# Curriculum Vitae

## Michael Jendryke, Dr.

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# Geospatial Data Science & GeoAI – DGGS & Spatial Tokenization

Academic researcher with substantial industry experience, focusing on discrete global grid systems (DGGS), GeoAI, spatial tokenization, and machine learning for heterogeneous spatial data. Key achievements include a *Scientific Data* (Nature Portfolio) paper on DGGS, leadership of a 1.4M EUR research transfer grant, co-authorship of the Open Geospatial Consortium (OGC) DGGS API standard, and work as a contracted DGGS expert for the European Commission. Through GeoInsight, I bridge academia, innovation, and industry in projects with the European Space Agency and Airbus.

## Academic Appointments & Research Leadership

### External Expert (Grid Systems)

*European Commission, Joint Research Center (JRC)* *9/2025 – present*

- Co-authoring a comparative study of global grid systems for geospatial and EO applications.
- Developing definitions & classifications of grids, including discrete global grid systems (DGGS).
- Designing benchmarking and ranking frameworks for grids across targeted use cases.
- Collaborating with the European Space Agency (ESA) and the Committee on Earth Observation Satellites (CEOS).
- Contributing to a report/publication planned for July 2026.

### PI and Team Lead

*Ruhr University Bochum, Germany* *6/2021 – 12/2023*

- Led a 2.5-year, €1.4M research project with a team of up to 6 people, focused on bringing Discrete Global Grid Systems (DGGS) to market as a university spin-off.
- Designed and developed software architecture, writing extensive code while steering the technical vision and innovation.
- Developed and released open-source DGGS/GeoAI components.
- Negotiated with administration, HR, and funding agencies to ensure effective project execution.
- Managed the transition from academic research to business development, laying the foundation for the spin-off.

### Postdoctoral Researcher

*Wuhan University, China* *11/2017 – 11/2019*

- Developed a discrete global grid spatial database with billions of hexagonal cells for large-scale geospatial analytics.
- Conducted multi-source geospatial data research using deep learning, resulting in SCI-listed publications.
- Implemented and facilitated the download and processing of night-time light satellite imagery.
- Led three research projects on big geospatial data and machine learning, including mapping hate crimes & hate groups in the USA.
- Supervised four Master's and PhD students in data science and remote sensing, guiding research and manuscript preparation.
- Facilitated international collaboration by helping establish contact between Wuhan University and UNITAR for MoU negotiations.
- Taught data science programming tutorials on Python and PostgreSQL to 20+ students, enhancing technical expertise.

### Consultant (COVAX Microplanning)

*World Health Organization, Switzerland* *11/2020 – 8/2021*

- Led GIS- and EO-based microplanning for COVID-19 vaccine deployment, integrating population, health facility, and accessibility data to support equitable allocation.

- Coordinated technical input from 50+ partners, chaired remote technical meetings, and documented workflows and guidance for country implementation.
- Developed geospatial data workflows and tools to support national vaccination strategies in low- and middle-income countries.

### Data Management Officer (Polio Programme)

*World Health Organization, Switzerland* *11/2013 – 3/2014*

- Improved geospatial data integrity for WHO's Polio Eradication Program by fixing 50+ administrative country boundary layers at levels 2 and 3, ensuring topological accuracy and historical consistency.
- Increased case-to-place matching accuracy from 80% to 95%, enhancing outbreak monitoring and response effectiveness.
- Developed a geodatabase backend to geolocate and analyze all recorded polio cases, enabling multi-temporal spatial analysis for epidemiological insights.
- Contributions integrated into WHO's global administrative boundary dataset, published via the WHO GIS portal.

### Visiting Researcher

*Wuhan University, China* *2/2011 – 7/2011*

- Developed and deployed an algorithm enabling the processing of high-resolution TerraSAR-X Spotlight Mode imagery for applications requiring sub-meter resolution.
- Implemented the prototype in MATLAB and Python, then extended it as a C++ add-on for the Delft Object-oriented Radar Interferometric Software (DORIS), now used internally and externally.
- Published and presented the paper "Using Open-Source Components to Process Interferometric TerraSAR-X Spotlight Data" at the TerraSAR-X & TanDEM-X Science Meeting (DLR).
- Built connections within China's geospatial research community, supporting student exchange and collaboration.
- Organized and led a weekly English support group for 25+ students and teachers, improving their language skills.

## Grants & Honors

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|---|---|---|
| 2025 | European Space Agency BIC | 50,000 EUR |
| 2024 | (Business) EXIST Forschungstransfer II (Research Transfer Grant) | 180,000 EUR |
| 2022 | (University) EXIST Forschungstransfer I (Research Transfer Grant) | 1,100,000 EUR |
| 2018/19 | LIEMARS Star Lake Research Grant | 15,000 EUR |
| 2016 | Publication Award – LIESMARS Star Lake Award | 1,500 EUR |
| 2012-2016 | Doctoral scholarship – Chinese Scholarship Council | per y ~14,000 EUR |
| 2012-2014 | Doctoral scholarship – German Academic Exchange Service | per y ~7,000 EUR |
| 2010 | Top 10% of all students in NRW cut BAföG student loan by | 25% |
| 2009 | UN short term grant – German Academic Exchange Service | ~1,000 EUR |

## Teaching & Supervision

Lecturer, "3-Day Python Programming for Geospatial Data" (Wuhan University, 2018, multiple times), ~15 students.

Supervision of 4 MSc students at Wuhan University and 2 at Ruhr University Bochum, topics in DGGS, EO data, and programming.

# Selected Publications & Standards

Gino Caspari, João dos Santos Manuel, Ana Gago-Silva, Michael Jendryke, (2024). *Employing discrete global grid systems for reproducible data obfuscation*. Nature Scientific Data 11, 509 (2024). https://doi.org/10.1038/s41597-024-03354-5

Michael Jendryke and Stephen C. McClure. (2021). *Spatial Prediction of Sparse Events Using a Discrete Global Grid System; a Case Study of Hate Crimes in the USA.* International Journal of Digital Earth 0 (0): 1–17. https://doi.org/10.1080/17538947.2021.1886356

Michael Jendryke and Stephen C. McClure. (2019). *Mapping crime – Hate crimes and hate groups in the USA: A spatial analysis with gridded data*. Applied Geography 111 (3). http://dx.doi.org/10.1016/j.apgeog.2019.102072

Michael Jendryke, Timo Balz, Stephen C. McClure, and Mingsheng Liao. (2017). *Putting People in the Picture: Combining Big Location-Based Social Media Data and Remote Sensing Imagery for Enhanced Contextual Urban Information in Shanghai*. Computers, Environment and Urban Systems 62: 99–112. https://doi.org/10.1016/j.compenvurbsys.2016.10.004

**Co-author, submitter and now approved standard:**
Open Geospatial Consortium. (2025). *OGC API - Discrete Global Grid Systems - Part 1: Core (Version 1.0, OGC Standard 21-038r1)*. https://docs.ogc.org/is/21-038r1/21-038r1.html

# Industry & Entrepreneurship

## Co-Founder & CTO

*GeoInsight, Germany/Switzerland* *5/2022 – present*

- PI on ESA BIC and related projects focusing on scalable DGGS-enabled GeoAI workflows and AI-ready data products.
- Led the technical vision and architecture of a Rust-based DGGS spatial tokenization platform, including core libraries, APIs, and data models.
- Designed and optimized databases and data pipelines for high-performance DGGS/GeoAI processing on large Earth observation and geospatial datasets.
- Co-author of the OGC API – Discrete Global Grid Systems (DGGS) API standard, aligning implementation with emerging OGC/ISO specifications.
- Secured public and private funding (e.g. ESA, national grants, commercial contracts) and managed project budgets and deliverables.
- Built and led a small interdisciplinary team, coordinating collaborations with partners such as ESA, Airbus, and PwC.
- Senior author of a *Scientific Data* (Nature Portfolio) paper on location security using DGGS.

## Remote Sensing Analyst @UNOSAT

*UN Institute for Training and Research, Switzerland* *8/2009 – 2/2011*

- Analyzed and visualized 20+ natural disasters, including the 2010 Haiti earthquake and 2011 Pakistan floods, using optical and microwave satellite data. Delivered actionable insights to ground teams under 48-hour time constraints.
- Conducted flood mapping with advanced remote sensing, ensuring less than 3% reported errors in field verification.
- Assessed civil conflicts in Sri Lanka, Kyrgyzstan, and South Sudan via high-resolution satellite imagery, contributing intelligence for UN security reports.
- Developed training materials, tutorials, and datasets for remote sensing methodology courses.

### Water Resources Analyst

*Association for Water and Rural Development (AWARD), South Africa* *6/2007 – 10/2007*

- Conducted the first-ever land cover change analysis for six South African villages using historical aerial imagery and GIS, revealing urban expansion and agricultural decline during Apartheid.
- Co-Authored a 150-page water resource management guide, simplifying government policies for stakeholders.
- Delivered spatial analysis that influenced financial development negotiations.

## Education

### Doctor of Engineering (Dr.-Ing.) – Photogrammetry & Remote Sensing

*Wuhan University, China & Technical University Munich, Germany (first 2 yrs.)* *6/2012 – 1/2017*

**Thesis title:** *Inferring Shanghai's Urban Vibrancy Using Microwave Remote Sensing and Big Social Sensing Data*, supervised by Professor Liao Mingsheng and Professor Timo Balz

Created an urban vibrancy index by analyzing ~1TB of remote sensing data and 110+ million web-scraped, location-based social media messages.

**Key coursework**: Advanced Remote Sensing, Spatial Statistics & Analysis, Spatiotemporal Big Data Analytics, Data Science.

**Skills & achievements**: Scientific writing & communication, proposal writing, PhD project management (2+ years), problem-solving, analytical thinking.

### Master of Science – Geography & Geomatics

*Ruhr University Bochum, Germany* *9/2008 – 10/2010*

**Thesis title:** *System Development for Flood Analysis Using Radar Remote Sensing Data*

Developed and optimized flood detection algorithms for UNOSAT, improving processing time and accuracy.

**GPA**: 3.65/4.00 (Top 15% of students in my province, resulting in a 25% student loan reduction).

**Skills & coursework**: Remote Sensing, GIS, Spatial Analysis, Cartography.

### Bachelor of Science – Geography

*Ruhr University Bochum, Germany* *9/2005 – 8/2008*

**Thesis title:** *Spatial Investigation of Six South African Settlements – A Qualitative Aerial Photo Analysis*

Baseline research on settlement development, used by AWARD and other institutions.

**Skills & coursework:** Physical & Human Geography, Geosciences, Geomatics.

**Internship:** Conducted GIS-based land cover analysis in South Africa.

## Publications

### Peer-reviewed Journal Articles

1. Gino Caspari, João dos Santos Manuel, Ana Gago-Silva, Michael Jendryke. (2024). *Employing discrete global grid systems for reproducible data obfuscation*. Nature Scientific Data 11, 509 (2024). https://doi.org/10.1038/s41597-024-03354-5
2. Michael Jendryke and Stephen C. McClure. (2021). *Spatial Prediction of Sparse Events Using a Discrete Global Grid System; a Case Study of Hate Crimes in the USA*. International Journal of Digital Earth 0 (0): 1–17. https://doi.org/10.1080/17538947.2021.1886356

3. Li, Xi, Xiya Li, Deren Li, Xiaojun He, and Michael Jendryke. (2019). *A Preliminary Investigation of Luojia-1 Night-Time Light Imagery.* Remote Sensing Letters 10 (6): 526–35. https://doi.org/10.1080/2150704X.2019.1577573
4. Caspari, Gino, Simon Donato, and Michael Jendryke. (2019). *Remote Sensing and Citizen Science for Assessing Land Use Change in the Musandam (Oman)*. Journal of Arid Environments. https://doi.org/10.1016/j.jaridenv.2019.104003
5. Michael Jendryke and Stephen C. McClure. (2019). *Mapping crime – Hate crimes and hate groups in the USA: A spatial analysis with gridded data*. Applied Geography 111 (3). http://dx.doi.org/10.1016/j.apgeog.2019.102072
6. Liu, Shanshan, Xi Li, Noam Levin, and Michael Jendryke. (2019). *Tracing Cultural Festival Patterns Using Time-Series of VIIRS Monthly Products*. Remote Sensing Letters 10 (12): 1172–81. https://doi.org/10.1080/2150704X.2019.1666313
7. Balz, Timo, Prosper Washaya, and Michael Jendryke. (2019) *Urban Change Monitoring Using Globally Available Sentinel-1 Imagery*. In BGDDS 2018 - 2018 International Workshop on Big Geospatial Data and Data Science. https://doi.org/10.1109/BGDDS.2018.8626814
8. Zhu, Ruoxin, Diao Lin, Michael Jendryke, Chenyu Zuo, Linfang Ding, and Liqiu Meng. (2018). *Geo-Tagged Social Media Data-Based Analytical Approach for Perceiving Impacts of Social Events.* ISPRS International Journal of Geo-Information 8 (1): 15. https://doi.org/10.3390/ijgi8010015
9. Li, Xi, Shanshan Liu, Michael Jendryke, Deren Li, and Chuanqing Wu. (2018). *Night-Time Light Dynamics during the Iraqi Civil War*. Remote Sensing 10 (6). https://doi.org/10.3390/rs10060858
10. Caspari, Gino, and Michael Jendryke. (2017). *Archsphere – A Cluster Algorithm for Archaeological Applications.* Journal of Archaeological Science: Reports 14 (May): 181–88. https://doi.org/10.1016/j.jasrep.2017.05.052
11. Michael Jendryke, Timo Balz, and Mingsheng Liao. (2017). *Big Location-Based Social Media Messages from China's Sina Weibo Network: Collection, Storage, Visualization, and Potential Ways of Analysis.* Transactions in GIS 21 (4): 825–34. https://doi.org/10.1111/tgis.12266
12. Michael Jendryke, Stephen C. McClure, Timo Balz, and Mingsheng Liao. (2017). *Monitoring the Built-up Environment of Shanghai on the Street-Block Level Using SAR and Volunteered Geographic Information*. International Journal of Digital Earth 10 (7): 675–86. https://doi.org/10.1080/17538947.2016.1216616
13. Michael Jendryke, Timo Balz, Stephen C. McClure, and Mingsheng Liao. (2017). *Putting People in the Picture: Combining Big Location-Based Social Media Data and Remote Sensing Imagery for Enhanced Contextual Urban Information in Shanghai*. Computers, Environment and Urban Systems 62: 99–112. https://doi.org/10.1016/j.compenvurbsys.2016.10.004
14. Michael Jendryke, Stephen C Mcclure, Timo Balz, and Mingsheng Liao. (2016). *Monitoring the Built-up Environment of Shanghai on the Street-Block Level Using SAR and Volunteered Geographic Information.* International Journal of Digital Earth 0 (0): 1–12. https://doi.org/10.1080/17538947.2016.1216616
15. Wei, Lianhuan, Mingsheng Liao, Timo Balz, Kang Liu, and Michael Jendryke. (2013). *High-Resolution Tomosar & PS-LnSAR Analysis in Urban Areas*. In European Space Agency, (Special Publication) ESA SP. Vol. 704 SP.
16. Michael Jendryke, Timo Balz, Houjun Jiang, Mingsheng Liao, and Uwe Stilla. (2013). *Using Open-Source Components to Process Interferometric TerraSAR-X Spotlight Data*. International Journal of Antennas and Propagation 2013. https://doi.org/10.1155/2013/275635
17. Balz, Timo, Lianhuan Wei, Michael Jendryke, Daniele Perissin, and Mingsheng Liao. (2012). Tomosar and PS-InSAR Analysis of High-Rise Buildings in Berlin. In Proc. IGARSS 2012, 447–50. IEEE. https://doi.org/10.1109/IGARSS.2012.6351542
18. Michael Jendryke, Timo Balz, Mingsheng Liao, and Uwe Stilla. (2003). *Measuring Shanghai's Urban Growth since 2003 Using ENVISAT ASAR*. In International Symposium on Remote Sensing of Environment ISRSE35, 1–7.

## Standards

1. Open Geospatial Consortium. (2025). *OGC API - Discrete Global Grid Systems - Part 1: Core (Version 1.0, OGC Standard 21-038r1)*. https://docs.ogc.org/is/21-038r1/21-038r1.html

## Proceedings

1. Michael Jendryke, João Manuel, Ludovic Augé, Emmanuel Mondon, and Gino Caspari. (2025). *An Interoperable Data Economy to Enable GeoAI via Spatial Tokenizers (DGGS)* In: Kempenners, Lumnitz, and Albani, Proceedings of the 2025 conference on Big Data from Space (BiDS`25), Publications Office of the European Union, Luxembourg, 2025, JRC143704., pp. 109-112. https://data.europa.eu/doi/10.2760/2119408
2. Michael Jendryke, João Manuel, and Gino Caspari (2025) *Eine interoperable Fernerkundungsdaten- wirtschaft zur Ermöglichung von GeoAI,* Geomatik Schweiz
3. Michael Jendryke, Timo Balz, and Mingsheng Liao. (2016). *Observing urban built-up change in Shanghai with SAR imagery*, Proceedings IGARSS 2016, Beijing, pp. 1788-1791, 2016. https://doi.org/10.1109/IGARSS.2016.7729459
4. Michael Jendryke, Mingsheng Liao, and Timo Balz (2013) *Using ENVISAT ASAR for urbanization surveillance in Shanghai*, Proc. 2013 Dragon Symposium, Palermo, Italy
5. Timo Balz, Lianhuan Wei, Michael Jendryke, Daniele Perissin, and Mingsheng Liao (2012) *TomoSAR and PS-InSAR analysis of high-rise buildings in Berlin*, IGARSS 2012 Proceedings, https://doi.org/10.1109/IGARSS.2012.6351542
6. Lianhuan Wei, Mingsheng Liao, Timo Balz, K. Liu, and Michael Jendryke (2012) *High-resolution TomoSAR & PS-InSAR analysis in urban areas*, Proceedings Dragon 2&3 Symposium, Beijing, China

## Presentations (only oral and as presenter)

1. Michael Jendryke, João Manuel, Ludovic Augé, Emmanuel Mondon, and Gino Caspari. (2025). An Interoperable Data Economy to Enable GeoAI via Spatial Tokenizers, ESA Big Data from Space (BiDS`25)
2. Michael Jendryke, João Manuel, and Gino Caspari. (2025). *Intro to DGGS and AI: How data structures can support machine learning + open questions*, Open GeoSpatial Consortium 131st Member Meeting - Rome '25
3. Michael Jendryke. (2019). *Breaking the Wall of Where – Predicting hate crimes*, Falling Walls Innovation Lab, Shanghai, China
4. Michael Jendryke, and Xi Li. (2017). *Observing China's urban development using big data*, ISPRS Workshop on Collaborative and Dynamic Land Cover Information Services Supporting UN Sustainable Development Goals, Jinan, China
5. Michael Jendryke, Guan Lin, Xi Li, Yidong Lou, and Deren Li. (2016). *Benefits of Geospatial Technology in the One Belt One Road Initiative*, Wuhan University – Chinese Scholarship Council Meeting for Doctoral Students, Wuhan, China
6. Michael Jendryke, and Mingsheng Liao. (2016). *Urban vibrancy inference from remote sensing and big social sensing data*, Ministry of Science and Technology – National Science Foundation of China, Annual Key Project Report, Beijing, China
7. Michael Jendryke, Timo Balz, and Mingsheng Liao. (2016). *Urban vibrancy inference from remote sensing and big social sensing data*. School of Remote Sensing and Information Engineering – Doctoral Forum, Wuhan, China
8. Michael Jendryke, Timo Balz, and Mingsheng Liao. (2016). *Collecting, visualizing, and analyzing location-based social media messages from China's Sina Weibo network*, International Symposium on Digital Earth – Digital Earth Summit, Beijing, China
9. Michael Jendryke, Timo Balz, Stephen McClure, and Mingsheng Liao. (2015). *Combining Mobile Social Media Messages and Remote Sensing Results to Identify Urbanization Patterns in China*, American Association of Geographers Annual Meeting AAG, Chicago, USA

10. Michael Jendryke, Timo Balz, and Mingsheng Liao. (2015). *Urban Dynamics in China*. LIESMARS Geoscience Café – Wuhan University, Wuhan, China
11. Michael Jendryke, Timo Balz, Mingsheng Liao, and Zhang Lu. (2013*). Interferometric Processing of TanDEM-X Bi-Static Pairs Using an Open-Source Platform*. TerraSAR-X/TanDEM-X Meeting DLR, Oberpfaffenhofen, Germany
12. Michael Jendryke, Timo Balz, Mingsheng Liao and Uwe Stilla. (2013). *Measuring Shanghai's urban growth since 2003 using ENVISAT ASAR*. International Symposium of Remote Sensing of the Environment ISRSE, Beijing, China
13. Michael Jendryke, and Wendi Petersen. (2010). *Satellite Derived Analysis and Mapping Population Dynamics*, United Nations Fund for Population Activities UNFPA Expert Meeting: Population Dynamics and Climate Change II: Building for Adaption, Mexico City, Mexico (invited talk)

## Maps

- ESRI Inc. (2011) ESRI Map Book Volume 26, pp. 93-95 http://www.esri.com/mapmuseum
- UNITAR/UNOSAT (2009-2011) Maps at https://www.unitar.org/unosat/maps (Contributions to maps as part of the team)

## Acknowledgements

- Du Toit D; Pollard S (2012) Public participation in the drafting of catchment management strategies made simple!
- Da Silva, A (2011) Land Use/Land Cover Modelling and Prediction
- Aigner, E. (2010) As Floodwaters Recede, a Crisis Emerges. The New York Times, Sept. 25
- Carvajal, D. (2010) Unrelenting misery in Pakistan. Int. Herald Tribune pp. 4, Aug. 28./29.
- Gall, C. (2010) Extent of the Flooding in Pakistan. The New York Times pp. A10, Aug. 20
- Shankar, R (2010) Accuracy Assessment of Post-Earthquake Building Damage Classification in Haiti

## Journal Reviewer

- Urban Informatics
- Computers, Environment and Urban Systems
- Transactions in GIS
- Geoinformatics & Geostatistics: An Overview
- IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing
- MDPI Remote Sensing

## Professional Membership

- Open Geospatial Consortium
- Deutsche Gesellschaft für Kartographie DGfK (German Association for Cartography)
- Open Source Geospatial Foundation (OSGeo)

# Skills & Trainings

## Key Competencies

### Entrepreneurship & Leadership

- Grant Writing
- Research Leadership
- Start-up Strategy
- Business Development
- Product Development
- Partner & Stakeholder Engagement

### Geospatial Data & Remote Sensing

- Discrete Global Grid Systems (DGGS)
- Spatial Tokenization
- Earth Observation
- Spatial Indexing
- Remote Sensing
- Geographic Information Systems
- Image Processing
- Spatial Statistics
- SAR/InSAR
- Multi-temporal Analysis

### Software & Databases

- PostgreSQL/PostGIS
- DuckDB
- QGIS
- ESRI/ArcGIS
- GDAL/OGR
- ERDAS
- Cloud-based Geospatial Processing
- S3 Storage
- Parquet/Arrow file formats

### Programming & Development

- Linux
- Rust
- Python
- C++
- C#
- PL/SQL
- MATLAB
- API Development
- Software Architecture

### Languages & Communication

- German (Native)
- English (Fluent)
- Chinese (Beginner)
- Technical Writing
- Public Speaking
- Scientific Communication

# Volunteering

### Vice Dean – Finances, 3-Quellen Verein Rudolf Steiner Kindergarten, Lohne

Co-chairing the board of a Waldorf kindergarten (ages 1–6, including special needs) and oversight of finances and staff (~10 personnel).

### Co-host, English Corner, Wuhan University

Organized weekly English conversation groups, career coaching and special events (e.g. baseball, Halloween) for students to practice spoken English.

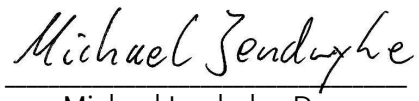
# Further Links

**Current**

- My Company https://geoinsight.ai
- Personal website https://michael.jendryke.de
- Google Scholar https://scholar.google.com/citations?user=0JVnOF4AAAAJ
- ResearchGate https://www.researchgate.net/profile/Michael_Jendryke
- LinkedIn https://www.linkedin.com/in/michaeljendryke/
- Github https://github.com/michaeljendryke
- GeoPlegma https://github.com/GeoPlegma

**From previous work**

- UNOSAT Maps: https://www.unitar.org/unosat/maps
- Prof. Xi Li's group: http://www.lmars.whu.edu.cn/prof_web/lixi/en/intlcollab.html



Michael Jendryke, Dr.