

# Publications 2018

Updated Apr 16, 2019

Forest, Global Change and Bioeconomy Research Area

Peer-reviewed scientific articles (refereed, original research) published (or in print) in international journals

Adnan, S., Iqbal, J., Maltamo, M., Valbuena, R. 2018. GIS-based DRASTIC model for groundwater vulnerability and pollution risk assessment in the Peshawar District, Pakistan. *Arabian journal of geosciences* 11:458. doi:10.1007/s12517-018-3795-9.

Adnan, S., Maltamo, M., Coomes, D.A., García-Abril, A., Malhi, Y., Manzanera, J.A., Butt, N., Morecroft, M., Valbuena, R. 2019. A simple approach to forest structure classification using airborne laser scanning that can be adopted across bioregions. *Forest Ecology and Management* 433:111-121. doi:10.1016/j.foreco.2018.10.057.

Alekseychik, P., Mammarella, I., Lindroth, A., Lohila, A., Aurela, M., Laurila, T., Kasurinen, V., Lund, M., Rinne, J., Nilsson, M.B., Peichl, M., Minkkinen, K., Shurpali, N.J., Tuittila, E.-S., Martikainen, P.J., Tuovinen, J.-P., Vesala, T. 2018. Surface energy exchange in pristine and managed boreal peatlands. *Mires and peat* 21, Article 14:1–26. doi:10.19189/MaP.2018.OMB.333.

Alexandersson, E., Keinänen, M., Chawade, A., Himanen, K. 2018. Nordic research infrastructures for plant phenotyping. *Agricultural and Food Science* 27(1):7–16. doi:10.23986/afsci.68870.

ALRahahleh, L., Kilpeläinen, A., Ikonen, V.-P., Strandman, H., Asikainen, A., Venäläinen, A., Kaurola, J., Kangas, J., Peltola, H. 2018. Effects of using certain tree species in forest regeneration on volume growth, timber yield, and carbon stock of boreal forests in Finland under different CMIP5 projections. *Eur J Forest Res.* 137(5):573-591. doi:10.1007/s10342-018-1126-z.

ALRahahleh, L., Kilpeläinen, A., Ikonen, V.-P., Strandman, H., Venäläinen, A., Peltola, H. 2018. Effects of CMIP5 projections on volume growth, carbon stock and timber yield in managed Scots pine, Norway spruce and Silver birch stands under southern and northern boreal conditions. *Forests* 9, 208. doi:10.3390/f9040208.

Ancin-Murguzur, F.J., Barbero-López, A., Kontunen-Soppela, S., Haapala, A. 2018. Automated image analysis tool to measure microbial growth on solid cultures. *Computers and Electronics in Agriculture* 151:426-430. doi:10.1016/j.compag.2018.06.031.

Ancin-Murguzur, F.J., Barbero-López, A., Kontunen-Soppela, S., Haapala, A. 2018. Automated image analysis tool to measure microbial growth on solid cultures. *Computers and Electronics in Agriculture* 151:426-430. doi:10.1016/j.compag.2018.06.031.

Asfandyar, S., Qi, S., Saeed, R., Souleymane, K., Majid, K., Syed, A. 2018. Groundwater vulnerability assessment using GIS-based DRASTIC method in the irrigated and coastal region of Sindh province, Pakistan. *Hydrology research* 50(1):319-338. doi:10.2166/nh.2018.001.

Bacha, M.S., Nafees, M., Adnan, S. 2018. Farmers' Perceptions about Climate Change Vulnerabilities and their Adaptation Measures in District Swat. *Sarhad Journal of Agriculture* 34(2):311-326. doi:10.17582/journal.sja/2018/34.2.311.326.

Barbero-López, A., Chibily, S., Tomppo, L., Salami, A., Ancin-Murguzur, F.J., Venäläinen, M., Lappalainen, R., Haapala, A. 2018. Pyrolysis distillates from tree bark and fibre hemp inhibit the growth of wood-decaying fungi. *Industrial Crops and Products* 129:604-610. doi:10.1016/j.indcrop.2018.12.049.

- Barbero-Lopez, A., Ochoa-Retamero, A., Lopez-Gomez, Y., Vilppo, T., Venäläinen, M., Lavola, A., Julkunen-Tiitto, R., Haapala, A. 2018. Activity of Spent Coffee Ground Cinnamates against Wood-decaying Fungi in vitro. *Bioresources* 13(3):6555-6564.
- Barbero-López, A., Ochoa-Retamero, A., López-Gómez, Y., Vilppo, T., Venäläinen, M., Lavola, A., Julkunen-Tiitto, R., and Haapala, A. 2018. Activity of spent coffee ground cinnamates against wood-decaying fungi in vitro. *Bioresources* 13(3):6555-6564.
- Baul, T.K., Datta, D., Alam, A. 2018. A comparative study on household level energy consumption and related emissions from renewable (biomass) and non-renewable energy sources in Bangladesh. *Energy Policy* 114:598-608. doi:10.1016/j.enpol.2017.12.037.
- Boevé, J.-L., Nyman, T., Shinohara, A., Schmidt, S. 2018. Endogenous toxins and the coupling of gregariousness to conspicuousness in Argidae and Pergidae sawflies. *Scientific Reports* 8(1):17636. doi:10.1038/s41598-018-35925-z.
- Cai, C., Antikainen, J., Luostarinen, K., Mononen, K., Heräjärvi, H. 2018. Wetting-induced changes on the surface of thermally modified Scots pine and Norway spruce wood. *Wood Science and Technology* 52:1181-1193. doi:10.1007/s00226-018-1030-1.
- Deepak, M., Lihavainen, J., Keski-Saari, S., Kontunen-Soppela, S., Salojärvi, J., Tenkanen, A., Heimonen, K., Oksanen, E., Keinänen, M. 2018. Genotype- and provenance-related variation in the leaf surface secondary metabolites of silver birch. *Canadian Journal of Forest Research* 48(5):494-505. doi:10.1139/cjfr-2017-0456.
- Du, S., Niu, G., Nyman, T., Wei, M. 2018. Characterization of the mitochondrial genome of *Arge bella* Wei & Du sp. nov. (Hymenoptera: Argidae). *PeerJ*, 6, e6131. doi:10.7717/peerj.6131.
- Eales, J., Haddaway, N.R., Bernes, C., Cooke, S.J., Jonsson, B.G., Kouki, J., Petrokofsky, G., Taylor, J.J. 2018. What is the effect of prescribed burning in temperate and boreal forest on biodiversity, beyond pyrophilous and saproxylic species? A systematic review. *Environmental Evidence* 7:19. doi:10.1186/s13750-018-0131-5.
- Faelt-Nardmann, J.J.J., Ruohomäki, K., Tikkanen, O.-P., Neuvonen, S. 2018. Cold hardiness of *Lymantria monacha* and *L-dispar* (Lepidoptera: Erebididae) eggs to extreme winter temperatures: implications for predicting climate change impacts. *Ecological Entomology* 43:422–430. doi:10.1111/een.12515.
- Faiola, C.L., Buchholz, A., Kari, E., Yli-Pirilä, P., Holopainen, J.K., Kivimäenpää, M., Miettinen, P., Worsnop, D.R., Lehtinen, K.E.J., Guenther, A.B., Virtanen, A. 2018. Terpene Composition Complexity Controls Secondary Organic Aerosol Yields from Scots Pine Volatile Emissions. *Scientific Reports* 8, Article number: 3053. doi:10.1038/s41598-018-21045-1.
- Fält-Nardmann, J.J.J., Tikkanen, O.-P., Ruohomäki, K., Otto, L.-F., Leinonen, R., Pöyry, J., Saikkonen, K., Neuvonen, S. 2018. The recent northward expansion of *Lymantria monacha* in relation to realised changes in temperatures of different seasons. *Forest Ecology and Management* 427:96-105. doi:10.1016/j.foreco.2018.05.053.
- Franz, D., Acosta, M., Altimir, N., Arriga, N., Arrouays, D., Aubinet, M., Aurela, M., Ayres, E. et al. [Incl. Pumpanen, Jukka; Tuittila, Eeva-Sti.] 2018. Towards long-term standardised carbon and greenhouse gas observations for monitoring Europe's terrestrial ecosystems: a review. *International Agrophysics* 32(4):439-455. doi:10.1515/intag-2017-0039.
- Franz, D., Acosta, M., Altimir, N., Arriga, N., Arrouays, D., Aubinet, M., Aurela, M., Ayres, E., Lopez-Ballesteros, A., et al. [Incl. Pumpanen, J., Tuittila, E.-S.] 2018. Towards long-term standardised carbon and greenhouse gas observations for monitoring Europe's terrestrial ecosystems: a review. *International Agrophysics* 32(4):439-455. doi:10.1515/intag-2017-0039.
- Franz, M., Alonso, R., Arneth, A., Büker, P., Elvira, S., Gerosa, G., Emberson, L., Feng, Z., Le Thiec, D., Marzuoli, R., Oksanen, E., Uddling, J., Wilkinson, M., and Zaehle, S. 2018. Evaluation of simulated ozone effects in forest ecosystems against biomass damage estimates from fumigation experiments. *Biogeosciences* 15:6941-6957. doi:10.5194/bg-15-6941-2018.

- Gielen, B., Acosta, M., Altimir, N., Buchmann, N., Cescatte, A., Ceschia, E., Fleck, S., Hortnagal, L., Klumpp, K., Kolari, P., Lohile, A., Loustau, D., Maranon-Jimenez, S., Manisp, L., Matteucci, G., Merbold, L., Metzger, C., Moureaux, C., Montagnani, L., Nilsson, M.B., et al. [Incl. Tuittila, E.-S.]. 2018. Ancillary vegetation measurements at ICOS ecosystem stations. *International agrophysics* 32(4):645-664. doi:10.1515/intag-2017-0048.
- Gong, J., Wang, B., Jia, X., Feng, W., Zha, T., Kellomäki, S., Peltola, H. 2018. Modelling the diurnal and seasonal dynamics of soil CO<sub>2</sub> exchange in a semiarid ecosystem with high plant-interspace heterogeneity. *Biogeosciences* 15(1):115-136. doi:10.5194/bg-15-115-2018.
- Granath, G., Kouki, J., Johnson, S., Heikkala, O., Rodríguez, A., Strengbom, J. 2018. Trade-offs in berry production and biodiversity under prescribed burning and retention regimes in Boreal forests. *Journal of Applied Ecology* 55(4):1658-1667. doi:10.1111/1365-2664.13098.
- Granath, G., Rydin, H., Baltzer, J.L., Bengtsson, F., Boncek, N., Bragazza, L., Bu, Z.J., Caporn, S.J.M., Dorrepaal, E., Galanina, O., Galka, M., Ganeva, A., Gillikin, D.P., Goia, I., Goncharova, N., Hajek, M., et al. [Incl. Tuittila, E.-S.]. 2018. Environmental and taxonomic controls of carbon and oxygen stable isotope composition in Sphagnum across broad climatic and geographic ranges. *Biogeosciences* 15:5189-5202. doi:10.5194/bg-15-5189-2018.
- Granlund, L., Keski-Saari, S., Kumpula, T., Oksanen, E., Keinänen, M. 2018. Imaging lichen water content with visible to mid-wave infrared (400 - 5500 nm) spectroscopy. *Remote sensing of environment* 216:301-310. doi:10.1016/j.rse.2018.06.041.
- Gravel, D., Baiser, B., Dunne, J.A., Kopelke, J.-P., Martinez, N.D., Nyman, T., Poisot, T., Stouffer, D.B., Tylianakis, J.M., Wood, S.A., Roslin, T. 2018. Bringing Elton and Grinnell together: a quantitative framework to represent the biogeography of ecological interaction networks. *Ecography* 42(3):401-415. doi:10.1111/ecog.04006.
- Hahn, J., Juottonen, H., Fritze, H., Tuittila, E.-S. 2018. Dung application increases CH<sub>4</sub> production potential and alters the composition and abundance of methanogen community in restored peatland soils from Europe. *Biol Fertil Soils* 54:533. doi:10.1007/s00374-018-1279-4.
- Halimaa, P., Blande, D., Baltzi, E., Aarts, M.G.M., Granlund, L., Keinänen, M., Kärenlampi, S.O., Kozhevnikova, A.D., Peräniemi, S., Schat, H., Seregin, I.V., Tuomainen, M., Tervahauta, A.I. 2018. Transcriptional effects of cadmium on iron homeostasis differ in calamine accessions of *Noccaea caerulescens*. *Plant Journal* 97(2):306-320. doi:10.1111/tpj.14121.
- Hämäläinen, K., Tahvanainen, T., Junninen, K. 2018. Characteristics of boreal and hemiboreal herb-rich forests as habitats for polypore fungi. *Silva Fennica*. doi:10.17011/conference/eccb2018/107524.
- Hämäläinen, K., Tahvanainen, T., Junninen, K. 2018. Characteristics of boreal and hemiboreal herb-rich forests as habitats for polypore fungi. *Silva Fennica* 52 no. 5, article id 10001. doi:10.14214/sf.10001.
- Heinonen, T., Mäkinen, A., Rasinmäki, J., Pukkala, T. 2018. Aggregating microsegments into harvest blocks by using spatial optimization and proximity objectives. *Canadian Journal of Forest Research* 48(10):1184-1193. doi:10.1139/cjfr-2018-0053.
- Heinonen, T., Pukkala, T., Kellomäki, S., Strandman, H., Asikainen, A., Venäläinen, A., Peltola, H. 2018. Effects of forest management and harvesting intensity on the timber supply from Finnish forests in a changing climate. *Can. J. For. Res.* 48:1124-1134. doi:10.1139/cjfr-2018-0118.
- Holopainen, J.K., Virjamo, V., Ghimire, R.P., Blande, J.D., Julkunen-Tiitto, R., Kivimäenpää, M. 2018. Climate Change Effects on Secondary Compounds of Forest Trees in the Northern Hemisphere. *Frontiers in Plant Science*, Vol. 9, article 1445. doi:10.3389/fpls.2018.01445.
- Hou, Z., McRoberts, R.E., Ståhl, G., Packalen, P., Greenberg, J.A., Xu, Q. 2018. How much can natural resource inventory benefit from finer resolution auxiliary data? *Remote Sensing of Environment* 209:31-40. doi:10.1016/j.rse.2018.02.039.

- Jia, X., Zha, T., Gong, J., Zhang, Y., Wu, B., Qin, S., Peltola, H. 2018. Multi-scale dynamics and environmental controls on net ecosystem CO<sub>2</sub> exchange over a temperate semiarid shrubland. *Agricultural and Forest Meteorology* 259:250-259. doi:10.1016/j.agrformet.2018.05.009.
- Jiang, W., Tomppo, L., Pakarinen, T., Sirviö, J.A., Liimatainen, H., Haapala, A. 2018. Effect of Cellulose Nanofibrils on the Bond Strength of Polyvinyl Acetate and Starch Adhesives for Wood. *BioResources* 13(2):2283-2292.
- Jin, X., Pukkala, T., Li, F. 2018. Meta optimization of stand management with population-based methods. *Canadian Journal of Forest Research* 48(6):697-708. doi:10.1139/cjfr-2017-0404.
- Jokela, J., Juutilainen, K., Korpela, L., Kouki, J., Kuntsi, S., Koivula, M., Siitonen, J. 2018. Cross-taxon congruence and relationships to stand characteristics of vascular plants, bryophytes, polyporous fungi and beetles in mature managed boreal forests. *Ecological Indicators* 85:137-145. doi:10.1016/j.ecolind.2017.10.036.
- Jokinen, M., Hujala, T., Paloniemi, R., Vainio, A. 2018. Private landowners and protected species: What sort of noncompliance should we be worried about? *Global Ecology and Conservation* 15, e00407. doi:10.1016/j.gecco.2018.e00407.
- Junttila, S., Sugano, J., Vastaranta, M., Linnakoski, R., Kaartinen, H., Kukko, A., Holopainen, M., Hyyppä, H., Hyyppä, J. 2018. Can Leaf Water Content Be Estimated Using Multispectral Terrestrial Laser Scanning? A Case Study With Norway Spruce Seedlings. *Frontiers in Plant Science* 9(299):1-14. doi:10.3389/fpls.2018.00299.
- Kangas, A., Astrup, R., Breidenbach, J., Fridman, J., Gobakken, T., Korhonen, K.T., Maltamo, M. et al. 2018. Remote sensing and forest inventories in Nordic countries - roadmap for the future. *Scandinavian Journal of Forest Research* 33(4):397-412. doi:10.1080/02827581.2017.1416666.
- Kärhä, K., Anttonen, T., Poikela, A., Palander, T., Lauren, A., Peltola, H., Nuutinen, Y. 2018. Evaluation of Salvage Logging Productivity and Costs in Windthrown Norway Spruce-Dominated Forests. *Forests* 9(5):280. doi:10.3390/f9050280.
- Karvonen, J., Kunttu, J., Suominen, T., Kangas, J., Leskinen, P., Judl, J. 2018. Integrating fast pyrolysis reactor with combined heat and power plant improves environmental and energy efficiency in bio-oil production. *Journal of Cleaner Production* 183:143-152. doi:10.1016/j.jclepro.2018.02.143.
- Kellomäki, S., Strandman, H., Heinonen, T., Asikainen, A., Venäläinen, A., Peltola, H. 2018. Temporal and Spatial Change in Diameter Growth of Boreal Scots Pine, Norway Spruce, and Birch under Recent-Generation (CMIP5) Global Climate Model Projections for the 21st Century. *Forests* 9, 118. doi:10.3390/f9030118.
- Kivimäenpää, M., Markkanen, J.-M., Ghimire, R.P., Holopainen, T., Vuorinen, M., Holopainen, J.K. 2018. Scots pine provenance affects the emission rate and chemical composition of volatile organic compounds of forest floor. *Canadian Journal of Forest Research* 48(11):1373-1381. doi:10.1139/cjfr-2018-0049.
- Korrensalo, A., Kettunen, L., Laiho, R., Alekseychik, P., Vesala, T., Mammarella, I., Tuittila, E.-S. 2018. Boreal bog plant communities along a water table gradient differ in their standing biomass but not their biomass production. *Journal of Vegetation Science* 29(2):136-146. doi:10.1111/jvs.12602.
- Korrensalo, A., Männistö, E., Alekseychik, P., Mammarella, I., Rinne, J., Vesala, T., Tuittila, E.-S. 2018. Small spatial variability in methane emission measured from a wet patterned boreal bog. *Biogeosciences* 15:1749-1761. doi:10.5194/bg-15-1749-2018.
- Koskinen, J., Roslin, T., Nyman, T., Abrego, N., Michell, C., Vesterinen, E.J. 2018. Finding flies in the mushroom soup: Host specificity of fungus-associated communities revisited with a novel molecular method. *Molecular Ecology* 28(2):190-202. doi:10.1111/mec.14810.
- Kotivuori, E., Maltamo, M., Korhonen, L., Packalen, P. 2018. Calibration of nationwide airborne laser scanning based stem volume models. *Remote Sensing of Environment* 210:179-192. doi:10.1016/j.rse.2018.02.069.

- Kuittinen, S., Yang, M., Kaipainen, E., Villa, A., Keinänen, M., Vepsäläinen, J., Pappinen, A. 2018. Acetone-Butanol-Ethanol Fermentation of Non-detoxified Dilute Acid extracted Hemicellulosic Hydrolysate from the Short-rotation Coppice *Salix schwerinii* E. Wolf. *Bioresources* 13(3):5225-5240.
- Kuittinen, S., Yang, M., Kaipainen, E., Villa, A., Keinänen, M., Vepsäläinen, J., Pappinen, A. 2018. Acetone-Butanol-Ethanol Fermentation of Non-detoxified Dilute Acid extracted Hemicellulosic Hydrolysate from the Short-rotation Coppice *Salix schwerinii* E. Wolf. *Bioresources* 13(3):5225-5240.
- Kukkonen, M., Korhonen, L., Maltamo, M., Suvanto, A., Packalen, P. 2018. How much can airborne laser scanning based forest inventory by tree species benefit from auxiliary optical data? *International journal of applied earth observation and geoinformation* 72:91-98. doi:10.1016/j.jag.2018.06.017.
- Kurttila, M., Pukkala, T., Miina, J. 2018. Synergies and trade-offs in the production of NWFPs predicted in boreal forests. *Forests* 9(7), 417. doi:10.3390/f9070417.
- Laine, A.M., Mehtätalo, M., Tolvanen, A., Frohling, S., Tuittila, E.-S. 2018. Impacts of drainage, restoration and warming on boreal wetland greenhouse gas fluxes. *Science of Total Environment* 647:169-181. doi:10.1016/j.scitotenv.2018.07.390.
- Laine, A.M., Selänpää, T., Oksanen, J., Seväkivi, M., Tuittila, E.-S. 2018. Plant diversity and functional trait composition during mire development. *Mires and Peat* 21, article 02:1-19. doi:10.19189/MaP.2017.OMB.280.
- Lappalainen, M., Palviainen, M., Kukkonen, J.V.K., Setälä, H., Piirainen, S., Sarjala, T., Koivusalo, H., Finer, L., Launiainen, S., Lauren, A. 2018. Release of Carbon in Different Molecule Size Fractions from Decomposing Boreal Mor and Peat as Affected by Enchytraeid Worms. *Water, air and soil pollution* 229:240. doi:10.1007/s11270-018-3871-5.
- Laurén, A., Asikainen, A., Kinnunen, J.-P., Palviainen, M., Sikanen, L. 2018. Improving the financial performance of solid forest fuel supply using a simple moisture and dry matter loss simulation and optimization. *Biomass and Bioenergy* 116:72-79. doi:10.1016/j.biombioe.2018.05.014.
- Lavola, A., Maukonen, M., Julkunen-Tiitto, R. 2018. Variability in the composition of phenolic compounds in winter-dormant *Salix pyrolifolia* in relation to plant part and age. *Phytochemistry* 153:102-110. doi:10.1016/j.phytochem.2018.05.021.
- Levkoev, E., Mehtätalo, L., Luostarinen, K., Pulkkinen, P., Zhigunov, A., Peltola, H. 2018. Development of height growth and frost hardiness for one-year-old Norway spruce seedlings in greenhouse conditions in response to elevated temperature and atmospheric CO<sub>2</sub> concentration. *Silva Fennica* vol. 52 no. 3 article id 9980. doi:10.14214/sf.9980.
- Li, S.H., Ge, Z.M., Xie, L.N., Chen, W., Yuan, L., Wang, D.Q., Li, X.Z., Zhang, L.Q. 2018. Ecophysiological response of native and exotic salt marsh vegetation to waterlogging and salinity: Implications for the effects of sea-level rise. *Scientific Reports* 8:2441. doi:10.1038/s41598-017-18721-z.
- Liang, X., Hyyppä, J., Kaartinen, H., Lehtomäki, M., Pyörälä, J., Pfeifer, N., Holopainen, M., et al. [Incl. Vastaranta, M.]. 2018. International benchmarking of terrestrial laser scanning approaches for forest inventories. *Isprs journal of photogrammetry and remote sensing* 144:137-179. doi:10.1016/j.isprsjprs.2018.06.021.
- Luostarinen, K., Heräjärvi, H. 2018. Relationship between anatomy and shear strength in wood of *Larix sibirica*. *Holzforschung*. doi:10.1515/hf-2018-0032.
- Maljanen, M., Kujala, K., Reinikainen, J., Tuittila, E.-S., Ronkanen, A.-K. 2018. Greenhouse Gas Dynamics of a Northern Boreal Peatland Used for Treating Metal Mine Wastewater. *Wetlands* 38:905. doi:10.1007/s13157-018-1040-7.
- Maljanen, M., Kujala, K., Reinikainen, J., Tuittila, E.-S., Ronkanen, A.-K. 2018. Greenhouse Gas Dynamics of a Northern Boreal Peatland Used for Treating Metal Mine Wastewater. *Wetlands* 38:905-917. doi:10.1007/s13157-018-1040-7.

- Maltamo, M., Karjalainen, T., Repola, J., Vauhkonen, J. 2018. Incorporating tree- and stand-level information on crown base height into multivariate forest management inventories based on airborne laser scanning. *Silva Fennica* 52(3), article id 10006. doi:10.14214/sf.10006.
- Mattila, U., Tokola, T. 2018. Terrain mobility estimation using TWI and airborne gamma-ray data. *Journal of Environmental Management* 232:531-536. doi:10.1016/j.jenvman.2018.11.081.
- Mgbeahuruike, E.E., Fyhrquist, P., Vuorela, H., Julkunen-Tiitto, R., Holm, Y. 2018. Alkaloid-Rich Crude Extracts, Fractions and Piperamide Alkaloids of *Piper guineense* Possess Promising Antibacterial Effects. *Antibiotics* 7(4), 98. doi:10.3390/antibiotics7040098.
- Mikkonen, A., Li, T., Vesala, M., Saarenheimo, J., Ahonen, V., Kärenlampi, S., Blande, J.D., Tiirola, M., Tervahauta, A. 2018. Biofiltration of airborne VOCs with green wall systems - microbial and chemical dynamics. *Indoor air* 28(5):697-707. doi:10.1111/ina.12473.
- Mofikoya, A.O., Kivimäenpää, M., Blande, J.D., Holopainen, J.K. 2018. Ozone disrupts adsorption of *Rhododendron tomentosum* volatiles to neighbouring plant surfaces, but does not disturb herbivore repellency. *Environmental Pollution* 240:775-780. doi:10.1016/j.envpol.2018.05.031.
- Mofikoya, A.O., Miura, K., Ghimire, R.P., Blande, J.D., Kivimäenpää, M., Holopainen, T., Holopainen, J.K. 2018. Understorey *Rhododendron tomentosum* and Leaf Trichome Density Affect Mountain Birch VOC Emissions in the Subarctic. *Scientific Reports* 8, Article number: 13261. doi:10.1038/s41598-018-31084-3.
- Mononen, L., Auvinen, A.P., Packalen, P., Virkkala, R., Valbuena, R., Bohlin, I., Valkama, J., Vihervaara, P. 2018. Usability of citizen science observations together with airborne laser scanning data in determining the habitat preferences of forest birds. *Forest Ecology and Management* 430:498-508. doi:10.1016/j.foreco.2018.08.040.
- Nichiforel, L., Keary, K., Deuffic, P., Weiss, G., Thorsen, B.J., Winkel G., Avdibegovic, M., et al. [Incl. Hujala, T.]. 2018. How private are Europe's private forests? A comparative property rights analysis. *Land Use Policy* 76:535-552. doi:10.1016/j.landusepol.2018.02.034.
- Nieminen, M., Piirainen, S., Sikström, U., Löfgren, S., Marttila, H., Sarkkola, S., Laurén, A., Finér, L. 2018. Ditch network maintenance in peat-dominated boreal forests: Review and analysis of water quality management options. *AMBIO* 47:535. doi:10.1007/s13280-018-1047-6.
- Nissinen, K., Virjamo, V., Mehtälä, L., Lavola, A., Valtonen, A., Nybakken, L., Julkunen-Tiitto, R. 2018. A Seven-Year Study of Phenolic Concentrations of the Dioecious *Salix myrsinifolia*. *Journal of Chemical Ecology* 44(4):416-430. doi:10.1007/s10886-018-0942-4.
- Nybakken, L., Lie, M.H., Julkunen-Tiitto, R., Asplund, J., Ohlson, M. 2018. Fertilization Changes Chemical Defense in Needles of Mature Norway Spruce (*Picea abies*). *Frontiers in Plant Science* 9:770. doi:10.3389/fpls.2018.00770.
- Oksanen, E. 2018. Trichomes form an important first line of defence against adverse environment - new evidence for ozone stress mitigation. *Plant, Cell and Environment* 41(7):1497-1499. doi:10.1111/pce.13187.
- Pakkala, T., Piirainen, J., Lakka, J., Tiainen, J., Piha, M., Kouki, J. 2018. Tree Sap as an Important Seasonal Food Resource for Woodpeckers: The Case of the Eurasian Three-Toed Woodpecker (*Picoides tridactylus*) in Southern Finland. *Annales Zoologici Fennici* 55(1-3):79-92. doi:10.5735/086.055.0108.
- Pakkala, T., Tiainen, J., Piha, M., Kouki, J. 2018. How important are nest cavities made by the Three-toed Woodpecker *Picoides tridactylus* for cavity-nesting forest bird species? *Acta ornithologica* 53(1):69-79. doi:10.3161/00016454AO2018.53.1.007.
- Pakkala, T., Tiainen, J., Piha, M., Kouki, J. 2018. Nest tree characteristics of the old-growth specialist Three-toed Woodpecker *Picoides tridactylus*. *Ornis Fennica* 95(3):89-102. http://hdl.handle.net/10138/247834.
- Pakkala, Ti., Tiainen, J., Piha, M., Kouki, J. 2018. Three-toed Woodpecker cavities in trees: A keystone structural feature in forests shows decadal persistence but only short-term benefit for secondary cavity-breeders. *Forest Ecology and Management* 413:70-75. doi:10.1016/j.foreco.2018.01.043.

- Pasalodos-Tato, M., Pukkala, T., Cañellas, I., Sánchez-González, M. 2018. Optimizing the debarking and cutting schedule of cork oak stands. *Annals of Forest Science* 75:61. doi:10.1007/s13595-018-0732-8.
- Pasanen, H., Junninen, K., Boberg, J., Tatsumi, S., Stenlid, J., Kouki, J. 2018. Life after tree death: Does restored dead wood host different fungal communities to natural woody substrates? *Forest Ecology and Management* 409:863-871. doi:10.1016/j.foreco.2017.12.021.
- Pascual, A., Pukkala, T., de Miguel, S., Pesonen, A., Packalen, P. 2018. Influence of size and shape of forest inventory units on the layout of harvest blocks in numerical forest planning. *European journal of forest research* 138(1):111-123. doi:10.1007/s10342-018-1157-5.
- Pascual, A., Pukkala, T., De-Miguel, S. 2018. Effects of Plot Positioning Errors on the Optimality of Harvest Prescriptions When Spatial Forest Planning Relies on ALS Data. *Forests* 9, 371. doi:10.3390/f9060371.
- Pascual, A., Pukkala, T., de-Miguel, S., Pesonen, A., Packalen, P. 2018. Influence of timber harvesting costs on the layout of cuttings and economic return in forest planning based on dynamic treatment units. *Forest Systems*, [S.l.], v. 27, n. 1, p. e001, may 2018. ISSN 2171-9845. Available at: <<http://revistas.inia.es/index.php/fs/article/view/11897>>. Date accessed: 11 apr. 2019. doi:<http://dx.doi.org/10.5424/fs/2018271-11897>.
- Peng, W., Pukkala, T., Jin, X., Li, F. 2018. Optimal management of larch (*Larix olgensis* A. Henry) plantations in Northeast China when timber production and carbon stock are considered. *Annals of Forest Science* 75:63. doi:10.1007/s13595-018-0739-1.
- Peuhkurinen, J., Tokola, T., Plevak, K., Sirparanta, S., Kedrov, A., Pyankov, S. 2018. Predicting Tree Diameter Distributions from Airborne Laser Scanning, SPOT 5 Satellite, and Field Sample Data in the Perm Region, Russia. *Forests* 9(10), 639. doi:10.3390/f9100639.
- Pukkala, T. 2018. Carbon forestry is surprising. *Forest Ecosystems* 5:11. doi:10.1186/s40663-018-0131-5.
- Pukkala, T. 2018. Effect of species composition on ecosystem services in European boreal forest. *Journal of Forestry Research* 29:261. doi:10.1007/s11676-017-0576-3.
- Pukkala, T. 2018. Instructions for optimal any-aged forestry. *Forestry* 91(5):563–574. doi:10.1093/forestry/cpy015.
- Pukkala, T. 2018. Optimized cellular automaton for stand delineation. *Journal of forestry research* 30:107-119. doi:10.1007/s11676-018-0803-6.
- Pynnönen, S., Paloniemi, R., Hujala, T. 2018. Recognizing the Interest of Forest Owners to Combine Nature-Oriented and Economic Uses of Forests. *Small-Scale Forestry* 17:443-470. doi:10.1007/s11842-018-9397-2.
- Pyorälä, J., Liang, X., Vastaranta, M., Saarinen, N., Kankare, V., Wang, Y., Holopainen, M., Hyypä, J. 2018. Quantitative Assessment of Scots Pine (*Pinus sylvestris*L.) Whorl Structure in a Forest Environment Using Terrestrial Laser Scanning. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing* 11(10):3598-3607. doi:10.1109/JSTARS.2018.2819598.
- Rahman, A., Viiri, H., Tikkanen, O.-P. 2018. Is stump removal for bioenergy production effective in reducing pine weevil (*Hylobius abietis*) and *Hylastes* spp. breeding and feeding activities at regeneration sites? *Forest Ecology and Management* 424:184-190. doi:10.1016/j.foreco.2018.05.003.
- Randriamanana, T.R., Nissinen, K., Ovaskainen, A., Lavola, A., Peltola, H., Albrechtsen, B., Julkunen-Tiitto, R. 2018. Does fungal endophyte inoculation affect the responses of aspen seedlings to carbon dioxide enrichment? *Fungal Ecology* 33:24-31. doi:10.1016/j.funeco.2017.12.002.
- Randriamanana, T.R., Nissinen, K., Ovaskainen, A., Lavola, A., Peltola, H., Albrechtsen, B., Julkunen-Tiitto, R. 2018. Does fungal endophyte inoculation affect the responses of aspen seedlings to carbon dioxide enrichment? *Fungal Ecology* 33:24-31. doi:10.1016/j.funeco.2017.12.002.
- Räsänen, N., Kankaala, P., Tahvanainen, T., Akkanen, J., Saarnio, S. 2018. Changes in dissolved organic matter and microbial activity in runoff waters of boreal mires after restoration. *Aquatic Sciences* 80:20. doi:10.1007/s00027-018-0569-0.

- Räty, J., Packalen, P., Maltamo, M. 2018. Comparing nearest neighbor configurations in the prediction of species-specific diameter distributions. *Annals of Forest Science* 75:26. doi:10.1007/s13595-018-0711-0.
- Ravindranath, N.H., Gopalakrishnan, R. 2018. Unmasking the story behind forest carbon flux: an integrated remote-sensing based approach. *Environmental Research Letters* 13 041001. doi:10.1088/1748-9326/aab0dd.
- Ren, F., Kovalchuk, A., Mukrimin, M., Liu, M., Zeng, Z., Ghimire, R.P., Kivimäenpää, M., Holopainen, J.K., Sun, H., Asiegbu, F.O. 2019. Tissue Microbiome of Norway Spruce Affected by Heterobasidion-Induced Wood Decay. *Microbial Ecology* 77:640-650. doi:10.1007/s00248-018-1240-y.
- Rinne, J., Tuittila, E.-S., Peltola, O., Li, X., Raivonen, M., Alekseychik, P., Haapanala, S., Pihlatie, M., Aurela, M., Mammarella, I., Vesala, T. 2018. Temporal Variation of Ecosystem Scale Methane Emission From a Boreal Fen in Relation to Temperature, Water Table Position, and Carbon Dioxide Fluxes. *Global Biochemical Cycles* 32:1087-1106. doi:10.1029/2017GB005747.
- Ruuhola, T., Nybakken, L., Randriamanana, T., Lavola, A., Julkunen-Tiitto, R. 2018. Effects of long-term UV-exposure and plant sex on the leaf phenoloxidase activities and phenolic concentrations of *Salix myrsinifolia* (Salisb.). *Plant Physiology and Biochemistry* 126. doi:10.1016/j.plaphy.2018.02.025.
- Saarinen, N., Vastaranta, M., Nasi, R., Rosnell, T., Hakala, T., Honkavaara, E., Wulder, M.A.; Luoma, V., Tommaselli, A.M.G., Imai, N.N., Ribeiro, E.A.W., Guimaraes, R.B., Holopainen, M., Hyypä, J. 2018. Assessing Biodiversity in Boreal Forests with UAV-Based Photogrammetric Point Clouds and Hyperspectral Imaging. *Remote Sensing* 10(2):338. doi:10.3390/rs10020338.
- Saarinen, N., White, J.C., Wulder, M.A., Kangas, A., Tuominen, S., Kankare, V., Holopainen, M., Hyypä, J., Vastaranta, M. 2018. Landsat archive holdings for Finland: opportunities for forest monitoring. *Silva Fennica* 52 no. 3, article id 9986. Category: research note. doi:10.14214/sf.9986.
- Sabatini, F.M., Burrascano, S., Keeton, W.S., Levers, C., Lindner, M., Pötzschner, F., Verkerk, P.J., Bauhus, J., Buchwald, E. et al [Incl Tikkanen, Olli-Pekka]. 2018. Where are Europe's last primary forests? Diversity and distributions. doi:10.1111/ddi.12778.
- Salih, E.Y.A., Julkunen-Tiitto, R., Lampi, A.-M., Kanninen, M., Luukkanen, O., Sipi, M., Lehtonen, M., Vuorela, H., Fyhrquist, P. 2018. Terminalia laxiflora and Terminalia brownii contain a broad spectrum of antimycobacterial compounds including ellagitannins, ellagic acid derivatives, triterpenes, fatty acids and fatty alcohols. *Journal of Ethnopharmacology (Limerik)* 227:82-96. doi:10.1016/j.jep.2018.04.030.
- Salo, K., Kouki, J. 2018. Severity of forest wildfire had a major influence on early successional ectomycorrhizal macrofungi assemblages, including edible mushrooms. *Forest Ecology and Management* 415-416:70-84. doi:10.1016/j.foreco.2017.12.044.
- Sanz, B., Malinen, J., Leppänen, V., Valbuena, R., Kauranne, T., Tokola, T. 2018. Valuation of growing stock using multisource GIS data, a stem quality database, and bucking simulation. *Canadian Journal of Forest Research* 48(8):888-897. doi:10.1139/cjfr-2017-0172.
- Saunier, A., Ormeño, E., Havaux, M., Wortham, H., Ksas, B., Temime-Roussel, B., Blande, J.D., Lecareux, C., Mévy, J.P., Bousquet-Mélou, A., Gauquelin, T., Fernandez, C. 2018. Resistance of native oak to recurrent drought conditions simulating predicted climatic changes in the Mediterranean region. *Plant, Cell and Environment* 41(10):2299-2312. doi:10.1111/pce.13331.
- Silfver, T., Kontro, M., Paaso, U., Karvinen, H., Keski-Saari, S., Keinänen, M., Rousi, M., Mikola, J. 2018. Intrapopulation genotypic variation in leaf litter chemistry does not control microbial abundance and litter mass loss in silver birch, *Betula pendula*. *Plant and Soil* 426:253-266. doi:10.1007/s11104-018-3631-8.
- Sivadasan, U., Chenhao, C., Nissinen, K., Randriamanana, T., Nybakken, L., Julkunen-Tiitto, R. 2018. Growth and defence of aspen (*Populus tremula*) after three seasons under elevated temperature and ultraviolet-B radiation. *Canadian Journal of Forest Research* 48(6):629-641. doi:10.1139/cjfr-2017-0380.
- Stenberg, L., Haahti, K., Hokka, H., Launiainen, S., Nieminen, M., Lauren, A., Koivusalo, H. 2018. Hydrology of Drained Peatland Forest: Numerical Experiment on the Role of Tree Stand Heterogeneity and Management. *Forests* 9(10):645. doi:10.3390/f9100645.



- Strømme, C., Sivadasan, U., Nissinen, K., Lavola, A., Randriamanana, T., Julkunen-Tiitto, R., Nybakken, L. 2018. Interannual variation IN UV-B and temperature effects on bud phenology and growth in *Populus tremula*. *Plant Physiology and Biochemistry* 134:31-39. doi:10.1016/j.plaphy.2018.08.029.
- Suominen, M., Junninen, K., Heikkala, O., Kouki, J. 2018. Burning harvested sites enhances polypore diversity on stumps and slash. *Forest Ecology and Management* 414:47-53. doi:10.1016/j.foreco.2018.02.007.
- Tahvanainen, V., Miina, J., Pukkala, T., Kurttila, M. 2018. Optimizing the joint production of timber and marketed mushrooms in *Picea abies* stands in eastern Finland. *Journal of Forest Economics* 32:34-41. doi:10.1016/j.jfe.2018.04.002.
- Tang, J., Valolahti, H., Kivimäenpää, M., Michelsen, A., Rinnan, R. 2018. Acclimation of Biogenic Volatile Organic Compound Emission From Subarctic Heath Under Long-Term Moderate Warming. *Journal of Geophysical Research: Biogeosciences* 123(1):95-105. doi:10.1002/2017JG004139.
- Taulavuori, K., Pyysalo, A., Taulavuori, E., Julkunen-Tiitto, R. 2018. Responses of phenolic acid and flavonoid synthesis to blue and blue-violet light depends on plant species. *Environmental and Experimental Botany* 150:183-187. doi:10.1016/j.envexpbot.2018.03.016.
- Tegelberg, R., Virjamo, V., Julkunen-Tiitto, R. 2018. Dry-air drying at room temperature - a practical pre-treatment method of tree leaves for quantitative analyses of phenolics? *Phytochemical analysis* 29(5):493-499. doi:10.1002/pca.2755.
- Thorn, S., Seibold, S., Heikkala, O., Koivula, M., Venugopal, P., Kouki, J. 2018. New records of Northern bats (*Eptesicus nilssonii*) in boreal clear cuts emphasize the value of green-tree retention for conservation. *Nyctalus* 19:22-26.
- Tikkinen, M., Varis, S., Peltola, H., Aronen, T. 2018. Improved germination conditions for Norway spruce somatic cotyledonary embryos increased survival and height growth of emblings. *Trees* 32(6):1489-1504. doi:10.1007/s00468-018-1728-6.
- Vainio, A., Paloniemi, R., Hujala, T. 2018. How are forest owners' objectives and social networks related to successful conservation? *Journal of Rural Studies* 62:21-28. doi:10.1016/j.jrurstud.2018.06.009.
- Varvia, P., Lähivaara, T., Maltamo, M., Packalen, P., Seppänen, A. 2018. Gaussian Process Regression for Forest Attribute Estimation From Airborne Laser Scanning Data. *IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING* arXiv:1806.09440 [stat.AP]. doi:10.1109/TGRS.2018.2883495.
- Vastaranta, M., Yu, X., Luoma, V., Karjalainen, M., Saarinen, N., Wulder, M.A., White, J.C., Persson, H.J., Hollaus, M., Yrttimaa, T., Holopainen, M., Hyyppä, J. 2018. Aboveground forest biomass derived using multiple dates of WorldView-2 stereo-imagery: quantifying the improvement in estimation accuracy. *International Journal of Remote Sensing* 39(23):8766-8783. doi:10.1080/01431161.2018.1492176.
- Virjamo, V., Julkunen-Tiitto, R. 2018. Quality and quantity of piperidine alkaloids in needles and bark of Scots pine (*Pinus sylvestris*) seedlings. *Phytochemistry Letters* 26:106-109. doi:10.1016/j.phytol.2018.05.014.
- White, J.C., Saarinen, N., Kankare, V., Wulder, M.A., Hermosilla, T., Coops, N.C., Pickell, P.D., Holopainen, M., Hyyppä, J., Vastaranta, M. 2018. Confirmation of post-harvest spectral recovery from Landsat time series using measures of forest cover and height derived from airborne laser scanning data. *Remote sensing of environment* 216:262-275. doi:10.1016/j.rse.2018.07.004.
- Zhang, H., Väliänta, M., Amesbury, M.J., Charman, D.J., Laine, A., Tuittila, E.-S. 2018. Successional change of testate amoeba assemblages along a space-for-time sequence of peatland development. *European journal of protistology* 66:36-47. doi:10.1016/j.ejop.2018.07.003.
- Zhang, Y., Virjamo, V., Du, W., Yin, Y., Nissinen, K., Nybakken, L., Guo, H., Julkunen-Tiitto, R. 2018. Effects of soil pyrene contamination on growth and phenolics in Norway spruce (*Picea abies*) are modified by elevated temperature and CO<sub>2</sub>. *Environmental Science and Pollution Research* 25(13):12788-12799. doi:10.1007/s11356-018-1564-7.

Zhang, Y., Virjamo, V., Sobuj, N., Du, W., Yin, Y., Nybakken, L., Guo, H., Julkunen-Tiitto, R. 2018. Elevated temperature and CO<sub>2</sub> affect responses of European aspen (*Populus tremula*) to soil pyrene contamination. *Science of the Total Environment* 634:150-157. doi:10.1016/j.scitotenv.2018.03.344.

Zhang, Y., Virjamo, V., Sobuj, N., Du, W., Yin, Y., Nybakken, L., Guo, H., Julkunen-Tiitto, R. 2018. Sex-related responses of European aspen (*Populus tremula* L.) to combined stress: TiO<sub>2</sub> nanoparticles, elevated temperature and CO<sub>2</sub> concentration. *Journal of Hazardous Materials* 352:130-138. doi:10.1016/j.jhazmat.2018.03.031.

Zubizarreta-Gerendiain, A., Pukkala, T., Peltola, H. 2018. Effect of wind damage on the habitat suitability of saproxylic species in a boreal forest landscape. *Journal of Forestry Research*. doi:10.1007/s11676-018-0693-7.