

Positions

- **Assistant Professor** **2021 to Present**
University of Wyoming -- Wyoming Geographic Information Science Center (WyGISC)
- **Postdoctoral Research Scholar** **2020 to 2021**
University of California, Los Angeles

Education

University of California, Los Angeles

Ph.D. Geography. 2020

Dissertation: "Magnitudes, mechanisms, and effects from large-scale lacustrine changes"

M.A. Geography. 2015

Thesis: "ICESat derived lithospheric flexure as caused by an endorheic lake's expansion on the Tibetan Plateau and its rheological constraints"

B.A. Geography, *magna cum laude* with Departmental Honors. 2012

Minor: Geospatial Information Systems & Technologies

Honors Thesis: "Sustainable farming methods with concern to water usage of Ventura County agriculture: Do local aquifer levels play a role on agriculture in the Oxnard and Pleasant Valley Basins of Ventura County?"

Research Summary

Austin Madson attained his Ph.D. from the UCLA Department of Geography (2020) and has research interests in varying types of geomorphologic/hydrologic/cryologic remote sensing (RS) (deglaciation, lake dynamics, soil moisture, land subsidence, thaw slumping, permafrost active layer thickness, groundwater, mass wasting, landslide and glacier movements, etc.), geodesy, Raspberry Pi projects, cluster computing, data processing parallelization, data visualization, open-source programming, low-cost GNSS hardware, autonomous rover and UAV construction, sensor fusion, UAS data acquisition, SfM, lidar and radar (PolSAR, InSAR, pixel offsets) RS techniques, real world applications in the use of RS and GIS, and the integration of RS and GIS technologies.

Honors/Awards/Grants/Proposals

- Principal Investigator – ASI COSMO-SkyMed Proposal ID716: Lithospheric deflection from seasonal hydrologic loading and unloading at the Three Gorges Reservoir, 2019.
- Principal Investigator – DLR TanDEM-X Proposal HYDR2283: DEMs for Hydrologic and Cryospheric Volume, 2019.
- Departmental Teaching Award Recipient: Given annually to the top TA in the department as determined by a departmental honors' committee, 2018.
- Co - Principal Investigator – XSEDE Proposal TG-EAR160041: Remote Sensing for High Resolution Landslide & Glacier Kinematic Measurements Utilizing Vast Spaceborne and Airborne Radar Datasets, 2017.
- Principal Investigator – DLR TerraSAR-X Proposal LAN3344 & LAN3340: Seasonal

- Landslide Flow Rate Fluctuations on the Palos Verdes Peninsula in Southern California, 2017 & Landslide Kinematic Measurements from TSX Data in Southwest Colorado, 2016.
- UCLA Graduate Summer Research Mentor Program Recipient: Received a grant to conduct summer research, 2015 & 2016.
 - Highly Commended Paper: The Undergraduate Awards – Agricultural and Environmental Sciences, 2012.
 - Blackman Family Award Recipient: Given to graduating undergraduates in the Geography and Geography/ Environmental Studies majors with the highest GPA, 2012.

Affiliations/Memberships

- American Geophysical Union (AGU) 2012 to Present
- Association of American Geographers (AAG) 2012 to Present
- American Society for Photogrammetry and Remote Sensing (ASPRS) 2015 to Present

Employment

- Mad Nadir Mapping. **Sole Proprietor** (2019 to Present) Research consultant for data science, UAV, lidar and sensor fusion applications for industry partners/clients
- UCLA Department of Geography. **Graduate Student Researcher** (Summer 2018, 2019, & 2020)
- UCLA Department of Geography. **Instructor** (Summer 2018 & 2019)
- UCLA Department of Geography. **Teaching Assistant** (2013), **Associate** (2014), and **Fellow** (Fall 2016 – Spring 2020)
- UNAVCO. **Geodetic Data Processor** (Summer 2014 & 2015) Produced and integrated *in situ* and remotely sensed Earth science data products for undergraduate geoscience teaching modules
- NASA DEVELOP/SSAI. DEVELOP Jet Propulsion Laboratory **Center Lead** (2012 – 2013) Formulated, led, and mentored 2-3 research teams per quarter in intensive Earth science research projects
- NASA DEVELOP/SSAI. DEVELOP Jet Propulsion Laboratory **Research Intern** (2011 – 2012) Undertook research on intensive applied Earth science research

Teaching Experience

Instructor – 2 Quarters of Experience

- Geog7 – Introduction to Geographic Information Systems (**x2**)
- Geog167 – Cartography (**x1**)

Teaching Assistant/Associate/Fellow – 18 Quarters of Experience

- Geog5 – People and Earth's Ecosystems (**x2**)
- Geog7 – Introduction to Geographic Information Systems (**x1**)
- Geog169 – Satellite Remote Sensing & Imaging Geographic Information Systems (**x1**)
- Geog170 – Advanced Geographic Information Systems (**x5**)

- Geog172 – Remote Sensing: Digital Image Processing & Analysis (**x1**)
- Geog173 – Geographic Information Systems Programming & Development (**x6**)
- Geog174 – Advanced Remote Sensing (**x2**)

Research/Technical Experience

- Experienced in the creation of cluster computing workflows for large-scale processing of spatial data arrays (modeled and remotely sensed)
- Experienced in cloud-based open-source spatial data processing workflows on extremely large datasets (hundreds of billions of data points)
- Experienced in scientific programming (bash and python) to process radar, lidar, multispectral, hyperspectral, gravity, *in situ* (SWE, surface water, groundwater, soil moisture, and GNSS) data to successfully answer scientific questions
- Experienced in plotly, matplotlib, postgresql, postgis, gdal, shapely, pandas/geopandas, numpy, scipy, folium, arcpy, envi, arcgis, qgis, dask, gmt, etc.
- Experienced in the design and building of self-contained *in situ* GNSS sensor swarms - Including power design and weatherproofing
- Experienced in the design and building of ground and air-based unmanned rovers for scientific data acquisition. Including sensor fusion of lidar, multispectral cameras, IMU, and GNSS
- Experienced in formulating and running GNSS and UAS field campaigns
- Design and utilization of cloud-based InSAR and dense pixel offset processing workflows from large SAR datasets to quantify land deformation
- Experienced in CAD design and additive manufacturing of custom UAV/lidar components

Side Projects

- MadNadirMapping – Plug-and-play UAV-based lidar solutions along with hardware & software consulting <www.MadNadirMapping.com>
- Mapping commuter routes from/to the San Fernando Valley to/from Santa Monica based on ~500,000 Google Maps Directions API calls to determine the spatial divides of commuter routes through time based on historical traffic data
- Machine learning for automated bird of prey notifications in the Santa Monica Mountains

Short Courses

- XSEDE HPC Workshop Summer Boot Camp. June 2 – 5. 2020. Online
- Advanced Computing and Data Analytics using Comet. November 9, 2019. UCLA. Los Angeles, CA
- UCLA Annual TA Pedagogy Workshop. Fall Quarter: 2014, 2015, 2016, 2017, 2018, & 2019
- InSAR Processing and Theory with GMTSAR: Sentinel-1A Time Series. August 16 - 18, 2017. Scripps Institution of Oceanography. La Jolla, CA
- Crustal Deformation Modeling Tutorial and Workshop. June 26 - 30, 2017. Colorado School of Mines. Golden, CO
- Advanced InSAR Processing. June 29 - July 2, 2015. UNAVCO. Boulder, CO
- InSAR: An introduction to Processing and Applications using ISCE and GIAN-T. August 4 - 6, 2014. UNAVCO. Boulder, CO

Publications

- **Madson, A.**, & Sheng, Y., Coulomb stress analysis for several filling and operational scenarios at the Grand Ethiopian Renaissance Dam impoundment, *Environmental Earth Sciences* 80.7 (2021): 1-17. <https://doi.org/10.1007/s12665-021-09591-w>
- **Madson, A.**, & Sheng, Y., Reservoir Induced Deformation Analysis for Several Filling and Operational Scenarios at the Grand Ethiopian Renaissance Dam Impoundment, *Remote Sensing* 12.11 (2020). <https://doi.org/10.3390/rs12111886>
- Yuan, T., Lee, H., Yu, H., Jung, H., **Madson, A.**, Sheng, Y., & Beighley, E. Mapping forested floodplain topography using InSAR and radar altimetry. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, (2020). <https://doi.org/10.1109/JSTARS.2019.2956400>
- Gillespie, T. W., **Madson, A.**, Cusack, C. F., & Xue, Y., Changes in NDVI and human population in protected areas on the Tibetan Plateau. *Arctic, Antarctic, and Alpine Research*, 51(1), 428-439, (2019). <https://doi.org/10.1080/15230430.2019.1650541>
- **Madson, A.**, Fielding, E., Cavanaugh, K., Sheng, Y., High-resolution spaceborne, airborne, and in situ landslide kinematic measurements of the Slumgullion Landslide in Southwest Colorado. *Remote Sensing* 11.3 (2019). <https://doi.org/10.3390/rs11030265>
- Sheng, Y., **Madson, A.**, Song, C., 2.02 GIS for Paleo-limnological studies, In Comprehensive Geographical Information Systems, edited by Bo Huang, Elsevier, Oxford, (2018), Pages 28-36, ISBN 9780128047934, <https://doi.org/10.1016/B978-0-12-409548-9.09632-9>.
- **Madson, A.**, Sheng, Y., Song, C., ICESat-derived lithospheric flexure as caused by an endorheic lake's expansion on the Tibetan Plateau and the comparison to modeled flexural responses. *Journal of Asian Earth Sciences*, (2017). <https://doi.org/10.1016/j.jseaes.2017.08.028>
- Song, C., Sheng, Y., Wang, J., Ke, L., **Madson, A.**, & Nie, Y. Heterogeneous glacial lake changes and links of lake expansions to the rapid thinning of adjacent glacier termini in the Himalayas. *Geomorphology*, (2017) pp. 280, 30-38. <https://doi.org/10.1016/j.geomorph.2016.12.002>

Under Review

- Song, C., **et al.**, Modern-era drainage reorganization driven by climate change in the Tibetan Plateau.

In Preparation

- **Madson, A.** & Sheng, Y., Automated Water Level and Storage Monitoring at the Continental Scale from ICESat-2 ATLAS Photons.
- **Madson, A.** & Gillespie, T. W., Monthly and seasonal shifts in Hawaiian vegetation health from a multidecadal NDVI time series.
- **Madson, A.**, et al., InSAR derived deformation from seasonal loading and unloading at the Three Gorges Reservoir.

Presentations

- **Madson, A.**, Low-cost landslide GNSS monitors and a ground-based all-wheel drive rover for precise surface elevation transects. *American Geophysical Union*, 2019 Fall Meeting, San

Francisco, CA.

- **Madson, A.**, A comparison of several of the latest high-resolution spaceborne, airborne, and in situ landslide kinematic measurement techniques utilizing the Slumgullion Earthflow Natural Laboratory in Southwest Colorado. *American Geophysical Union*, 2016 Fall Meeting, San Francisco, CA.
- **Madson, A.**, ICESat derived crustal flexure as caused by the expansion of an endorheic lake on the Tibetan Plateau. *American Geophysical Union*, 2015 Fall Meeting, San Francisco, CA.
- **Madson, A.**, Barron, S., Sehler, R., Sacramento-San Joaquin Delta disasters and water resources: NASA radar remote sensing for levee health assessment. *Association of American Geographers*, 2013 Annual Meeting, Los Angeles, CA.
- **Madson, A.**, RADAR Love – NASA DEVELOP students utilize airborne radar data for a variety of uses. 2012, *Ignite@AGU*, Infusion Lounge, San Francisco, CA
- **Madson, A.**, Laygo, K., O’Connell, K., Utilizing radar remote sensing to assess the water extent along river levees. *American Geophysical Union*, 2012 Fall Meeting, San Francisco, CA.
- **Madson, A.**, Laygo, K., Gorelik, S., Central US disasters: visualizing the New Madrid Earthquake Seismic Zone for improved hazard assessments. 2012, *NASA DEVELOP Closeout Featured Presentation Session*, NASA Headquarters, Washington D.C.