Richard Webster Medal 2018

By David G Rossiter, Chair Pedometrics Committee on Prizes and Awards for 2014--2017

The Pedometrics Committee on Prizes and Awards is pleased to announce the award of the Richard Webster Medal of the International Union of Soil Sciences (IUSS) to be awarded at the 21st World Congress of Soil Science (WCSS) in Rio de Janeiro (Brasil) in August 2018. This medal recognizes the person who has most advanced pedometrics in the period between the IUSS WCSS of 2014 and 2018, while also considering achievements prior to that period.

The Medal is awarded to Professor Richard Murray Lark, chair in Geoinformatics at the University of Nottingham (UK).

Professor Lark was nominated by:
- Dr Raphael Viscarra Rossel, CSIRO Land and Water, Canberra, Australia
- Dr Ben Marchant, British Geological Survey, Nottingham, UK
- Prof Budiman Minasny, University of Sydney, Australia
- Dr Thomas Bishop, University of Sydney, Australia
- Dr Matthew Pringle, Department of Environment and Science, Queensland Government, Australia
- Dr Thomas Orton, Department of Environment and Science, Queensland Government, Australia

Professor Lark is internationally recognized as an outstanding pedometrician. He has devoted most of his professional career to elucidating the complexity of soil distribution in the landscape and to describing it quantitatively. He has applied advanced statistical techniques and developed new ones for the purpose and to map the soil's properties for land management. All of these applications are both rigorous and pertinent in leading to an understanding of soil processes and predictions in the real world. He has shown the value of pedometrics at scales ranging from nanometres to nations, and he has communicated his findings to statisticians, pedologists, land managers and policy makers.

Since 1994, Professor Lark has had 155 papers published in peer-reviewed journals. Four have won best pedometrics paper award (twice with Lark as first author), and one was declared best paper in the journal Mathematical Geology in 2007.

Professor Lark's research includes new techniques that have been widely adopted by other pedometricians. He has extended the linear mixed model to include multivariate data, robust model estimators and non-stationary variation, and he has optimized sample design for such modelling. He has applied boundary-line analysis, cumulants, wavelets, copulas, and Bayesian maximum entropy methods in novel ways, and he has shown how statistical and process-based models might be combined to understand behaviour such as the emission of greenhouse gases from soil. Recently he has proposed means of communicating uncertainty to the public and in eliciting soil information from experts. He has applied these methods to matters of practical importance at local, regional and national scale. They include soil contamination, erosion, the status and rate of change of organic

carbon and how these depend on spatial scale.

Professor Lark currently holds the new chair in Geoinformatics at the University of Nottingham. There he leads a multi-disciplinary and multi-institution project, comprising four British and four African research centres, to quantify the impacts of conservation agriculture in Africa. Previously he was Deputy Head of Department of Biomathematics and Bioinformatics at Rothamsted Research, where he shaped the institute's mathematical research strategy. He founded and led the Environmetrics Group through which he supervised seven post-doctoral scientists who continue to work in pedometrics. He secured research funding from agricultural levy-payers' organisations, the British research councils and government agencies, and he led projects which these organisations required to understand and manage variable soil. On leaving Rothamsted in 2011 he led (from then until December 2017) the Environmental Statistics Extended Project and team at the British Geological Survey (BGS). In this role he was responsible for statistical modelling across the Survey's activities. Throughout, he maintained a focus on soil, and secured funding for and led diverse projects from variation of soil at the microscopic scale to agricultural management at the field and farm scales.

Though employed as a research scientist for most of his career, Lark has supervised eight doctoral students and numerous visiting scientists, lectured on the MSc programmes at Cranfield and Reading Universities (at which he has held Visiting Professorships), run short courses on time-series analysis and soil sampling and participated in workshops on scientific publishing. He teaches a course on wavelets in Potsdam, Germany, and he is now training African scientists in the quantitative methods needed for the study of conservation agriculture. His talks at conferences are well planned and presented with great clarity to tell listeners of the statistical tools at their disposal. In particular, the recent book written with Richard Webster plainly elucidates the fundamentals of soil sampling and sound design.

Professor Lark was elected chairman of the Pedometrics Commission in 2006 and served the full four-year term. He continues to serve as member of the advisory board. The commission thrived during his tenure as chairman. He delivered a well-received keynote presentation at the Pedometrics 25th Anniversary Conference in 2017. He supported the establishment of the IUSS working groups on Soil Monitoring and Proximal Soil Sensing. He revitalized the pedometrics newsletter, Pedometron, through initiatives that encouraged communication about pedometrics within the IUSS. He is Associate Editor of the European Journal of Soil Science and chairman of its statistical panel. In 2011 he instigated and edited a special issue of this journal in tribute to Richard Webster. He is also a member of the editorial boards of Geoderma, Spatial Statistics and Precision Agriculture. He is the founding chair of the 'Informatics and Statistics' subdivision of the European Geosciences Union Soil Systems Division (2013–14).

Among his most cited (influential) first-author journal papers are:
Lark, R. M., Cullis, B. R., & Welham, S. J. (2006). On spatial prediction of soil properties in the presence of a spatial trend: the empirical best linear unbiased predictor (E-BLUP) with REML. European Journal of Soil Science, 57(6), 787–799.

Lark, R. M., & Webster, R. (2006). Geostatistical mapping of geomorphic variables in the presence of trend. Earth Surface Processes and Landforms, 31(7), 862–874.

Lark, R. M., Bellamy, P. H., & Rawlins, B. G. (2006). Spatio-temporal variability of some metal concentrations in the soil of eastern England, and implications for soil monitoring. Geoderma, 133(3–4), 363–379.

Lark, R. M. (2012). Towards soil geostatistics. Spatial Statistics, 1, 92–99. https://doi.org/10.1016/j.spasta.2012.02.001

Lark, R. M. (2009). Estimating the regional mean status and change of soil properties: two distinct objectives for soil survey. European Journal of Soil Science, 60(5), 748–756. https://doi.org/10.1111/j.1365-2389.2009.01156.x

Lark, R. M. (2007). Inference about soil variability from the structure of the best wavelet packet basis. European Journal of Soil Science, 58(3), 822–831.

Lark, R. M., & Scheib, C. (2013). Land use and lead content in the soils of London. Geoderma, 209–210, 65–74. https://doi.org/10.1016/j.geoderma.2013.06.004

Lark, R. M., Ander, E. L., Cave, M. R., Knights, K. V., Glennon, M. M., & Scanlon, R. P. (2014). Mapping trace element deficiency by cokriging from regional geochemical soil data: A case study on cobalt for grazing sheep in Ireland. Geoderma, 226–227, 64–78. https://doi.org/10.1016/j.geoderma.2014.03.002

Lark, R. M., Patton, M., Ander, E. L., & Reay, D. M. (2018). The singularity index for soil geochemical variables, and a mixture model for its interpretation. Geoderma, 323, 83–106. https://doi.org/10.1016/j.geoderma.2018.02.032

Lark, R. M., & Milne, A. E. (2016). Boundary line analysis of the effect of water-filled pore space on nitrous oxide emission from cores of arable soil. European Journal of Soil Science, 67(2), 148–159. https://doi.org/10.1111/ejss.12318

Taking all this into consideration, the Awards Committee is pleased to honour Professor Lark with this Medal.