Dr. Taylor Smith

tasmith@uni-potsdam.de
https://tasmi.github.io

EDUCATION

Dr. rer. nat. (summa cum laude), Remote Sensing. *Universität Potsdam* — February 2018
Master of Arts, Geography. *UC Santa Barbara* — September 2014
Bachelor of Arts, Geology. *Middlebury College* — May 2011

RESEARCH PROFILE

My research focuses on extracting signals from diverse environmental datasets. My current projects are focused on monitoring high-altitude rivers, quantifying the state and fate of snow-water resources, and measuring the resilience of natural ecosystems. My methods are data-driven, and rely on the combination of high-performance computing and novel statistical methods to explore changes in the Earth system.

PROFESSIONAL EXPERIENCE

2018 -	Research Staff and Instructor, Universität Potsdam
2014 - 2018	PhD Candidate and Teaching Assistant, Universität Potsdam
2013 - 2018	Independent Consultant, Climate Hazard Analysis for International Development
Summer 2013	Natural Hazards Research Fellow, Earth Research Institute
2012 - 2014	MA Candidate and Teaching Assistant, UC Santa Barbara
2011 - 2012	GIS Analyst, Tetra Tech ARD
Summer 2010	Field Researcher, UMass Amherst
2009 - 2011	Research and Teaching Assistant, Middlebury College

FUNDING

- **DFG** - Principle Investigator, "Quantifying the Influence of Snowmelt on River Hydrology in High Mountain Asia" (Eur 365k, 2023-2026)
- **BMBF** - Postdoctoral Fellow, "Options for Sustainable Land Use Adaptations in Savanna Systems" (ORYCS, 2019-2022)
- **ERI** - Natural Hazards Research Fellow, "Mapping Glacial Lake Outburst Floods in the Himalaya" (USD 5k, 2013)

AWARDS, HONORS, AND CERTIFICATIONS

- **International Teaching Professional** (U. Potsdam, 2021) - Training for University Pedagogy
- **Michelson Prize** (U. Potsdam, 2018) - Awarded for the top doctoral thesis of the year in the Math and Science Faculty at Universität Potsdam
- **Prize for Excellence in Teaching** (U. Potsdam, 2018) - Awarded for excellent teaching at the graduate level. Assessed based on course design, innovation, and student reviews

PEER-REVIEWED PUBLICATIONS

Journal Articles

26. N Boers, T Liu, S Bathiany, M Ben-Yami, L Blaschke, N Bochow, C Boulton, T Lenton, A Morr, D Nian, M Rypdal, and **T Smith**. "Destabilization of Earth system tipping elements." Nature Geoscience. (2025, accepted).
25. **T Smith**, A Morr, B Bookhagen and N Boers. "Predicting Instabilities in Transient Landforms and Interconnected Ecosystems." arXiv (2025). https://doi.org/10.48550/arXiv.2506.23946
24. T Liu, A Morr, S Bathiany, L Blaschke, Z Qian, C Diao, **T Smith**, and N Boers. "The influence of data gaps and outliers on resilience indicators." arXiv (2025). https://doi.org/10.48550/arXiv.2505.19034
23. L Flores, C Nendel, B Bookhagen, J A Oviedo-Reyes, **T Smith**, and G Ghazaryan. "The potential of Sentinel-1 time series for large-scale assessment of maize and wheat phenology across Germany". GIScience & Remote Sensing, 62(1) (2025). https://doi.org/10.1080/15481603.2025.2531593

22. Y Su, C Zhang, A Cescatti, K Yu, P Ciais, **T Smith**, J Shang, J Carnicer, J Liu, JM Chen, J K Green, J Wu, G E Ponce-Campos, Y Zhang, Z Zuo, J Liao, J Wu, R Lafortezza, K Yan, X Yang, L Liu, J Ren, W Yuan, X Chen, C Wu, and W Zhou. "Pervasive but biome-dependent relationship between fragmentation and resilience in forests." Nature Ecology & Evolution. (2025) https://doi.org/10.1038/s41559-025-02776-7

21. L Blaschke, D Nian, S Bathiany, M Ben-Yami, **T Smith**, C Boulton, and N Boers. "Spatial correlation increase in single-sensor satellite data reveals loss of Amazon rainforest resilience." (2024). Earth's Future, 12, e2023EF004040. https://doi.org/10.1029/2023EF004040

20. S Bathiany, R Bastiaansen, A Bastos, L Blaschke, J Lever, S Loriani, W De Keersmaecker, W Dorigo, M Milenković, C Senf, **T Smith**, J Verbesselt, and N Boers. "Ecosystem Resilience Monitoring and Early Warning Using Earth Observation Data: Challenges and Outlook." Surveys in Geophysics (2024). https://doi.org/10.1007/s10712-024-09833-z

19. T M Lenton, J F Abrams, A Bartsch, S Bathiany, C A Boulton, J E Buxton, A Conversi, A M Cunliffe, S Hebden, T Lavergne, B Poulter, A Shepherd, **T Smith**, D Swingedouw, R Winkelmann, and N Boers. "Remotely sensing potential climate change tipping points across scales." Nature Communications 15, 343 (2024). https://doi.org/10.1038/s41467-023-44609-w

18. Y Yang, Q You, **T Smith**, R Kelly, S Kang. "Spatiotemporal dipole variations of spring snowmelt over Eurasia." Atmospheric Research (2023): 107042. https://doi.org/10.1016/j.atmosres.2023.107042

17. **T Smith** and N Boers. "Reliability of Vegetation Resilience Estimates Depends on Biomass Density." Nature Ecology & Evolution (2023): 1-10. https://doi.org/10.1038/s41559-023-02194-7

16. T Schmidt, T Kuester, **T Smith**, and M Bochow. "Potential of Optical Spaceborne Sensors for the Differentiation of Plastics in the Environment", Remote Sensing 15(8):2020 (2023). https://doi.org/10.3390/rs15082020

15. **T Smith**, R.-M. Zotta, C. A. Boulton, T. M. Lenton, W. Dorigo, and N. Boers: "Reliability of resilience estimation based on multi-instrument time series." Earth Syst. Dynam., 14, 173–183 (2023). https://doi.org/10.5194/esd-14-173-2023

14. **T Smith** and N Boers. "Global vegetation resilience linked to water availability and variability." Nature Communications 14, 498 (2023). https://doi.org/10.1038/s41467-023-36207-7

13. **T Smith**, D Traxl, and N Boers. "Empirical evidence for recent global shifts in vegetation resilience." Nature Climate Change. (2022). https://doi.org/10.1038/s41558-022-01352-2

12. R Hering, M Hauptfleisch, M Jago, **T Smith**, S Kramer-Schadt, J Stiegler, and N Blaum. "Don't stop me now: Managed fence gaps could allow migratory ungulates to track dynamic resources and reduce fence related energy loss." Frontiers in Ecology and Evolution. (2022). https://doi.org/10.3389/fevo.2022.907079

11. F Atmani, B Bookhagen, **T Smith**. "Measuring Vegetation Heights and Their Seasonal Changes in the Western Namibian Savanna Using Spaceborne Lidars." Remote Sensing 14, 2928. (2022). https://doi.org/10.3390/rs14122928

10. **T Smith**, A Rheinwalt, and B Bookhagen. "Topography and Climate in the Upper Indus Basin: Mapping Elevation-Snow Cover Relationships." Science of The Total Environment (2021), 147363, ISSN 0048-9697, https://doi.org/10.1016/j.scitotenv.2021.147363

9. **T Smith** and B. Bookhagen. "Climatic and Biotic Controls on Topographic Asymmetry at the Global Scale." Journal of Geophysical Research: Earth Surface, 125, e2020JF005692 (2020). https://doi.org/10.1029/2020JF005692

8. **T Smith** and B. Bookhagen. "Assessing Multi-Temporal Snow-Volume Trends in High Mountain Asia From 1987 to 2016 Using High-Resolution Passive Microwave Data." Front. Earth Sci. (2020) 8:559175. https://doi.org/10.3389/feart.2020.559175

7. **T Smith**, A Rheinwalt, and B Bookhagen. "Determining the Optimal Grid Resolution for Topographic Analysis on an Airborne Lidar Dataset", Earth Surface Dynamics 7 (2019): 475-489 https://doi.org/10.5194/esurf-7-475-2019

6. **T Smith** and B Bookhagen. "Using passive microwave data to understand spatio-temporal trends and dynamics in snow-water storage in High Mountain Asia", Proc. SPIE 10788, Active and Passive Microwave Remote Sensing for Environmental Monitoring II, 1078806 (9 October 2018) https://doi.org/10.1117/12.2323827
5. **T Smith** and B Bookhagen. "Changes in seasonal snow water equivalent distribution in High Mountain Asia (1987 to 2009)", Science Advances 4 (2018): 1, https://doi.org/10.1126/sciadv.1701550
4. **T Smith**, B Bookhagen, and A Rheinwalt. "Spatio-temporal Patterns of High Mountain Asia's Snowmelt Season Identified with an Automated Snowmelt Detection Algorithm, 1987-2016", The Cryosphere 11 (2017): 2329-2343, https://doi.org/10.5194/tc-11-2329-2017
3. **T Smith** and B Bookhagen. "Assessing uncertainty and sensor biases in passive microwave data across High Mountain Asia", Remote Sensing of Environment 181 (2016): 174-185. https://doi.org/10.1016/j.rse.2016.03.037
2. **T Smith**, B Bookhagen, and F Cannon. "Improving semi-automated glacier mapping with a multi-method approach: applications in central Asia", The Cryosphere 9.5 (2015): 1747-1759. https://doi.org/10.5194/tc-9-1747-2015
1. W Amidon, B Bookhagen, J-P Avouac, **T Smith**, D Rood. "Late Pleistocene Glacial Advances in the Western Tibet Interior", *Earth and Planetary Science Letters 381* (2013): 210-221. https://doi.org/10.1016/j.epsl.2013.08.041

Book Chapters

2. K Geißler, N Blaum, G von Maltitz, **T Smith**, B Bookhagen, H Wanke, M Hipondoka, E Hamunyelae, D Lohmann, D U Lüdtke, M Mbidzo, M Rauchecker, R Hering, K Irob, B Tietjen, A Marquart, F V Skhosana, T Herkenrath and S Uugulu. "Biodiversity and Ecosystem Functions in Southern African Savanna Rangelands: Threats, Impacts and Solutions." in: von Maltitz, G.P., et al. Sustainability of Southern African Ecosystems under Global Change, Ecological Studies, vol 248, 2024. https://doi.org/10.1007/978-3-031-10948-5_15
1. **T. Smith** and B Bookhagen. "Chapter 7: Remotely sensed rain and snowfall in the Himalaya", in: Dimri, A.P., Bookhagen, B., Stoffel, M., Yasunari, T. (Eds.): *Himalayan Weather and Climate and their Impact on the Environment*, Springer International Publishing, 2020. https://www.springer.com/gp/book/9783030296834

Technical Reports

2. **T Smith**. *Climate Vulnerability in Asia's High Mountains: How climate change affects communities and ecosystems in Asia's water towers.* WWF: 2014. Web Link
1. M Gale, J Kim, H Earle, A Clark, **T Smith**, K Peterson. Open File Report VG09-5: *Bedrock Geologic Map of Charlotte, Vermont* (Vermont Geologic Survey, 2009)

PUBLISHED DATASETS AND SOFTWARE

10. **T Smith** and N Boers. (2023). Reliability of Vegetation Resilience Estimates Depends on Biomass Density (1.0). Zenodo. https://doi.org/10.5281/zenodo.7550255
9. **T Smith** and N Boers. (2023). Global Vegetation Resilience Linked to Water Availability and Variability (1.0). Zenodo. https://doi.org/10.5281/zenodo.7436669
8. **T Smith** and N Boers. (2022). Reliability of Resilience Estimation based on Multi-Instrument Time Series (1.0). Zenodo. https://doi.org/10.5281/zenodo.7009414
7. **T Smith**, D Traxl, and N Boers. (2022). Empirical evidence for recent global shifts in vegetation resilience (1.0). Zenodo. https://doi.org/10.5281/zenodo.5816934
6. **T Smith** and B Bookhagen (2021). Elevation-Snow Clusters for Glaciers and Watersheds in the Upper Indus Basin Region (Version v1.0). Zenodo. https://doi.org/10.5281/zenodo.4469473
5. **T Smith** and B Bookhagen (2020). Global Climatic, Biotic, and Topographic Asymmetries (Version v1.0). Zenodo. https://doi.org/10.5281/zenodo.4019109
4. **T Smith** (2020). Hillslope Asymmetry: Initial Release. Zenodo. https://doi.org/10.5281/zenodo.3839251

3. **T Smith** and B Bookhagen (2020). Snow Variables for High Mountain Asia (Version v1.0). Zenodo. http://doi.org/10.5281/zenodo.3898517
2. **T Smith**, A Rheinwalt, and B Bookhagen (2019). TopoMetricUncertainty - Calculating Topographic Metric Uncertainty and Optimal Grid Resolution. V. 1.0. GFZ Data Services. https://doi.org/10.5880/fidgeo.2019.017
1. **T Smith** and B Bookhagen (2017). Snowmelt Parameters, 1987-2016, High Mountain Asia. V. 1.0. GFZ Data Services. https://doi.org/10.5880/fidgeo.2017.006

JOURNAL REFEREE (selected)

Nature, Nature Climate Change, Nature Ecology & Evolution, Nature Communications, Nature Sustainability, Earth and Planetary Science Letters, Geophysical Research Letters, Science Advances, Global Change Biology, Remote Sensing of Environment, Remote Sensing, Science of the Total Environment

ADVISING

12. **Yulong Yang** (2024-2026, visiting PhD scholar from Fudan University): Snowmelt Variations in High Mountain Asia: Characteristics, Mechanisms, and Climate Effects
11. **Stefan Schütz** (2024, MSc Thesis): Satellite-Based Lake Area Time Series Analysis on the Central Andean Plateau
10. **Juan Sebastian Valencia Velasquez** (2024, MSc Thesis): Landslide detection using time series of spaceborne Digital Elevation Models and Lidar instruments in the South American Andes
9. **Stepan Svintsov** (2024, MSc Thesis): A systematic assessment of European urban agriculture potential using geoinformation
8. **Gittu Thampi** (2023, MSc Thesis): Identify the animal pathways using a convolutional neural network
7. **Larissa Cristina De Rezende Magalhaes** (2023, MSc Thesis): Use of spaceborne lidar and radar data to analyze the vegetation cover in the Namibian Savannah
6. **Adeola Olanrewaju Obidiya** (2022, MSc Thesis): Land-cover Classification and Time Series Analysis of Sentinel-1 and Sentinel-2 Images at Two Contrasting Sites (Northern Treeline vs. Taiga) with Integration of Additional Ground and Satellite Validation Data
5. **Farid Atmani** (2021, MSc Thesis): Canopy height estimation of the Namibian Savanna Forest with ICESat-2 and GEDI missions
4. **Toni Schmidt** (2021, MSc Thesis): Theoretical Potential of Former, Present, and Hypothetical Optical Spaceborne Sensors for the Differentiation of Plastics Using Hyperspectral Analysis
3. **Kittipon Wutthimetheekul** (2021, MSc Thesis): Detection and analysis of flooding areas by using Sentinal-1 data in a part of the lower Chao-phraya river basin (Thailand)
2. **Ariane Müting** (2020, MSc Thesis): Generating high-resolution DEMs from tri-stereo satellite imagery: A geomorphologic case study in the Quebrada del Toro, NW Argentina
1. **Ariane Müting** (2018, BSc Thesis): Classification and spectral unmixing of remote sensing data for the Batura Glacier, Karakoram

INVITED LECTURES

11. **INSTAAR, CU Boulder**, February 2025. *The State and Fate of Global Ecosystems: Using Dense Environmental Records to Quantify the Impacts of Climate Change*
10. **Middlebury College**, September 2024. *Snow, Rivers, and Climate Change in High Mountain Asia*
9. **GFZ**, November 2023. *Quantifying the Influence of Snowmelt on High Alpine Rivers*
8. **EEBiomass Seminar**, November 2023. *Tracking Changes in Global Vegetation Resilience*
7. **Technical University of Munich**, January 2023. *Biases and Pitfalls for Resilience Estimation with Satellite Vegetation Data*
6. **Fudan University**, January 2023. *Recent Snow-Water Storage Changes in High Mountain Asia*

5. **Technical University of Munich**, October 2022. *Tracking Ecosystem Resilience with Satellite Data*
4. **TIPES Seminar**, April 2022. *Tracking Changes in Global Vegetation Resilience*
3. **Tsinghua University**, February 2022. *Snow-Water Storage Changes in High Mountain Asia*
2. **GFZ**, March 2021. *Climatic and Biotic Controls on Topographic Asymmetry at the Global Scale*
1. **Humboldt University**, May 2018. *Decadal Changes in the Snow Regime of High Mountain Asia, 1987-2016*

TEACHING EXPERIENCE

Instructor, Universität Potsdam
Big Data Analytics (DAP03, Summer 2019, 2020, 2021, 2022, 2023)
Spatial Data Analysis with Numerical Methods (DAP04, Winter 2021)
Remote Sensing of the Environment (RCM01, Winter 2019, 2020, 2021, 2022)
Terrestrial and Airborne Lidar and Photogrammetry (RSM02, Summer 2018)

Graduate Teaching Assistant, Universität Potsdam
Remote Sensing of the Environment (RCM01, Winter 2017, 2018)
GIS Methods and Techniques (RCM04, Summer 2017)

Graduate Teaching Assistant, UC Santa Barbara
Quantitative Geomorphology I (GEOG 237) & II (GEOG 288)
Groundwater (GEOG 116)
Water Quality (GEOG 162)
Oceans and Atmospheres (GEOG 3A)

Undergraduate Teaching Assistant, Middlebury College
Remote Sensing in Geoscience (GEOL 222)
The Dynamic Earth (GEOL 170)
The Ocean Floor (GEOL 142)

THESES

Smith, T (2018) - Decadal changes in the snow regime of High Mountain Asia, 1987-2016, *Doctoral Thesis (summa cum laude), Universität Potsdam, 142. pp.* (Advisor: Bodo Bookhagen) Link

Smith, T (2014) - Glacial Response to Climate Change in the Tien Shan Mountain Range of Central Asia, *Masters Thesis, UC Santa Barbara, 116. pp.* (Advisor: Bodo Bookhagen) Link

Smith, T (2011) - Petrogenesis of Highly Evolved Rocks in the Springerville Volcanic Field, Eastern Arizona, *Bachelor Thesis, Middlebury College, 98. pp.* (Advisors: Ray Coish and Chris Condit)

CONFERENCE PARTICIPATION

23. **International Mountain Conference 2025**
    - **T Smith** and B Bookhagen. *Strongly Heterogeneous Surface-Water Warming Trends in High Mountain Asia*
22. **European Geophysical Union 2025**
    - **T Smith** and B Bookhagen. *Strongly Heterogeneous Surface-Water Warming Trends in High Mountain Asia*
    - Y Yang, Q You, **T Smith**. *Dynamic Impacts of Eurasian Spring Snowmelt on Summer Heat Extremes in Northern East Asia*
21. **European Geophysical Union 2024**
    - **T Smith** and B Bookhagen. *River Temperature Gradients from Foreland to High-Mountain Environments*
20. **European Geophysical Union 2023**

- **T Smith** and N Boers. *How Low Can You Go? Implications of Spatial Aggregation for the Estimation of Ecosystem Resilience*

19. **Nonlinear Data Analysis and Modeling: Advances, Applications, Perspectives 2023**
    - **T Smith** and N Boers. *Progress on Data Reliability and Processing Best Practices for Resilience Estimation with Satellite Data*
18. **ForestSAT 2022**
    - **T Smith** and N Boers. *Global-scale Changes in Vegetation Resilience Mapped with Satellite Data*
17. **European Geophysical Union 2022**
    - **T Smith**, N Boers, and D Traxl. *Global-scale Changes in Vegetation Resilience Mapped with Satellite Data*
16. **European Geophysical Union 2021, Online**
    - **T Smith** and B Bookhagen. *Climatic and Biotic Controls on Topographic Asymmetry at the Global Scale*
15. **AI for Climate Hackathon**
    - Session Organizer: Changing Cryosphere
14. **European Geophysical Union 2020, Online**
    - **T Smith** and B Bookhagen. *Shaping Planetary Surfaces: The Impact of Water Mobility on Topography*
13. **YES Conference 2019, Potsdam**
    - Session Co-organizer - Data-driven Remote Sensing of Earth Surface Processes
12. **European Geophysical Union 2019, Vienna**
    - **T Smith**, A Rheinwalt, and B Bookhagen. *Determining the Optimal Grid Resolution for Topographic Analysis on an Airborne Lidar Dataset*
11. **European Geophysical Union 2018, Vienna**
    - **T Smith** and B Bookhagen. *The impacts of physical weathering regimes on large-scale slope distributions in High Mountain Asia and the Central Andes*
    - **T Smith**, B Bookhagen, and A Rheinwalt. *Spatiotemporal Trends in Snow-Water Storage and the Timing of Snowmelt in High Mountain Asia*
10. **Natural Hazards and Risks 2018, Potsdam**
    - **T Smith** and B Bookhagen. *Decadal trends in the timing of the snowmelt season in High Mountain Asia*
9. **European Geophysical Union 2017, Vienna**
    - **T Smith** and B Bookhagen. *Spatiotemporal Trends in the Timing and Volume of Snowfall in High Mountain Asia*
8. **FOSDEM Open Source Conference 2017, Brussels**
7. **European Geophysical Union 2016, Vienna**
    - I Crisologo, B Bookagen, **T Smith** and M Heistermann. *Using TRMM and GPM precipitation radar for calibration of weather radars in the Philippines*
6. **PyData 2016, Berlin**
5. **American Geophysical Union 2015, San Francisco**
    - **T Smith** and B Bookhagen. *Tracking Snowmelt Events in Remote High Asia Using Passive Microwave Data.*

4. **American Geophysical Union 2013, San Francisco**

   - **T Smith** and B Bookhagen. *Glacial Retreat and Associated Glacial Lake Hazards in the High Tien Shan.*

3. **Geological Society of America 2010, Denver**

   - **T Smith**, M Mnich, and C Condit. *Progress Towards Completed Mapping of the Springerville Volcanic Field, East-Central Arizona.*

2. **New England Geological Society of America 2010, Baltimore**

   - A Clark, **T Smith**, P Ryan, J Kim, H Mango. *Elevated Arsenic in Domestic Wells from the Taconic Allochthons in Southern Vermont* (Paper 79-35) (NEGSA, Baltimore, 2010)
   - G Springston, M Gale, J Kim, S Wright, L Becker, A Clark, **T Smith**. *Geologic Framework for Evaluating Groundwater Resources, Charlotte, VT* (Paper 39-6) (NEGSA, Baltimore, 2010)

1. **Geological Society of America 2009, Portland**

   - P Ryan, J Kim, A Clark, **T Smith**, D Chow, C Sullivan, K Bright. *Ultramafic Source of Arsenic in a Fractured Bedrock Aquifer*