

UMAKANT MISHRA
Environmental Science Division
Argonne National Laboratory
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RESEARCH INTERESTS

- Spatial prediction of soil properties at regional, national, and global scales using GIS/remote sensing and spatial statistics.
- Predicting land use change impact on soil organic carbon pool and greenhouse gas emissions from terrestrial ecosystems.
- Quantifying climate change impacts on permafrost soil carbon pool.

ACADEMIC PREPARATION

Geological Postdoctoral Fellow

Aug 09-May 12

Lawrence Berkeley National Laboratory/University of California Berkeley
Research - Predicting land use change and climatic impacts on soil organic carbon.
Advisors: Dr. Margaret Torn and Dr. William J. Riley

Ph. D., Soil Science

Jun 09

The Ohio State University, OH, USA.
Dissertation - "Predicting storage and dynamics of soil organic carbon at a regional scale" with an objective to develop geospatial methodologies to quantify the soil carbon stock at various scales in terrestrial ecosystem.
Advisors: Dr. Rattan Lal, Dr. Brian Slater, Dr. Frank Calhoun, and Dr. Desheng Liu

Master of Science, Physical Land Resources

Sep 04

Ghent University, Ghent, Belgium.
Thesis - "Predicting soil properties using GIS based landscape analysis" with an objective to quantify the role of terrain attributes in determining soil properties.
Advisors: Dr. Marc Van Meirvenne, and Dr. Rudi Goossens

Bachelor of Science in Agriculture

Jul 98

Tribhuvan University, IAAS, Chitwan, Nepal.

PROFESSIONAL EXPERIENCE

Assistant Geospatial Modeler

Jun 12 - present

Environmental Science Division, Argonne National Laboratory, IL, USA

- Estimating spatial and vertical distribution of SOC stocks of the permafrost affected soils.
- Evaluating the environmental sustainability of regional scale cellulosic bioenergy adoption.
- Developing geospatial approaches to quantify the change in SOC stocks due to anthropogenic and climatic impacts on soil system.

Geological Postdoctoral Fellow

Aug 09 – May 12

Earth Sciences Division, Lawrence Berkeley National Laboratory, USA
Energy Biosciences Institute, University of California Berkeley, CA, USA

- Quantifying impacts of climate change on the soils of permafrost region.
- Evaluating the environmental sustainability of cellulosic biofuels.
- Developing new geospatial methodologies to quantify the change in soil organic carbon due to anthropogenic and climatic influences on soil systems.

Graduate Research Associate

Jan 06 – Jun 09

School of Environment and Natural Resources, OSU, OH, USA.

- Geospatial analysis of soil organic carbon in the Midwest United States (Mathematical modeling, Pedometrics, Spatial statistics, Terrain analysis, Digital soil prediction).
- Land use management impact on SOC pools at various environmental settings.

Research Assistant

Jan 05 – Dec 05

Plant Science Department, South Dakota State University, SD, USA

- Use of Remote sensing and GIS in soil science (Remote sensing, Geographic Information Science, Precision Agriculture, Hydrological modeling).

Teaching Assistant

Sep 05 – Dec 05

Plant Science Department, South Dakota State University, SD, USA

- PS 213 Soils (Taught 23 students in Lab class – Six months)

Assistant Agronomist

Dec 98 – Sep 02

Department of Agriculture, Nepal.

- Worked as a coordinator and resource person in seed related trainings.
- Worked as a team member in national seed production program.
- Monitored, evaluated and prepared reports of agricultural programs in country.
- Presented the reports of different programs at the regional and national level workshops.
- Lectured on soil status, nutrient management, and agronomic practices to conserve soil properties.

NEWS & RESEARCH HIGHLIGHTS



ALASKAN SOIL CARBON STOCKS HAVE LARGE SPATIAL VARIABILITY AND DEPENDENCE ON ENVIRONMENTAL FACTORS (OCT 3, 2012).

[Alaskan soil carbon stocks: Spatial variability and dependence on environmental factors](#), **Umakant Mishra** and William J. Riley



Soil Science
Society of America

NEWS RELEASE

“Common view of scientists in the discipline is that a single model applicable to different soil landscapes in regional-scale was unlikely to be developed. This new method can play a vital role in improving the prediction ability of soil organic carbon pools on a regional scale” – May 20, 2010.

[Predicting the Spatial Variation of the Soil Organic Carbon Pool at a Regional Scale](#), Umakant Mishra, Rattan Lal, Desheng Liu and Marc Van Meirvenne



Soil Science
Society of America

Soil Science Society of America Journal: 10 Most Cited Papers in the past 3 years (6/19/2012)

[Regional Study of No-Till Effects on Carbon Sequestration in the Midwestern United States](#), Sheila F. Christopher, Rattan Lal and **Umakant Mishra**

RESEARCH FUNDING

- Project/Proposal Title: Developing, improving, and testing methods for predicting spatial and vertical distributions of soil organic carbon at regional scales
Role: PI
Support: Funded
Sponsor: Argonne National Laboratory, Laboratory Directed Research & Development
Total award amount: \$894,000
Total award period covered: 06/01/2012 - 09/30/2015
- Project/Proposal Title: Past and present terrestrial ecosystem development south of Vatnajökull, Iceland
Role: Co-PI
Support: Funded
Sponsor: The Icelandic Research Fund (RANNIS)
Total award amount: \$157,500
Total award period covered: 05/1/2012 - 12/31/2014

PEER-REVIEWED PUBLICATIONS

- **Mishra U.,** and W.J. Riley. 2012. Alaskan soil carbon stocks: spatial variability and dependence on environmental factors. *Biogeosciences*, 9:3637-3645.

- **Mishra U.,** M.S. Torn, and K. Fingerman. 2012. Miscanthus biomass productivity within U.S. croplands and its potential impact on soil organic carbon. *Global Change Biology Bioenergy* doi: 10.1111/j.1757-1707.2012.01201.x.
- **Mishra U.,** M.S. Torn, S. Ogle, and E. Masanet. 2012. Improving regional soil carbon inventories: combining IPCC carbon inventory method with regression kriging. *Geoderma*, 189-190:288-295.
- Scown C.D., W. Nazaroff, **U. Mishra**, B. Strogon, A. Lobscheid, T. McKone, and A. Horvath. 2012. Lifecycle greenhouse gas implications of US National Scenarios for cellulosic ethanol production. *Environmental Research Letters*, 7:014011, doi:10.1088/1748-9326/7/1/014011.
- McKone T., W. Nazaroff, M. Auffhammer, P. Berck, T. Lipman, M. Torn, E. Masanet, A. Lobscheid, N. Santero, **U. Mishra**, A. Barrett, M. Bomberg, K. Fingerman, C. Scown, B. Strogon, and A. Horvath. 2011. Grand Challenges for life-cycle assessment of biofuels. *Environmental Science & Technology*, 45:1751-1756.
- **Mishra U.,** D. Ussiri, and R. Lal. 2010. Tillage effects on soil carbon storage and dynamics in corn belt of Ohio USA. *Soil & Tillage Research*, 107:88-96.
- **Mishra U.,** R. Lal, D. Liu, and M. Van Meirvenne. 2010. Predicting the spatial variation of soil organic carbon pool at a regional scale. *Soil Science Society of America Journal*, 74: 906-914.
- Lamsal S., and **U. Mishra**. 2010. Mapping soil textural fractions across a large watershed in north-east Florida. *Journal of Environmental Management*, 91:1686-1694.
- **Mishra U.,** R. Lal, B. Slater, F. Calhoun, D. Liu, and M. Van Meirvenne. 2009. Predicting soil organic carbon stock using profile depth distribution functions and ordinary kriging. *Soil Science Society of America Journal*, 73:614-621.
- Christopher S.F., R. Lal, and **U. Mishra**. 2009. Long-term no-till effects on carbon sequestration in the Midwestern U.S. *Soil Science Society of America Journal*, 73:207-216.
- **Mishra U.,** D. Clay, T. Trooien, K. Dalsted, D. Malo, and C.G. Carlson. 2008. Assessing the value of using a remote sensing-based evapotranspiration map in site-specific management. *Journal of Plant Nutrition*, 31, 7:1188-1202.

PUBLICATIONS IN PROGRESS

- Nave, L.E., C.W. Swanston, **U. Mishra**, and K.J. Nadelhoffer. 2012. Afforestation effects on soil carbon storage: An assessment for the United States based on meta-analysis, stable isotopes, and a geospatial soil carbon database. *Soil Science Society of America Journal* (under review).

- **Mishra U.,** and W.J. Riley. 2012. Spatial variability and environmental controls of active-layer, permafrost, and whole-profile thickness across Alaska. *Soil Science Society of America Journal* (under review).

PEER-REVIEWED BOOK CHAPTERS

- **Mishra U.,** and R. Lal. 2011. Chapter 13, Predictive mapping of soil organic carbon: A case study using geographic weighted regression approach. In: Clay, D. and Shanahan, J. (eds.) “GIS Applications in Agriculture– Nutrient Management for Improved Energy Efficiency”. CRC Press. p. 209-233.
- **Mishra U.,** and W.J. Riley. 2012. Active-layer, permafrost, and whole-profile depth variability of Alaskan soils. In: Minasny, B., Brendan M., and McBratney, A.B. (eds.) “Digital Soil Assessments and Beyond: Proceedings of the 5th Global Workshop on Digital Soil Mapping 2012”. CRC Press. P. 83-88.

PROFESSIONAL SERVICE

Editorial Board:

- Associate Editor Agronomy Journal (Aug 2009 – Present)

Reviewer in journals:

- * Agriculture, Ecosystems and Environment
- * Applied and Environmental Soil Science
- * Archives of Agronomy & Soil science
- * Catena
- * Climatic Change
- * Ecosystems
- * Environmental Monitoring and Assessment
- * European Journal of Soil Science
- * Geoderma
- * Global Biogeochemical Cycles
- * Global Change Biology Bioenergy
- * International Journal of Agronomy
- * International Journal of Geographical Information Science
- * Journal of Environmental Management
- * Northern Journal of Applied Forestry
- * Pedosphere
- * Plant & soils
- * Precision Agriculture
- * Soil Science Society of America Journal
- * Soil & Tillage Research

Book review:

- B.P. Singh, A.L. Cowie, and K.Y. Chan. 2011. Soil health and climate change. Springer-Verlag Berlin Heidelberg , Germany (*For Soil Science Society of America Journal*).

Internal Reviewer:

- United States Department of Agriculture publications

American Geophysical Union session convener:

- Environmental aspects of bioenergy production- AGU Fall meeting 2010.

INVITED PRESENTATIONS

- Mishra U. 2012. Predicting climate and land use change impact on soil organic carbon stocks at regional scales, **Korean Scientists Meeting** at American Society of Agronomy conference, Cincinnati, OH. 10/21/2012.
- Mishra U., 2012. Quantifying and predicting climatic and anthropogenic impacts on soil organic carbon pool, **University of Sydney**, Sydney, Australia. 04/06/2012.
- **Mishra U.**, and M.S. Torn. 2011. Rainfed productivity of Miscanthus biomass on US croplands and its potential impact on soil organic carbon, **International Society of Industrial Ecology**, Berkeley, California, USA. 06/09/2011.
- Mishra U., 2011. Accounting for regional scale soil carbon storage and dynamics using pedometrics, **University of Wisconsin Madison**, Madison, Wisconsin. 04/08/2011.
- Mishra U., 2011. Terrestrial carbon sequestration: a local solution to global problems, **Operation Research Society Nepal**, Kathmandu. 01/20/2011.
- Mishra U., 2010. Predicting the storage and dynamics of soil organic carbon in terrestrial ecosystems, **USGS Western Geographic Science Center**, Menlo Park, California. 08/25/2010.
- Mishra U., 2009. Pedometrics in environmental research, **USDA-ARS, Pendleton, Oregon/ Center for Precision Agricultural Systems, Washington State University**, Washington. 03/12/2009.
- Mishra U., 2009. Regional estimates of soil organic carbon stocks in terrestrial ecosystem, **Energy and Resources Group, University of California Berkeley**, Berkeley, California. 05/26/2009.
- Mishra U., 2009. Tillage effects on carbon storage and dynamics in contrasting soils of Ohio, **Hayes research forum, The Ohio State University**, Columbus, Ohio. 04/25/2009.

CONTRIBUTED PRESENTATIONS

- **Mishra, U.**, W.J. Riley, and C.D. Koven. 2012. Assessment of spatial heterogeneity, environmental controls, and prediction accuracy of soil organic carbon stocks across geospatial and earth system models, presented at American Geophysical Union, San Francisco, California, USA.
- Nave L., C. Swanston, **U. Mishra**, and K. Nadelhoffer. 2012. Afforestation Effects On Soil Carbon Storage: An Assessment for the United States Based On Meta-Analysis, Stable Isotopes, and a Geospatial Soil Carbon Database, presented at Soil Science Society of America, Cincinnati, Ohio, USA.

- **Mishra U.**, and W.J. Riley. 2012. Active-layer, permafrost, and whole-profile depth variability of Alaskan soils. Fifth Global workshop of Digital Soil Mapping, Apr 10-13, Sydney, Australia.
- Torn M.S., D.P. Billesbach, J. Bradford, C. Zou, **U. Mishra**, M.L. Fischer, S. Gunter. 2011. The effects of converting marginal lands to switchgrass on carbon, water and energy fluxes. AmeriFlux Science Meeting & 3rd NACP All-investigators Meeting Jan 31-Feb 4, New Orleans, LA.
- Thornton P., W.J. Riley, N. McDowell, J.T. Randerson, F.M. Hoffman, X. Yang, M. Post, **U. Mishra**, C.D. Koven, C. Xu, R. Fisher. 2011. Reducing uncertainties associated with terrestrial carbon cycle-climate system feedbacks: Improved Earth System model process representation for arctic, tropical and temperate systems - Annual meeting DOE, Office of Biological and Environmental Research, Climate and Earth system modeling, Sept 19-22, Washington D.C., USA.
- **Mishra U.**, and W.J. Riley. 2011. Spatial variability of active layer depth and organic carbon stocks of Alaska, Annual meeting DOE, Office of Biological and Environmental Research, Climate and Earth system modeling, Sept 19-22, Washington D.C., USA.
- **Mishra U.**, and W.J. Riley. 2011. Spatial variability of soil depth and organic carbon stocks of Alaska, American Geophysical Union, San Francisco, California, USA.
- Horvath A., E. Masanet, T. McKone, A. Lobscheid, **U. Mishra**, K. Fingerman, T. Lipman, M. Auffhammer. 2010. Large-scale advanced biofuel implementation: A case study of Illinois and Indiana, presented at 239th ACS National meeting "Chemistry for a sustainable world" March 21-25, San Francisco, CA, USA.
- **Mishra U.**, M.S. Torn, and K. Fingerman. 2010. Adoption of Miscanthus on US croplands: impacts on soil organic carbon and water, American Geophysical Union, San Francisco, California, USA.
- **Mishra U.**, and M.S. Torn. 2010. An improved method for estimating regional soil carbon sequestration: combining IPCC carbon inventory method and geostatistics, presented at 9th Annual Berkeley Atmospheric Sciences Symposium, Berkeley, California, USA.
- **Mishra U.**, and M.S. Torn. 2010. Potential Miscanthus productivity on croplands of US, presented at UC Berkeley Energy Symposium, Berkeley, California, USA.
- Lobscheid A.B., E. Masanet, **U. Mishra**, A. Barrett, B. Strogen, C. Scown, A. Horvath, and T.E. McKone. 2010. Sustainable biofuels: Life cycle assessment of health impacts, presented at UC Berkeley Energy Symposium, Berkeley, California, USA.
- **Mishra U.**, R. Lal, and M.S. Torn. 2009. Effect of landuse change on soil organic carbon pool in Midwestern U.S., presented at Soil Science Society of America, Pittsburgh, Pennsylvania, USA.

- **Mishra U.**, R. Lal, D. Liu, and B. Slater. 2008. Evaluation of the predictors of soil organic carbon stock at a regional scale, presented at Soil Science Society of America, Houston, Texas, USA.
- **Mishra U.**, R. Lal, B. Slater, F. Calhoun, and D. Liu. 2007. Prediction and mapping of soil organic carbon stock using pedometrical techniques at regional scale, presented at Soil Science Society of America, New Orleans, Louisiana, USA.
- **Mishra U.**, D. Clay, and T. Trooien. 2005. Using Remote sensing based Evapotranspiration maps to assess soil and crop yield variability, presented at International conference of Pedometrics, Naples, Florida, USA.

TRAINING/WORKSHOPS

- “DAYCENT/CENTURY ecosystem modeling”. Training participant, organized by Natural Resource Ecology Laboratory, Colorado State University, Fort Collins, CO, Apr 5-9, 2010.
- “Characterizing soil carbon in Permafrost regions and its vulnerability to climate change” Invited participant, organized by Argonne National Laboratory, Chicago, IL, Feb 14-15, 2011.
- “Pre-conference digital soil mapping intensive training” training participant, organized by University of Sydney, Australia, Apr 4-5, 2012.

PROFESSIONAL AFFILIATIONS

- Member of commission 1.5 “Pedometrics” of the International Union of Soil Science since 2004.
- Member of Soil Science Society of America since 2006.
- Member of International Working Group on “Digital Soil Mapping” since 2008.
- Member of American Geophysical Union since 2009
- Member of National Soil Carbon Network since 2009
- Member of American Association for the Advancement of Science since 2009
- Member of Permafrost Carbon Network since 2011

AWARDS, SCHOLARSHIPS & HONORS

- **Flemish Interuniversity Council of Belgium Award** to pursue M.Sc. program at Ghent University, Belgium (2002 – 2004).
- **Gamma Sigma Delta**, The Honor Society of Agriculture (2008).
- **Edward J. Ray Travel Award** by The Ohio State University to participate in Digital Soil Mapping meeting (summer, 2008).
- **University Merit Scholarship**, Institute of Agriculture and Animal Science, Tribhuvan University, Nepal (1994 – 1998).

LANGUAGES, SOFTWARES AND OTHER SKILLS

- Proficient in English, Nepali and Hindi (speaking, writing, reading). Fluent in other regional languages of Nepal.
- GIS and Geostatistical softwares: Good command in **ArcGIS, ERDAS, Surfer, IDRISI, Variowin, and Geoda.**
- Statistical softwares: **SAS, R, SPSS, and Sigmaplot.**
- Excellent ability to work well with people across disciplines, cultures and backgrounds.
- Ability to manage multiple tasks, projects, responsibilities simultaneously.

OTHER SERVICE

- Chair, EVS seminar series at Argonne National Laboratory (2012).
- Representative of Soil Science and Agronomy students in the Council of Graduate Students at The Ohio State University (2007-2008, 2008-2009).
- Mentored a High School student to conduct a Landuse change experiment showing the importance of carbon sequestration (2008).
- Worked as a member of Nepal Red Cross Society, Chitwan chapter, Nepal (1995-1997).