-PIs: Fox, P. (RPI), Narock, T. (Marymount U.), Hitzler, P., (Wright State U.) Janowicz, K. (UCSB), 03/2018–08/2019	\$20,000.00
Sloan: The 4-D Workshop : Deep-Time Data-Driven Discovery and the Evolution of Earth, PI: Hazen, R. (CIW), <b>Non-paid Collaborator: Ma, X.</b> , et al., 01/2018-12/2018	\$115,000.00
NSF ACI-1349002 sub-grant through Research Data Alliance: Collecting data standards among scientific disciplines and building a catalogue, <b>PI: Ma, X.</b> , 05/2017–08/2018	\$5,000.00
NSF IIS-1815526: Student Support for the 2018 U.S. Semantic Technologies Symposium (US2TS), <b>PI: Ma, X.</b> , Co-PI: Hitzler, P., 12/2017–11/2018	\$10,250.00
NSF IIA-1301792 sub-grant through Idaho EPSCoR: Network analysis of research collaborations and outputs in MILES program, MILES Undergraduate Research and Internship (MURI) Program, <b>PI: Ma, X.</b> , 08/2017–12/2017	\$4,500.00
NSF IIA-1301792 sub-grant through Idaho EPSCoR: Support synthesis and data analysis in MILES program, <b>PI: Ma, X.</b> , 08/2017–12/2017	\$14,738.00
NSF IIA-1301792 sub-grant through Idaho EPSCoR: A Fresh Insight into the MILES Research Network towards Its Synthesis Stage, MILES Undergraduate Research and Internship (MURI) Program, <b>PI: Ma, X.</b> , 05/2017–08/2017	\$4,500.00
UI Idaho Office of Research and Economic Development (ORED) Seed Grant: Leveraging data science to explore co-relationships between elements and minerals, <b>PI: Ma, X.</b> , 05/2017–08/20	\$11,795.57
CODATA: Task Group on coordinating data standards amongst scientific unions, <b>PI: Ma, X.</b> , 09/2016–09/2018	\$8,800.00
NSF IIA-1301792 sub-grant through Idaho EPSCoR: Support cyberinfrastructure construction in MILES program, Idaho EPSCoR, <b>PI: Ma, X.</b> , 01/2017–05/2017	\$26,830.00

*Below are grants before joining the University of Idaho*

NSF ACI-1349002 sub-grant through Research Data Alliance: Deploying Research Data Alliance Data Type Registry and Persistent Identifier Information Types in the Deep Carbon Observatory Data Portal, PI: Fox, P., <b>Co-PI: Ma, X.</b> , 02/2015–08/2015	\$50,000.00
ESIP Incubator Program: An Entity Linking Service for Documents and Datasets in Earth and Environmental Sciences, <b>PI: Ma, X.</b> , 05/2015–12/2015	\$7,000.00
Keck: Deep-Time Data Infrastructure: The Co-Evolution of the Geo- and Biosphere: An Integrated Program for Data-Driven Abductive Discovery in the Earth Sciences, PI: Hazen, R. (CIW), Co-PI: Downs, R. (UArizona), Falkowski, P.G. (Rutgers), Fox, P. (RPI), Knoll, A. (Harvard), Sverjensky, D.A. (Johns Hopkins U.), <b>Data Science Sub-Project Leader: Ma, X.</b> , 01/2015–12/2017	\$1,390,676.00
Sloan: Deep Carbon Observatory Data Science Day, PI: Fox, P., <b>Co-PI: Ma, X.</b> , Erickson, J., West, P., 01/2014–12/2014	\$22,300.00
CODATA: Early Career Data Professionals Group, PI: Doko, T., <b>Co-PIs: Ma, X.</b> , Laughton, P., Li, S., Murillo, A., Qiu, Y., Rybkina, A., Sharif, R., Tiwari, V., 09/2014–09/2016	€10,000.00
ESIP Funding Friday: Semantic Similarity Computation and Concept Mapping in the Earth and Environmental Sciences, PI: Zheng, J.G., <b>Co-PI: Ma, X.</b> , 07/2013–06/2013	\$3,000.00
Sloan: Deep Carbon Observatory – Data Science, PI: P. Fox, <b>Postdoc and Sub-Project Leader: Ma, X.</b> , 10/2012–10/2016	\$1,500,000.00
NSF UCAR S13-94358: USGCRP Global Change Information System – Information Modeling and Semantic Application Prototype, PI: Fox, P., <b>Project Leader: Ma, X.</b> , 08/2012–08/2014	\$214,042.00
ESIP Funding Friday: Exploratory Visualization of Earth Science Data in Semantic Web, <b>PI: Ma, X.</b> , 07/2012–06/2013	\$5,000.00
NSF EAR-1240144: EarthCube Assessment of the 2012 State of Geoinformatics: A Community and Interagency Exploration of the LifeCycle, Citation, and Integration of Geoscience Data, PI: Fox, P., <b>Project Leader and Workshop Coordinator: Ma, X.</b> , 06/2012–05/2015	\$99,000.00
NSF ACI-0955649: INTEROP ECO-OP: Employing Cyber Infrastructure Data Technologies to Facilitate Integrated Ecosystem Approach for Climate Impacts in NE & CA Large Marine Ecosystems (#3 & #7), PI: Fox, P., Co-PIs: S. Beaulieu (WHOI), A. Muffei (WHOI), <b>Sub-Project Leader: Ma, X.</b> , 09/2010–08/2014	\$1,089,337.00
IAMG: Student Chapter at ITC, University of Twente, <b>PI: Ma, X.</b> , 07/2010–06/2011	\$1,000.00
ITC Research Fund: Ontology Spectrum for Geological Data Interoperability (PhD research), <b>PI: Ma, X.</b> , 01/2008–11/2011	€60,000.00
IAMG: 3D Visualization of Geologic Bodies and Kriging Method, <b>PI: Ma, X.</b> , 08/2006–07/2007	\$2,000.00

#### Honors and Awards for Research Activities:

2022	Invited Keynote Speaker at the First Workshop on Geospatial Knowledge Graphs, Knowledge Graph Conference 2022, New York
2021	University of Idaho College of Engineering Outstanding Early Career Faculty Award
2020	Most Cited Articles (2017-2021), Computers & Geosciences, Elsevier
2020	Invited Talk at the GSA 2020 Annual Meeting, Online.
2019	Funding Friday Award, Federation of Earth Science Information Partners
2019	Best Poster Award at the 2019 University of Idaho Computer Science Industrial Advisory Board Meeting
2019	Invited Plenary Keynote Speaker at the International Forum on Deep-time Digital Earth (DDE) Big Science Program and the 644th Session of the Xiangshan Science Conference, Beijing, China
2019	Invited Speaker for the Seminar Series at Carnegie Institution for Science – Geophysical Laboratory, Washington, DC
2019	Invited Talk at GSA 2019 Annual Meeting, Phoenix, AZ
2018	Elsevier Artificial Intelligence Journal Funding to Promote AI Research
2018	Frontiers Spotlight Award Finalist (my paper is in one of the 10 shortlisted article collections)
2018	SciTS Meritorious Contribution Award, Science of Team Science Conference (SciTS)
2017	Finalist of Demo Paper Track, IEEE International Conference on Data Engineering (ICDE)
2017	Invited Talk at the AbSciCon2017, Mesa, AZ
2016–present	Travel Grants awarded: NSF-EarthCube (1), International Council for Science-CODATA (1), World Data System (1), Carnegie Institution for Science (4), UC Berkeley (1), Columbia Univ. (2), PennState Univ. (1), USGS (1), Geological Society of America (1), INL-Center for Advanced Energy Studies (1), Idaho EPSCoR program (2), Deep-time Digital Earth Program (2)

- 2015 Andrei B. Vistelius Research Award, International Association for Mathematical Geosciences  
 2015 Best Paper Nomination, Conference on Empirical Methods in Natural Language Processing, (EMNLP)  
 2015 Invited Presentation at AGU Fall Meeting 2015, San Francisco, CA  
 2014 Inaugural WDS Data Stewardship Award, International Council for Science-World Data System  
 2014 Invited Presentation at AGU Fall Meeting 2014, San Francisco, CA  
 2014 Invited Presentation at ESIP Winter Meeting 2014, Washington, DC  
 2013 Invited Presentation at ESIP Winter Meeting 2013, Washington, DC
- 2013, 2012 Funding Friday Award, Federation of Earth Science Information Partners  
 2011 Top 25 Hottest Articles (Jul.–Sept., 2011), Computers & Geosciences, Elsevier  
 2011–2016 Travel Grants awarded by: NSF-EarthCube (4), NSF-RDA (1), A.P. Sloan Foundation (8), W.M. Keck Foundation and Carnegie Institution for Science (3), Univ. of Oxford (1), Smithsonian Inst. (1), UCLA (1), McGill Univ. (1), Univ. of Muenster (1), Ohio State Univ. (1), Google (1), IAMG (1), ESIP (1), CODATA (1), Global Young Academy (1), CUG (2)
- 2007 Zhongkai Scholarship (2/3,000 graduate students), China University of Geosciences  
 2006 Graduate Student Research Grant, International Association for Mathematical Geosciences  
 2006 Excellent Academic Work Award, China University of Geosciences  
 2005 Third Grade Prize, Challenge Cup Academic Competition, China University of Geosciences  
 2003 Second Grade Prize, 13th Science & Technology Conference of Students, China University of Geosciences
- 2002 Zijin Scholarship (6/20,000 undergraduate students), China University of Geosciences  
 2002 First Grade Prize, 12th Science & Technology Conference of Students, China University of Geosciences
- 2001 Third Grade Prize, Outstanding Academic Achievement of University Students in Hubei Province, Hubei Provincial Department of Education  
 2000 Huayi Scholarship (3/20,000 undergraduate students), China University of Geosciences

**SERVICE:****Major Committee Assignments:***Department Services*

- 2019 Member, Faculty Third Year Review Committee, Department of Computer Science, University of Idaho  
 2018–2022 Member, Graduate Committee, Department of Computer Science, University of Idaho  
 2018 Member, Department Chair Search Committee, Department of Computer Science, University of Idaho  
 2017–2018 Member, New Faculty Search Committee, Department of Computer Science, University of Idaho

*College Services*

- 2021 Volunteer, 2021 University of Idaho Annual Engineering Design EXPO  
 2019 Volunteer, 2019 University of Idaho Annual Engineering Design EXPO  
 2018 Member, Tenure and Promotion Review Committee, Department of Civil and Environmental Engineering, College of Engineering, University of Idaho

*University Services*

- 2021 Search Committee, Presidential Initiative Faculty Cluster Hire (six new faculty members) in Modeling and Data Science, University of Idaho  
 2019– now Member, Interdisciplinary Committee on Data Science, University of Idaho  
 2019– now Member, Library Affairs Committee, University of Idaho  
 2017–2019 Member, University of Idaho Data Science Program Initiative  
 2018 Judging Committee, The First Student Data Science Competition, University of Idaho  
 2018– now Member, Curriculum Committee of Data Analytics Certificate Program, University of Idaho  
 2016– now Member, Advisory Committee, Northwest Knowledge Network, University of Idaho

*External Committee Services*

- 2020–2021 Member, NASA Planetary Data Ecosystem Independent Review Board  
 2019–2021 IGSN 2040 Technical Steering Committee, Sloan-funded IGSN 2040 project  
 2017–2019 Member, Technical Advisory Committee, NSF-funded Interdisciplinary Earth Data Alliance,

## Columbia University

*Before joining University of Idaho*

- |           |                                                                                                                |
|-----------|----------------------------------------------------------------------------------------------------------------|
| 2010      | Vice-chair, Faculty Council, ITC, University of Twente, Netherlands                                            |
| 2010      | Board Member, ITC PhD student Committee, ITC, University of Twente                                             |
| 2002–2004 | Secretary General, Science and Technology Society of Graduate Students, China University of Geosciences, Wuhan |

**Professional and Scholarly Organizations:***Membership*

- ACM Special Interest Group on Hypertext and the Web (ACM SIGWEB)
- Research Data Alliance (RDA)
- International Council for Science (ICSU) - Committee on Data for Science and Technology (CODATA)
- ICSU-World Data System: Early Career Researchers and Scientists Network
- Federation of Earth Science Information Partners (ESIP)
- American Geophysical Union (AGU) - Earth and Space Science Informatics Cluster
- International Union for Geological Sciences (IUGS) - Commission for the Management and Application of Geoscience Information (CGI)
- International Association for Mathematical Geosciences (IAMG)
- Geological Society of America (GSA) - Geoinformatics Division
- Geological Society of London (GSL) - Geoscience Information Group
- Spatial Statistics Society
- Sigma Xi

*Committee Assignments*

- |           |                                                                                                |
|-----------|------------------------------------------------------------------------------------------------|
| 2019–     | Chair, Awards Committee, International Association for Mathematical Geosciences                |
| 2018      | Chair, Awards and New Officer Nomination, Geoinformatics Division, Geologic Society of America |
| 2018–2020 | Vice-Chair/Chair/Past Chair, Geoinformatics Division, Geologic Society of America              |
| 2017–2019 | Member, Awards Committee, International Association for Mathematical Geosciences               |
| 2017–     | Representative of International Union of Geological Sciences to CODATA                         |
| 2016–2020 | Councilor, International Association for Mathematical Geosciences                              |
| 2016–2018 | Chair, Task Group on Coordinating Data Standards amongst Scientific Unions, CODATA             |
| 2013–2015 | Member, Geoscience Terminology Workgroup, IUGS-CGI                                             |

*Editorial Services*

## Journal and Book Editorial Service:

- Associate Editor:
  - *Computers & Geosciences (Elsevier)*, ▪ *Applied Computing & Geosciences (Elsevier)*
- Editorial Board Member:
  - *Earth Science Informatics (Springer-Nature)*, ▪ *Data Science Journal (CODATA)*, ▪ *Big Earth Data (Taylor & Francis)* ▪ *Bulletin of Geological Science and Technology (China University of Geosciences)*
- Journal Guest Editor:
  - *Earth Science Informatics (2015, special issue 'Semantic e-Science')*
  - *Geoscience Frontiers (2021-2022, special issue 'Geoscience Knowledge Graph')*
  - *Journal of Earth Science (2021-2022, special issue 'Geoscience Knowledge Graph')*
- Book Editor:
  - *Section Editor for Encyclopedia of Mathematical Geosciences (responsible for section on geoinformatics and data science, ~45 chapters) (anticipated publication in late 2021, Springer-Nature)*
  - *Leading Editor for Recent Advances in Geoinformatics and Data Science (21 chapters, anticipated publication in early 2022, Geological Society of America)*

## Reviewer for Journals and Books:

- *Future Generation Computer Systems*, ▪ *IEEE Transactions on Emerging Topics in Computing*, ▪ *Data Science Journal*, ▪ *IEEE Transactions on Knowledge and Data Engineering*, ▪ *Informatics*, ▪ *Expert Systems with Applications*, ▪ *Cluster Computing*, ▪ *Semantic Web*, ▪ *International Journal on Semantic Web and Information*

*Systems*, ▪ *Journal of the Association for Information Science and Technology*, ▪ *Plos One*, ▪ *Geoscience Data Journal*, ▪ *International Journal of Information Retrieval Research*, ▪ *Information*, ▪ *Earth and Space Science*, ▪ *International Journal of Applied Earth Observation and Geoinformation*, ▪ *Environmental Modelling & Software*, ▪ *International Journal of Geographical Information Science*, ▪ *International Journal of Digital Earth*, ▪ *Sensors*, ▪ *ISPRS International Journal of Geo-Information*, ▪ *Computers & Geosciences*, ▪ *Computers, Environment and Urban Systems*, ▪ *Stochastic Environmental Research and Risk Assessment*, ▪ *Earth Science Informatics*, ▪ *Environmental Management*, ▪ *Transactions in GIS*, ▪ *GeoResJ*, ▪ *American Mineralogist*, ▪ *Geosciences*, ▪ *Geological Journal of China Universities*, ▪ *Ore Geology Reviews*, ▪ *Natural Resource Research*, ▪ *International Journal of Oil, Gas and Coal Technology*, ▪ *Book Proposal in Geoinformatics (Elsevier, 2020)*, ▪ *Spatial Cloud Computing: A Practical Approach (4 book chapters, 2013)*, ▪ *The Semantic Web in Earth and Space Science: Current Paths and Future Directions (1 book chapter, 2015)*, ▪ *Oceanographic and Marine Cross-Domain Data Management for Sustainable Development (2 book chapters)*

#### Reviewer for Conferences:

▪ *SciDataCon 2016 (10 abstracts)*, ▪ *AGU 2015 (Abstracts of 9 sessions)*, *AGU 2014 (38 abstracts)*, ▪ *AAG 2014 (5 abstracts)*, ▪ *AAAI 2014 (1 abstract)*, ▪ *AGU 2013 (25 abstracts)*, ▪ *Big Data in the Geosciences Workshop 2015 (1 abstract)*

#### Conference/Workshop Organization

2022 Session co-chair, American Geophysical Union Fall Meeting 2022  
 2022 Organizing Committee, The 1st ACM SIGSPATIAL International Workshop on Geospatial Knowledge Graphs (GKG 2022), Seattle, WA, USA  
 2022 Session co-chair, International Mineralogical Association 2022 Annual Conference, Lyon, France  
 2022 Session co-chair, Geological Society of America 2022 Annual Meeting  
 2022 Scientific Committee and Session Chair, IAMG 2022 Annual Conference, Nancy, France  
 2021 Session leading convener, American Geophysical Union Fall Meeting 2021  
 2021 Session co-chair, Geological Society of America 2021 Annual Meeting  
 2020 Session leader, Workshop on Earth Science meets Data Science - Services & Systems, Policies & Procedures, Tools & Techniques for Geochemistry, Goldschmidt 2020 (virtual meeting).  
 2020 Joint Technical Program Committee, Geological Society of America  
 2019 Programme Committee Member, Geoinformatics in Sustainable Ecosystem and Society 2019; Geospatial Artificial Intelligence for Urban Computing 2019, Guangzhou, China  
 2019 Chair, Organizing Committee, 2019 Deep Time Data Science Mini-Workshop, Moscow, ID  
 2019 Programme Committee Member, 2019 International Congress on Big Data (BigData Congress 2019), San Diego, CA  
 2019 Programme Committee Member and Sponsorship Chair, US2TS 2019: Second U.S. Semantic Technologies Symposium, Durham, NC  
 2018 Co-convener of one session and OSPA Judge. American Geophysical Union Fall Meeting 2018, Washington, DC  
 2018 Programme Committee of the Linked Data and Semantic Integration Track, CCKS2018: China Conference on Knowledge Graph and Semantic Computing, Tianjin, China  
 2018 Co-chair of breakout session, The 4D Workshop: Deep-time Data Driven Discovery and the Evolution of Earth, Washington, DC  
 2018 Joint Technical Program Committee, Proposer of two technical sessions. Geoinformatics Division, GSA 2018, Indianapolis, IN  
 2018 Sponsorship Chair, US2TS2018: First U.S. Semantic Technologies Symposium, Dayton, OH  
 2017 Programme Committee, K-CAP 2017: The Ninth International Conference on Knowledge Capture, Austin, TX  
 2017 Programme Committee, CCKS 2017: Chinese Conference on Knowledge Graph and Semantic Computing, Chengdu, China  
 2017 Hackathon Session Chair, The 9th ACM Web Science Conference, Troy, NY  
 2016 Co-chair of a Union Session, AGU Fall Meeting, San Francisco, CA  
 2016 Co-organizer, GeoVoCampDC2016, Washington, DC  
 2016 Programme Committee, CCKS 2016: Chinese Conference on Knowledge Graph and Semantic Computing, Beijing, China  
 2016 Programme Committee, Co-chair of a session, SciDataCon2016, Denver, CO  
 2016 Organizer of the Keck Data Science Day Symposium, Troy, NY

- 2016 Co-organizer of 1 session, International Geological Congress, Cape Town, South Africa
- 2015 Organizer of 4 sessions, Chair of 8 sessions, AGU Fall Meeting, San Francisco, CA
- 2015 Program committee, Diversity++ Workshop, 2015 International Semantic Web Conference, Bethlehem, PA
- 2015 Program chair, Big Data in the Geosciences Workshop, 2015 IEEE International Conference on Big Data, Santa Clara, CA
- 2015 Organizer of 1 session, Association of American Geographers Annual Meeting 2015, Chicago, IL
- 2015 Organizer of 2 sessions, Federation of Earth Science Information Partners Winter Meeting, Washington, DC
- 2014 Organizer of 2 sessions, SciDataCon 2014, New Delhi, India
- 2014 Organizer and convener of 2 sessions; OSPA Award liaison of two sessions; Organizer of 4 other initial sessions, American Geophysical Union Fall Meeting 2013, San Francisco, CA, USA
- 2014 Chair of organizing committee; Moderator of 2 sessions, GeoData 2014 Workshop, Boulder, CO
- 2014 Chair of organizing committee; Co-Chair of workshop, DCO Data Science Day, Troy, NY, USA
- 2014 Chair of 1 session, Association of American Geographers Annual Meeting 2014, Tampa, FL
- 2013 Organizer and co-convener of 1 session, American Geophysical Union Fall Meeting 2013, San Francisco, CA

#### *Grant and Award Reviews*

##### Reviewer/Panelist for Research Grant Programs:

- 2022 One NASA grant panel
- 2022 Three NSF grant panels
- 2021 DHS CBTS Center of Excellence
- 2021 One NSF grant panel
- 2020 Ad Hoc Review for two NSF programs
- 2018 The Research Council of Norway
- 2016 One NASA grant panel

##### Reviewer/Judge for Awards and Scholarships:

- 2018– Several awards in geoinformatics and mathematical geosciences (Founders Scholarship, Andrei B. Vistelius Research Award, John C. Griffiths Teaching Award, Felix Chayes Prize, and William C. Krumbein Medal), International Association for Mathematical Geosciences
- 2018– Geoinformatics Division Outstanding Contribution Award, Geological Society of America
- 2014 Computers & Geosciences Research Scholarship, Elsevier

#### **Outreach Service:**

- 2022 Instructor of Short Course on Coding for Cub Scouts at Moscow, ID
- 2021 University of Idaho Engineering EXPO
- 2021 Data Help Desk volunteers at EGU 2021 General Assembly
- 2020 Data Help Desk volunteers at GSA 2020 Annual Conference and AGU 2020 Fall Meeting
- 2020 Report and interview about the NSF EPSCoR Track-2 project on the Moscow-Pullman Daily News and several other regional news websites and TV programs.
- 2017 Selection Committee, American Geophysical Union Open API Challenge
- 2016 Mentor for Highschool CS Summer Camp at Rensselaer Polytechnic Institute
- 2015 Judge for Sigma Xi Highschool Student Research Showcase
- 2015 Coordinator of Outstanding Student Presentation Award, Earth and Space Science Informatics Cluster of the American Geophysical Union
- 2015 Mentor for Highschool CS Summer Camp at Rensselaer Polytechnic Institute
- 2015 Invited speaker for the Global Young Academy Annual Meeting, Montebello, QC, Canada
- 2014–2016 Invited blogger for topics on data science and semantic web, ITC Alumni Blog
- 2013–2016 Key contributor to the open data portal of the Deep Carbon Observatory (DCO)
  - DCO is a 10-year (2009-2019), \$500-million global project
  - The DCO open data portal serves more than 1,000 scientists across the world and numerous visitors from the general public
  - DCO open data portal website: <https://info.deepcarbon.net/>
- 2012–2015 Key contributor to the Global Change Information System (GCIS) of the U.S. Global Change Research Program (USGCRP)

- USGCRP has an annual budget of about \$2.6 billion (<https://www.globalchange.gov/about/budget>)
  - GCIS was formally launched on May 06, 2014 at the White House (report: <https://news.ucar.edu/11647/inside-national-assessment>)
  - GCIS website: <https://data.globalchange.gov>
  - Citation of Dr. Ma's contribution: <https://data.globalchange.gov/about>
  - GCIS ontology: <https://data.globalchange.gov/gcis.owl>
- 2012–2014 Judge for Fall Meeting Outstanding Student Presentation Award, American Geophysical Union  
 2010–2011 Chair, IAMG Student Chapter at ITC, University of Twente  
 2010– Correspondent for the International Association for Mathematical Geosciences Newsletter

#### Honors and Awards for Service Activities:

- 2019 Recognized Reviewer, Future Generation Computer Systems, Elsevier  
 2018 Recognized Reviewer, Environmental Modelling & Software, Elsevier  
 2016 Outstanding Reviewer, Computers & Geosciences, Elsevier  
 2016 Outstanding Reviewer, Computers, Environment & Urban Systems, Elsevier

#### PROFESSIONAL DEVELOPMENT:

##### Teaching:

- 2018– Workshop and Online Group on Undergraduate Data Science Pedagogy and Practice, University of California, Berkeley  
 2017 Participant, Webinar Series (9 sessions, 09/12/17-11/14/17) on Data Science Undergraduate Education, The National Academies of Sciences, Engineering, and Medicine

##### Scholarship:

- 2021 NSF EPSCoR PI meeting, Online  
 2020 NSF CSSI program PI meeting, Seattle, WA  
 2018–2019 NSF CAREER Proposal Development Workshop series, Office of Research and Economic Development, University of Idaho  
 2018 CAES/Nuclear Collaborative Research Planning Meeting, Center for Advanced Energy Studies (CAES), Idaho Falls, ID  
 2017 Spring 2017 NSF Grants Conference, Louisville, KY  
 2016 Proposal Development Workshop for New Faculty Members, Office of Research and Economic Development, University of Idaho  
 2015 Vespucci Institute 2015 - Spatial Ontologies for e-Science, three-day boot camp, Bar Harbor, ME  
 2015 NSF EarthCube-EC3: Earth-Centered Communication for Cyberinfrastructure, one-week field trip and training at Yosemite and Owens Valley, CA  
 2013–2014 Preparing Future Faculty Seminar Series, Rensselaer Polytechnic Institute

##### Outreach:

- 2019 GIS Day, University of Idaho, Moscow, ID  
 2019 Research Computing and Data Science Symposium, Moscow, ID  
 2017 Idaho EPSCoR Annual Research Meeting, Pocatello, ID  
 2017 GIS Day, University of Idaho, Moscow, ID  
 2016 Idaho EPSCoR Annual Research Meeting, Coeur d'Alene, ID  
 2016 GIS Day, University of Idaho, Moscow, ID  
 2016 University of Idaho New Faculty Orientation, Moscow, ID

##### Administration/Management:

- 2016–present Work-related training about safety, security, ethics, management, responsible conduct of research, and organizational mission, University of Idaho