

Contacts for the Department of Soil & Physical Sciences

Faculty of Agriculture & Life Sciences

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Dean

Professor Grant Edwards

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Secretary

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May 2017

Introduction to the Department of Soil & Physical Sciences

The Soil and Physical Sciences department comprises 19 academic staff, research officers and postdoctoral fellows and a similar number of technical and support staff. As the name implies, the department has responsibility at the University for the delivery of all undergraduate and postgraduate soil-related subjects, and many physical science subjects including first and second year undergraduate chemistry and physics. The academic staff teach into a number of academic programmes including: Bachelor of Agricultural Science, Bachelor of Science, Bachelor of Viticulture and Oenology, and the Diploma of Agriculture. All the academic staff are involved in postgraduate supervision at Masters and Doctoral levels.

The range of research being undertaken is extensive but in recent years has increasingly focused on environmental issues, especially soil's role and influence on water and air quality. For example, a number of current research programmes involve the measurement and modelling of solute and microbial transport through soil. Other programmes involve the measurement and modelling of gases generated within or absorbed by soil. Further examples of current programmes include investigations into: soil-plant rhizosphere relationships, heavy-metal contamination of soil, soil remediation and quaternary geology and paleoclimate research.





Introduction to the Faculty of Agriculture & Life Sciences

The Faculty of Agriculture and Life Sciences at Lincoln University provides knowledge and expertise to lead New Zealand into a dynamic, innovative and sustainable future in a wide range of disciplines related to Agriculture, Food and the Environment. It is a multidisciplinary research and teaching Faculty with 16 Professors and 150 staff. The Faculty of Agriculture and Life Sciences provides expertise throughout the 'farm to fork' value chain.

The Faculty is a centre of excellence for postgraduate education. It provides a continuum of postgraduate programmes from the fundamental areas of science through to the applied in disciplines relating to soils, the environment and its management, plants, animals, viticulture and oenology, food, farm management and ecology. The Faculty also provides undergraduate degrees in: Agricultural Science, Viticulture & Oenology, Science (which includes a number of majors), and Diplomas in Agriculture, Horticulture and Agricultural and Horticultural Management

Most importantly, there are wide ranging employment opportunities for the Faculty's graduates who are sought after by innovative and progressive organisations in New Zealand and worldwide.

The Faculty has excellent collaborations with the agriculture and horticulture industries and research in these areas is directed towards solving industry problems. Collaboration is also very strong with government-funded research organisations that are based in Lincoln or elsewhere in New Zealand. Notably, the Faculty is an integral part of the Marlborough Wine Research Centre, a new initiative to

provide leading research to this important industry. This is only one of many examples of our credibility with industry partners: meeting expectations and solving problems in a modern society. The Faculty of Agriculture and Life Sciences also has extensive links to a wide range of international research organisations.

The Faculty has access to excellent facilities, including well-equipped laboratories, controlled environment rooms, animal laboratories, a winery, advanced analytical instruments and computing facilities. The Faculty's field facilities incorporate a wide range of production systems including arable cropping and pastures (three research farms totalling 430 ha), a vineyard, horticultural research area, lysimeters, access to a 'best practice' commercial dairy farm and a new purpose-built research dairy farm. The Faculty also has access to a wide range of livestock including sheep, beef and dairy cattle, and deer.

There are four departments in the Faculty:

- Agricultural Sciences
- Ecology
- Soil and Physical Sciences
- Wine, Food and Molecular Biosciences

The Faculty is research led and has a number of specific research centres, including the:

- Centre for Soil and Environmental Research
- Centre for Viticulture and Oenology
- Centre for Advanced Computational Solutions
- Centre for Food Research and Innovation

Research and Teaching Strengths within the Faculty include:

Agricultural Sciences

- Animal production; dairy, sheep, beef and deer
- Plant production; crops, pasture and horticulture
- Animal genetics
- Animal health
- Nutrition; animal and plant
- Physiology; animal and crop
- Agronomy
- Animal products
- Animal welfare
- Grazing ecology
- Parasitology and immunology
- Reproductive physiology
- Rumen function

Pest-management and Conservation

- Animal behaviour
- Conservation and Biodiversity
- Ecological restoration
- Evolutionary biology
- Fire ecology
- Molecular ecology
- Plant pathology
- Plant microbiology
- Remediation of degraded and contaminated land
- Soil ecology
- Sustainable agriculture and ecosystem services
- Wildlife and pest management

Specialist unit

- Centre for Wildlife Management and Conservation

Soil and Physical Sciences

- Agricultural greenhouse gas science, measurement, mitigation and modelling
- Antarctic soils
- Environmental biochemistry
- Nitrate leaching and mitigation
- Remediation of contaminated soils
- Rhizosphere process science
- Soil and environmental physics
- Soil biology, biochemistry and molecular biology
- Soil fertility and nutrient management
- Soil geomorphology, quaternary geology and soil-landscape modelling
- Soil micro-morphology
- Soil nutrient cycling and management
- Stable isotope methodologies
- Sustainable land management
- Trace elements in soils

Wine, Food and Molecular Biosciences

- Animal models for human health
- Biochemistry and cell biology
- Biotechnology
- Computer modelling
- Food biochemistry
- Immunology
- Microbiology
- Molecular biology
- Plant biology
- Systems biology
- Toxicology
- Wine science
- Viticulture

Peter C. Almond



Assoc. Prof. in Soil Science

BSc(Hons) (Massey) PhD (Lincoln)

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Member of:

N.Z. Society of Soil Science; Soil Science Society of Am.; Geological Society of New Zealand.; Australasian and New Zealand Geom. Group (ANZGG); Australasian Quaternary Association; Am. Geophysical Union.

• Teaching

Introduction to Earth Science; Soil Science; Geomorphology; Soil Geomorphology; Soil Resources.

Research

Soil geomorphology - using soil properties and patterns to interpret landscape history and processes:

- Effects of Quaternary climate change in glaciated landscapes.
- Assessment of hazard related to Alpine Fault earthquakes on the Wetland lowlands.
- Climatically induced changes in soil formation and transport processes on hillslopes.
- Quaternary geology and paleoclimate research:
- Loess stratigraphy, phytolith analysis, stable isotopes of pedogenic carbonate.
- Viticulture and soils:
- Influence of soil variability on fruit quality and quantity.

Selected Publications

- Balks, M.R., López-Martínez, J., Goryachkin, S., Mergelov, N., Schaefer, C., Simas, F., Almond, P., Claridge, G.G.C., McLeod, M. and Scarrow, J., 2013. Windows on Antarctic soil landscape relationships: comparison across selected regions of Antarctica. Antarctic Glacial & Periglacial Processes (ISAES volume), accepted.
- Barrell, D., Almond, P.C., Vandergoes, M.J., Lowe, D.J. and Newnham, R.M., 2013. A composite stratotype for regional comparison of climatic events in New Zealand over the past 30,000 years (NZ-INTIMATE project). Quaternary Science Reviews, Australasian-INTIMATE Special Issue.
- Lindeburg, K., Almond, P., Roering, J. and Chadwick, O., 2013. Pathways of soil genesis in the Coast Range of Oregon, USA. Plant and Soil: (10.1007/s11104-012-1566-z) 1-19.
- Eger, A., Almond, P.C. and Condon, L.M., 2012. Phosphorus fertilisation by active Holocene dust deposition in a super-humid, temperate environment (West Coast, South Island, New Zealand) – soil phosphorus fractionation and accession processes. Global Biogeochemical Cycles, 27: (10.1002/gbc.20019) 108–118.

Janet Bertram



Senior Tutor

BSc (Hons)(Lincoln) PhD
(Lincoln)

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Teaching

Soil Chemistry & Environmental Biogeoscience

Research

- Chemistry & Environmental Biogeoscience

Selected Publications.

- Clough T J, Bertram J E, Ray J L, Condon L M, O'Callaghan M, Sherlock R R, Wells N S (2010) Impact of an unweathered wood biochar on emissions of N₂O from a bovine-urine amended pasture soil. *Soil Science Society of America Journal* 74: 852-860.
- Orwin K H, Bertram J E, Clough T J, Condon L M, Sherlock R R, O'Callaghan M, Ray J L, Baird D B (2010) Impact of bovine urine deposition on soil microbial activity, biomass, and community structure. *Applied Soil Ecology* 44 (1): 89-100.
- Ray J L, Clough T J, Baird D, Bertram J E, O'Callaghan M, Sherlock R R, Condon L M (2009) Effects of biochar amendment on total and active soil ammonia-oxidizer communities. *Journal of Environmental Quality* .
- Orwin K H, Bertram J E, Clough T J, Condon L M, Sherlock R R, O'Callaghan M (2009) Short-term consequences of spatial heterogeneity in soil nitrogen concentrations caused by urine patches of different sizes. *Applied Soil Ecology* 42: 271-278.
- Bertram J E, Clough T J, Sherlock R R, Condon L M, O'Callaghan M, Wells N S, Ray J L (2009) Hippuric acid and benzoic acid inhibition of urine derived N₂O emissions from soil. *Global Change Biology* 15: 2067-2077.

Keith Cameron



Professor of Soil Science, Head of Centre for Soil & Environmental Research

ONZM, BSc(Hons) (Aberd) PhD
(R'dg) FRSNZ FNZSSS FNZIAS
MRSNZ

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Keith.Cameron@lincoln.ac.nz

Head of Centre for Soil & Environmental Research, Lincoln University; Past President, New Zealand Society of Soil Science.

Fellow of:

Royal Society of New Zealand;
NZ Institute of Agricultural Science;
NZ Society of Soil Science.

Member of:

International Society of Soil Science;
British Society of Soil Science.

Teaching

Soil fertility. Soil management. Soil physical conditions. Sustainable production and environmental protection.

Research

Mitigation of nitrous oxide greenhouse gas emissions and nitrate leaching from soil, Nitrification inhibitors, Soil fertility, Soil nitrogen, Soil physics, Solute transport, Nitrate leaching, Lysimetry; Dairy farming and the environment.

Selected Publications

- Cameron, K.C., Hedley M., Clark H. and Di H.J. 2007. Impact of pasture and supplement feeding on the environment In: "Pasture and Supplements for Grazing Animals" New Zealand Society of Animal Production, Occasional Publication No.14, pp287-309.
- Cameron, K.C. and Di, H.J. 2004. Nitrogen leaching losses from different forms and rates of farm effluent applied to a Templeton soil in Canterbury, New Zealand. *New Zealand Journal of Agricultural Research* **47**: 429-437.
- Di, H.J., Cameron, K.C., Shen, J.P., Winefield, C.S., O'Callaghan, M., Bowatte, S. and He, J.Z. (2009). Nitrification driven by bacteria and not archaea in nitrogen rich grassland soils. *Nature Geoscience*. **2**: 621-624.
- Di, H.J., Cameron K.C. and Sherlock R.R. 2007. Comparison of the effectiveness of a nitrification inhibitor, dicyandiamide, in reducing nitrous oxide emissions in four different soils under different climatic and management conditions. *Soil Use and Management* **23**: 1-9.
- Di, H.J. and Cameron, K.C. (2008). Sources of nitrous oxide from ¹⁵N-labelled animal urine and urea fertilizer with and without a nitrification inhibitor, dicyandiamide (DCD). *Australian Journal of Soil Research* **46**: 76-82.
- McLaren, R.G.; Cameron, K.C. 2008. *Soil Science: Sustainable Production and Environmental Protection*. Oxford University Press, Auckland, 304p

Henry Chau



Lecturer in Environmental Physics

PhD (Saskatchewan, Can.); B.Sc. (Alberta, Can.)

DDI: 4230587

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Henry.Chau@lincoln.ac.nz

Teaching

Environmental Physics, Soil Physics

Research

- Environmental Physics
- Soil Physics
- Soil and Water Management
- Soil Water Repellency and Soil Mycology
- Soil Spatial Variability

Selected Publications

- Chau, H.W., Biswas A., Vujanovic, V. and Si, B.C. (2014). Relationship between the severity, persistence of soil water repellency and the critical soil water content in water repellent soils. *Geoderma* (in press) <http://dx.doi.org/10.1016/j.geoderma.2013.12.025>
- Biswas, A., Cresswell, H.P., Chau, H.W., Viscarra Rossel, R.A., and Si, B.C. (2013). Separating scale-specific soil spatial variability: A comparison of multi-resolution analysis and empirical mode decomposition. *Geoderma*. 209-210:57-64. <http://dx.doi.org/10.1016/j.geoderma.2013.06.003>
- Vujanovic, V. and Chau, H.W. (2012). Monitoring Fusarium complex mycelia replacement by mycopathogenic Sphaerodes using alcohol percentage test, qRT-PCR and HPLC. *Physiological and Molecular Plant Pathology*. 80:28–34. <http://dx.doi.org/10.1016/j.pmpp.2012.07.004>
- Chau, H.W., Goh, Y.K., Si, B.C., and Vujanovic, V. (2012). Wetting properties of fungi mycelium alter soil infiltration and soil water repellency in a γ -sterilized wettable and repellent soil. *Fungal Biology* 116:1212-1218. <http://dx.doi.org/10.1016/j.funbio.2012.10.004>
- Chau, H.W., Goh, Y.K., Si, B.C., and Vujanovic, V. (2012). An innovative brilliant blue FCF method for fluorescent staining of fungi and bacteria. *Biotechnic and Histochemistry*. 86:280-287. doi:10.3109/10520295.2010.492733
- Biswas, A., Chau, H.W., Bedard-Haughn, A., and Si, B.C. (2011). Factors controlling soil water storage in the hummocky landscape of the Prairie Pothole region of North America. *Canadian Journal of Soil Science*. 92:649-663. doi:10.4141/CJSS2011-045

Tim J. Clough



Professor of Environmental Biogeochemistry

BAgrSc(Hons) (Cant) PhD (Lincoln)
FNZSSS

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Teaching

Global environmental Issues, Advanced soil Management, Biogeochemistry and Climate Change.

Research

- Greenhouse gas emissions & climate change
- Stable isotope science & methodology
- Biogeochemistry & Environmental science.

Selected Publications

- *Buckthought, L.E., Clough T.J., Cameron, K.C., Di, H.J., Shepherd, M.A. 2015 Urine patch and fertiliser N interaction: effects of fertiliser rate and season of urine application on nitrate leaching and pasture N uptake. In press Agriculture, Ecosystems & Environment In press AGEE12203R1*
- *Clague, J.C., Stenger, R., Clough, T.J. 2015 Evaluation of the stable isotope signatures of nitrate to detect denitrification in a shallow groundwater system in New Zealand. Agriculture, Ecosystems & Environment 202: 188–197*
- *Naomi S. Wells, W. Troy Baisden, Tim J. Clough 2014 "Ammonia volatilisation is not the dominant factor in determining the soil nitrate isotopic composition of pasture systems" In Press Agriculture, Ecosystems and Environment <http://dx.doi.org/10.1016/j.agee.2014.10.001>*
- *Naomi S. Wells, Tim J. Clough, Sarah E. Johnson-Beebout, Roland J. Buresh 2014 "Land management between crops affects the soil inorganic nitrogen balance in a tropical rice system" Nutrient Cycling in Agroecosystems 100: 315-332*
- *N. Balaine, T.J. Clough, F.M. Kelliher, C. van Koten 2014 Soil aeration affects the degradation rate of the nitrification inhibitor, dicyandiamide. In Press. Soil Research SR14162.*
- *Roland R. Klefoth, Tim J. Clough, Oene Oenema, Jan-Willem Van Groenigen 2014 Soil bulk density and moisture content influence relative gas diffusivity and the reduction of N₂O-15N Vadose Zone Journal Accepted paper, posted 09/15/2014. Doi:10.2136/vzj2014.07.0089*
- *Khan, S., Clough, T.J., Goh, K.M., Sherlock, R.R. 2014 Nitric and nitrous oxide fluxes following bovine urine deposition to summer-grazed pasture. New Zealand Journal of Agricultural Research. <http://www.tandfonline.com/doi/full/10.1080/00288233.2014.897633>.*

Leo Condrón



Professor of Biogeochemistry
BSc(Hons) (Glas) PhD (Cant)

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Teaching

Soil biology and biochemistry, biogeochemistry, soil fertility, chemistry, organic chemistry.

Research

Biogeochemistry of organic carbon and major nutrients in natural and managed ecosystems, with an emphasis on the nature, dynamics and bioavailability of organic and mineral forms of nutrients in the soil-plant system in relation to soil management and land use. Project areas include organic matter and nutrient dynamics in grassland and forest soils, soil chronosequence dynamics, rhizosphere processes, relationships between soil microbial diversity and function, and the nature, mobility and fate of phosphorus in terrestrial environments.

Selected Publications

- Clough, T.J., Condrón, L.M., Kammann, C. and Müller, C. 2013. A review of biochar and soil nitrogen dynamics. *Agronomy* 3: 275-293.
- Condrón, L.M., Spears, B.M., Haygarth, P.M., Turner, B.L. and Richardson, A.E. 2013. Role of legacy phosphorus in improving global phosphorus-use efficiency. *Environmental Development* 8: 147-148.
- Eger, A., Almond, P.C. and Condrón, L.M. 2013. Phosphorus fertilisation by active dust deposition in a super-humid, temperate environment - soil phosphorus fractionation and accession processes. *Global Biogeochemical Cycles* 27: 108-118.
- Hamonts, K., Clough, T.J., Stewart, A., Clinton, P.W., Richardson, A.E., O'Callaghan, M. and Condrón, L.M. 2013. Effects of nitrogen and water-logging on denitrifier gene abundance, community structure and activity in the rhizosphere of wheat. *FEMS Microbiology Ecology* 83: 568-584.
- Haygarth, P.M., Bardgett, R.D. and Condrón, L.M. 2013. Phosphorus and nitrogen cycles and their management. In: *Russell's Soil Conditions and Plant Growth - 12th Edition*. Eds. P.J. Gregory and S. Nortcliff. Wiley-Blackwell pp. 132-159.
- Jangid, K., Whitman, W.B., Condrón, L.M., Turner, B.L. and Williams, M.A. 2013. Soil bacterial community succession during long-term ecosystem development. *Molecular Ecology* 22: 3415-3124.

Hong J. Di



Professor of Soil & Environmental Science

ONZM, BSc (AgrUniHebei)
MAppSci (Cant) PhD, FNZSSS,
FNZIAHS, MRSNZ

DDI: 4230779

Burns 314

Hong.Di@lincoln.ac.nz

Appointed as Officer of New Zealand Order of Merit (ONZM) by her Majesty Queen Elizabeth the II for services to agricultural research.

Fellow of:

NZ Institute of Agricultural and Horticultural Science;
NZ Society of Soil Science.

Member of:

Royal Society of NZ; Soil Science Society of America; NZ Institute of Agricultural and Horticultural Science; Management Board, Centre for Soil and Environmental Research (CSER).

Teaching

Introductory Soil Science: Soil Chemistry and Fertility; Soil Management: Soil Fertility Evaluation and Management; Advanced Soil Management: Nutrient Management and Water Quality; Advanced Soil Science: Nitrogen mineralisation and nitrification.

Research

- Soil and environmental science.
- Mitigation of nitrate leaching and nitrous oxide emissions.
- Soil molecular biology and microbial ecology.
- Organic wastes and endocrine disrupting chemicals.
- Pesticide degradation, leaching and modelling.

Selected Publications

- Di, H.J., Cameron, K.C., Shen, J.P., Winefield, C.S., O'Callaghan, M., Bowatte, S. and He, J.Z. (2009). Nitrification driven by bacteria and not archaea in nitrogen rich grassland soils. *Nature Geoscience* 2: 621-624.
- Di, H.J., Cameron, K.C., Sherlock, R.R., Shen, J.P., He, J.Z., Winefield, C.S. (2010). Nitrous oxide emissions from grazed grassland as affected by a nitrification inhibitor, dicyandiamide, and relationships with ammonia oxidizing bacteria and archaea. *Journal of Soils and Sediments* DOI 10.1007/s11368-009-0174-x.
- Di, H.J., Cameron, K.C., Shen, J.P., He, J.Z., Winefield, C.S. (2009). Nitrate leaching from grazed grassland as affected by a nitrification inhibitor, dicyandiamide, and relationships with ammonia oxidizing bacteria and archaea. *Soil Use and Management* 25: 454-461.
- Di, H.J., Cameron, K.C. and Sherlock, R.R. Comparison of the effectiveness of a nitrification inhibitor, dicyandiamide (DCD), in reducing nitrous oxide emissions in four different soils under different climatic and management conditions. *Soil Use and Management* 23: 1-9, 2007.
- Di, H.J. and Cameron, K.C. Nitrous oxide emissions from two dairy pasture soils as affected by different rates of a fine particle suspension nitrification inhibitor, dicyandiamide (DCD). *Biology and Fertility of Soils* 42: 472-480, 2006.
- Di, H.J., Cameron, K.C. Mitigation of nitrate leaching in grazed pastures by treating the soil with a fine particle suspension nitrification inhibitor, dicyandiamide. *Agriculture, Ecosystems and Environment* 109: 202-212, 2005.
- Di, H.J. and Cameron, K.C. Effects of temperature and application rate of a nitrification inhibitor, dicyandiamide (DCD) on nitrification rate and microbial biomass in a grazed pasture soil. *Australian Journal of Soil Research* 42: 927-932, 2004.
- Di, H.J. and Cameron, K.C. Effects of the nitrification inhibitor, diacyandiamide on potassium, magnesium and calcium leaching in grazed grassland. *Soil Use and and Management* 20: 2-7, 2004.

Nik Lehto



Lecturer of Soil Chemistry

PhD (Lancaster, U.K.); MChem (Lancaster, U.K.).

DDI: 4230769

Burns 221

Niklas.Lehto@lincoln.ac.nz

Member of:

British, American and New Zealand Societies of Soil Science; involved with collaborative research projects in China and Thailand; Undertake consultancy work in the area of soil contamination with heavy metals.

Teaching:

Soil Chemistry, Biogeochemistry, Trace Metals, Micronutrients, Bioavailability, Speciation.

Research

- Bioavailability and dynamics of plant nutrients in soils
- Trace metal kinetics and speciation in aquatic systems
- Carbon, oxygen and nitrogen dynamics in soils

Selected Publications

- Paul Williams, Jakob Santner, Morten Larsen, Niklas J. Lehto, Eva Oburger, Walter Wenzel, Ronnie Glud, William Davison, Hao Zhang (2014) Localised Flux-Maxima of Arsenic, Lead and Iron around Root Apices in Flooded Lowland Rice. *Environmental Science & Technology* "In Press" DOI: 10.1021/es501127k
- Niklas J. Lehto, Ronnie Glud, Gunnvør á Norði, Hao Zhang, William Davison (2014) Anoxic microniches in marine sediments induced by aggregate settlement: biogeochemical dynamics and implications *Biogeochemistry*. 119 (1-3) 307-327. DOI: 10.1007/s10533-014-9967-0
- Niklas J. Lehto, William Davison, Hao Zhang (2012). The use of ultra-thin DGT devices for the analysis of trace metal dynamics in soils and sediments: a measurement and modelling approach. *Environmental Chemistry* 9 (4) 415-423 <http://dx.doi.org/10.1071/EN12036>.
- Yue Gao, Niklas Lehto (2012). A simple laser ablation ICP-MS method for the analysis of trace metals in a resin gel. *Talanta*, 92:78– 83. DOI:10.1016/j.talanta.2012.01.043
- Mohammad Shafaei-Arvajeh, Niklas Lehto, Øyvind Aarberg, Hao Zhang (2013) Kinetic Studies of Ni Organic Complexes Using Diffusive Gradients in Thin Films (DGT) with Double Binding Layers and a Dynamic Numerical Model. *Environmental science & technology*. 47(1) 463-470. DOI: 10.1021/es301371.
- Niklas J. Lehto, Łukasz Sochaczewski, William Davison, Wlodek Tych, Hao Zhang (2008). Sensitivity analysis of the determination of distribution coefficients and response times in soils using DGT. *Chemosphere*, 71: 795-801. DOI:10.1016/j.chemosphere.2007.10.003

Rich McDowell



Professor of Soil and Water Quality

BSc(Hons) Linc, PhD (Cantab), FNZSSS

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Teaching:

Soil Science

Research

- Soil Investigation of contaminant (faecal microbes, sediment and nutrients, especially phosphorus) losses from land (and land uses) to water.
- Developing tools and practices for the management and mitigation of contaminant losses at multiple scales.
- Working within farm systems and catchments to advise best practice and policy and achieve water quality outcomes.

Selected Publications

- McDowell RW, Cox N, Daughney CJ, Wheeler D, Moreau M. 2015. A national assessment of the potential linkage between soil, and surface and groundwater concentrations of phosphorus. *Journal of the American Water Resources Association*. 51:992-1002.
- McDowell RW (2015) Relationship between sediment chemistry, equilibrium phosphorus concentrations (EPC₀) and phosphorus concentrations at baseflow in rivers of the New Zealand National River Water Quality Network. *Journal of Environmental Quality*. 44:921-929.
- McDowell RW, Snelder TH, Cox N, Booker DJ, Wilcock RJ (2013) Establishment of reference or baseline conditions of chemical indicators in New Zealand streams and rivers relative to present conditions. *Marine and Freshwater Research* 64:387-400.
- McDowell RW, Taylor MD, Stevenson BA (2013) Natural background and anthropogenic contributions of cadmium to New Zealand soils. *Agriculture, Ecosystems and Environment* 165:80-87.
- McDowell RW, Nash D (2012) A review of the cost-effectiveness and suitability of mitigation strategies to prevent phosphorus loss from dairy farms in New Zealand and Australia. *Journal of Environmental Quality* 41:680-693.
- McDowell RW (2012) The rate of accumulation of cadmium and uranium in a long-term pasture: implications for soil quality. *New Zealand Journal of Agricultural Research* 55:133-146.
- McDowell RW (editor) (2008) *Environmental impacts of pasture-based farming*. CABI Press, Oxon, U.K. 283 p.

Ronald G. McLaren



**Emeritus Professor of
Environmental Soil Science**
BSc (Hons) (Lond) PhD (Nott)
FNZSSS

Ron.Mclaren@lincoln.ac.nz

Member of:
British, American and New
Zealand Societies of Soil Science;
involved with collaborative
research projects in China and
Thailand; Undertake consultancy
work in the area of soil
contamination with heavy metals.

Research

- Soil chemistry and plant availability of trace elements and heavy metals.
- Land application of sewage sludge (biosolids)
- Leaching of metals and metalloid elements.

Selected Publications

- Black, A., McLaren, R. G., Reichman, S. M., Speir, T. W. & Condron, L. M. Evaluation of soil metal bioavailability estimates using two plant species (*L. perenne* and *T. aestivum*) grown in a range of agricultural soils treated with biosolids and metal salts. *Environmental Pollution* 159, 1523–1535, 2011
- McLaren, R.G., Clucas, L.M., Speir, T. and van Schaik, A. Distribution and movement of nutrients and metals in a *Pinus radiata* forest soil following applications of biosolids. *Environmental Pollution* 147: 32-40, 2007.
- Chen, Z., Kim, K-W., Zhu, Y-G., McLaren, R.G., Liu, F. and He, J-Z. Adsorption ($As^{III,V}$) and oxidation (As^{III}) of arsenic by pedogenic Fe-Mn nodules. *Geoderma* 136: 566-572, 2006.
- McLaren, R.G., Clucas, L.M. A field comparison of pasture selenium uptake from different forms of selenium fertiliser. *New Zealand Journal of Agricultural Research* 49: 227-232, 2006.
- Singh, D., McLaren, R.G. and Cameron, K.C. Zinc sorption-desorption by soils: Effect of concentration and length of contact period. *Geoderma* 137: 117-125, 2006.
- McLaren, R.G., Clucas, L.M. and Taylor, M.D. Leaching of macronutrients and metals from undisturbed soils treated with metal-spiked sewage sludge. 3. Distribution of residual metals. *Australian Journal of Soil Research* 43: 159-170, 2005.
- Tongtavee, N., Shiowatana, J., McLaren, R.G. and Gray, C.W. Assessment of lead availability in contaminated soil using isotope dilution techniques. *Science of the Total Environment* 348: 244-256, 2005.

**Roger D.
McLenaghan****Senior Tutor**

PGDipAgrSc (Lincoln) NZCS

DDI: 4230785

Burns 127

Roger.McLenaghan@lincoln.ac.nz**Teaching**

Soils and soil management to diploma students, as well as laboratory sessions to degree students. Teach the use of the Nutrient Budget 'Overseer 5' model to advanced soil management students.

Research

- Soil chemistry: leaching of nutrients, trace elements
- Soil physical conditions: soil structure.

Selected Publications .

- McLenaghan, R.D., Condrón, L.M., Randhawa, P.S., Hong, D. 2008. Influence of Lupin green manure on phosphate rock availability and utilisation under different soil conditions. 4th Australian/Newzealand conference, Palmerston North NZ 1-5 December.
- Randhawa, P.S., Condrón, L.M., Di, H.J., Sinaj, S. and McLenaghan, R.D. 2006. Phosphorus availability in soils amended with different phosphate fertilisers. *Communications in Soil Science and Plant Analysis* 37: 25-39.
- Randhawa, P.S., Condrón, L.M., Di, H.J., Sinaj, S. and McLenaghan, R.D. 2005. Effect of green manure addition on soil organic phosphorus mineralisation. *Nutrient Cycling in Agroecosystems* 73: 181-189.
- McLenaghan R.D., Randhawa, P.S., Condrón, L.M., Di, H.J. 2004. Increasing Phosphate Rock dissolution using Green Manure Crops. 3rd Australian/New Zealand Soil Conference, Sydney, 5-11 December.
- Fowler C.J.E., Condrón L.M., McLenaghan R.D. 2004. Effects of green manures on nitrogen loss and availability in an organic cropping system. *New Zealand Journal of Agricultural Research* 47: 95-100.

Jim Moir



Associate Professor in Soil Fertility

BAgr, DipAgrSc, MAgrSc (Hons),
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Member of the New Zealand
Society of Soil Science.
Member of the New Zealand
Grassland Association.

Teaching

Soils and Soil Management; Soil Management, Advanced Soil Management; Advanced Soil Science

Current Research

- Soil and Environmental Quality, Soil nitrogen, Nitrification inhibitors.
- Nutrient cycling, and plant nutrition in soil/plant/ animal systems.
- Dairy farming and the environment; sustainability of high production systems.

Selected Publications

- Moir, J.L., Edwards, G.R. and Berry, L.N. (2012) Nitrogen uptake and leaching loss of thirteen temperate grass species under high N loading. Grass and Forage Science, doi: 10.1111/j.1365-2494.2012.00905.x
- Dennis, S.J., Moir, J.L., Cameron, K.C. and Di, H.J. (2012) Measuring excreta patch distribution in grazed pasture through low-cost image analysis. Grass and Forage Science, (In Press)
- Moir, J.L., Malcolm, B.J., Cameron, K.C. and Di, H.J. (2012) The effect of dicyandiamide on pasture nitrate concentration, yield and N offtake under high N loading in winter and spring. Grass and Forage Science, 67: 391-402.
- Lilburne, L., Carrick, S, Webb, T. and Moir, J.L. (2012) Computer-based evaluation of methods to sample nitrate leached from grazed pasture. Soil Use and Management, 28: 19-26.
- Maxwell, T.M.R., Moir, J.L. and Edwards, G.R. (2012) Sulphur and lime response of four adventive annual clovers grown in a New Zealand high country soil under glasshouse conditions. New Zealand Journal of Agricultural Research, 55: 47-62.
- Dennis, S.J., Cameron, K.C., Di, H.J., Moir, J.L., Staples, V., Sills, P. and Richards, K.G. (2011) Reducing nitrate losses from simulated grazing on grassland lysimeters in Ireland using a nitrification inhibitor (dicyandiamide). Biology and Environment, 112: 79-89.

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BSc(Ukraine), MSc(Ukraine),
PGCert Appl Sci (Lincoln)
PhD (Lincoln)

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Member of:
New Zealand Society for
Biochemistry and Molecular Biology

Current Research

- Soil microbial diversity,
- Involvement of soil microbes in important biochemical cycles and greenhouse gas emission,
- Next generation sequencing techniques for soil metagenomic metagenomic studies.

Selected Publications

- Podolyan, A., H. J. Di, K. C. Cameron, T. Clough, C. de Klein, and S. Saggar (2014), Ammonia oxidising populations and relationships with N₂O emissions in three New Zealand soils, *New Zealand Journal of Agricultural Research*, 57(3), 228-243, doi:10.1080/00288233.2014.924969.
- Robinson, A., H. J. Di, K. C. Cameron, and A. Podolyan (2014), Effect of soil aggregate size and dicyandiamide on N₂O emissions and ammonia oxidizer abundance in a grazed pasture soil, *Soil Use and Management*, 30(2), 231-240, doi:10.1111/sum.12104.
- GuoY., Di, H., Cameron, K., Li, B., Podolyan, A., Moir, J., Monaghan, R., Smith L. C., O'Callaghan, M., Bowatte, S., Waugh, D. & He, J.-Z. 2013. Effect of 7-year application of a nitrification inhibitor, dicyandiamide (DCD), on soil microbial biomass, protease and deaminase activities, and the abundance of bacteria and archaea in pasture soils. *Journal of Soils and Sediments*, 13, 753-759.
- Podolyan A, White J, Jordan B and Winefield C 2010 Identification of the lipoxygenase gene family from *Vitis vinifera* and biochemical characterisation of two 13-lipoxygenases expressed in grape berries of Sauvignon Blanc. *Functional Plant Biology* 37, 767-784.

Brett Robinson



Professor in Soil Chemistry

MSc(Hons) (Massey) PhD
(Massey)

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Teaching

Chemistry, Land, Water and Atmosphere, Environmental Biogeoscience, Soil Science II, Biogeochemistry and Climate Change

Research

- Trace element biogeochemistry
- Biofortification of essential micronutrients in crops
- Heavy metal contamination in soils and waters
- Phytomanagement

Selected Publications

- Bhatti SM, Anderson CWN, Stewart RB and Robinson BH (2013). Risk assessment of vegetables irrigated with arsenic-contaminated water. *Environmental Science: Process & Impacts*. DOI: 10.1039/C3EM00218G
- Gartler J, Robinson B, Burton K, Clucas L. Carbonaceous soil amendments to biofortify crop plants with zinc. *Science of the Total Environment*. 465,308-313. <http://dx.doi.org/10.1016/j.scitotenv.212.10.027>
- Simmler M, Ciadamidaro L, Schulin R, Madejón P, Reiser R, Clucas L, Weber P, Robinson BH (2013). Lignite reduces the solubility and plant uptake of cadmium in pasturelands. *Environmental Science and Technology* 47, 9, 4497-4504.
- Rees R, Robinson BH, Rog CJ, Papritz A, Schulin R (2013). Boron accumulation and tolerance of hybrid poplars grown on a B-laden mixed paper mill waste landfill. *Science of the Total Environment* 447, 515-524.
- Melpanque M, Collet S, Del Gratta F, Schnuriger B, Gaucher R, Robinson B, Bert V (2013). Combustion of Salix used for phytoextraction: The fate of metals and viability of the processes. *Biomass and Bioenergy* 49, 160-170.
- Evangelou MWH, Robinson BH, Gunthardt-Goeg MS, Schulin R (2013). Metal uptake and allocation in trees grown on contaminated land: implications for biomass production. *International Journal of Phytoremediation* 15(1), 77-90.
- Anderson CWN, Robinson BH, West DM, Clucas L, Portmann D (2012). Zinc-enriched and zinc-biofortified feed as a possible animal remedy in pastoral agriculture: Animal health and environmental benefits. *Journal of Geochemical Exploration* 121, 30-35
- Evangelou MWH, Conesa HM, Robinson BH, Schulin R (2012). Biomass Production on Trace Element-Contaminated Land: A review *Environmental Engineering Science* 29(9), 823-839.

Carol Smith



Head of Department

Senior Lecturer

BSc. (Hons) (Portsmouth), MSc. (R'dg), PhD (Aberd)

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Fellow, Royal Geographical Society.
Member, New Zealand Society of Soil Science; Australian Society of Soil Science; British Society of Soil Science; Australia, New Zealand Geomorphology Group (ANZGG); Australasian Quaternary Association.

Teaching

Introduction to Earth Science, Geomorphology, Soil Resources

Research

Quaternary studies. Micromorphology for soil & sediment fabric analysis; paleoclimate reconstruction using pedogenic carbonate; Quaternary geology and stratigraphy ;Antarctic soils and processes. Soil remediation. Sustainable strategies for reclamation of open-cast coal and gold mines; use of recycled organic materials. Geomorphology and soil/landscape dynamics.

Administration

Science Faculty Teaching Committee.

Selected Publications

- Smith, C. M. S., M. H. Bowie, J. L. Hahner, S. Boyer, Y. N. Kim, H. T. Zhong, M. Abbott, S. Rhodes, D. Sharp, and N. Dickinson Punakaiki Coastal Restoration Project: A case study for a consultative and multidisciplinary approach in selecting indicators of restoration success for a sand mining closure site, West Coast, New Zealand, CATENA
- Callard, S. L., Newnham, R. M., Vandergoes, M. J., Alloway, B. V., and C. Smith (2013) The vegetation and climate during the Last Glacial Cold Period, northern South Island, New Zealand. *Quaternary Science Reviews* 74, 215-229.
- Smith, C., Almond, P., Shanhun, F., Downward, R., Nall, V., Eger, A. and J. Bockheim (2012) Micromorphology of polygon evolution on hill slopes in Taylor Valley, McMurdo Dry Valleys, Antarctica. 14th International Working Meeting on Soil Micromorphology, Lleida, 8-14 July.
- Smith, C., Almond, P., Shanhun, F., Downward, R., Nall, V., Eger, A. and J. Bockheim (2012). An alternative mechanism for polygon evolution on hillslopes in Taylor Valley, McMurdo Dry Valleys, Antarctica: implications for surface exposure dating? Australasian Quaternary Association, Biennial Meeting, Lake Tekapo, New Zealand, February, 2012.
- Smith, C, Matthew Hughes, M, Almond, P and P Tonkin (2010). Micromorphology of a welded paleosol in the Dillondale loess, Charwell Basin, South Island, New Zealand. *Proceedings, 19th World Congress of Soil Science*, 1-6 August, Brisbane.
- Craw, D., Rufaut, C.G., Hammit, S., Clearwater, S. G. and C. M. Smith (2006). Geological controls on natural system recovery on mine waste in southern New Zealand. *Environmental Geology*, 51, 1389-1400.

Department of Soil and Physical Sciences Staff

<i>Name</i>	<i>Designation</i>
<i>Smith, Carol</i>	Head of Department & Senior Lecturer
<i>Torky, Amal</i>	Secretary
<i>Almond, Peter</i>	Associate Professor
<i>Anderson, Barry</i>	Technician
<i>Atkinson, Roger</i>	Technician
<i>Barlow, Carole</i>	Technician
<i>Beale, Nigel</i>	Technician
<i>Bertram, Janet</i>	Senior tutor
<i>Breitmeyer, Jason</i>	Senior Analyst
<i>Brown, Barbara</i>	Research Assistant
<i>Cameron, Keith</i>	Professor
<i>Chau, Henry</i>	Lecturer
<i>Clough, Tim</i>	Professor
<i>Clucas, Lynne</i>	Technician
<i>Condron, Leo</i>	Professor
<i>Cresswell, Roger</i>	Analytical Services Manager
<i>Di, Hong</i>	Professor
<i>Flynn, Victoria</i>	Lab Technician
<i>Hassall, Leanne</i>	Technical Officer
<i>Hendry, Trevor</i>	Technical Officer
<i>Jiao, Joy</i>	Analytical Technician
<i>Lehto, Nik</i>	Senior Lecturer
<i>Lei, Jie</i>	Technician
<i>Liang, Qian</i>	Analytical Technician
<i>McDowell, Richard</i>	Professor
<i>McLaren, Ron</i>	Emeritus Professor
<i>McLenaghan, Roger</i>	Senior Tutor
<i>Moir, Jim</i>	Associate Professor
<i>Moore, Stephen</i>	Technician
<i>Premaratne, Manjula</i>	Analytical Technician
<i>Robinson, Brett</i>	Professor
<i>Smith, Carol</i>	Senior Lecturer
<i>Smith, Neil</i>	Technical Officer

Van Dijk, Judith

Zhang, Vicky

Tutor

Technician