

# COLIN BRUST

WEBSITE: <https://colinbrust.com>

GITHUB: <https://github.com/colinbrust>

## WORK EXPERIENCE

---

January 2022 - Present	<b>Montana Climate Office</b> <i>Climate Data Specialist</i> <ul style="list-style-type: none"><li>• Develop, manage, and deploy the Montana Mesonet API using <b>FastAPI</b>, <b>Docker</b>, and <b>Caddy</b>.</li><li>• Maintain and monitor the <b>PostgreSQL</b> database hosting all weather station data for the state of Montana.</li></ul>
January 2021 - December 2021	<b>Numerical Terradynamic Simulation Group</b> <i>Research Scientist</i> <ul style="list-style-type: none"><li>• Conduct research on a <b>machine learning</b> method of forecasting drought in the United States using <b>PyTorch</b>.</li><li>• Maintain and improve the operational NASA MODIS MOD17 gross primary production algorithm using <b>Python</b> and <b>R</b>.</li></ul>
January 2019 - December 2020	<b>Numerical Terradynamic Simulation Group</b> <i>Student Research Scholar</i> <ul style="list-style-type: none"><li>• Implemented a new soil moisture-constrained version of the MOD16 evapotranspiration algorithm in <b>Google Earth Engine</b>, decreasing model error by 31%.</li><li>• <b>Collaborated</b> with peers to write and edit a manuscript that was published in the journal <i>Remote Sensing of Environment</i>.</li><li>• Aggregated and normalized remote sensing and NASS crop data to use as inputs for a hydroeconomic model that forecasts crop price and production for the upcoming growing season.</li></ul>
May 2019 September 2019	<b>Arable Labs Inc.</b> <i>Data Visualization Consultant</i> <ul style="list-style-type: none"><li>• Created web applications that visualized climate data, satellite imagery, and crop phenology using <b>Python</b>, <b>SQL</b> and <b>Flask</b>.</li><li>• Wrote and shared code in a collaborative environment using <b>Git</b>.</li></ul>
September 2016 - August 2018	<b>Montana Climate Office</b> <i>Intern</i> <ul style="list-style-type: none"><li>• Gathered land use data from a variety of sources to calculate the area of all agricultural land in Montana using <b>ArcGIS</b>.</li><li>• Used <b>R</b> to download, normalize, and visualize data from five gridded climate datasets to determine which product was most accurate across Montana.</li></ul>

## EDUCATION

---

January 2018 - December 2020	<b>M.S. University of Montana</b> <b>Major:</b> Systems Ecology <b>GPA:</b> 3.95 <b>Thesis Title:</b> Using Satellite Observations of Soil Moisture to Improve Modeling of Terrestrial Water Cycles
August 2014 - May 2018	<b>B.S. University of Montana, Davidson Honors College</b> <b>Major:</b> Resource Conservation <b>Minors:</b> Spanish, Climate Change Studies <b>Certificates:</b> Geographic Information Systems Certificate, Global Leadership Initiative Scholar <b>GPA:</b> 3.94

## PUBLICATIONS & PRESENTATIONS

---

- Brust, C., Kimball, J. S., Maneta, M. P., Jencsoi, K., and Reichle, R. H. 2021. DroughtCast: A Machine Learning Forecast of the United States Drought Monitor, *Frontiers in Big Data*.
- Bajgain R, Xiao X, Wagle P, Kimball JS, Brust C, Basara JB, Gowda P, Starks PJ, Neel JPS. 2021. Comparing Evapotranspiration Products of Different Temporal and Spatial Scales in Native and Managed Prairie Pastures. *Remote Sensing*. 13(1):82.
- Brust, Colin W., Using Satellite Observations of Soil Moisture to Improve Modeling of Terrestrial Water Cycles. 2020. *Graduate Student Theses, Dissertations, & Professional Papers*. 11671.
- Brust C, Kimball J, Maneta M, Jencso K, He M, Reichle R. 2021. Using SMAP Level-4 soil moisture to constrain MOD16 evapotranspiration over the contiguous USA. *Remote Sensing of Environment*. 255:112277.
- Brust C, Kimball J, Maneta M, Jencso K, Reichle R. 2021. DroughtCast: A Machine Learning Forecast of the U.S. Drought Monitor. *Frontiers in Big Data: Data-driven Climate Sciences*. <https://doi.org/10.3389/fdata.2021.773478>
- Brust C, Kimball J, Maneta M, Jencso K, He M Reichle R. 2019. Using SMAP Soil Moisture to Constrain MOD16. Poster presented at 2019 American Geophysical Union conference, San Francisco, CA.
- He M, Kimball J, Brust C, Maneta M. 2019. Satellite Data-driven Modeling of Field Scale Evapotranspiration in Croplands Using the MOD16 Algorithm Framework. Presentation given at 2019 Universities Council on Water Research, Snowbird, UT.
- Whitlock C, Cross W, Maxwell B, Silverman N, Wade AA. 2017. 2017 Montana Climate Assessment: [Climate Chapter](#). Bozeman and Missoula MT: Montana State University and University of Montana, Montana Institute on Ecosystems. 318 p. doi:10.15788/m2ww8w.

## PROGRAMMING & SOFTWARE EXPERIENCE

---

Python, Google Earth Engine, Docker, FastAPI, Neo4j, PyTorch, Caddy, Flask, R, Leaflet, Shiny, ArcGIS, QGIS, SQL, Git, LaTeX, Microsoft Office Suite