Dr. Taylor Smith

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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 -	Postdoctoral Researcher 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 Intern and 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** (Universität Potsdam, 2021) - Training for University Pedagogy Link
- **Michelson Prize** (Universität 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** (Universität Potsdam, 2018) - Awarded for excellent teaching at the graduate level. Assessed based on course design, innovation, and student reviews

PEER-REVIEWED PUBLICATIONS

Journal Articles

19. 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. arXiv preprint arXiv:2310.18540 (2023). https://arxiv.org/abs/2310.18540
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.

Book Chapters

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.7009414https://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)

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

THESIS ADVISING

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

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 (Block Course, Winter 2016)

Graduate Teaching Assistant, UC Santa Barbara
Quantitative Geomorphology II (GEOG 288, Spring 2014)
Quantitative Geomorphology (GEOG 237, Winter 2013)
Groundwater (GEOG 116, Spring 2013)
Water Quality (GEOG 162, Winter 2012)
Oceans and Atmospheres (GEOG 3A, Fall 2012, 2013)

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

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

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*