

Travis M. Williams

Phone: (850) 510-3408
Email: Travis.Williams@colorado.edu
LinkedIn: www.linkedin.com/in/TravisMWilliams
Portfolio: WilliamsTravis.github.io

Research-oriented geographer with a focus on geospatial data modeling. Focused and detailed-oriented with an enthusiasm for graphics, presentation, and the development of interactive user interfaces. Experienced in a variety of GIS- and programming-oriented applications, adept at spatial and tabular data manipulation.

Education

Master of the Arts in Geography - University of Colorado Boulder Aug

Thesis: "Drought index-based insurance for the US cattle ranching industry" 2018

Focus: Climate risk management, drought, weather-based index insurance, geospatial analysis

Cumulative GPA: 3.90

Bachelor of Science in Geography - Florida State University Dec

Focus: GIS, Ecology, French

Minors: French, Biology

Cumulative GPA: 3.39 2009

Skills

GIS Interfaces: ArcGIS, QGIS, GRASS, & DIVA GIS

Coding Languages: Python, R, Geospatial Data Abstraction Library (GDAL), STATA, HTML, & SQL

Applications: Spatial and tabular data manipulation, online application development, econometrics, cloud-based data transfer and storage & imagery analysis

Research and Technical Experience

Research Assistant – *Earth Lab of the University of Colorado Boulder* Jan 2017 -

Present

- Use Python and R to perform and automate spatial analysis of earth systems data sets.
- Use GDAL and bash scripts to transform large raster datasets for analysis and storage.
- Optimize memory utilization to automate dataset building, manipulation and statistical analysis.
- Build automated web-scraping routines or corresponded with various organizations to acquire large climate, market, and policy data.
- Redesign existing weather index-based insurance system to accommodate drought indices for research into the efficacy of such a design in drought hazard mitigation.
- Develop and deploy interactive, online risk management and decision-making models through various web server applications and cloud-based virtual machines.
- Apply spatial and panel econometric methods to discover climate signals in

agricultural market data sets.

- Performed extensive literature review on the history of the Federal Crop Insurance program, cattle ranching in the US, and drought index development.
- Generate descriptive charts, maps, and other graphical representations of research results for publications.
- Update and maintain website content.

Apr 2014 -
May 2016

Research Assistant - *Agriculture Dept. of Southern Illinois University Carbondale*

- Used ArcGIS and SAS to perform spatial analysis into the performance of no-till and cover crop treatment on yield improvements concurrent with extensive research into the practices.
- Used soil survey data, soil content interpolations, and digital elevation model development along with topographical positioning algorithms to test for the effects of the interaction between soil and topography effects on grain yields.
- Collected, geocoded, and/or interpolated climate, yield, and research site information for a large meta-analysis of high-yield fertilizer studies using various GIS programs.
- Collected plant tissue and soil samples with truck mounted soil probes, SPAD and other devices.
- Performed KCL extractions and other laboratory tests for agricultural chemicals content.

Teaching Experience

Graduate Teaching Assistant – *Geography Dept. of the University of Colorado Boulder*

Fall 2016,
2017

GEOG 1972 - Geography of the Environment and Society

- Taught three recitations per term, 25-30 students per recitation
- Content involved human-Earth system interactions, theories of resource management, and natural hazard mitigation.
- Combination of content review, group activity, one on one counseling, and grading.
- Focused on connecting course content with current events and engaging students in discussion.

GEOG 1982 - World Regional Geography

Summer
2017

- Taught one recitation, 21 students
- Content involved features of five major world regions with a particular focus on culture and social injustice.

Publications

Shrum, T., W.R. Travis, **T. Williams**, E. Lih. "Managing climate risks on the ranch with limited drought information". *Climate Risk Management*, vol. 20, pp. 11-26, 2018.

<https://doi.org/10.1016/j.crm.2018.01.002>

Williams, Travis M. "Drought Index-Based Insurance for the US Cattle Ranching Industry". Geography Graduate Theses & Dissertations. 123, 2018.

Williams, Travis M. and William R. Travis. "Evaluating alternative drought indicators in a weather index insurance instrument." *Weather, Climate, and Society*, vol. 11, pp. 629-649, 2019.

<https://doi.org/10.1175/WCAS-D-18-0107.1>

Visualization Samples

The following is a sample list of interactive, cartographic models that I have designed to support research into drought and climate risk management at the University of Colorado. The underlying data was transformed using GDAL, Python, QGIS, or R. The model calculations are performed primarily in Python, and the applications are served using Plotly's DASH platform, NGINX, Green Unicorn, and either Amazon Web Services or Digital Ocean.

Drought Index Comparison Tool:

This tool brings together a suite of drought indices for quick comparison. It allows the user to select a panel of four indices from a selection of twelve, though I will be adding to this list as I come across the need to assess more data sets. For each index and for any period between 1948 and 2017, a map can be generated using one of a variety of spatial functions (mean percentiles, coefficient of variation, etc.). A time series of values can be generated for any location in the Contiguous United States. It also allows for quick adjustments to the color scale used in each map. In addition to comparisons between indices, this program is designed to help users to identify extremes in any one index.

<https://climate-scatterplot.space>

Insurance Model #1:

This model assesses the performance of a rainfall-based insurance program provided by the U.S. Dept. of Agriculture (USDA). This insurance program bases payment only on precipitation deficits. The program, "Pasture, Rangeland, and Forage" (PRF), is intended to provide livestock producers protection against losses due to precipitation deficits. Policyholders are often displeased with the timing of payments because of the inability of simple rainfall measurements to fully indicate losses to rangeland productivity. Many of these producers pay close attention to the U.S. Drought Monitor (USDM), which provides a more sophisticated assessment of water shortages. These producers are more likely to complain to the USDA if they don't receive payment when the USDM indicates drought. So, I designed the following application to show potential policyholders when and where the PRF is likely or unlikely to align with the USDM.

<https://www.earthlab-riskappone.org>

Insurance Model #2:

This application compares a set of experimental weather index-based insurance models that I designed around the structure of the PRF (described above). It shows the spatial and temporal distribution of insurance payments, premiums, and other outputs based on a suite of drought indices in place of rainfall.

<https://www.earthlab-riskapptwo.org/>

References

William R. Travis

University of Colorado Boulder - Geography Department

Associate Professor

(303) 492-6312

William.Travis@Colorado.edu

Rachel L. Cook

North Carolina State University - Department of Forestry and Environmental Resources

(Previously, Southern Illinois University)

Assistant Professor

(919) 515-5979

rlcook@ncsu.edu

Trisha R. Shrum

University of Vermont – Community Development and Applied Economics

(Previously, University of Colorado Boulder)

Assistant Professor

(802) 656-8117

Trisha.Shrum@uvm.edu