

Publications

1. Peer-reviewed publications in international scientific journals

Koestel, J., Larsbo, M., Jarvis, N., 2020. Scale and REV analyses for porosity and pore connectivity measures in undisturbed soil. *Geoderma* 366.

Chakrawal, A., Herrmann, A.M., **Koestel, J.**, Jarsjö, J., Nunan, N., Kätterer, T., Manzoni, S., 2020. Dynamic upscaling of decomposition kinetics for carbon cycling models. *Geoscientific Model Development* 13(3), 1399-1429.

Meurer, K., Barron, J., Chenu, C., Coucheney, E., Fielding, M., Hallett, P., Herrmann, A.M., Keller, T., **Koestel, J.**, Larsbo, M., Lewan, E., Or, D., Parsons, D., Parvin, N., Taylor, A., Vereecken, H., Jarvis, N., 2020. A framework for modelling soil structure dynamics induced by biological activity. *Global Change Biology* 26(10), 5382-5403.

Princ, T., Reis Fideles, H.M., **Koestel, J.**, Snehota, M., 2020. The impact of capillary trapping of air on saturated hydraulic conductivity of sands interpreted by X-ray microtomography. *Water (Switzerland)* 12(2).

Schlüter, S., Sammartino, S., **Koestel, J.**, 2020. Exploring the relationship between soil structure and soil functions via pore-scale imaging. *Geoderma* 370.

Soto-Gómez, D., Vázquez Juárez, L., Pérez-Rodríguez, P., López-Periago, J.E., Paradelo, M., **Koestel, J.**, 2020. Percolation theory applied to soil tomography. *Geoderma* 357.

Turunen, M., Hyväluoma, J., Heikkinen, J., Keskinen, R., Kaseva, J., **Koestel, J.**, Rasa, K., 2019. Quantifying physical properties of three sphagnum-based growing media as affected by drying–wetting cycles. *Vadose Zone J.* 18(1).

Kravchenko, A.N., Guber, A.K., Razavi, B.S., **Koestel, J.**, Quigley, M.Y., Robertson, G.P., Kuzyakov, Y., 2019. Microbial spatial footprint as a driver of soil carbon stabilization. *Nature Communications* 10(1).

Kravchenko, A.N., Guber, A.K., Razavi, B.S., **Koestel, J.**, Blagodatskaya, E.V., Kuzyakov, Y., 2019. Spatial patterns of extracellular enzymes: Combining X-ray computed microtomography and 2D zymography. *Soil Biology and Biochemistry* 135, 411-419.

Koestel, J., Schlüter, S., 2019. Quantification of the structure evolution in a garden soil over the course of two years. *Geoderma* 338, 597-609.

Hellner, Q., **Koestel, J.**, Ulén, B., Larsbo, M., 2018. Effects of tillage and liming on macropore networks derived from X-ray tomography images of a silty clay soil. *Soil Use Manage.* 34(2), 197-205.

Koestel, J., Dathe, A., Skaggs, T.H., Klakegg, O., Ahmad, M.A., Babko, M., Giménez, D., Farkas, C., Nemes, A., Jarvis, N., 2018. Estimating the Permeability of Naturally Structured Soil From Percolation Theory and Pore Space Characteristics Imaged by X-Ray. *Water Resour. Res.* 54(11), 9255-9263.

Koestel, J. 2018. SoilJ: An ImageJ Plugin for the Semi-automatic Processing of Three-Dimensional X-ray Images of Soils. *Vadose Zone J.* 17.

Kravchenko, A.N., A.K. Guber, M.Y. Quigley, **J. Koestel**, H. Gandhi and N.E. Ostrom. X-ray computed tomography to predict soil N₂O production via bacterial denitrification and N₂O emission in contrasting bioenergy cropping systems. *GCB Bioenergy* 10(11), 894-909. doi:doi:10.1111/gcbb.12552.

Hansson, L.J., **J. Koestel**, E. Ring and A.I. Gärdenäs. 2017. Impacts of off-road traffic on soil physical properties of forest clear-cuts: X-ray and laboratory analysis. *Scandinavian Journal of Forest Research*: 1-12.

Jarvis, N., M. Larsbo and **J. Koestel**. 2017. Connectivity and percolation of structural pore networks in a cultivated silt loam soil quantified by X-ray tomography. *Geoderma* 287: 71-79.

Jarvis, N., J. Forkman, **J. Koestel**, T. Kätterer, M. Larsbo and A. Taylor. 2017. Long-term effects of grass-clover leys on the structure of a silt loam soil in a cold climate. *Agriculture, Ecosystems & Environment* 247: 319-328.

Jarvis, N., **J. Koestel** and M. Larsbo. 2017. Reply to 'Comment on "Understanding preferential flow in the vadose zone: Recent advances and future prospects" by N. Jarvis et al.'. *Vadose Zone Journal*. 16. doi:10.2136/vzj2017.01.0034r.

Keck, H., B.W. Strobel, J.P. Gustafsson and **J. Koestel**. 2017. Quantitative imaging of the 3-D distribution of cation adsorption sites in undisturbed soil. *SOIL* 3: 177-189.

Sandin, M., **J. Koestel**, N. Jarvis and M. Larsbo. 2017. Post-tillage evolution of structural pore space and saturated and near-saturated hydraulic conductivity in a clay loam soil. *Soil and Tillage Research* 165: 161-168.

Ulén, B., M. Larsbo, **J. Koestel**, Q. Hellner, M. Blomberg and P. Geranmayeh. 2017. Assessing strategies to mitigate phosphorus leaching from drained clay soils. *Ambio*. doi:10.1007/s13280-017-0991-x.

Van Looy K., Bouma J., Herbst M., **Koestel J.**, Minasny B., Mishra U., Montzka C., Nemes A., Pachepsky Y., Padarian J., Schaap M., Tóth B., Verhoef A., Vanderborght J., van der Ploeg M., Weihermüller L., Zacharias S., Zhang Y., Vereecken H. 2017, Pedotransfer functions in Earth system science: challenges and perspectives. *Reviews of Geophysics* 55, 1199-1256, doi: 10.1002/2017RG000581.

Jarvis, N., **J. Koestel** and M. Larsbo. 2016. Understanding preferential flow in the vadose zone: Recent advances and future prospects. *Vadose Zone Journal*. 15. doi: 10.2136/vzj2016.09.0075

Larsbo, M., **J. Koestel**, T. Kätterer and N. Jarvis. 2016. Preferential transport in macropores is reduced by soil organic carbon. *Vadose Zone Journal*. 15. doi:10.2136/vzj2016.03.0021.

Mossadeghi-Björklund, M., J. Arvidsson, T. Keller, **J. Koestel**, M. Lamandé, M. Larsbo, N. Jarvis. 2016. Effects of subsoil compaction on hydraulic properties and preferential flow in a Swedish clay soil. *Soil and Tillage Research* 156: 91-98. doi: 10.1016/j.still.2015.09.013.

Bacher, M., A. Schwen and **J. Koestel**. 2015, 3-D printing of macropore networks of an undisturbed soil sample, *Vadose Zone Journal*, 14(2). doi: 10.2136/vzj2014.08.0111.

Jorda, H., M. Bechtold, N. Jarvis and **J. Koestel**. 2015, Using boosted regression trees to explore key factors controlling saturated and near-saturated hydraulic conductivity, *European Journal of Soil Science*, 66, 744-756.

Koestel, J. and H. Jorda. 2014, What determines the strength of preferential transport in undisturbed soil under steady-state flow? *Geoderma*, 217–218, 144-160.

Koestel, J. and M. Larsbo. 2014, Imaging and quantification of preferential solute transport in soil macropores, *Water Resources Research*, 50, 4357-4378.

Larsbo, M., **J. Koestel**, N. Jarvis. 2014, Relations between macropore network characteristics and the degree of preferential solute transport, *Hydrology and Earth System Sciences*, 18, 5255-5269. doi: 10.5194/hess-18-5255-2014.

Jarvis, N., **J. Koestel**, I. Messing, J. Moeys and A. Lindahl. 2013, Influence of soil, land use and climatic factors on the hydraulic conductivity of soil, *Hydrology and Earth System Sciences*, 17(12), 5185-5195. doi: 10.5194/hess-17-5185-2013.

Koestel, J., T. Norgaard, N. M. Luong, A. L. Vendelboe, P. Moldrup, N. J. Jarvis, M. Lamandé, B. V. Iversen and L. Wollesen de Jonge. 2013, Links between soil properties and steady-state solute transport through cultivated topsoil at the field scale, *Water Resources Research*, 49(2), 790-807. doi: 10.1002/wrcr.20079.

Ghafoor, A., **J. Koestel**, M. Larsbo, J. Moeys and N. Jarvis. 2013, Soil properties and susceptibility to preferential solute transport in tilled topsoil at the catchment scale, *Journal of Hydrology*, 492, 190-199. doi: 10.1016/j.jhydrol.2013.03.046.

Koestel, J., J. Moeys and N. J. Jarvis. 2012, Meta-analysis of the effects of soil properties, site factors and experimental conditions on solute transport, *Hydrology and Earth System Sciences*, 16(6), 1647-1665. doi: 10.5194/hess-16-1647-2012.

Jarvis, N.J., Moeys, J., **Koestel, J.**, Hollis, J.M., 2012. Preferential flow in a pedological perspective. In: H. Lin (Ed.), *Hydropedology: Synergistic Integration of Soil Science and Hydrology*. Elsevier, Amsterdam.

Koestel, J.K., Moeys, J., Jarvis, N.J., 2011. Evaluation of nonparametric shape measures for solute breakthrough curves. *Vadose Zone J.* 10(4), 1261-1275.

Garré, S., **Koestel, J.**, Günther, T., Javaux, M., Vanderborght, J., Vereecken, H., 2010. Comparison of heterogeneous transport processes observed with electrical resistivity tomography in two soils. *Vadose Zone J.* 9(2), 336-349.

Koestel, J.K., Vanderborght, J., Javaux, M., Kemna, A., Binley, A., Vereecken, H., 2009. Noninvasive 3-D transport characterization in a sandy soil using ERT: 1. Investigating the validity of ERT-derived transport parameters. *Vadose Zone J.* 8(3), 711-722.

Koestel, J.K., Vanderborght, J., Javaux, M., Kamna, A., Binley, A., Vereecken, H., 2009. Noninvasive 3-D transport characterization in a sandy soil using ERT: 2. Transport process inference. *Vadose Zone J.* 8(3), 723-734.

Koestel, J.K., Kasteel, R., Kemna, A., Esser, O., Javaux, M., Binley, A., Vereecken, H., 2009. Imaging Brilliant Blue stained soil by means of electrical resistivity tomography. *Vadose Zone J.* 8(4), 963-975.

Koestel, J.K., Kemna, A., Javaux, M., Binley, A., Vereecken, H., 2008. Quantitative imaging of solute transport in an unsaturated and undisturbed soil monolith with 3-D ERT and TDR. *Water Resour. Res.* 44(12).

Oral contributions to international conferences

Invited talks

Koestel, J. 2018. SoilJ: An ImageJ plugin for the semi-automatic processing of three-dimensional X-ray Images of Soils, MicroSoil 2018 - Workshop on “Elucidating microbial processes in soils and sediments: Microscale measurements and modeling”, Saint-Loup-Lamairé, France, 26-29. June 2018.

Koestel, J. 2017. On the role of structure in PTFs, workshop of the International Soil Modelling Consortium (ISMC) ‘Pedotransfer functions in Earth system sciences; challenges and perspectives’, New Orleans, USA, 10th December 2017.

Jarvis, N, **J. Koestel**, M. Larsbo, 2017. Preferential flow from pore to landscape scales (Invited, J. Koestel held the presentation), American Geophysical Union, Fall Meeting 2017, abstract #H54B-02.

Koestel, J. 2017. Soil structure evolution in an individual soil column over the course of two years, Invited speaker in the framework of the PhD symposium of Steffen Merz, 24th March 2017, University Bonn / Forschungszentrum Jülich, Germany.

Koestel, J. 2016. Unravelling relationships between soil properties, site factors and preferential flow using meta-analyses and X-ray imaging. 3rd International Conference on Hydropedology during August 16-19, 2016 in Beijing Normal University, Beijing, China.

Koestel, J. 2014. A machine learning approach for appraising soils’ susceptibility to preferential flow under steady state irrigation. 16th Fresenius AGRO Conference, Behaviour of Pesticides in Air, Soil and Water, Mainz, Germany, 23-24 June 2014.

Other selected oral presentations

Koestel, J. 2019. SoilJ - A software for the semi-automatic processing and analyses of X-ray images of soil samples. Interpore 2019, 11th Annual Meeting, 6-10 May 2019, Valencia, Spain.

Koestel, J. 2017, Finger-printing breakthrough curves in soils, American Geophysical Union, Fall Meeting 2017, abstract #H44E-04, New Orleans, USA.

Koestel, J., Mats Larsbo, and Nick Jarvis, 2017. Current challenges in quantifying preferential flow through the vadose zone, EGU General Assembly 2017, abstract EGU2017-16617, Vienna, Austria.

Koestel, J. and Mats Larsbo, 2014. Imaging and quantification of preferential solute transport in an undisturbed soil, EGU General Assembly 2014, abstract EGU2014-10361, Vienna, Austria.

Koestel, J. 2015, Monitoring the 3-D Evolution of Soil Macropore Networks Under Natural Boundary Conditions. ASA, CSSA and SSSA International Annual Meetings, Nov. 15-18, Minneapolis, USA.

Software

Koestel, J., 2017. SoilJ, Software, 1.1 MB of JAVA code, <https://github.com/johnkoestel/soilj>