

Alex McBratney - Profile



Alex McBratney is a globally recognised soil scientist, and advocate for soil science, with ongoing fruitful collaborations with colleagues from Europe, the Americas, Africa, Asia and Oceania. He has been involved in IUSS activities since first attending a Working Group meeting of the ISSS Working Group on Soil Information Systems in Paris in 1981. Alex has been a leading advocate of Pedometrics and Digital Soil Mapping in the IUSS and wider communities. He served as IUSS Deputy Secretary General from 2010 to 2014 where he developed its Strategic Plan.

Professional Background

BSc (Honours in Soil Science) 1977, University of Aberdeen

PhD (Soil Science) 1984, University of Aberdeen

DSc (Soil Science) 2001, University of Aberdeen

Graduate (2007) Australian Institute of Company Directors

DScAgr (Precision Agriculture) 2012, University of Sydney

He has received, *inter alia*, the following awards and recognition.

- 2016 Fellowship Australian Academy of Science
- 2015 Fellowship Soil Science Australia (formerly Australian Society of Soil Science)
- 2014 V.V. Dokuchaev Medal in Soil Science from the International Union of Soil Sciences
- 2008 J.K. Taylor Medal, Australian Society of Soil Science
- 2006 Richard Webster Medal, International Society of Soil Sciences

- 2004 Prescott Medal, Australian Society of Soil Science

Positions Held

2017-	Director, Sydney institute of Agriculture	The University of Sydney
2015-2017	Dean, Faculty of Agriculture & Environment	The University of Sydney
1994-	Professor of Soil Science	The University of Sydney
1989-1994	Associate Professor in Soil Science	The University of Sydney
1981-1988	Research Scientist	CSIRO Division of Soils, Brisbane

Summary of Expertise

Soil science, pedometrics, precision agriculture, soil security

Alex. McBratney's major contribution to soil science can be considered under the general heading of Pedometrics. Alex leads one of the strongest university-based research groups on soil resource assessment internationally, working on the basic theoretical, methodological and applied aspects. Methodologically, he has developed new approaches for numerical soil classification and mapping of soil classes. The group has also been instrumental in developing methods of spatial analysis for describing and predicting field soil attributes based on geostatistics and generalised linear and non-linear models. Most recently, his research group has developed new methods of spatial sampling including spatially-constrained Latin hypercube sampling and random toposequences; and new models for soil inference using pedotransfer functions and infrared spectroscopy. These methods have been eagerly adopted by research groups and practitioners worldwide. These developments have been applied in two major areas; namely, precision agriculture and digital soil assessment. Applications in precision agriculture have focused on developing systems for on-farm implementation by designing new methods of experimentation and proximal soil sensing. These have been adopted by several hundred farmers across Australia. He pioneered the development and formalized the concept of digital soil mapping. This has become the fastest growing area of research into providing quantitative spatial soil information. Digital soil assessment applications spans scales from catchments to the globe. The methodology, which includes novel sampling, measurement, spatial and temporal prediction and modelling techniques, is the basis for a truly international global digital soil map proposal (www.globalsoilmap.net) which has been funded by the Gates Foundation as well as for collaborative work with state and federal agencies in Australia. All the theoretical and applied work so far developed can now be brought to bear to powerfully tackle the challenging problems at hand. Alex. is currently pursuing a new integrative concept, namely that of Soil Security, which recognizing the interacting biophysical, economic, social and policy dimensions attempts to secure soil for global sustainability. This also helps to facilitate soil science advocacy. Alex has taught soil science at the University of Sydney for almost 30 years, and

has a strong interest in soil education. Alex has also contributed significantly to soil science and its community of practitioners by editing the IUSS-affiliated journal, *Geoderma*, since 1995.

International Activities

IUSS

- Proposed, initiated and developed the Working group on Pedometrics which subsequently became the Pedometrics Commission. Acted as Secretary (1990-1994) and Chair (1994-1998) of the Working Group. Initiated the successful newsletter *Pedometron*. Involved in a series of biennial conferences which have all been published as Special Issues of *Geoderma*. More than 250 participants at the 25th anniversary conference in Wageningen in 2017. Chair of the Organizing Committee Pedometrics 1999 in Sydney.
- Stood for Chair of Division 1 in 2002 and 2006
- Proposed, initiated and developed the Working Group on Digital Soil Mapping. Inaugural Chair of the Working Group (2005-2006). Initiated a successful set of global workshops on digital soil mapping (Montpellier 2004, Rio de Janeiro 2006, Logan 2008) resulting in a number of books).
- Instrumental in setting up the Working Group on Proximal Soil Sensing. Chair of the organizing committee of the Global Workshop on High-Resolution Digital Soil Sensing & Mapping, February 2008, Sydney.
- Recipient of the Richard Webster Medal in Pedometrics 2006
- Vice-Chair of Division 1 (2006-2010) instrumental in organizing the symposium program for commissions and working groups in Division 1 for WCSS 2010
- Recipient of the V.V. Dokuchaev Medal in Soil Science 2014
- Participated in the 1994, 1998, 2002, 2006, 2010 and 2014 World Congresses
- 2014- Participation in the Working Group on Universal Soil Classification
- 207 Keynote Address at the 25th Anniversary Pedometrics Conference, Wageningen

non-IUSS

- Chair of Editors-in-Chief of the global soil science journal, *Geoderma* 2015-2017 ; Joint Editor-in-Chief 1995-
- Co-editor Kluwer's *Progress in Soil Science* book series.
- Chair of the Scientific Committee for GlobalSoilMap project 2008-2016
- Co-Chair, Global Symposium on Soil Security, College Station, Texas 2015.
- Co-Chair, Symposium on Soil Security and Planetary, Sydney, 2018

Summary of Publications

According to the ISI Web of Science, Alex has published 345 journal articles with an h-index of 59. Alternatively, according to Google Scholar, Alex has published some 700 scientific articles with an h-index of 86 and an i-10 index of 296.

A full list of his publications and citations can be found at <https://scholar.google.com/citations?authuser=1&user=0FnTDAsAAAAJ> Alex. has also edited eight books, with one in press, and more than 100 book chapters .

Six most significant publications

The papers chosen here represent in some way a significant step forward in various fields.

A.B. McBratney and R. Webster (1986). Choosing functions for semi-variograms of soil properties and fitting them to sampling estimates. *Journal of Soil Science* 37, 617–639.

A.B. McBratney (1992). On variation, uncertainty and informatics in environmental soil management. *Australian Journal of Soil Research* 30, 913–935.

A.B. McBratney, Budiman Minasny, S.R. Cattle & R.W. Vervoort. (2002). From pedotransfer functions to soil inference systems. *Geoderma* 109, 41-73.

A.B. McBratney, M.L. Mendonça Santos & B. Minasny (2003). On digital soil mapping. *Geoderma* 117, 3-52.

P.A. Sanchez, S. Ahamed, F.Carré, A.E. Hartemink, J. Hempel, J. Huising, P. Lagacherie, **A. B. McBratney**, N.J. McKenzie, M.L. Mendonça-Santos, B. Minasny, L. Montanarella, P. Okoth, C.A. Palm, J.D. Sachs, K.D. Shepherd, T.-G. Vågen, B. Vanlauwe, M.G. Walsh, L.A. Winowiecki & G.-L. Zhang. (2009) Digital soil map of the world. *Science* 325, 680-681.

A.B. McBratney, D. Field, D. & A. Koch. (2014). The dimensions of soil security. *Geoderma*, 213, 203-213.

Highly Cited Papers 2007-2017 – Clarivate Web of Science

Alex McBratney is currently recognised by Clarivate as a Highly Cited Researcher because of a significant number of Highly Cited papers. Highly Cited papers are the top 1% in the field over the last 10 years. Many of these papers are a result of large international collaborations which IUSS membership helps to facilitate. Such international collaborations are crucial to the progress of our science.

Minasny, B, Malone, BP, **McBratney, AB**, Angers, DA, Arrouays, D, Chambers, A, Chaplot, V, Chen, ZS, Cheng, K, Das, BS, Field, DJ, Gimona, A, Hedley, CB, Hong, SY, Mandal, B, Marchant, BP, Martin, M, McConkey, BG, Mulder, VL, O'Rourke, S, Richer-de-Forges, AC, Odeh, I, Padarian, J, Paustian, K, Pan, GX, Poggio, L, Savin, I, Stolbovoy, V, Stockmann, U, Sulaeman, Y, Tsui, CC, Vagen, TG, van Wesemael, B, Winowiecki, L. 2017. Soil carbon 4 per mille. *Geoderma* 292, 59-86.

Malone, BP, Styc, Q, Minasny, B, **McBratney, AB**, Malone, Brendan P. 2017. *Geoderma* 290, 91-99.

Huang, J., **McBratney, AB**, Minasny, B, Triantafyllis, J. 2017. Monitoring and modelling soil water dynamics using electromagnetic conductivity imaging and the ensemble Kalman filter. *Geoderma* 285, 76-93.

Chaney, NW, Wood, EF, **McBratney, AB**, Hempel, JW, Nauman, TW, Brungard, CW, Odgers, NP. 2016. POLARIS: A 30-meter probabilistic soil series map of the contiguous United States. *Geoderma* 274, 54-67.

Vereecken, H, Schnepf, A, Hopmans, JW, Javaux, M, Or, D, Roose, DOT, Vanderborght, J, Young, MH, Amelung, W, Aitkenhead, M, Allison, SD, Assouline, S, Baveye, P, Berli, M, Bruggemann, N, Finke, P, Flury, M, Gaiser, T, Govers, G, Ghezzehei, T, Hallett, P, Franssen, HJH, Heppell, J, Horn, R, Huisman, JA, Jacques, D, Jonard, F, Kollet, S, Lafolie, F, Lamorski, K, Leitner, D, **McBratney, A**, Minasny, B, Montzka, C, Nowak, W, Pachepsky, Y, Padarian, J, Romano, N, Roth, K, Rothfuss, Y, Rowe, EC, Schwen, A, Simunek, J, Tiktak, A, Van Dam, J, van der Zee, SEATM, Vogel, HJ, Vrugt, JA, Wohling, T, Young, IM. 2016. Modeling soil processes: review, key challenges, and new perspectives. *Vadose Zone Journal* 15, 5.

Minasny, B, **McBratney, AB**. 2016. Digital soil mapping: A brief history and some lessons. *Geoderma* 264, 301-311.

Horta, A, Malone, B, Stockmann, U, Minasny, B, Bishop, TFA, **McBratney, AB**, Pallasser, R, Pozza, L. 2015. Potential of integrated field spectroscopy and spatial analysis for enhanced assessment of soil contamination: a prospective review. *Geoderma* 241, 180-209.

Arrouays, D, Grundy, MG, Hartemink, AE, Hempel, JW, Heuvelink, GBM, Hong, SY, Lagacherie, P, Lelyk, G, **McBratney, AB**, McKenzie, NJ, Mendonca-Santos, MDL, Minasny, B, Montanarella, L, Odeh, IOA, Sanchez, PA, Thompson, JA, Zhang, GL 2014. GlobalSoilMap: toward a fine-resolution global grid of soil properties. *Advances in Agronomy* (Sparks, DL ed.), 125, 93-

McBratney, Alex, Field, Damien J., Koch, Andrea. 2014. The dimensions of soil security. *Geoderma* 213, 203-213.

Minasny, B, **McBratney, AB**, Malone, BP, Wheeler, I. 2013. Digital mapping of soil carbon. *Advances in Agronomy* (DL Sparks, ed.) 118, 1-47.

Stockmann, U, Adams, MA, Crawford, JW, Field, DJ, Henakaarchchi, N, Jenkins, M, Minasny, B, **McBratney, AB**, de Courcelles, VD, Singh, K, Wheeler, I, Abbott, L, Angers, DA, Baldock, J, Bird, M, Brookes, PC, Chenu, C, Jastrow, JD, Lal, R, Lehmann, J, O'Donnell, AG, Parton, WJ, Whitehead, D. 2013. The knowns, known unknowns and unknowns of sequestration of soil organic carbon. *Agriculture Ecosystems and Environment* 164, 80-99.

Bellon-Maurel, V, **McBratney, A**. 2011. Near-infrared (NIR) and mid-infrared (MIR) spectroscopic techniques for assessing the amount of carbon stock in soils - critical review and research perspectives. *Soil Biology & Biochemistry* 43, 1398-1410.

Malone, BP, **McBratney, AB**, Minasny, B, Laslett, GM. 2009. Mapping continuous depth functions of soil carbon storage and available water capacity. *Geoderma* 154, 138-152.

Gomez, C, Rossel, RAV, **McBratney, AB**. 2008. Soil organic carbon prediction by hyperspectral remote sensing and field vis-NIR spectroscopy: An Australian case study. *Geoderma* 146, 403-411.

Statement of Intent

As President I would wholeheartedly uphold the IUSS mission to promote the scientific and life-sustaining importance of soil to humankind, and to support and enhance the discipline of soil science globally. The IUSS President is the world's principal ambassador and advocate for soil science.

Further, I would hope to provide the leadership and collegiality so that IUSS can:-

- aim to be recognized as the leading world organization for the facilitation, curation and dissemination of soil science
- strive to support and value the global community of scientists who generate soil knowledge and increase understanding of soil
- provide opportunities for all soil scientists to meet, present their work and exchange views in global and regional fora physically and virtually.

From the 2014 IUSS Strategic Plan, which I co-wrote, priorities which I would hope to strengthen as president include:-

- (1) Branding and communication soil and soil science to the wider community
- (2) Increasing participation in IUSS by better recognizing the role and influence of our member societies
- (3) Increasing our resource base by applying for international grants to promote soil science and soil education
- (4) Improving the member experience by further improving resources to Commissions and Working Groups
- (5) Improving stakeholder engagement particularly at the government and international policy level including promoting global and international soil instruments.
- (6) Promoting education on soil and soil science at all levels.

The IUSS leadership structure changed at the end of 2014 and the first and second 2-year Presidents elected by the new process have taken office, with the third to take office in 2019. Additionally the Secretariat moved to a new headquarters in Vienna on a more permanent and professional footing. Both of these changes have been very successful and I would strive to maintain that success.

I pledge to work unstintingly for the IUSS – my track record attests to this. I look forward to the task and to working with the representatives of our affiliated national societies and all office bearers and members.

