Melanie A. Mayes

Scientist
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Education and Training

2006 University of Tennessee, Geological Sciences, Ph.D.
1999 University of Tennessee, Geological Sciences, M.S.
1995 University of Missouri, Columbia, Geological Sciences, B.S.

Research and Professional Experience

2002-Present Staff Scientist, Associate (2006-present), Staff Scientist, Assistant (2002-2006). Oak Ridge National Laboratory, Environmental Sciences Division, Oak Ridge, TN.

- Managed research projects, authored research proposals, prepared peer-review manuscripts, interfaced with sponsors, attended conferences and workshops
- Mentored post-doctorate (6), graduate (4), and undergraduate (~30) researchers
- Molecular-scale to lab-scale mechanistic controls of carbon cycling in soils, developing innovative methods for incorporating experimental data into carbon cycle models
- Experiments and modeling coupled hydrological and geochemical reactions of dissolved and particulate explosives, radionuclides, metals, and nutrients migrating through soils and rocks at lab to field scales
- Technical lead for site license applications for hydrology and radionuclide safety in groundwater at second generation nuclear power plants

2011-present Joint Faculty Appointment. University of Tennessee Earth and Planetary Sciences Department.

2008-2011 Adjunct Professor. University of Tennessee Earth and Planetary Sciences Department. Co-supervise graduate research and teaching assistants.

1999-2002 Post-Master's Research Associate, Oak Ridge Institute for Science and Education.

- Determined the influence of water content on solute mobility in fractured rocks and in layered sands using a variety of experimental techniques
- Analyzed samples using Inductively Coupled Plasma Mass Spectrophotometer (ICP-MS), Kinetic Phosphorescence Analyzer (KPA), Gas Chromatography Mass Spectrophotometer (GC-MS)
- Mentored graduate and undergraduate researchers

Publications

Mayes, M.A., Jagadamma, S., Ambaye, H., Petridis, L., and Lauter, V. Neutron reflectometry reveals the internal structure of natural organic matter deposited onto an aluminium oxide. In Press with Geoderma, July 2012

Wang, G., Post, W.M., Mayes, M.A. Parameterizing an enzyme-mediated soil organic carbon decomposition model. In Press with Ecological Applications, July 2012, doi: 10.1890/12-0681.1.

Wang, G., Post, W.M., Mayes, M.A., Frerichs, J., and Jagadamma, S. 2012. Parameter estimation for models of ligninolytic and cellulolytic enzyme kinetics. Soil Biology & Biochemistry 48:28-38, doi 10.1016/j.soilbio.2012.01.011.

Mayes, M.A., Heal, K., Brandt, C., Phillips, J.R., and Jardine, P.M. 2012. Relation between soil order and Langmuir parameters for sorption of dissolved organic carbon. Soil Science Society of America Journal 76:1027-1037, doi:10.2136/sssaj2011.0340.

Lavoie, B., Mayes, M.A., and McKay, L.D. 2011. Transport of explosive residue surrogates in saturated porous media. Water, Air, and Soil Pollution, doi:10.1007/s11270-011-0999-y.

C.T. Garten, Jr., Brice, D.J., Castro, H.F., Graham, R.L., Mayes, M.A., Phillips, J.R., Post III, W.M., Schadt, C.W., Wullschleger, S.D., Tyler, D.D., Jardine, P.M. Jastrow, J.D., Matamala, R., Miller, R.M., Moran, K.T., Vugteveen, T., Izaurralde, R.C., Thomson, A.M., West, T.O., Amonette, J.E., Bailey, V.L., Metting, F.B., and Smith, J.L. 2011. Response of "Alamo" switchgrass tissue chemistry and biomass to nitrogen fertilization in west Tennessee, USA. Agriculture, Ecosystems, & Environment 140: 389-297.

Tang, G., Mayes, M.A., Parker, J.C., and Jardine, P.M. 2010. CXTFIT/Excel – A modular adaptable approach for parameter estimation and uncertainty/sensitivity analysis. Computers and Geosciences 36:1200-1209, doi: 2052/10.1016/j.cageo.2010.01.013.

Mayes, M.A., Tang, G., Jardine, P.M., McKay, L.D., Yin, X.L., Pace, M.N., Parker, J.C., Zhang, F., Mehlhorn, T.L., and Dansby-Sparks, R.N. 2009. Influence of sedimentary bedding on reactive transport parameters under unsaturated conditions. Soil Science Society of America Journal 73:1938-1946, doi:10.2136/sssaj2008.0317

Tang, G., Mayes, M.A., Parker, J.C., Yin, X.L., Watson, D.B., and Jardine, P.M. 2009. Improving parameter estimation for column experiments by multi-model evaluation and comparison. Journal of Hydrology 376, 567–578. doi:10.1016/j.jhydrol.2009.07.063.

Jardine, P.M., Mayes, M.A., Mulholland, P.J., Hanson, P.J., Tarver, J.R., Luxmoore, R.J., McCarthy, J.F., and Wilson, G.V. 2006. Vadose zone flow and transport of dissolved organic carbon at multiple scales in humid regimes. Vadose Zone Journal 5:140-152, doi: 10.2136/vzj2005.0036.

Mayes, M.A., Jardine, P.M., Mehlhorn, T.L., Bjornstad, B.N., Ladd, J.L., and Zachara, J.M. 2003. Transport of multiple tracers in variably saturated humid region structured soils and semi-arid region laminated sediments. Journal of Hydrology 275: 141-161, doi: 10.1016/S0022-1694(03)00039-8.

Mayes, M.A., Jardine, P.M., Larsen, I.L., Brooks, S.C., and Fendorf, S.E. 2000. Multispecies transport of metal-EDTA and chromate complexes through undisturbed columns of weathered fractured saprolite. Journal of Contaminant Hydrology 45: 243-265, doi: 10.1016/S0169-7722(00)00108-X.

Synergistic Activities

1. January 2007 – December 2012, Associate Editor, Soil Science Society of America Journal, S-1 Soil Physics Division
2. Reviewer for Biology and Fertility of Soils, Journal of Hazardous Materials, Journal of Contaminant Hydrology, Chemosphere, Environmental Science and Technology, Vadose Zone Journal, various other journals and publications (~10 per y)
3. Panel reviewer for 2010 DOE Subsurface Biogeochemical Research Program;
4. 2001-present, Member, Soil Science Society of America
5. 2001-present, Member, American Chemical Society
6. 2001-present, Member, American Geophysical Union
7. 2008-present, Member, American Association for the Advancement of Science

Awards and Honors

1. *University of Tennessee Earth and Planetary Sciences Young Alumna Award.* University of Tennessee Earth and Planetary Sciences Department (November, 2011).
2. *Stanley Auerbach Award for Excellence in Environmental Sciences,* Environmental Sciences Division, Oak Ridge National Laboratory (June, 2011).
3. *Associate Editor of Excellence,* Soil Science Society of America Journal (April, 2011).
4. 2006, Editor's Citation for Excellence in Manuscript Review, Soil Science Society of America Journal
5. 2004, Outstanding Mentor Award, US Department of Energy Office of Science Undergraduate Research Program

Graduate and Postdoctoral Advisors

M.S. Advisor: Claudia Mora (University of Tennessee)
Ph.D. co-Advisors: Larry McKay (University of Tennessee) and Phil Jardine (Oak Ridge National Laboratory)