

Colby W. Brungard

CONTACT INFORMATION	New Mexico State University Department of Plant and Environmental Sciences Skeen Hall Room N324 Box 30003 MSC 3Q Las Cruces, NM 88003 USA	<i>Work:</i> (575) 646-1907 <i>Cell:</i> (575) 636-8941 cbrung@nmsu.edu
EDUCATION	Utah State University, Ph.D., Soil Science, August, 2014 <ul style="list-style-type: none">• Dissertation Title: Advancing Digital Soil Mapping and Assessment in Arid Landscapes• Advisor: Dr. Janis L. Boettinger• Area of Study: Digital Soil Mapping M.S., Soil Science, October, 2009 <ul style="list-style-type: none">• Thesis Title: Alternative Sampling and Analysis Methods for Digital Soil Mapping in Arid Rangelands of Southwestern Utah, USA.• Advisor: Dr. Janis L. Boettinger• Area of Study: Pedology, Taxonomy, and Digital Soil Mapping B.S., Physical Geography, December 2006 <ul style="list-style-type: none">• <i>Valedictorian, College of Natural Resources</i>	Logan, Utah, USA
PROFESSIONAL EXPERIENCE	Assistant Professor Dept. of Plant and Environmental Sciences, New Mexico State University	Aug 2016–present
	Post-Doctoral Research Scientist Dept. of Plants, Soils and Climate, Utah State University	May 2014–Aug 2016
	<ul style="list-style-type: none">• Modeled biological soil crust potential at site-specific and landscape scales• Mentored two graduate students in rare plant data analysis• Supervised two undergraduate students in laboratory data collection	
	Graduate Research Assistant Dept. of Plants, Soils and Climate, Utah State University	Jan 2007–May 2014
	<ul style="list-style-type: none">• Investigated the soil properties governing threshold friction velocity as a first step towards spatial wind erosion modeling• Investigated the application multiple machine learning algorithms for soil mapping in arid landscapes of Utah, Wyoming, and New Mexico• Performed approximately 4 summers of field soil sampling• Supervised 11 undergraduate students in field and laboratory data collection practices	
	Undergraduate Research Assistant Dept. of Plants, Soils and Climate, Utah State University	Nov 2005–Jan 2007

- Performed soil testing for physical and chemical properties
- Assisted with field soil sampling

GIS Technician

Jun 2005–Aug 2005

USDI Bureau of Land Management, Shoshone, Idaho USA

- Worked closely with specialists to manage relevant GIS data
- Created and maintained cave and OHV trail inventory and spatial database

Assistant Manager

Nov 2004–Feb 2005

Geospatial Teaching Lab, College of Natural Resources. Utah State University

- Managed GIS database and software licensing to support teaching efforts

PUBLICATIONS

Zeraatpisheh, M., Ayoubi, S., **Brungard, C.**, Pinke, P. Submitted. Disaggregating and Updating a Legacy Soil Map Using DSMART, Fuzzy c-means and K-means Clustering Algorithms in Central Iran. *Geoderma*, submission number GEODER_2018_1473.

Pahlavan-Rad, M.R., Dahmardeh, K., **Brungard, C.B.**. 2018 (Accepted). Predicting soil organic carbon concentrations in a low relief landscape, eastern Iran. *Geoderma Regional*. <https://doi.org/10.1016/j.geodrs.2018.e00195>

Chaney, N., **Brungard, C.W.**, Herman, J.D., McBratney, A.B., Minasny, B., Morgan, C.L.S., Nauman, T.W., Wood, E.F., Yimam, Y.(in revision). POLARIS properties: 30-meter probabilistic maps of soil properties over the contiguous United States. *Water Resources Research*.

Peters, D.P.C., Burruss, N.D., Rodriguez, L.L., McVey, D.S., Elias, E.H., Pelzel-McCluskey, A.M., Derner, J.D., Schrader, T.S., Yao, J. Pauszek, S.J., Lombard, J., Archer, S.R., Bestelmeyer, B.T., Browning, D.M., **Brungard, C.W.**, Hatfield, J.L., Hannan, N.P., Herrick, J.E., Okin, G.S., Sala, O.E., Savoy, H., Vivoni, E.R. 2018. An integrated view of complex landscapes: a big data-model integration approach to trans-disciplinary science. *BioScience*, 68:9, pp. 653669. <https://doi.org/10.1093/biosci/biy069>

Fan, Zhasheng, Wills, S., Herrick, J., Nauman, T., **Brungard, C.W.**, Beaudette, D., Levi, M, O’Geen, A. 2018. Approaches for improving field soil identification. *Soil Sci. Soc. Am. Journal*. doi:10.2136/sssaj2017.09.0337

Ramcharan, A., Hengl, T., Nauman, T., **Brungard, C.W.**, Waltman, S., Wills, S., Thompson, J. 2018. Soil Property and Class Maps of the Conterminous United States at 100-Meter Spatial Resolution. *Soil Sci. Soc. Am. Journal*. doi:10.2136/sssaj2017.04.0122

Pahlavan-Rad, M.R., Khormali, F., Toomanian, N., **Brungard, C.W.**, Kiani, F., Komaki, C.B., Bogaert, P. 2016. Legacy soil maps as a covariate in dig-

ital soil mapping: a case study from Northern Iran. *Geoderma*.279, 141-148. <http://dx.doi.org/10.1016/j.geoderma.2016.05.014>

Chaney, N.W., Hempel, J.W., McBratney, A.B., Nauman, T.W., **Brungard, C.W.**, Odgers, N., Wood, E.F. 2016. POLARIS: A 30-meter Probabilistic Soil Series Map of the Contiguous United States. *Geoderma*. 274, 54-67. doi:10.1016/j.geoderma.2016.03.025

Brungard, C.W., Boettinger, J.L., Hipps, L.E. 2015. Wind Erosion Potential of Lacustrine and Alluvial Soils Before and After Disturbance in the Eastern Great Basin, USA: Estimating Threshold Friction Velocity Using Easier-to-Measure Soil Properties. *Aeolian Research*, 18, pp. 185-203.

Brungard, C.W., Boettinger, J.L., Duniway, M.C., Wills, S.A., Edwards Jr., T.C. 2015. Machine learning for predicting soil classes in three arid landscapes. *Geoderma*, 239–240, pp. 68-83.

Pahlavan Rad, M.R., Toomanian, N., Khormali, F., **Brungard, C.W.**, Komaki, C.B., Bogaert, P. 2014. Updating soil survey maps using random forest and conditioned Latin hypercube sampling in the loess derived soils of northern Iran. *Geoderma*, 232–234, pp.97–106.

Brungard, C.W., Boettinger, J.L. 2012. Spatial prediction of biological soil crust classes: value added DSM from soil survey, in: Minasny, B., Malone, B.P., McBratney, A. (Eds.), *Digital Soil Assessments and Beyond: Proceedings of the 5th Global Workshop on Digital Soil Mapping*. CRC Press, Sydney Australia, pp. 57-60.

Brungard, C.W., Boettinger, J.L. 2010. Application of Conditioned Latin Hypercube Sampling for Digital Soil Mapping of Arid Rangelands in Utah, USA, in: Boettinger, J.L., Howell, D.W., Moore, A.C., Hartemink, A.E., Kienast-Brown, S. (Eds.), *Digital Soil Mapping: Bridging Research, Production, and Environmental Application, and Operation*. Springer, Dordrecht, pp. 67-78.

Non-Peer Reviewed

Brungard, C., Johanson, J. 2015. The gates locked! I cant get to the exact sampling spot . . . can I sample nearby? *Pedometron*, 37, pp. 8-10.

In preparation

Duniway, M.C., **Brungard, C.W.**, Boettinger, J.L. Digital soil mapping of soil properties and historical aerial photo analysis as tools for developing and testing ecological site concepts. Anticipated submission: Summer 2016 to *Soil Science Society of America Journal*.

Brungard, C.W., Boettinger, J.L., Symanzik, J. Spatial variability of soil surface properties, Anticipated submission to Soil Science Society of America.

EXTERNAL
FUNDING

2018-2019. National Science Foundation. "LTER: Long-Term Research at the Jornada Basin (LTER (VII))" CoPI: Brungard, C., \$XXX
2017-2020. Cooperative Ecosystem Studies Unit (CESU). United States Geological Survey. PI: Brungard, C. \$10,000

2017-2018. Water Resources Research Institute. "Digital Soil Mapping for Improving Hydrological Modeling". PI: Brungard, C. \$45,285

2017-2022. USDI Bureau of Land Management. "Tools and Techniques for Biological Soils Crust Survey". PI: Brungard, C. Co-PI: Pietrasiak, N. \$65,978.

2015-2017. Utah Division of Wildlife Resources. "Interactive effects of soils and browsing on sagebrush: implications for restoration success." PI: Veblen, K. Research Partners: Nehring, K., Boettinger, J., Schupp, E., Thacker, E., Villalba, J., **Brungard, C.**, Duniway, M., Monaco, T., Scott, A., Shannon, J, Nielson, N., Wood, C., Wallace, G., Eddington, D., Mitchell, D. \$13,508 (total award \$137,000)

*2015 USDA Forest Service. "Soil characteristics of interior west forests". PI: Boettinger, J.L. Co-PI: **Brungard, C.W.** \$11,000.

*2012-2014 USDA Natural Resources Conservation Service. "Digital soil mapping of soil properties and historical aerial photo analysis as tools for developing and testing ecological site concepts". PI: Duniway, M. Co-PI: **Brungard, C.W.**. Collaborator: Baker, B. \$39,426.

2010-2011 USDA Natural Resources Conservation Service. Use of the LabSpec-2500 VNIR spectrometer to Investigate Utility in Predicting Soil Carbon. "NO COST" Loan of \$50,000 VNIR Spectrometer.

2010 DigitalGlobe. "8-Band Research Challenge". PI: **Brungard, C.W.** 106 km² Worldview-2 satellite image.

**PhD candidates and postdoctoral researchers restricted to Co-PI only*

COOPERATIVE
AGREEMENTS

Predictive Soil-Site Mapping Project Jun 2015–Jun 2020
• Cooperative agreement with the Natural Resources Conservation Service Soil Survey Program to test the ability of digital soil mapping techniques to improve the development of ecological site concepts for upland, wetland, and riparian ecosystems in Maine, Vermont, New Hampshire, Connecticut, and New York.

TEACHING
EXPERIENCE

Instructor

Soils, Water, and the Environment (2010–3 cr) Jan–May 2016
• Introduced 100 non-science students to basic principals of earth and soil science.

University Connections (1010–2 cr) June–Sept 2015
• Instructed incoming freshmen about the purpose of higher education.
• Introduced students to university resources, optimal study habits, time management, and university course selection.

Soils, Water, and the Environment (2010–3 cr) Jan–May 2015
• Introduced 100 non-science students to basic principals of earth and soil science.

Soil Genesis, Morphology and Classification (5130/6130–4 cr) Sept–Dec 2007
• Introduced upper division undergraduate and graduate students to pedology, including taxonomic classification.
• Used weekly outdoor laboratory instruction to guide students to develop the necessary skills to describe, classify, and interpret soils in the field.

Graduate Teaching Assistant

Soil Genesis, Morphology and Classification (5130/6130) Sept–Dec 2012
Soils, Water, and the Environment (2010) Sept–Dec 2008

Undergraduate Teaching Fellow

Climate Change (3820) Sept–Dec 2004

PROFESSIONAL
PRESENTATIONS

Invited Presentations

Brungard C.W. and J.L. Boettinger. 2010. "Digital Soil Mapping of Soil Attribute and Taxonomic Classes with Random Forests in Arid Rangelands, Utah, USA." National Soil Survey Center, 20-22 July, 2010, Lincoln, Nebraska.

Volunteered Presentations

International

Malone, B, Brungard, C., Minasny, B., McBratney, A. 2017. Useful applications of conditioned Latin hypercube sample for digital soil mapping. Abstract # 186. Pedometrics 2017, Wageningen, NL.

Brungard, C., Lopez-Brody, N. 2017. Thermal remote sensing for digital soil mapping. Abstract # 147. Pedometrics 2017, Wageningen, NL.

Pahlavan-Rad, M., Shahriari, Ali, Hadizadeh, M. Eftekhari, K., Brungard, C. 2017. Predicting soil organic carbon in Ap horizons in Sistan region, eastern

Iran. Abstract # 234. Pedometrics 2017, Wageningen, NL.

Pahlavan-Rad, M., Moghaddam, A.R.A., Dahmardeh, K. Brungard. C. 2017. Digital mapping of soil salinity in eastern Iran. Abstract # 245. Pedometrics 2017, Wageningen, NL.

Brungard, C.W., Bottinger, J.L., Hipps, L. 2015. "Wind Erosion Potential of Lacustrine and Alluvial Soils Before and After Disturbance in the Eastern Great Basin, USA: Estimating Threshold Friction Velocity Using Easier-to-Measure Soil Properties". Abstract #63956. American Geophysical Union Fall meeting. San Francisco, CA.

Levi, M., Nauman, T., Bestelmeyer, B.T., Brown, J.R., Brungard, C.W., Libohova, Z., Duniway M., Johansen J. 2015. "Considerations for applying digital soil mapping to ecological sites". 2015 National Cooperative Soil Survey National Conference. Duluth, MN.

Brungard, C.W., Duniway, M.C., Baker, B., Johanson, J. 2014. "Digital Soil Mapping of Soil Properties for Ecological Sites". Abstract #417-5. Soil Science Society of America International Annual Meeting, Long Beach, CA.

Skidmore, T.J., Brungard, C.W. 2014. "Towards developing a soil property visualization tool to support the NRCS soil data join re-correlation (SDJR) effort". Soil Science Society of America International Annual Meeting, Long Beach, CA.

Brungard, C.W., Boettinger, J.L., Edwards, T.C. 2013. "The limitations of data mining for digital soil mapping: implications for soil survey programs". Pedometrics 2013, Nairobi, Kenya.

Brungard, C.W. and J.L. Boettinger. 2011. "Spatial Prediction of Ecological Site and Biological Soil Crust Classes in Canyonlands National Park." Soil Science Society of America International Annual Meeting, 16-19 October, 2011, San Antonio, Texas.

Brungard, C.W. 2011. "Spatial Prediction of Soil Carbon Using WorldView-2 Imagery and Elevation Data for a Desert Wetland Ecosystem, Utah, USA." Soil Science Society of America International Annual Meeting, 16-19 October, 2011, San Antonio, Texas.

Brungard, C.W. and J.L. Boettinger. 2010. "Predicting Soil Attribute and Taxonomic Classes Using Random Forests in Arid Rangelands, Utah, USA." 4th Global Workshop on Digital Soil Mapping, Rome, Italy.

Brungard, C.W. and J.L. Boettinger. 2009. "From Pedon to Prediction: Innovative Methods for Predicting Soil Distribution on the Landscape." Soil Science Society of America International Annual Meeting, Pittsburgh, Pennsylvania.

Brungard, C.W. and J.L. Boettinger. 2008. "Application of Conditioned Latin

Hypercube Sampling for Digital Soil Mapping of Arid Rangelands in Utah, USA." 3rd Global Workshop on Digital Soil Mapping, 30 September - 3 October 2008, Utah State University, Logan, Utah.

National

Brungard, C.W., Boettinger, J.L. 2015. "Spatial predictions of biological soil crust class: a value added soil survey product". National Cooperative Soil Survey National Conference, Duluth, MN.

Kienast-Brown, S., **Brungard, C.W.**, D'avello, T. 2015. "Applying Random Forests Probabilities for Mapping Soil Classes in Remote Areas Boundary Waters Canoe Area Wilderness (BWCA)". National Cooperative Soil Survey National Conference, Duluth, MN.

Brungard, C.W., Johanson, J. 2014. "Digital Soil Mapping and Ecological Site Descriptions: the potential". Society for Range Management 67th Annual International Meeting, Technical Training & Trade Show. Orlando, FL.

Brungard, C.W., 2014. "Digital Soil Mapping Methodologies". Digital soil mapping - ecological sites workshop. Las Cruces, NM.

Brungard, C.W., Duniway, M.C. 2014. "Digital soil mapping and ecological sites". Digital soil mapping - ecological sites workshop. Las Cruces, NM.

Brungard, C.W. 2012. "Spatial Prediction of Ecological Site and Biological Soil Crust Classes in Canyonlands National Park." Society for Range Management Workshop on Ecological Site Description and State-and-Transition Model Development, Spokane, Washington.

Brungard, C.W. and J.L. Boettinger. 2011. "Predicting Biological Soil Crust and Ecological Site Classes Using Polygon, Topographic, and Spectral Data. National Cooperative Soil Survey Conference, Asheville, North Carolina.

Regional

Brungard, C.W. and J.L. Boettinger. 2011. "Spatial Prediction of Potential Biological Soil Crust Classes in and Around Canyonlands National Park: Implications for Management." 11th Biennial Conference of Research on the Colorado Plateau, Flagstaff, Arizona.

Brungard, C.W. 2011. "Spatial Prediction of Soil Carbon in a Desert Wetland using WorldView-2 and LiDAR." 2011 Intermountain Graduate Student Symposium, Logan, Utah.

Brungard, C.W. 2010. "Digital Soil Mapping for Soil Survey." 2010 Intermountain Graduate Student Symposium, 26 March, 2010, Logan, Utah.

Brungard, C.W. 2009. "Conditioned Latin Hypercube Sampling (cLHS); A Digital Soil Mapping Example." 27 March, 2009 Intermountain Graduate Student Symposium, 2009, Logan, Utah.

Brungard C.W. and J.L. Boettinger. 2008. "Conditioned Latin Hypercube Sampling (cLHS): A digital soil mapping example." NRCS Western States Remote Sensing Workshop, Phoenix, Arizona.

AWARDS

Utah State University

Logan, Utah, USA

- 2011 Graduate Researcher of the Year. College of Agriculture. Utah State University
- 2010 First place, Dept. of Plants, Soils and Climate, 13th Intermountain Graduate Research Symposium
- 2009 Utah State University Graduate Student Senate Stipend Enhancement Award
- 2009 Academic merit tuition waiver
- 2008 First place, College of Agriculture, 11th Intermountain Graduate Research Symposium
- 2008 Academic merit tuition waiver
- 2006 Selected to deliver Commencement address, Utah State University Winter Commencement
- 2006 Fall Valedictorian, College of Natural Resources, Utah State University
- 2006 Inducted into Phi Kappa Phi honor society
- 2006 Outstanding senior, College of Natural Resources, Utah State University
- 2006 Geospatial information and technology (GITA) scholarship
- 2006 Geography faculty scholarship for academic excellence
- 2006 Environment and Society faculty scholarship
- 2005 Alsop Athenaeum Award

SERVICE

Professional Service

Utah Organizing Committee, 3rd Global Workshop on Digital Soil Mapping, Sept. 30–Oct. 3, 2008, Logan, Utah.

Scientific Program Committee, Pedometrics 2017, June 26- July 2, 2017, Wageningen, NL.

Manuscript Review (ongoing)

- Geoderma
- Soil Science Society of America Journal
- Photogrammetric Engineering & Remote Sensing
- European Journal of Soil Science

- PlosOne

- Geomorphology

University Service
Utah State University Graduate Student Senate representative for the Department of Plants, Soils, and Climate

RESEARCH INTERESTS Statistical, Geostatistical, and Data Mining methods for Digital Soil Mapping, Modeling and Assessment
Pedology, Geomorphology, and Landscape Evolution
Sampling strategies for Digital Soil Mapping
Sustainable International Agricultural Development

TECHNICAL KNOWLEDGE AND SKILLS Computing Environments:
• Google Earth Engine
• Amazon Elastic Compute Cloud

Commercial GIS Software:
• ArcGIS 10.3
• ERDAS Imagine 2014

Open Source GIS:
• QGIS 2.8.2
• SAGA 2.0.8
• GRASS 7.0.0

Statistical Analysis Software:
• R (highly proficient)
• Python (introductory knowledge)

INTERNATIONAL EXPERIENCE **David M. Kennedy Center for International Studies** Jan–Apr 2002
Employment Services Intern Manila, Philippines