



professional experience and training

- Since 2022 *Postdoctoral Research Associate*, Dpt. of Forest & Wildlife Ecology, University of Wisconsin
1630 Linden Dr., Madison WI, 53706, USA
Global Hotspots of the Wildland-Urban Interface
Advisor: Prof. Volker Radeloff
- 2018 – 2021 *Doctoral Researcher*, Humboldt-Universität zu Berlin, Earth Observation Lab
Unter den Linden 6, 10099 Berlin, Germany
Understanding the Role of Material Stock Patterns for the Transformation to a Sustainable Society (MAT_STOCKS)
Advisor: Prof. Patrick Hostert
- 2017 – 2017 *Research Assistant*, Humboldt-Innovation GmbH
Rudower Chaussee 16, 12489 Berlin, Germany
- 2013 – 2015 *Student Research Assistant*, Humboldt-Universität zu Berlin, Earth Observation Lab
Rudower Chaussee 16, 12489 Berlin, Germany
- 2014 *Intern*, GFZ German Research Centre for Geosciences
Telegrafenberg, 14473 Potsdam, Germany

education

- 2018 – 2021 Ph.D. (Dr. rer. nat.), Earth Observation Lab, Humboldt-Universität zu Berlin, Germany
A multi-dimensional characterization of settlements with Earth Observation data
Advisor: Prof. Patrick Hostert
- 2018 – 2021 IRI THESys graduate program, Humboldt-Universität zu Berlin, Germany
Interdisciplinary learning and research program, with contributions from, e.g., Geography,
Ethnology, Philosophy, Agricultural, Environmental and Sustainability Sciences
- 2014 – 2017 M.Sc., Physical Geography, Humboldt-Universität zu Berlin, Germany
Advisor: Prof. Patrick Hostert, Prof. Tobia Lakes, Prof. Blake Walker
- 2015 – 2016 Visiting Student, Simon Fraser University, Burnaby, BC, Canada
- 2011 – 2014 B.Sc., Geography (major) / Computer Sciences (minor), Humboldt-Universität zu Berlin, Ger.
Advisor: Prof. Sebastian van der Linden, Prof. Jonas Ø. Nielsen
- 2008 - 2011 B.A., Business Administration
University of Applied Sciences Saarbrücken, Germany & Université de Lorraine, France

publications

citations: 384, h-index: 8 (according to Google Scholar, 01 Feb. 2023)

peer-reviewed articles

- 2022 10. **Schug, F.**; Frantz, D.; Wiedenhofer, D.; Haberl, H.; Virág, D.; van der Linden, S.; Hostert, P.
(2022): *High-resolution mapping of 33 years of material stock and population growth in Germany using Earth Observation data*. Journal of Industrial Ecology, 1-15, doi: 10.1111/jiec.13343
9. **Schug, F.**; Frantz, D.; Okujeni, A.; Hostert, P. (2022): *Sub-pixel building area mapping based on*

synthetic training data and regression-based unmixing using Sentinel-1 and-2 data. Remote Sensing Letters, 13 (8), doi: 10.1080/2150704X.2022.2088253

- 2021 8. Kreyling, J.; Tanneberger, F.; Jansen, F.; van der Linden, S.; Aggenbach, C.; Blüml, V.; Couwenberg, J.; Emsens, W.J.; Joosten, H.; Klimkowska, A.; Kotowski, W.; Kozub, L.; Lennartz, B.; Liczner, Y.; Liu, H.; Michaelis, D.; Oehmke, C.; Parakenings, K.; Pleyl, E.; Poyda, A.; Raabe, S.; Röhl, M.; Rücker, K.; Schneider, A.; Schrautzer, J.; Schröder, C.; **Schug, F.**; Seeber, E., Thiel, F.; Thiele, S.; Tiemeyer, B.; Timmermann, T.; Urich, T.; van Diggelen, R.; Vegelin, K.; Verbruggen, E.; Wilmking, M.; Wrage-Mönnig, N.; Wołejko, L.; Zak, D.; Jurasinski, G. (2021): *Rewetting does not return drained fen peatlands to their old selves*. Nature Communications, 12, 5693. doi: 10.1038/s41467-021-25619-y
7. **Schug, F.**; Frantz, D.; van der Linden, S.; Hostert, P. (2021): *Gridded population mapping for Germany based on building density, height and type from Earth Observation data using census disaggregation and bottom-up estimates*. PLOS ONE, 16(3). doi: 10.1371/journal.pone.0249044
6. Haberl, H.; Wiedenhofer, D.; **Schug, F.**; Frantz, D.; Virág, D.; Plutzer, C.; Grubler, K.; Lederer, J.; Schiller, G.; Fishman, T.; Lanau, M.; Gattringer, A.; Kemper, T.; Liu, G.; Tanikawa, H.; van der Linden, S.; Hostert, P (2021): *High-Resolution Maps of Material Stocks in Buildings and Infrastructures in Austria and Germany*. Environmental Science & Technology, doi: 10.1021/acs.est.0c05642
5. Frantz, D.; **Schug, F.**; Okujeni, A.; Navacchi, C.; Wagner, W.; van der Linden, S.; Hostert, P. (2021): *National-scale mapping of building height using Sentinel-1 and Sentinel-2 time series*. Remote Sensing of Environment, vol. 252. doi: 10.1016/j.rse.2020.112128
- 2020 4. Wellmann, T.; Lausch, A.; Andersson, E.; Knapp, S.; Cortinovis, C.; Jache, J.; Scheuer, S.; Kremer, P.; Mascarenhas, A.; Kraemer, R.; Haase, A.; **Schug, F.**; Haase, D. (2020): *Remote Sensing in urban planning: Contributions towards ecologically sound policies?* Landscape and Urban Planning, vol. 204. doi: <https://doi.org/10.1016/j.landurbplan.2020.103921>
3. **Schug, F.**; Frantz, D.; Okujeni, A.; van der Linden, S.; Hostert, P. (2020). *Mapping urban-rural gradients of settlements and vegetation at national scale using Sentinel-2 spectral-temporal metrics and regression-based unmixing with synthetic training data*. Remote Sensing of Environment, vol. 246, September 2020, doi: 10.1016/j.rse.2020.111810
2. Wellmann, T.; **Schug, F.**; Haase, D.; Pflugmacher, D.; van der Linden, S. (2020). *Green growth? On the relation between population density, land use and vegetation cover fractions in a city using a 30-years Landsat time series*. Landscape and Urban Planning, vol. 202. doi: 10.1016/j.landurbplan.2020.103857
- 2018 1. **Schug, F.**; Okujeni, A.; Hauer, J.; Hostert, P.; Nielsen, J. Ø.; van der Linden, S. (2018). *Mapping patterns of urban development in Ouagadougou, Burkina Faso, using machine learning regression modeling with bi-seasonal Landsat time series*. Remote Sensing of Environment, vol. 210, June 2018, doi: 10.1016/j.rse.2018.03.022

conference contributions / talks / workshops

- 2022 17. **Schug, F.**; Bar-Massada, A.; Carlson, A.; Cox, H.; Hawbaker, T. J.; Helmers, D.; Hostert, P.; Kaim, D.; Kasraee, N.; Lewinska, K. E.; Martinuzzi, S.; Mockrin, M.; Pereira, J.; Pfoch, K.; Price, O. F.; Radeloff, V. C. (2022): *Mapping and Quantifying the Global Wildland-Urban Interface*. Oral contribution. American Geophysical Union Fall Meeting, Chicago, 12 – 16 December 2022
16. Cox, H.; **Schug, F.**; Radeloff, V. C. (2022): *Hotspots of the Wildland-Urban Interface in Africa*. Poster contribution. American Geophysical Union Fall Meeting, Chicago, 12 – 16 December 2022
15. Pfoch, K.; **Schug, F.**; Radeloff, V. C. (2022): *Mapping the Wildland-Urban Interface in Mediterranean ecoregions with a spectral mixture analysis of Landsat imagery*. Poster contribution.

- American Geophysical Union Fall Meeting, Chicago, 12 – 16 December 2022
14. Radeloff, V. C.; **Schug, F.**; Carlson, A.; Cox, H.; Kasraee, N.; Pfoch, K.; Martinuzzi, S.; Bar-Massada, A.; Hawbaker, T.; Kaim, T.; Mockrin, M. (2022): Global Hotspots of the Wildland-Urban Interface. Poster contribution. NASA Land Cover & Land Use Science Team Meeting, Washington D.C., 17 – 21 October 2022
 - 2021** 13. **Schug, F.**; Frantz, D.; Okujeni, A.; van der Linden, S.; Hostert, P (2021): *Sub-pixel mapping of land cover along the urban-rural gradient with regression-based unmixing and spectral-temporal metrics*. **Oral** contribution. WSL Remote Sensing Lecture, Birmensdorf (CH), 02 June 2021
 12. **Schug, F.**; Frantz, D.; Okujeni, A.; van der Linden, S.; Hostert, P (2021): *Mapping urban-rural gradients of settlements and vegetation using Sentinel-2 spectral-temporal metrics and regression-based unmixing with synthetic training data*. **Oral** contribution. EARSeL Joint Workshop 2020, Liège, 30 March – 01 April 2021
 11. Wellmann, T.; **Schug, F.**; Haase, D.; Pflugmacher, D.; van der Linden, S. (2021): Green Growth? On The Relation Between Population Density, Land Use And Vegetation Cover Fractions In A City Using A 30-Years Landsat Time Series. EARSeL Joint Workshop 2020, Liège, 30 March – 01 April 2021
 10. Wiedenhofer, D.; Virág, D.; **Schug, F.**; Frantz, D.; van der Linden, S.; Hostert, P.; Haberl, H. (2021): A novel approach for mapping material stocks of buildings and infrastructure from remote-sensing data at the national scale and beyond. Oral contribution. 14th Biennial International Conference on EcoBalance, Sendai, 25 February – 05 March 2021.
 - 2019** 9. **Schug, F.**; Frantz, D.; Okujeni, A.; van der Linden, S.; Hostert, P (2019): *Sentinel-2 and machine learning regression for built-up and urban green fraction mapping across European settlements*. Oral contribution. ESA Living Planet Symposium, Milan, 13 – 17 May 2019
 8. **Schug, F.**; Frantz, D.; Okujeni, A.; van der Linden, S.; Hostert, P (2019): *Urban surface fraction mapping with optical remote sensing for material stock estimation*. Oral contribution. Global Land Programme Open Science Meeting, Bern, 24 – 26 April 2019
 7. **Schug, F.**; van der Linden, S.; Okujeni, A.; Hostert, P (2019): *Using Time Series Information For Mapping Human Settlements With Sentinel-2*. Oral contribution. DGPF Dreiländertagung, Vienna, 20 – 21 February 2019
 - 2018** 6. **Schug, F.**; van der Linden, S.; Okujeni, A.; Hostert, P (2018): *Evaluating Sentinel-2 imagery for mapping human settlements*. Oral contribution. ESA Mapping Urban Areas From Space, Frascati, 30 – 31 October 2018
 5. **Schug, F.**; Okujeni, A.; Hauer, J.; Hostert, P.; Nielsen, J. Ø; van der Linden, S. (2018). *Mapping Patterns Of Urban Development Using Support Vector Regression With Synthetically Mixed Training Spectra And Bi-seasonal Landsat Time Series*. Poster contribution. EARSeL 5th Joint Workshop “Urban Remote Sensing – Challenges and Solutions”, Bochum, 24 – 26 September 2018
 4. Van der Linden, S.; Okujeni, A.; **Schug, F.** (2018): *Urban Mapping*. Workshop. 8th Advanced Training Course on Land Remote Sensing. University of Leicester, Leicester, 11 September 2019
 - 2015** 3. **Schug, F.**; Pagalan, L.; Mather, S. (2015): *Modeling population growth of young adults within the City of Vancouver using Cellular Automata*. Poster contribution. ESRI User Conference, Vancouver, November 2015
 2. **Schug, F.**; van der Linden, S.; Nielsen, J. Ø; Okujeni, A. (2015): *Multi-seasonal spectral mixture analysis using Landsat data for mapping urban land cover in Ouagadougou, Burkina Faso*. Oral contribution. IEEE International Geoscience and Remote Sensing Symposium, Milan, 26 – 31 July 2015

- 2014 1. van der Linden, S.; Kuemmerle, T.; Janson, K.; **Schug, F.** (Eds., 2014). Conference proceedings: *Frontiers in Earth Observation for Land System Science*. 5th Workshop of the EARSeL Special Interest Group on Land Use and Land Cover, Berlin, 17 – 18 March 2014

student supervision

- 2019 *Cremer, N.*: Regression-based impervious surface mapping across European capital cities using semi-automated training data collection, *Bachelor's Thesis*
- 2019 *Küpper, J.*: Dhaka revisited - Combining Sentinel-1 and Sentinel-2 Imagery for Land Cover Mapping in a Monsoon Region, *Bachelor's Thesis*
- 2018 *Spengler, S.*: Mapping urban structures from Sentinel-2 data for Ouagadougou, Burkina Faso, *Bachelor's Thesis*
- 2018 *Will, C.*: Eine Untersuchung der zeitlichen Übertragbarkeit fernerkundlicher Klassifikationsmodelle zur urbanen Landnutzungskartierung in Berlin auf Basis einer Landsat-Zeitreihe, *Bachelor's Thesis*

reviewing activities

Science of the Total Environment, Elsevier; International Journal of Remote Sensing, T & F; GIScience & Remote Sensing, T & F; Remote Sensing, MDPI; Earth System Science Data, Cop. Pub.; Remote Sensing in Ecology and Conservation, Wiley; Transactions in GIS, Wiley

teaching

- 2020 & 2021 Instructor, Lecture & Seminar, Remote Sensing in Fundamentals of Human-Environment Research, 6 hrs., M.Sc. / Ph.D., IRI THESys, Humboldt-Universität zu Berlin
- 2020 Instructor, Research Seminar, Remote Sensing for Settlement Mapping & Scientific Writing, 31 hrs., B.Sc. / M.Sc., Humboldt-Universität zu Berlin
- 2018 – 2019 Student project advice, Seminar, Sustainability and Global Justice, 8 hrs., B.Sc. / M.Sc.
- 2018 Student project supervision, Seminar, Quantitative Methods in Geography, 10 hrs., M.Sc.
- 2014 – 2015 Assistantship, Lecture & Seminar, Advanced Remote Sensing Methods, 20 hrs., M.Sc.
- 2014 – 2015 Assistantship, Seminar, Introduction to Remote Sensing, 20 hrs., B.Sc.

grants / awards

- 2020 Digital Teaching Grant, bologna.lab, Humboldt-Universität zu Berlin
Funding for creating and implementing innovative digital learning methods
- 2020 Q-Team Grant, bologna.lab, Humboldt-Universität zu Berlin
Funding for a leading a research-based learning seminar (1 semester, 31 hrs.)
- 2019 European Commission Travel Grant for attending ESA Living Planet Symposium
- 2015 IEEE Travel Grant for attending IEEE Intl. Geosci. and Remote Sensing Symposium
- 2015 Travel Grant, Humboldt-Universität zu Berlin for exchange student travel expenses
- 2015 IRI THESys award - best Thesis in human-environment research
- 2014 Best student award Bachelor of Science, Geography, Humboldt-Universität zu Berlin
- 2014 – 2016 Scholarship (Deutschlandstipendium) granted by Stiftung Humboldt-Universität

and the German Federal Ministry of Education and Research for student research in sustainability and global justice

2008 Erasmus exchange student grant, Université de Lorraine, France

workshops / courses attended (after M.Sc. graduation)

2021 Workshop, *Preparing for the Disputation*, Humboldt Graudate Schook, Germany, 16 hrs.

2020 - 2021 Course, *Globalization of the Global South – Examples from Sub Saharan Africa*, Humboldt-Universität zu Berlin, Germany, 90 hrs.

2020 Workshop, *Grant Application Writing*, Humboldt Graudate Schook, Germany, 32 hrs.

2019 Workshop, *How to design visual storylines to communicate research*, IRI THESys, 16 hrs.

2018 - 2019 Course, *Fundamentals of Human-Environment Research*, IRI THESys, 32 hrs.

2018 Workshop, *Conceptualizing services and the stock-flow-services nexus*, University of Natural Resources & Life Sciences Vienna, Austria, 16 hrs.

2018 Summer School, SAR-EDU Summer School for Applied Radar Remote Sensing, Friedrich-Schiller-Universität Jena, Germany, 30 hrs.

language proficiency

German	native
English, French	advanced (fluent in writing and speaking)
Spanish	beginner (speaking and writing), intermediate (reading and understanding)