

Prof. Dr. Christian Geiß

RESEARCH INTERESTS

- Development of machine learning algorithms for interpretation of earth observation data
- Multimodal remote sensing of built environments
- Analysis of exposure and vulnerability in the context of natural hazards
- Automated techniques for damage mapping after natural catastrophes

EDUCATIONAL BACKGROUND

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|----------------|-----------------------------------------------------------------------------------|
| 2020 - ongoing | Habilitation Geography
Julius-Maximilian University, Würzburg, Germany |
| 2014 | PhD (Dr. rer. nat.) Geoinformatics
Humboldt University, Berlin, Germany |
| 2010 | MSc Applied Geoinformatics
Paris Lodron University, Salzburg, Austria |
| 2007 | BA Geography
Friedrich-Alexander University, Erlangen-Nürnberg, Germany |

SELECTED PUBLICATIONS (ISI-LISTED JOURNALS)

- [41] Standfuß, I., **Geiß, C.**, Kühnl, M., Droin, A., Mast, J., Wurm, M., Heider, B., Siedentop, S., and Taubenböck, H. (2023): In the tension between large-scale analysis and accuracy - Identifying and analysing intra-urban (sub-)centre structures comparing official 3D-building models and TanDEM-X nDSMs. *Computers, Environment and Urban Systems*, 102, 101953.
- [40] Kühnl, M., Sapena, M., Wurm, M., **Geiß, C.**, and Taubenböck, H. (2022): Multitemporal Landslide Exposure and Vulnerability Assessment in Medellín, Colombia. *Natural Hazards*, <https://doi.org/10.1007/s11069-022-05679-z>.
- [39] **Geiß, C.**, Priesmeier, P., Aravena Pelizari, P., Soto, A., Schöpfer, E., Riedlinger, T., Villar Vega, M., Santa Maria, H., Gomez Zapata, C., Pittore, M., So, E., Fekete, A., and Taubenböck, H. (2022): Benefits of Global Earth Observation Missions for Disaggregation of Exposure Data and Earthquake Loss Modelling – Evidence from Santiago de Chile. *Natural Hazards*, <https://doi.org/10.1007/s11069-022-05672-6>.
- [38] Dong, Y., Fan, L., Zhao, J., Huang, S., **Geiß, C.**, Wang, L., and Taubenböck, H. (2022): Mapping of small water bodies with integrated spatial information for time series images of optical remote sensing. *Journal of Hydrology*, 614, Part B, 128580.
- [37] **Geiß, C.**, Rabuske, A., Aravena Pelizari, P., Bauer, S., and Taubenböck, T. (2022): Selection of Unlabeled Source Domains for Domain Adaptation in Remote Sensing, *Array*, 15, 100233.
- [36] **Geiß, C.**, Brzoska, E., Aravena Pelizari, P., Lautenbach, S., and Taubenböck, H. (2022): Multi-target Regressor Chains with Repetitive Permutation Scheme for Characterization of Built

- Environments with Remote Sensing. *International Journal of Applied Earth Observation and Geoinformation*, 106, 102657.
- [35] **Geiß, C.**, Zhu, Y., Qiu, C., Mou, L., Zhu, X.X., and Taubenböck, H. (2022): Deep Relearning in the Geospatial Domain for Semantic Remote Sensing Image Segmentation. *IEEE Geoscience and Remote Sensing Letters*, 19, 8002705.
- [34] Standfuß, I., Geiß, C., Nathan, R., Rotics, S., Scacco, M., Kerr, G., and Taubenböck, H. (2022): Medium-resolution time series allow characterization of small-scale vegetation dynamics affecting fine-scale animal behavior in agricultural landscapes: an example of white storks. *Remote Sensing in Ecology and Conservation*, 1-18.
- [33] Zhu, Y., **Geiß, C.**, and So. E. (2021): Image Super-Resolution with Dense-sampling Residual Channel-Spatial Attention Networks for Multi-temporal Remote Sensing Image Classification. *International Journal of Applied Earth Observation and Geoinformation*, 104, 102543.
- [32] Aravena Pelizari, P., **Geiß, C.**, Aguirre, P., Santa María, H., Merino Peña, Y., and Taubenböck, H. (2021): Automated building characterization for seismic risk assessment using street-level imagery and deep learning. *ISPRS Journal of Photogrammetry and Remote Sensing*, 180, 370–386.
- [31] Zhu, Y., **Geiß, C.**, So. E., and Jin, Y. (2021): Multi-temporal Relearning with Convolutional LSTM Models for Land Use Classification. *IEEE Journal of Selected Topics in Applied Earth Observation and Remote Sensing*, 14, 3251–3265.
- [30] Wurm, M., Droin, A., Stark, T., **Geiß, C.**, Sulzer, W., and Taubenböck, H. (2021): Deep Learning-Based Generation of Building Stock Data from Remote Sensing for Urban Heat Demand Modeling. *ISPRS International Journal of Geo-Information*, 10, 23.
- [29] Moya, L., **Geiß, C.**, Hashimoto, M., Mas, E., Koshimura, K., and Strunz, G. (2021): Hazard Intensity-Based Selection of Training Samples for Remote Sensing Building Damage Classification. *IEEE Transactions on Geoscience and Remote Sensing*, 59, 10, 8288–8304.
- [28] **Geiß, C.**, Schrade, H., Aravena Pelizari, P., and Taubenböck, H. (2020): Multistrategy Ensemble Regression for Mapping of Built-Up Height and Density with Sentinel-2 Data. *ISPRS Journal of Photogrammetry and Remote Sensing*, 170, 57–71.
- [27] Zhao, J., Tian, S., **Geiß, C.**, Wang, L., Zhong, Y., and Taubenböck, H. (2020): Spectral-spatial classification integrated band selection for hyperspectral imagery with severe noise bands. *IEEE Journal of Selected Topics in Applied Earth Observation and Remote Sensing*, 13, 1597–1609.
- [26] Qiu, C., Schmitt, M., **Geiß, C.**, Chen, T-H.K. and Zhu, X.X. (2020): A framework for large-scale mapping of human settlement extent from Sentinel-2 images via fully convolutional neural networks. *ISPRS Journal of Photogrammetry and Remote Sensing*, 163, 152–170.
- [25] **Geiß, C.**, Aravena Pelizari, P., Bauer, S., Schmitt, A., and Taubenböck, H. (2020): Automatic Training Set Compilation with Multisource Geodata for DTM Generation from the TanDEM-X DSM. *IEEE Geoscience and Remote Sensing Letters*, 17(3), 456–460.

- [24] Liuzzi, M., Aravena Pelizari, P., **Geiß, C.**, Masi, A., Tramutoli, V., and Taubenböck, H. (2019): A Transferable Remote Sensing Approach to Classify Building Structural Types for Seismic Risk Analyses: the case of Val d'Agri Area (Italy). *Bulletin of Earthquake Engineering*, 17, 4825–4853.
- [23] **Geiß, C.**, Leichtle, T., Wurm, M., Aravena Pelizari, P., Standfuß, I., Zhu, X. X., So, E., Siedentop, S., Esch, T., and Taubenböck, H. (2019): Large-Area Characterization of Urban Morphology – Mapping Built-Up Height and Density with the TanDEM-X Mission and Sentinel-2. *IEEE Journal of Selected Topics in Applied Earth Observation and Remote Sensing*, 12(8), 2912–2927.
- [22] Taubenböck, H., Wurm, M., **Geiß, C.**, and Siedentop, S. (2019): Urbanization between compactness and dispersion - Designing a spatial model for measuring 2D binary settlement landscape configurations. *Journal of Digital Earth*, 12(6), 679–698.
- [21] **Geiß, C.**, Aravena Pelizari, P., Blickensdörfer, L., and Taubenböck, H. (2019): Virtual Support Vector Machines with Self-Learning Strategy for Classification of Multispectral Remote Sensing Imagery. *ISPRS Journal of Photogrammetry and Remote Sensing*, 151, 42–58.
- [20] Taubenböck, H., Staab, J., Zhu, X., **Geiß, C.**, Dech, S., and Wurm, M. (2018) Are the poor digitally left behind? Analyzing urban divides using remote sensing and twitter data. *ISPRS International Journal of Geo-Information*, vol. 8, no. 7, 304; doi: 10.3390/ijgi7080304.
- [19] Selvakumaran, S., Plank, S., **Geiß, C.**, Rossi, C., and Middleton, C. (2018): Remote monitoring to predict bridge scour failure using Interferometric Synthetic Aperture Radar (InSAR) stacking techniques. *International Journal of Applied Earth Observation and Geoinformation*, 73, 463–470.
- [18] **Geiß, C.**, Thoma, M., and Taubenböck, H. (2018): Cost-sensitive Multitask Active Learning for Characterization of Urban Environments with Remote Sensing. *IEEE Geoscience and Remote Sensing Letters*, 15(6), 922–926.
- [17] Aravena Pelizari, P., Spröhnle, K., **Geiß, C.**, Schöpfer, E., Plank, S., and Taubenböck, H. (2018): Multi-sensor feature fusion for very high spatial resolution built-up area extraction in temporary settlements. *Remote Sensing of Environment*, 209, 793–807.
- [16] **Geiß, C.**, Thoma, M., Pittore M., Wieland, M., Dech, S., and Taubenböck, H. (2017): Multitask Active Learning for Characterization of Built Environments with Multisensor Earth Observation Data. *IEEE Journal of Selected Topics in Applied Earth Observation and Remote Sensing*, 10(12), 5583–5597.
- [15] **Geiß, C.**, Aravena Pelizari, P., Schrade, H., Brenning, A., and Taubenböck, H. (2017): On the Effect of Spatially Non-disjoint Training and Test Samples on Estimated Model Generalization Capabilities in Supervised Classification with Spatial Features. *IEEE Geoscience and Remote Sensing Letters*, 14(11), 2008–2012.
- [14] Leichtle, T., **Geiß, C.**, Lakes, T., and Taubenböck, H. (2017): Class imbalance in unsupervised change detection – A diagnostic analysis from urban remote sensing. *International Journal of Applied Earth Observation and Geoinformation*, 60, 83–98.
- [13] **Geiß, C.**, Schauß, A., Riedlinger, T., Dech, S., Zelaya, C., Guzman, N., Hube, M., Arsanjani, J. J., and Taubenböck, H. (2017): Joint use of remote sensing data and volunteered geographic

- information for exposure estimation – evidence from Valparaíso, Chile. *Natural Hazards*, 86, 81–105.
- [12] Leichtle, T., **Geiß, C.**, Wurm, M., Lakes, T., and Taubenböck, H. (2017): Unsupervised change detection in VHR remote sensing imagery – an object-based clustering approach in a dynamic urban environment. *International Journal of Applied Earth Observation and Geoinformation*, 54, 15–27.
- [11] **Geiß, C.**, Klotz, M., Schmitt, A., and Taubenböck, H. (2016): Object-based Morphological Profiles for Classification of Remote Sensing Imagery. *IEEE Transactions on Geoscience and Remote Sensing*, 54(10), 5952–5963.
- [10] Klotz, M., Kemper, T., **Geiß, C.**, Esch, T., and Taubenböck, H. (2016): How good is the map? A multi-scale cross-comparison framework for global settlement layers: Evidence from Central Europe. *Remote Sensing of Environment*, 178, 191–212.
- [9] Schreyer, J., **Geiß, C.**, and Lakes, T. (2016): TanDEM-X for Large-Area Modeling of Urban Vegetation Height: Evidence from Berlin, Germany. *IEEE Journal of Selected Topics in Applied Earth Observation and Remote Sensing*, 9(5), 1876–1887.
- [8] **Geiß, C.**, Jilge, M., Lakes, T., and Taubenböck, H. (2016): Estimation of Seismic Vulnerability Levels of Urban Structures With Multisensor Remote Sensing. *IEEE Journal of Selected Topics in Applied Earth Observation and Remote Sensing*, 9(5), 1913–1936.
- [7] **Geiß, C.**, and Taubenböck, H. (2015) Object-based Postclassification Relearning. *IEEE Geoscience and Remote Sensing Letters*, 12(11), 2336–2340.
- [6] **Geiß, C.**, Wurm, M., Breunig, M., Felbier, A., and Taubenböck, H. (2015): Normalization of TanDEM-X DSM Data in Urban Environments with Morphological Filters. *IEEE Transactions on Geoscience and Remote Sensing*, 53(8), 4348–4362.
- [5] **Geiß, C.**, Aravena Pelizari, P., Marconcini, M., Sengara, W., Edwards, M., Lakes, T., and Taubenböck, H. (2015): Estimation of seismic buildings structural types using multi-sensor remote sensing and machine learning techniques. *ISPRS Journal of Photogrammetry and Remote Sensing*, 104, 175–188.
- [4] Gokon, H., Post, J., Stein, E., Martinis, S., Twele, A., Mück, M., **Geiß, C.**, Koshimura, S., and Matsuoka, M. (2015): A method for detecting devastated buildings by the 2011 Tohoku earthquake tsunami using multi-temporal TerraSAR-X data. *IEEE Geoscience and Remote Sensing Letters*, 12(6), 1277–1281.
- [3] **Geiß, C.**, Taubenböck, H., Tyagunov, S., Tisch, A., Post, J., and Lakes, T. (2014): Assessment of seismic building vulnerability from space. *Earthquake Spectra*, 30(4), 1553–1583.
- [2] **Geiß, C.**, and Taubenböck, H. (2013): Remote sensing contributing to assess earthquake risk: from a literature review towards a roadmap. *Natural Hazards*, 68, 7–48.
- [1] **Geiß, C.**, Taubenböck, H., Wurm, M., Esch, T., Nast, M., Schillings, C., and Blaschke, T. (2011): Remote sensing-based characterization of settlement structures for assessing local potential of district heat. *Remote Sensing*, 3, 1447–1471.