

- **Editorial – OVERSEER** in the kaleidoscopic world of nutrient management
- **Obituary – Ted Cox**

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OVERSEER® in the kaleidoscopic world of nutrient management - Ants Roberts

Many readers of Soil News will be experienced users of the Overseer® nutrient budgeting tool, while others may have had a play or heard about it. Anybody who has any interest or contact with past and current Regional Planning exercises around nutrient management and water quality will be aware of it. In my experience, most people in the agricultural industry in its widest sense have good or bad opinions about the model whether or not they understand what it is, what it was designed to do and how it functions!

Potted history

The original contract between AgResearch and MAF was to produce a tool to determine N loss from NZ agricultural systems to report to OECD. Prior to this, overseas ‘experts’ would visit for a couple of weeks and ‘calculate’ our national N loss figure for OECD reporting. Consequently, we ranked second highest in N loss of all the OECD countries (Australia ranked second lowest). MAF believed that the experts were wrong and so contracted AgResearch to produce a NZ model in 1993. Dr Doug Edmeades, who was leading the Soil Fertility Group of AgResearch, had the vision that the tool could be much more than just an N cycle model and expanded the contract to include P, K and S as well. Drs Ledgard, Metherell and Thorrold were responsible for initiating the development of the algorithms from the then known science with respect to N, P, K and S cycling in grazed pastoral systems. Thus, OVERSEER® was born.

Since then many people, led by David Wheeler, with a wider range of knowledge and skills have been involved in the model’s further development and in the future many more will need to be involved given the direction that nutrient management in agricultural systems is travelling.

What is OVERSEER®?

OVERSEER® is a world class Decision Support System farm model which allows nutrient budgets to be constructed for many enterprises including dairy, sheep, beef, deer, dairy goats, fruit, vegetables and arable crops. OVERSEER® nutrient budgets allow farms to comprise one or more management blocks (defined as an area of the farm that has common physical and management attributes). Nine separate types of management block are available: pastoral, fodder crop, cut and carry, fruit, vegetable/arable cropping, trees and scrub, riparian, wetland and house. OVERSEER® differs from other farm models in that it aims to be a practical tool relying on input data that are readily obtained, and aims to model most major farm systems across all regions of New Zealand. This broad scope is both a strength and a weakness of the model. OVERSEER® is an annual time step, long term equilibrium model.

The pastoral model calculates budgets (inputs and outputs) for each separate management block and a whole farm, giving a weighted average for each of the nutrients N, P, K, S, Ca, Mg, Na and H⁺ (acidity - pastoral block only).

Additionally, the model estimates animal pasture intake, pasture production, calculates maintenance fertiliser nutrient and lime requirements and estimates losses to the environment from the boundary of the farm system e.g., N loss to water (leaching), P run-off risk and

greenhouse gas emissions. The OVERSEER[®] boundary is defined as the actual farm boundary, the bottom of the root zone, and the edge of second order waterways.

Given OVERSEER[®] is a long-term equilibrium model, it does not reflect year to year or within year variability accurately. While inputting annual data does change the outputs of the model this is in conflict with the use of long term climatic data and the equilibrium approach of the model. One possibility is to use rolling 3 or 5 year data for inputs such as animal production, feed imported, fertilizer nutrients and soil tests, unless there is a major change to the farm system. Given that there is uncertainty around the model predictions, with respect to N loss, for example, it is the downward trend over time in sensitive catchments which is important rather than the absolute N loss number.

The model does not include losses due to poor management practices (good management practice or best management practice is assumed), direct discharges into waterways (e.g., runoff from raceways, bridges, roads or stock crossings), or losses due to catastrophic events (e.g., earthquakes, storms or volcanic eruptions).

The model is jointly owned by AgResearch, the Ministry of Primary Industries and the Fertiliser Association of New Zealand.

Use of OVERSEER[®]

In the initial years OVERSEER[®] was used by AgResearch staff and some agricultural consultants to help explain fertiliser nutrient cycling and requirements to farmers. As the tool became more widely promoted by the owners, increasingly Fertiliser Company service staff have been using OVERSEER[®] generated nutrient budgets to assist in informing their recommended fertiliser nutrient and lime requirements to farmers. Additionally, the tool is used to undertake ‘what if’ scenario analysis to determine the long term consequences of changing farm systems on nutrients inputs, outputs and losses.

More recently, OVERSEER[®] nutrient budgets have been used to demonstrate good practice by dairy farmers. For example, in 2006/2007 all dairy farmers were obliged to have a nutrient budget prepared for their farms as a requirement of the Clean Streams Accord. Ballance, Summit Quinphos and Ravensdown service staff ensured that by the end of June 2007, some 98% of all dairy farms had a nutrient budget that was less than 3 years old.

The dairy industry wish to use OVERSEER[®] as part of their audited self-management process, and Fonterra are the first dairy company off the blocks to attempt to obtain and benchmark annual N and P loss and N conversion efficiency data from their suppliers this season.

OVERSEER[®] has now been used in regional planning processes. For example, the Waikato Regional Council Variation 5 (Western Taupo area) used nutrient budgeting to estimate the N loss from all farms in the affected area over the years 2001 to 2005 and each property was assigned a nitrogen discharge allowance based on the highest annual N loss estimated in those years. In the Horizons Proposed One Plan, OVERSEER[®] was used as the basis for determining N loss based on the potential carrying capacity for each of the eight land use classes defined in the Land Use Capability system.

OVERSEER[®] also features as a tool to be used by farmers, irrigation companies and regional councils to measure and monitor N loss from farm systems e.g., in the Otago Regional Plan

Variation 6A and in the proposed Canterbury Land and Water Regional Plan. Understandably, the appropriateness or otherwise of the use of OVERSEER[®] for these various purposes has been the subject of vigorous discussion in Regional Council hearings, Environment Court and the farming arenas.

These rapidly changing applications of OVERSEER[®] have placed increasing pressure on the model to suit a variety of end uses. The importance of skilled operators who understand both the strengths and the limitations of the model are paramount. The model outputs are only as robust as the input data used to generate them. To this end, Intermediate and Advanced Sustainable Nutrient Management Courses were developed by Massey University, funded by the fertiliser industry, from 2002. These courses open to any who wish to attend, teach or refresh the principles and practice of nutrient cycling on farms and use OVERSEER[®] as one tool in this. Further to this a pan sector group is developing an accreditation system for nutrient management advisors which will require successful completion of the Massey Courses, several years' experience in nutrient management advice, completion of an entry qualification and on-going professional development to gain accreditation.

As mentioned earlier the results of an OVERSEER[®] analysis is totally reliant on the quality of the input information used to generate this. There are both quantitative and qualitative input parameters required and there is considerable user judgement employed in the choice of especially the qualitative parameters. This situation has led to nutrient budgets prepared by two different users for the same farm giving different outputs. In order to obtain consistency between users, input parameter protocols will help minimise, but not obviate, these conflicts. The dairy industry has developed a protocol to guide Ballance and Ravensdown representatives who are preparing supplier's nutrient budgets for their audited self-management scheme. However, this protocol may not serve the purposes of all users of OVERSEER[®] information.

Some people have suggested that different protocols should be developed for the different uses to which OVERSEER[®] will be put. In my opinion, this situation needs to be strenuously avoided as having multiple nutrient budgets describing the same farm (but for different purposes) will only serve to confuse farmers and others and undermine the credibility of the tool itself. What is required is one nutrient budget which is created by input data which best represents the long term farm system. Discussion and debate will continue as we all strive to ensure that OVERSEER[®] is used for the benefit of farmers and the receiving environment in the best possible way.

Note from the editor - Vacancies section

At our most recent council meeting of the New Zealand Society of Soil Science we discussed the initiation of a new section in the Soil News to be called current vacancies. The idea here is that we would create a list of all soil related vacancies and other opportunities such as PhD projects or scholarships available. Instead of listing all the associated detail or job advertisement, we will simply provide the job title, organisation, contact person and a web link back to the host organisation. We would like to offer this service so that we can help promote careers in soil science to our membership. If you would like to list a vacancy in the future then please contact either myself david.houlbrooke@agresearch.co.nz or Isabelle Vanderkolk isabelle.vanderkolk@agresearch.co.nz.

Regards
Dave Houlbrooke

Ted Cox - Pedologist Extraordinary



Josef Edgar Cox MA (Cantab)
(1929 – 2013)

Known to most of us as Ted Cox or said with affection and jest Ted the Ped, he was one of those personalities who stays in ones memory and around whom stories abound. Ted died in his 84th year on the 26th of January 2013.

Ted's early life

The following is taken from memories of his family and friends in the United Kingdom and who spoke at Ted's funeral. For this information we are grateful to Ted's eldest daughter Elizabeth.

Ted was born in England on the 3rd of April 1929, and sadly ten days later Ted's mother died, which is why he went to live with his grandparents. Ted's grandparents lived in Sleights a village near coastal town of Whitby in North Yorkshire. For his secondary school years Ted moved to live with his uncle's family so that he could attend Rugby School (the home of that famous game with the oval ball) as a dayboy for five years. Bill Pool a friend of Ted's from school and university days recalled that, "a very important annual event in the school's sporting calendar was a cross-country run to the village of Crick and therefore known as the Crick Run. Ted entered for this in 1947. Few people gave him a chance. The favorites thought it was just between themselves, but somewhere along the way he overtook them and left them far behind. He was justifiably proud of this achievement. It meant that his name has been preserved and honoured in the schools archives. He left school later that year in a blaze of glory".

On leaving school Ted had been accepted at Queens College Cambridge, but was persuaded in would be better to do his two years of National Service in the Army first. He spent most of this time in an Army Intelligence Corps stationed in Cyprus. After leaving the Army Ted intended to read Agriculture at Cambridge but decided he needed some practical experience and so worked for a year on the estate run by 4th Baron Raglan in south eastern Wales. Bill Pool considered "this was an interesting time for Ted, because he enjoyed the farming but was also exposed to Lord Raglan's passionately held but often unorthodox views on certain archaeological matters. Raglan had written books on these subjects that attracted interest but much criticism from mainstream archaeologists. This appealed to something in Ted: for the rest of his life he was noted among his friends for the quirky nature of some of his ideas and for always having a bee in his bonnet about something or other". The following year Ted

entered Queens College where his friend Bill Pool had been studying for a year, and was readily accepted into Bill's group of friends as "one of the boys". His quirky ideas were subjected to much good-humored scrutiny! He did of course have his own life apart from this, and that included running. The following is an extract from a letter of Ted's quoted by his daughter Madeleine at his funeral, "It was while swotting for Cambridge exams at home during the Long Vac that I met my future wife's mother and brother from NZ. I decided to offer to work on their farm after sitting and passing the exams and was accepted. There I met my wife Mary and we married in 1955".

Elizabeth Cox, Ted's eldest daughter remembers that Ted moved out to New Zealand in 1953 to work on the Coates' farm. The Coates were distant relatives. Alas this lasted only a few years as they discovered that the farm was to be submerged by a hydroelectric scheme when Ted and new bride Mary Coates were on their honeymoon. Ted saw an advertisement for a position with Soil Bureau DSIR, applied and was accepted. Mary always said it was far the best for Ted - he was not a practical farmer but he genuinely loved being a pedologist.

Ted's life as a Pedologist in New Zealand

On joining Soil Bureau, Ted spent 1955 to 1957 at head office in Wellington as an assistant to Norman Taylor. During this time they co-wrote an important paper "The soil pattern in New Zealand" a key reference outlining Taylor's ideas on New Zealand's zonal pattern of soils. This paper was superseded by the 1968 publication of Soils of New Zealand.

Ted shifted to Christchurch in 1957, joining Bill Ward who had taken charge of this office following Pat Fox's resignation in 1956. A year later Ted was joined by Clem Mead and Bill Ward moved north to Huntly. Ted and Clem mapped the soils of Paparua County, on the lower Canterbury Plains, an area of arable soils with growing potential for processed vegetable crops, and close to a planned factory. They produced a detailed soil map, two land use interpretive maps and discovered radiocarbon datable material. This was the first comprehensive study of a soil landscape and its history involving radiocarbon dating in the South Island and is still regarded as the finest piece of work of its time.

Publication of a paper by Cox and Mead in the New Zealand Journal of Ecology prompted Dr Pat Suggate to revise his chronology of surfaces on the central Canterbury Plains. By 1959 Colin Vucetich had moved back to Christchurch from Rotorua. Colin and Ted were involved with the selection of sites in preparation for an International Soil Meeting in Palmerston North in 1962. These soil sites formed part of a set of reference soils in part three of the Soils of New Zealand. Two friends who came to know Ted at this time were the botanists Drs Brian Molly and Neville Moar.

During their time in Christchurch Ted and Mary had two daughters, Elizabeth and Madeleine. In 1965 Ted and the family moved to Whangarei to reopen the Soil Bureau office closed in 1961 on the retirement of Charles Sutherland. Ted's task was to bring together the information on North Auckland soils that had been left in various files by Norman Taylor, Charles Wright and Charles Sutherland. This incomplete record of various soil surveys had accumulated since Taylor's Whangarei County survey in the mid 1930's. This was a giant task. Ted was faced with more than a life-times-work and alas did not meet the time lines set him. He was in an office without the support of another pedologist, far from an ideal situation.

Ted's desire to be of help to others and his ever enquiring mind led him in many and diverse directions. The fact that he made a reputation throughout the region was made evident when

it was decided to close the Whangarei office. His daughter Madeleine recalls, “as for Dad’s work, he loved it. He would bring his research projects home and spent many evening hours poring over soil maps. In the weekends, on the way to or from family outings to local beaches, he would regularly stop the car and go and investigate the sediments of roadside cuttings. Dad was never cured of this habit and we learnt to live with it graciously in the end. Dad was well respected by the farmers in the region for his work and advice. When the DSIR made plans to close the Soil Bureau office in Whangarei, there was uproar of protest from the farmers who petitioned for it to stay open. Nevertheless it closed and Dad and our family were transferred to Auckland in 1974. In Auckland Ted was joined by Alistair Wilson and Dr Beryl Barratt who moved north from Hamilton. Beryl recalled that Ted had one official project, which was to finish the dreaded North Auckland survey, but he got a bit bogged down with the extended legend which was eventually sabotaged at the head office in Taita on the grounds of impracticability. This was a very large legend that was intended to make correlation from sheet to sheet a breeze. Ted also got roped into many soil related matters as diverse as a proposed thermonuclear plant in the harbour area to forestry. Eventually the Auckland office closed and that was when Ted left and the Soil Bureau ceased to exist. Ted returned to the United Kingdom in 1988 to join his wife in a bed and breakfast venture in Wales.

Toward the end of 1968, Harry Gibbs sent me to Whangarei to get experience of North Auckland soils. Ted spent several days taking me to classic soil sites around Norman Taylor’s Whangarei County. In 1973 at an International Quaternary Union Congress in Christchurch Ted presented his dust collection study from the Rakaia River, the source of the loess at Barrhill. A local Congress field tour included some of Ted’s key dating sites in Paparua County. Ted sent me his notes and it fell to me, to interpret these, locate the sites and dig the soil pits. At one of these sites the exposed pit did not quite match Ted’s description as used in the handout. Professor Robert Ruhe from the United States, a person with a formidable and tough reputation took to Ted over this mismatch and they nearly came to blows. I eventually had to order Ruhe on the bus. Ted was disappointed that I had not shown more care in getting his sites right.

Dr Philip Tonkin

Contributions from fellow Pedologist of Soil Bureau days

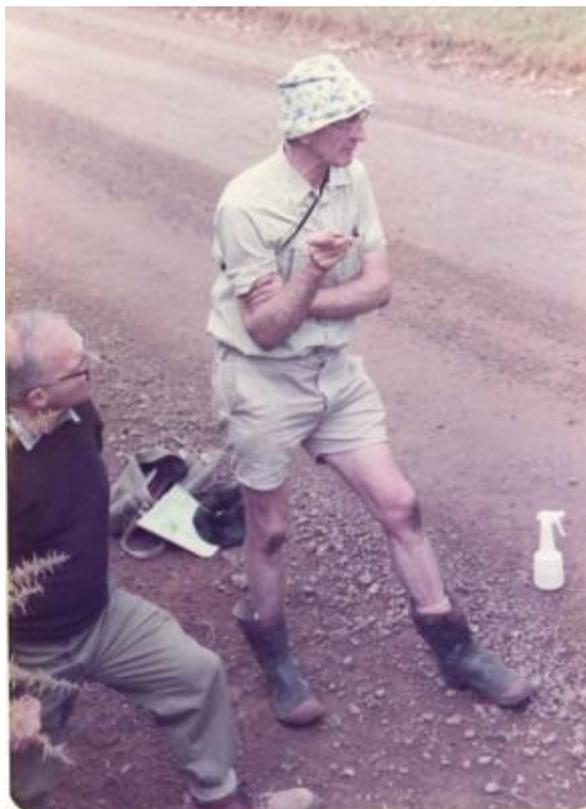


I never worked with Ted and met him only at conferences and such like. Come to think of it I did work with him for a week during the 1960s when I was asked to take my team up to Kaikohe to do a soil map of the Grasslands research station there but I have little memory of the occasion. My main memories of Ted are his notorious lateness for appointments and many times the field trip bus was kept waiting because Ted was late. Ted was a scholar and liked to spend a long time examining a soil profile. I don't think he liked the broad soil-landscape connection that allowed rapid soil mapping in New Zealand.

Emeritus Professor John McCraw.

Ted the last man on the bus!

Ted was an enigmatic character who could constantly amaze those in his company, with his wide knowledge of relevant ideas. Frustrating to the nth degree with his lack of observance of Government Department “rules and regulations” he managed to survive many official “telling’s off”. Despite a monumental lack of punctuality (especially on tours of soil sites which resulted on at least one occasion on being left on the roadside only to be picked up by a following official vehicle) he was never the less a delightful travelling companion constantly commenting on the nature of the passing landscape and relating it to the present state of soil science. His encyclopaedic knowledge of the soils of North Auckland and their relationships to the total environment was a joy to behold. He was always looking for the next connection and never satisfied with the current level of understanding. Unfortunately this resulted in his knowledge being largely restricted to his brain cells and difficult for others to access unless in his company when a lengthy and rational explanation would be forthcoming.



Gary Orbell and Ted discussing a point



Forever looking for the full history of each soil site his 15 metre long auger was frequently in use and no amount of protestation would allow any unwary companion to abandon the site until the auger was fully recovered, sometimes well after darkness. One such expedition resulted in the examination of lateral spread of Kauri roots at unprecedented depths so solving a kauri nutrition question. Lateral thinking was an art with Ted and on one occasion he isolated gas seepage in a home with no gas supply, by associating the volcanic soils at the site with underlying lava tunnels that were ducting gas from a ruptured gas main several kilometres distant. His soil collection and sorting of samples resulted in the Auckland office basement space of the small house used by the then Soil Bureau overflowing onto the adjacent section. Such samples were constantly exposed to saturation with carbon tetrachloride to float off the contained charcoal so that carbon dating could be applied to the soils. How he managed to avoid skin ailments from the carcinogenic carbon tetrachloride is a mystery. His final work of amalgamating the soil maps of North Auckland saw the early work of pioneering soils scientists such as Taylor, Wright and Sutherland, finally amassed into one

correlated soil map of the whole of North Auckland thus bringing to a conclusion some 50 to 60 years of field work in that region. The interpretation of enormous amounts of hand written soil data sheets left behind by those early soil scientists, was a testament to his dedication to soil science.

Gary Orbell

I first met Ted Cox when I joined New Zealand Soil Bureau at the Christchurch office in St Elmo Courts at the end of 1961. As a new pedologist, I was soon initiated into the most practical laboratory there is for soils, namely the field. Over the space of a few days, I was taken to the Cass area to look at High Country soils, to the Lincoln area where some soil mapping was being carried out and also to the Rakaia River area, where there was a project at Barhill to measure the amount of loess that was currently being deposited.



The Cox family, Mary, Elizabeth and Ted on the occasion of a visit by Iain Campbell

These field visits were essentially related to preparations for the forthcoming 1962 International Soils Conference and also the Soils of New Zealand project. The Barhill dust accumulation project was in hindsight, vintage Ted Cox. If there was a problem or a question that was somehow related to the main issue that Ted was supposed to be working on, he tried to solve it. This, I think was the defining characteristic of his scientific career in Soil Bureau, and it didn't earn him any favours within the organisation. Sadly, there was never any real effort made within the organisation to use the inherent skills that a person like Ted possessed. He had a capacity for lateral thinking. Invariably, at any organisational meeting or conference Ted could be relied upon to consider soil relationships which although appearing abstract and most people weren't thinking about, were probably linked to soil genesis in some way and could be important. On the personal side, Ted had a cheerful, respectful, gentlemanly and thoughtful demeanour. One day, I was with Ted while driving to the Taitapu soil conference site south of Lincoln. We were running late, travelling fast and struck a small bird that hadn't made it out of the way in time. It took Ted about two seconds to decide to turn around and check on whether the bird had survived the impact. He was a dedicated person and I recall on one occasion when he had the headlights of the car trained onto a cutting so that he could complete the examination that he was engaged in. The 1962 Soil Conference dinner was a social function that was vividly recalled by the participants of many countries for many years afterwards. One of my remembrances of that event was seeing Ted Cox at 5.30 am sitting on a tree stump outside the hostel in which many of us were residing, addressing the dawn in a

manner reminiscent of Fitzgerald's Omar Khayyam. After Ted left the Soil Bureau and went to Wales, as Treasurer of the NZSSS, I was able to keep in touch with Ted and we regularly exchanged Christmas cards. I had the pleasure of hosting Ted in Nelson when he made a nostalgic visit a few years ago. During this visit, I think he was mentally tying up a few loose ends that he had in his mind regarding various soil matters. Beth and I also had the pleasure of staying with Ted and Mary at Builth Wells and meeting Elizabeth on a visit that we made to the UK in 1997. Ted's hospitality naturally included a trip around the local area looking at various soils and landscapes. I would summarize Ted Cox as a person that represented a significant page in the History of the New Zealand Soil Bureau with a personality to match.

Dr Iain Campbell

Ted was one of the early recruits to Soil Bureau following the completion of the reconnaissance Soil Survey of New Zealand. Along with his fellow soil surveyors, Ted faced the challenge of moving from broad brush, to detailed brush, soil characterisation and mapping. When making their large scale soil maps, all of his cohort faced the tyranny of the vastly increased number of observations needed to produce a credible map of use to individual farmers and horticulturalists and their advisors. Since they were based in District Offices Ted and his fellow soil surveyors were expected to service enquiries from local land users and advisors as well as to carry out a vigorous mapping program. The rate of mapping varied according to the outside pressures and importantly, to the scientific opportunities and challenges that the soils themselves and their pattern presented. As a result the district soil surveyors did not always make the mapping progress that Soil Bureau senior staff expected them to and this was a source of tension that Ted and his cohort experienced from time to time. Ted with his agricultural science training had a great interest in supporting agriculture through his work. He was always very interested to collaborate in selection of sites for agricultural trial work and to become involved in the work itself. His soil and agricultural and horticultural suitability maps and accompanying text for Paparua County published in 1978 is a splendid piece of detailed work. It has been frequently drawn on by various agronomists carrying out trials, and it is a great teaching resource. Ted also saw that soil survey had the potential to illuminate landscape history, for example flooding history and sedimentation on current and ancient flood plains. His painstaking work sieving minute pieces of charcoal from the alluvial soils of Paparua County, allowed a valuable carbon dated history of the considerable changes of course, flooding and sedimentation by the Waimakariri River - the charcoal that he recovered had been meticulously recorded previously while mapping the soils. Ted was later assigned the daunting task of depicting the soils of North Auckland on a coherent set of maps together with an internally consistent set of descriptions of the soils shown on the maps. The initial soil characterisation and mapping had been done mainly by Norman Taylor and Charles Wright and reflected the evolution of their views and understanding during this pioneering phase of soil science in New Zealand. Taylor and Wrights' work required much revision. After much time and mental sweat and drain of energy Ted created the 1 to 100,000 scale Land Use Inventory maps for Northland published in the 1980s. Ted was a great example of a scientist who was true to himself, and who did not compromise his high intellectual standards, and who as a result produced quality work.

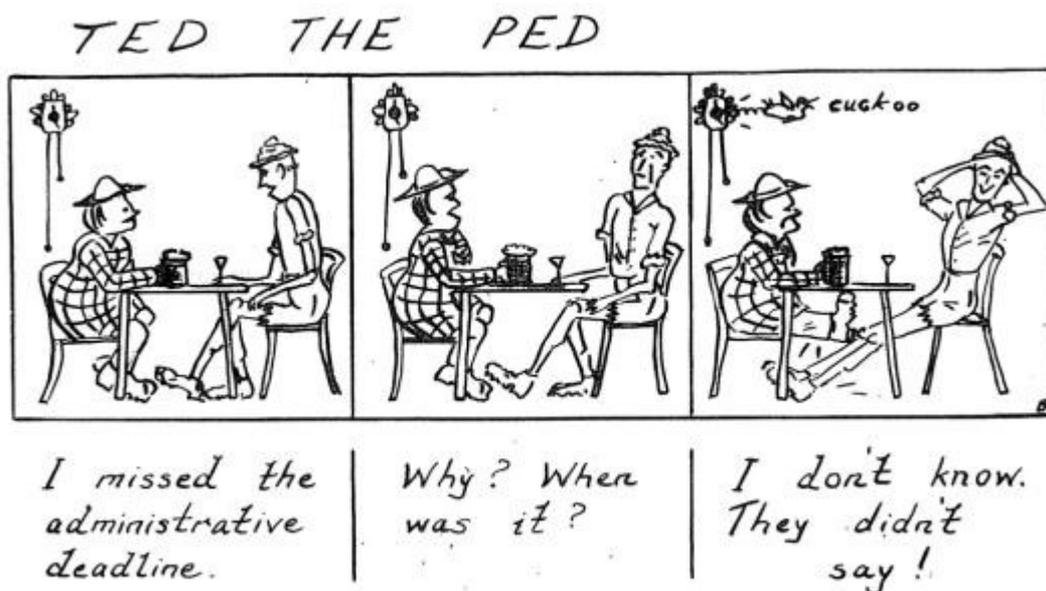
Dr Derek Milne

Something Colin Vucetich told me some years ago is as follows; Soil Bureau wanted Ted to move from Christchurch to Whangarei to write up the North Auckland work of Taylor et al. Colin told me that Harry Gibbs discussed this idea with him at the time and Colin warned Harry that Ted wasn't the person to write up Taylor's work and would get diverted on to other things. Which turned out to be true, as Harry ignored Colin's advice. I remember that years later both Soil Bureau and DSIR Head Office put a lot of pressure on Ted to produce the

North Auckland maps and gave him various deadlines which Ted largely ignored. In the end he was told to bring the finished work to the next Soil Bureau Conference at which the Director General was attending and Ted turned up with some of the finished maps. All the North Auckland maps were eventually published, albeit at a smaller scale. I don't remember how much of Taylor's written material was published. Ted was certainly something of a character. In the late 1970s we were instructed to map the soils of the King Country and I was given the job of co-ordinating Sheet 3 from north of Taumarunui down to about National Park. Most of the field staff, were initially fingered to help but Ted was left of the list because he didn't usually get involved in these 'team surveys'. However, he asked to come along so he was included and was given an area to work in north of Taumarunui with one or two other pedologists. I recall the area was quite large and really should have been reconnaissance soil surveying given the time constraints, but Ted spent all of one day in one paddock because he had found some buried forest remnants and was excavating these. I recall that during the 1970s I was asleep on a Saturday night around 11.30 PM and the phone rang. It was Ted who I think was then based in Auckland wanting to know some obscure fact about a soil series in the Manawatu. I don't remember what my reply was.

Hugh Wilde

Most ex-Soil Bureau staff who are still active pedologists didn't know Ted all that well but are certainly appreciative of his mapping and soil survey compilations in Canterbury, North Auckland and around Auckland. My acquaintance with Ted was limited to Soil Bureau and New Zealand Soil Science Society conferences, especially the field trips where Ted was always a significant and knowledgeable contributor to pedological discussions. And of course, there was the occasion on the reconnaissance trip led by the late Brian Purdie, at the beginning of the Manukau City team soil survey in 1979, when we had to leave Ted behind somewhere in the Clevedon area. He was on the third extension of his auger, intent on investigating paleo-stratigraphy of the particularly deep soil layers at the site. He never caught back up with the group that day! Ted, I recall, was a bit of an eccentric pedologist who had a propensity to thoroughly investigate and sample soils in the landscape, in much detail. He was from that era of New Zealand soil surveying pedologists who were 'special personalities and characters'. He certainly left his mark on New Zealand Soil Science. Brian Daly recalled that the Soil Bureau Chemistry Lab at Taita periodically received samples from Ted but rarely any requests to analyze them.



The pinnacle was a truck load of soil samples sent down to Taita by Ted when either the Whangarei or Auckland office was closing, there was no accompanying documentation or request for analyses, so they were diverted (sadly) to the Silverstream landfill. Ted never did follow-up on the samples. Kevin Tate recalled requesting a site to sample a soil in the Auckland area for a particular study he was doing in soil biochemistry. Ted told Kevin he knew precisely the right place to sample the soil Kevin was after, the sampling site was Ted's lawn. My final comment is on the accuracy of Ted's soil map for Part of the former Paparua County, around the outskirts of Christchurch. In my four years as a Lincoln-based pedologist with Soil Bureau, I never found any soils that shouldn't have been in the mapping unit. Trevor Webb has since re-mapped the area in the S-Map system context, so I presume Ted's accurate map has now been superseded. Lastly there were the "Ted-the-Ped" cartoons in Soil News when I was editor. Ted Cox was the only Pedologist to have gathered such an acclaim. Dr *Craig Ross*

I remember Ted telling me something of his national service. He was sent incognito to Israel to investigate petrol theft from the army. The petrol was coloured to distinguish civilian from army supplies. Unfortunately he befriended those he was investigating and warned them. As a result he was shipped out (to Cyprus?) where he was put in charge of organising files for an officer. The officer would always blame the unreliable postage for not acting on instructions. However, Ted's filing system was so good that the officer could no longer use the post as an excuse. This made Ted unpopular with the officer!

Peter Singleton

Most of my contact with Ted was at meetings at Taita and on field trips. I have three enduring memories. Firstly, he was the consummate gentleman and took genuine interest in the welfare and interests of those he met. Secondly, he had the most inquisitive mind of anyone I have met. Thirdly, he had a dogged determination to investigate every science question that his inquisitive mind set upon. The two latter attributes were evident on soil field trips. When any issue was raised that could not be answered satisfactorily, Ted would bag a sample or two of pertinent horizons for storage or for later investigation. The picture accompanying this note is of Ted remaining at the the Pelorus soil site in 1976. The note on the slide by Bill Rennie reads 'Ted , usually the last man on board the bus, collecting soil samples'. I did not visit him in his Auckland office, but legend has it that he had tracks from the door that guided visitors to his desk via the piles of reports and soil samples. Ted's attention to detail was well rewarded in his soil survey of Paparua County, published at 1:31,680. In my opinion this map and report has not been surpassed in density of soil observations, quality of presentation and detail of soil characterisation. The bulletin included excellent sections on chemistry, physics and land use. Craig Ross and I also benefited from Ted's contentious commitment to detail when he reviewed our paper on Eyre and Lismore soils. Ted showed that we had not interpreted some of the results correctly and convinced us young-uns that there were clear differences between these two soil series.

Trevor Webb

I recall Jock Churchman and I had cause to be grateful to Ted during our Soil Bureau days for his help in selecting suitable sites to collect some iron-rich soils that also contained good levels of organic matter. Ted was then the resident pedologist in Auckland where he was completing the North Auckland survey report. Norman Wells had suggested the project to help us understand why volcanic soils formed such strong aggregates. As part of the study, we sought Ted's help and he enthusiastically agreed, and so we joined him in Auckland. The first site he took us to was on Motutapu Island where we not only found and sampled a suitable

soil (a Mollic Vistrandept), but in the process found some large lumps of Kauri gum in the soil pit. Ted, being a true academic when it came to soil processes, was ecstatic over this unexpected finding. We had to drag him away as we had another site to sample on the mainland. This turned out to be an even bigger surprise because he decided the best example of an Ohaewai soil (a Hydric Dystrandept) he could find was on his own property in Mt Albert! So, we found ourselves late in the day digging up Ted's front lawn-and he wasn't at all bothered! The result of this memorable, albeit brief, encounter with Ted was a nice paper that largely came out of the subsequent analytical work carried out by Jock at the University of Reading supported by a Commonwealth Bursary from the Royal Society in London

Dr Kevin Tate

Kevin's recollection of Ted's sacrifice of his own lawn in the cause of soil science is absolutely accurate. It was typical of Ted because he was always highly enthusiastic about soils. At Soil Bureau conferences, Ted could be relied on to ask a question of each and every speaker and his questions were always probing, never trivial, and were asked politely and because Ted really wanted to know the answer. Ted was a true gentleman of a school that hardly exists any more. Not only was he unfailingly polite, he was also very friendly, encouraging, helpful and patient. Remembering him brings a smile to my face.

Dr Jock Churchman

Contributions from two botanists who knew Ted from his days in Christchurch.

I first met Ted shortly after he shifted to Christchurch in 1957. I can't remember the exact date of our meeting, but I remember the venue only too well. It was at a large soil pit I had dug on the slopes above Porters Pass as part of my MSc thesis on the history of soils and vegetation of the area. I had previously taken Bill Ward there to teach me the fundamentals of pedology and profile description, and I also invited Colin Vucetich to view the same. A feature of this profile was a layer of buried charcoal, which attracted the interest of all three pedologists. This charcoal I later identified as mountain beech and yielded a radiocarbon date (NZ 304) of 510 yr BP., proving that beech forest formerly occupied the slopes now covered in snowgrass, eroded areas, *Dracophyllum* scrub and composite soil profiles. This evidence of soil/vegetation/erosion history covering the early Maori period of occupancy was subsequently shown to be widespread throughout the eastern South Island high country, forcing a rethink of previous opinions. Ted was most impressed with the Porters Pass profile and its significance and was immediately smitten with "charcoal fever" which he put to good effect in his survey of the soils of Paparua County with Clem Mead, resulting in a reappraisal of soils and landforms on the Canterbury Plains. The radiocarbon dates determined on charcoals derived from their survey included several that extended our fire history back to pre-human times; a notable milestone for Ted and Clem, and those of us with similar interests. Ted did not stop within the confines of Paparua County but extended his field research to other parts of the Canterbury Plains and hinterland in an endeavour to unravel the history of soils and landscapes over a much wider region, usually with considerable success. Often we joined forces in those forays, sometimes with Colin Vucetich, to bring our combined knowledge of soils and plants to bear on other areas, such as the Mackenzie Basin, in an attempt to unravel their soil and vegetation history. For my part I was able to identify most of Ted's charcoal samples, and in the process improved my knowledge of soil/vegetation relationships, which I carry to this day. When Ted left Christchurch for Whangarei in 1965, he left all his charcoal samples with me to use as I saw fit; a generous gesture. They are still in my safe keeping.

In the 1970s, in several projects led by Kwan Goh, Lincoln University, we used some of Ted's samples, as well as my own, to determine the nature and extent of contaminants in soil

charcoals used for radiocarbon dating. This work led to an improvement in the pretreatment of buried soil charcoals prior to radiocarbon dating. Occasionally, while Ted was based in Whangarei, he would send me a charcoal sample from a particular soil in North Auckland to help in his interpretation of previous work there. And when my own research extended to native conifers and orchids, especially in North Auckland, Ted was most helpful in explaining the complexity of soils in this orchid-rich part of the country. I was not the only one to profit from Ted's help. He had a reputation for helping people, be they fellow scientists or lay folk. During our association, Ted and I wrote a short piece in *Soil News* (1965) on the role of beech forest in the development of the yellow-brown earth to podzol sequence in eastern South Island, and in the *NZ Jl. Botany* in 1972 we wrote about subfossil forest remains and their bearing on forest history in the Rakaia catchment. In 1963, in the first issue of the *NZ Jl. Botany*, we collaborated with fellow workers Colin Burrows, Tony Johnson and Peter Wardle in the seminal paper on distribution of subfossil forest remains, eastern South Island, New Zealand. Ted and I were the same age, give or take a month or two, and we shared a background in academic agriculture and practical farming. Both of us challenged the written word, preferring to follow the old adage "The answer lies in the soil". I could not have asked for a better field companion and co-author, and when he left Christchurch in 1965 he was sorely missed by all of his associates here. In retrospect, I blame myself for showing Ted the Porters Pass soil pit and its charcoal, leading him to deviate from his main tasks for Soil Bureau. That is a story best left untold. I prefer better memories of a great friend and colleague.

Dr Brian Molloy

I last saw Ted about ten years ago when he visited Christchurch with daughter Elizabeth not long after his wife Mary died. As was often the case Ted had a busy schedule, but he wanted to visit some of sites he knew from his time with Soil Bureau, DSIR, in Christchurch. And so we drove to the Rakaia Gorge to remember, but Mary's passing was still affecting him and for a time he just wanted to wander alone with his memories. However, Ted also wanted to see his old sites and so we drove down the length of the Rakaia River and we listened as he told us of the farmers he had worked with, the soils he had investigated and the things he remembered. The day passed all too quickly and it was time for Ted and Elizabeth to move on. We talked about many things that day. He reminded me that in the 1950s he, and I think Clem Mead, had found peat close to the surface at Lincoln College dairy farm, now a Ngai Tahu residential development, and was disappointed that except for a radiocarbon date and the identification of a few plant remains no further studies of that deposit had been made. Ted thought that this was an opportunity lost and as recent work has revealed considerable peat deposits in that development he was probably right. His comments that day emphasised his continued interest in the Quaternary, which sometimes may have taken precedence over his main task of soil survey. Indeed my professional contact with Ted was invariably associated with Quaternary matters from spending time during the weekends looking for charcoal in possible middens on the Canterbury Plains, examining stumps and other plant remains in the Ashley River and on one memorable Sunday driving down Palmers Road near Springs Junction with him to examine the peat bog near the Alpine Fault. This was a great day, but our reception following a very late arrival home that evening dampened our excitement!

Not long after that event I left for England and some three years later I had barely returned before Ted and his family transferred to Whangarei; his task there was to complete work done years before by earlier pedologists. When Ted heard in April of 1966 that Maria and I would be in Whangarei for a wedding he suggested I bring a peat borer in order to examine the extensive Otekairangi bog just to the north. Just as at Palmers Road we had a great day, but sadly there was never time to do a detailed pollen analysis, another disappointment for Ted.

However, he was glad when years later Rewi Newnham published a detailed study of the site, just as he was when again years later the pollen diagram for Palmers Road was published. I think the Whangarei experience was a lonely one for Ted who worked alone and had no easy access to divisional colleagues.

It was not long after the Otekairangi visit that he was again transferred, this time to Auckland where he was fascinated by the potential for Quaternary studies there. He wrote of the buried peats he had seen at various excavations around the city and sent samples taken from them which he was sure would reveal a story of interglacial Auckland. If only I could do pollen analyses! Sadly there were not many palynologists around at that time and besides cursory looks I could do nothing. Happily I was able to write, again years later, that a new generation of palynologists in Auckland were discovering the Quaternary story there. And then he sent news that he and Mary were leaving New Zealand for good and we met briefly in Auckland shortly before their departure. I said my farewells feeling that Ted was disillusioned about his time in New Zealand and perhaps because he found the constraints of working in a discipline orientated organisation irksome I believe he felt, correctly, that his talents were not well appreciated here.

Although we kept in contact after he and Mary settled in the UK we only met once years later when he and Elizabeth came to Christchurch on the visit mentioned at the beginning of this note. Ted was a discerning and challenging colleague and both he and Mary were good friends.

Dr Neville Moar



Ted and Colin Vucetich on a field trip in deep discussion over the presence of the Kawakawa tephra in this South Island soil profile (the distinct layer between Ted's shoulder and John Bruce's head).

Minutes of a meeting of the NZSSS Council held at 10:30 am on Friday 22nd March 2013 in the Board Room at AgResearch Palmerston North.

Present: Tony van der Weerden, David Houlbrooke, Cecile de Klein, Mike Hedley, Megan Balks, Hamish Lowe, Alan Hewitt, Iris Vogeler, Tim Clough, Reece Hill, Trish Fraser.

Apologies: Roger McLenaghan

Secretariat:

Minutes of the meeting held 20th November 2012:

“That the minutes be accepted as a true and accurate record” carried Fraser/Hill

Matters arising from the minutes:

No matters arising

Matters for General Business:

No matters in addition to proposed agenda.

Approval of Agenda:

It was moved that “The agenda be approved.” Fraser/Hewitt

Council members’ roles and responsibilities/portfolios

Secretary: Tim Clough

Treasurer: Tony van der Weerden

Soil News Editor: David Houlbrooke/Isabelle Vanderkolk

Awards convener: Reece Hill

Science Fairs: Roger McLenaghan

Web-site manager: Iris Vogeler

Royal Society contact: Trish Fraser/Alan Hewitt

Soil Research Journal representative: Iris Vogeler (on editorial board)

Soils in NZ landscape: Roger McLenaghan

Profiling NZ soils/education: Megan Balks

Developing policy to protect soils: Reece Hill

Linkages with SSSA, ANZSSPEF: Tim Clough

Linkages with Australian Soil Science Society: Trish Fraser

Consultancy and certification: Mike Hedley/Hamish Lowe

Awards: Reece Hill/Hamish Lowe

Treasury

The Society’s financial reports (Profit & Loss 1 July 2012 to 28 February 2013; Cash Summary (Nov 2012 - Feb 2013); Cash Summary Nov 2012 – Feb 2013) were tabled. See attached.

Groundwork Associates Ltd costs higher perhaps than first estimated. Treasurer will monitor and clarify this. Outgoing treasurer will supply original contract details to Treasurer. “True and accurate record of incoming and outgoings.” de Klein/Lowe

Membership

Approval of new members:

The following have applied for membership:

Dharini Paramashivam, Laura Creswell, Nikolas Lento, Xiao Zhou.

“That those listed above be accepted as members of the NZSSS” Clough/Balks

Resignations:

Corrine Rooney, Alfred E Hartemink.

“That resignations from those listed above be accepted” Clough/Balks

Overdue subscriptions:

Overdue subscriptions total \$6,270. Those with known contact details have been reminded twice, and will receive another reminder in June. In the interim council member have taken the decision to contact all of these members and ask them to attend to their overdue subscriptions. Council members will also track any members without current contact details. The following members who are severely in arrears with subscription payments have been removed.

Afiquir R Khan, Bash rah M Fazli, Dong Gill Kim, Guillermo Hernandez, Jennifer A Prosser, John Lavery, Ravi Naidu, Raza U Khan, Victoria J Nall.

The remaining members with overdue subscriptions will be reminded again using personal contacts.

Mike Hedley will contact colleagues of Sally Officer (deceased) to see if an obituary is available for reprinting in Soil News.

Life membership and fellowship nominations were considered.

Soil News

Status quo mode continues.

Dave H will add a vacancy section/links to job advertisements

Next issue is end of April.

NZSSS Web-page

Update of council roles will be made.

Check USA/NZ exchange fellowship will be made and added to the site.

‘Soils in the NZ landscape’ book and/or chapters will go on the www site.

Discussion on creation of ‘expert’ lists.

Trish/Reece will add a paragraph to advertise the Facebook site.

Soils in the NZ landscape

Aim is to get electronic copies on the www site. Alan would like to see these split into chapters. New chapters could be ‘built’ using peoples own work that would cover important aspects of NZ soils not previously covered. E.g. Alan and colleagues have been working on soil landscape models for three areas of New Zealand not previously covered. This could form the basis of a new chapter. There was unanimous agreement for this to happen. There are cross over’s here into the ‘Soil Education’ arena. To progress this Alan will shoulder tap people to do chapters. Also we should welcome approaches by people to make

contributions, but there needs to be editorial control of submissions (i.e. refereeing of material). Alan and Megan will pursue this.

Awards

Reece has consolidated information regarding awards with respect to timing, criteria, \$ value, award committee members, and nominations. Relevant information is going to be put out in a timely fashion and updated on the NZSSS web-site.

Following discussion on thesis judging it was decided an amendment be made to the wording of the Maurice Fieldes and Sir Theodore Rigg awards to allow greater flexibility in the submission of theses with respect to submission date. Reece will provide copy of wording change.

Promoting Soil Science

See note above regarding 'Soils in the NZ Landscape'.

Outgoing committee member Louis Schipper has done a very good job of getting soil related science into school curriculum. Links need to be put up on NZSSS www site and Facebook page to these educational resources. Council members need to send related links to Iris. It was agreed that these go under a separate tab on these sites.

Science Fairs

Society is still providing awards for science fairs.

Conferences

Regional workshops:

WBOP regional conference in 2013

Leo Condron (Lincoln) has put up a regional soil biology conference at about the same time so need to co-ordinate dates to avoid overlap.

Mike Hedley/Hamish Lowe will consider a Palmerston North regional conference with time to be decided.

Hamilton 2014

David H (chair of local organising committee (8 members)), 1st-4th December in Hamilton.

Theme 'Soil Science for Future Generations' Venue probably at S-block at Waikato University. Obtaining professional conference organiser. Moved that "NZSSS provide \$5000 seeding money to conference organisers. To be reimbursed." Megan/Alan. One advertisement for the conference has been placed in soil news. Conference symposia and sessions are being discussed and generated.

Other conferences:

NZSSS in Queenstown joint with Australian Society 2016

NZGA Tauranga 2013 asked NZSSS to be involved – said we would be doing regional conferences this year.

General Business

"Thank you" emails have been received from Waikato students that went to Hobart conference.

Next Meeting Dates will be canvassed within 2nd 3rd weeks of May

Meeting Closed 1:50 pm

Balance Sheet

The New Zealand Society of Soil Science As at 28 February 2013

	28 Feb 2013	29 Feb 2012
Assets		
Bank		
BNZ Current Account	40,902	55,456
Total Bank	40,902	55,456
Current Assets		
Accounts Receivable	6,270 ¹	4,395
Fixed Term Deposits	143,394	137,269
Stock on Hand (LUC Handbooks etc)	-	10,476
Total Current Assets	149,664	152,140
Total Assets	190,566	207,596
Liabilities		
Current Liabilities		
Accounts Payable	2,715 ¹	249
Rounding	-	-
Total Current Liabilities	2,715	249
Total Liabilities	2,715	249
Net Assets	187,851	207,346
Equity		
Accumulated Funds (Opening Balance)	198,744	200,778
Current Year Earnings	(10,893)	6,568
Total Equity	187,851	207,346

Notes

1
Includes 22 members with unpaid subscriptions for previous years (refer separate listing for details)

Also includes 51 additional members with unpaid 2012/2013 subs at 28 Feb 2013.

2
These were supplier invoices due for payment 20th March which have now been paid in full.

Waikato/Bay of Plenty

AgResearch Ruakura

The annual P21 science workshop was hosted at Ruakura over two days in March. This involved a review of the research results to date and discussion about plans for next year's work programme. The programme is on track with useful data already coming on line. There was quite a debate about how and when information from the programme should be released to the industry, with an interesting tension between releasing early results and the need for accurate and well-proven information.

Erin Garnett has joined us for four weeks as a DairyNZ/AgR intern. During this stay Erin will be learning about and Overseer and N₂O emissions, and participating in field work.



Stewart Ledgard spent a week in Rome at the FAO leading a Technical Advisory Group on international environmental benchmarking. He said it was amazing walking past the Colosseum every day on his way to and from work, but he did have some trouble explaining why he was digging soil pits to the local Carabinieri.

Upon hearing the shock announcement in February that DCD use was being suspended indefinitely, **Jiafa Luo** embarked with a team on an arduous mission to a remote mountainous region of China in an attempt to isolate the elusive microbe *raptorus pyogenes*. Having returned triumphant Jiafa now hopes to train the microbe to debilitate nitrifying bacteria using traditional methods of kung fu and tai chi.



In other soil news, after watching several days of test cricket this summer **Mark Shepherd** surmised that the skill of the curators (aka 'groundsmen') is now such that they can produce a pitch to meet the exact requirements of the home team. However Mark has two questions. Is a test pitch that doesn't deteriorate over five days a good test wicket; and was Jimmy Anderson's inability to extract lateral movement with the new ball due to the pitch or the switch to the Kookaburra (as opposed to the preferred Dukes) ball? Answers to these queries can be directed to Mark personally.

Waikato University

Louis Schipper and **Dave Campbell** have moved into their new offices with space for their team on the third floor of a newly constructed science block. They are all very pleased with the new surrounding which provides space for PhD and MSc students and **Susanna Rutledge** (Research Fellow) and **Aaron Wall** (Research Technician). **Graham Sparling** continues to work one day a week in the team coming over on Thursday from his home in Katikati.

Congratulations are due to **Dr Tanya O'Neill** who has recently successfully defended her PhD thesis entitled "Soil physical impacts, and recovery rates, following human-induced disturbances in the Ross Sea Region of Antarctica" (chief supervisor [CS] **Megan Balks**). Tanya has also recently returned from working on the Antarctic Peninsula with the Spanish Programme thus extending her work into the warmer, wetter, peninsula environment.



We also acknowledge and congratulate two long-serving staff members in the Department of Earth and Ocean Sciences at Waikato University who retired in 2012: **Cam Nelson** has been appointed a Professor Emeritus, and **Roger Briggs** has been appointed an Honorary Fellow (Fig. 1). An article on Cam's and Roger's monumental contributions to the department and university was written by Kamp and Lowe (2012).

Fig. 1. Roger Briggs (left) and Cam Nelson at their retirement function in June 2012. Photo courtesy of Betty-Ann Kamp.

A number of MSc students submitted their MSc thesis in the last month or two. First, by several months (December 2012), was **Michael Cunningham**, supervised by **Vicki Moon** (CS) with **David Lowe** and **Jock Churchman** (University of Adelaide). Michael submitted his MSc thesis on landsliding and sensitivity of rhyolitic pyroclastic deposits in the Tauranga area and how these relate to mineralogy, geomechanics and microstructures in both peak and remoulded states.

Emma Chibnall (CS **Louis Schipper**) measured dissolved organic carbon leaching under pastures soils using suction cup lysimeters and whether DOC could be degraded lower in the profile. **Catherine Sturgeon** (CS **Dave Campbell**) also measured dissolved organic carbon but in a restiad peat bog. Both of these studies will contribute to carbon balances being constructed for these ecosystems incorporating annual CO₂ exchange (by eddy covariance) and other imports and exports.

Holly Goddard (CS **Megan Balks**) has completed her MSc on soil climate and wind patterns in the Ross Sea region of Antarctica. Holly is now employed in environmental monitoring in the Reservoir Chemistry Department of MB Century. **Erin Telfer** (CS **Megan Balks**) has completed her MSc study on N leaching at the Taupo effluent irrigation site and she is moving to Canberra where she will be seeking employment. **Max Arrowsmith** (CS **Megan Balks**) has completed his study on hill country P distribution in relation to soil-landscape units and was last seen heading for Europe via Asia. **Marie Heaphy**, based at Scion and supervised

by **David Lowe** (CS) with **Dave Palmer** (Landcare Research, Hamilton) and **Haydon Jones** (Waikato Regional Council), and supported by **Gerty Gielen** (Scion), has completed her part-time MSc thesis project investigating the impacts of soil erosion on the productivity of plantation forestry in hill country in eastern North Island (from catchment to regional scale).

Courtney Foster (CS David Lowe with **Rewi Newnham**, Victoria University of Wellington, and **Marcus Vandergoes**, GNS Science, Lower Hutt,) has completed a very interesting project on the palaeolimnology of Adelaide Tarn, an alpine glacial lake in the northwest Nelson region. Courtney identified plant macrofossils from the sediments and worked on range of other proxies in evaluating past environments since the lake was formed c. 14,000 years ago. Also studying the lake sediments as part of a wider project is PhD student **Ignacio Jara** (Victoria University of Wellington), who also spent time coring Moanatuatua bog near Hamilton in late November last year (Figs. 2-4).



Fig. 2. Aerial photo of Moanatuatua bog with the reserve (a remnant of original vegetation) seen at top right. Photo courtesy of Reece Hill (Waikato Regional Council).



Fig. 3. Getting ready to core Moanatuatua bog reserve on 29 November 2012: (from left) Courtney Foster, Ignacio Jara, Matt Ryan, and Rewi Newnham. Photo by David Lowe.



Fig. 4. Doing the hard yards on Moanatuatua bog reserve: Matt Ryan and Ignacio Jara (PhD students at Victoria University of Wellington) coring under watchful eye of supervisor Rewi Newnham (Victoria University of Wellington). A clear example of the natural order of doctoral student-professor relationships! Photo by David Lowe.

As the latest crop of MSc students leaves, Louis has welcomed a new exciting cohort. **Anna Carter** (MSc thesis) and **David Zweig** (Fullbright Fellow from Georgia, USA) will be measuring the influence of temperature and nitrate concentration on performance of denitrification beds in the North Island. **Jack Pronger** (Fig. 5) is well underway in his BSc (Hons) project measuring peat shrinkage rates in the Waikato peat bogs also supported by **Reece Hill** at Waikato Regional Council and **Malcolm McLeod** at Landcare Research (Hamilton), including Moanatuatua bog. **Tim Norris** (Fig. 5) has initiated a study of a new simple sampling technique for measuring total C and N in the top 60 cm of soil. He has just taken a break from sampling to complete his graduate papers and will resume his MSc thesis work in July.



*Fig. 5. Land and soil evaluation graduate class on AgResearch's Tokanui Farm on 14 March this year. From left, Jack Pronger, Tim Norris, Emma Bagley, Olivia Jordan, and Brad Monahan. As well as undertaking a mapping exercise, the group had talks by **Debbie Care** (Agritech/Wintec) and **David Houlbrooke** (AgResearch, Hamilton). Photo courtesy of Brad Monahan.*

Nadia Laubscher (CS Megan Balks, with David Lowe and Louis Schipper) is progressing her MSc fieldwork in the Galatea basin, investigating the effects of soil flipping, which is undertaken to bring subsurface allophanic materials (buried soils on Taupo and Whakatane tephras) to the surface, on soil moisture retention. **Asaeli Tulagi** (CS Megan Balks) is commencing his fieldwork related to downstream effects of old sheep dip sites.

Meanwhile, **Doreen (Yu-Tuan) Huang**, undertaking PhD studies (with **David Lowe, Jock Churchman, and Louis Schipper**) on the interactions between carbon and DNA with allophanic materials including in buried soils, has been burning the midnight oil in the synchrotron in Hsinchu, Taiwan, where the National Synchrotron Radiation Research Center (NSRRC) is based (Figs. 6-7). Doreen has just completed a six-day stint (24-hour days) in the facility and is now working on analysing and interpreting results. She has received fantastic support from staff in NSRRC and we are very grateful to be able to access this facility. Doreen earlier spent time synthesising allophane in Hamilton (Fig. 8) and then preparing

sample material at her alma mater, the National Pingtung University of Science and Technology in Taiwan, with her MSc supervisor Prof **Zeng-Yei Hseu**, who has been a very helpful and generous colleague with this research. Doreen returns to NSRRC in May for three more days using synchrotron radiation. This research is part of the Marsden-funded project being led by David, “New views from old soils”. One member of this Marsden team, postdoctoral fellow **Nic Rawlence**, has now left the project to take up a new postdoctoral position in the zoology group at Otago University. Nic continues to work closely with David on the project as time permits, however, and interaction continues with the Ancient DNA lab (led by **Prof Alan Cooper**), and with **Jock Churchman**, at the University of Adelaide. Both Doreen and Jock are attending the IUSS Global Soil Carbon Conference, in early June, at the University of Wisconsin-Madison.



Fig. 6. Exterior of part of the massive synchrotron facility, the National Synchrotron Radiation Research Center (NSRRC) at Hsinchu, Taiwan, where Doreen Huang has been analysing carbon-allophane interactions for the Marsden project “New views from old soils”. Photo by David Lowe.



*Fig. 7. Inside the NSRRC synchrotron at one of ~40 beamlines, a rather complicated place!
Photo by David Lowe*

*Fig. 8. Synthetic allophane made by Doreen Huang (PhD student) at Waikato University.
Photo courtesy of Doreen Huang*



Finally, **Louis** has also had some fun being videoed on farm explaining the nitrogen cycle and biogeochemistry for a new teaching context on soils and farming being developed by the Science Learning Hub at the University of Waikato. The teaching context is aimed at intermediate school children and will be supported by teaching resources and materials.

Reference

Kamp, P.J.J. and Lowe, D.J. 2012. Retirements of Professor Cam Nelson and Associate Professor Roger Briggs from the Department of Earth and Ocean Sciences, University of Waikato. *Geoscience Society of New Zealand Newsletter* 8, 50-56.

Waikato Regional Council

WRC and Landcare Research staff including **Reece Hill, Les Basher, John Dymond** and **Dave Palmer** had a couple of very sunny days in the Waipa catchment looking for erosion. The reconnaissance trip is part of a Waikato River Authority funded project to prioritise erosion and sediment issues in the Waipa Catchment and includes the use of improved SEDNET modelling for the Waipa.

Matthew Taylor and **Nick Kim** (Massey University) are completing a report ranking diffuse contamination issues within the Waikato region. Matthew is also writing up the trace element data collected as part of the soil quality programme. He recently attended the Biowastes Programme Advisory Board Meeting. Topics covered included:

- Assessing the impacts of chemical cocktails
- Vermicomposting of biowastes
- Greywater
- Community engagement on biosolids
- Review and update biosolids guidelines (to begin soon)

Haydon Jones and his wife **Donna** report the safe arrival of Natalie Avalon Jones at about 11 pm on 30 March. Natalie weighed in at 3.71 kg (about 8 lb). Both Natalie and her Mum are back at home and doing well. Big brother Matthew is still getting used to the idea of having a little sister but is very excited about the new helicopter his sister gave him. Haydon is not at work today but he has been working on land fragmentation and running the riparian survey.

Landcare Research, Hamilton

Congratulations to **Malcolm McLeod** who has gained 2 years Sustainable Farming Fund funding to continue monitoring N leaching under cut-and-carry lucerne from large lysimeters at Tihoi. The work is also funded by the Lake Taupō Protection Trust who is charged with reducing manageable N discharges in Taupo catchment by 20%. The N leaching data will be supplied to the Overseer® Committee for inclusion in their model. A recent article on Hyundai Country Calendar outlined the issues associated with farming in the catchment under a farm-by-farm N discharge allowance. The Country Calendar episode can be viewed at <http://tvnz.co.nz/country-calendar>; Series 2013-Episode 2 – Nitrogen bomb. Malcolm has also been talking about “Progress” in his Norman Taylor lecture series.



The large lysimeter facility at Tihoi

We have had a spate of graduations in the last year, with the latest two completing their PhDs with the University of Waikato. Our Murray Jessen Memorial Scholarship recipient, **Tanya O’Neill**, looked at assessing, predicting, and managing the physical impacts of human activities on Antarctic ice-free environments. She found that visual recovery from human disturbance depended on the intensity of the disturbance, age, and characteristics of the parent



material, and the environmental conditions of the site. In some instances, such as one-off campsites, the visual impacts associated with widespread trampling are recoverable to pre-disturbance condition in <5 years. In contrast, visible tracks form quickly (after <50 passes) and remain visible in the landscape for decades due to the unconsolidated nature of many Ross Sea region surface materials. The challenge is to use the research to help environmental managers make better-informed decisions about site selection, impact mitigation, and remediation measures for activities in Antarctic terrestrial environments.

Tanya O’Neill at graduation

Paul Mudge investigated whether the natural abundance of nitrogen (N) isotopes (the $^{15}\text{N}:^{14}\text{N}$ ratio) in pastoral soils could be used as an indicator of long-term N cycling and loss. In general, results showed that the ratio of $^{15}\text{N}:^{14}\text{N}$ in soils under intensively managed pastures was higher than under less intensively managed pastures, and strong positive correlations were observed between rates of change in $^{15}\text{N}:^{14}\text{N}$ and N losses (e.g. N leaching). The $^{15}\text{N}:^{14}\text{N}$ ratio could therefore be a useful indicator of past management intensity and N cycling and loss from pastoral systems, and could also be used to assess the vulnerability of soils to N losses in the future.



Paul Mudge, after graduation, with his wife and children, one of whom took a liking to the bonnet.

Manawatu/Hawke's Bay

AgResearch

The Norman Taylor Memorial Lecture entitled "Progress" was delivered by Dr Malcolm McLeod on 22nd March at AgResearch, following the NZSSS Council Meeting.



Malcolm McLeod reviewed highlights of some of the progress soil scientists have been involved with since joining Soil Bureau. Topics to be covered include Town and Country planning; the Soil Map of Northland; Allophanic Soils that aren't; bypass flow of microbes through soils; LENZ; functional horizons and Antarctic soils.

Past President Dr Allan Hewitt congratulates Malcolm McLeod at the conclusion of his lecture

Plant & Food Research – Palmerston North

We've moved! The Production Footprints team & associates are now located 300m down the road in Plant & Food Research's FISC Building, Palmerston North. You can find any member of our team in one convenient location – the group office. We have an adjacent new lab to boot, which we plan to get dirty as soon as we unpack all the boxes.



The new open plan office.



Moving in to the new lab.

Our PhD student, **Indika Herath**, has just left to return to Sri Lanka. For her doctoral research at Massey University she worked on water footprinting, and studied the water footprint of wine and potatoes. Her work developed new protocols for water footprinting that fulfil the basic laws of hydrology. She had her PhD oral defence three weeks' ago, and she performed exceptionally well – so well, that her work has been nominated for the Dean's List of Exceptional Theses. Well done Indika! Indika will resume her job with the Coconut Research Institute just north of Colombo in Sri Lanka.

Massey University, Palmerston North

As previously reported, Vince Neall retired at the end of 2012 and two functions were held where colleagues and friends recognised his achievements in his four decades of teaching and research at Massey University. His contributions were further recognised when he was made a Member of the New Zealand Order of Merit in the New Year's Honours list. The article that appeared in the local newspaper is reprinted here:

Rock solid choice for an honour

What started as a love of rocks has landed a Palmerston North professor a New Year honour. Professor Vince Neall, the head of Earth Sciences at Massey University has been made a Member of the New Zealand Order of Merit for his work.

Prof Neall, who has been involved in Earth Science at Massey since 1973, said it was as much an honour for the staff he worked with as it was for him.

"I just think it is great that what we have done in Earth Science at Massey has been recognised."



An internationally recognised expert on volcanoes, Prof Neall said his interest in Earth Science came about when he went to university. "I was always interested in rocks and fossils in general, and when I left school I wasn't sure what vocation I wanted to choose."

After some study, his interest in Earth Science peaked on a trip to Antarctica. Since then, he has studied artefacts found in former lava flows in Papua New Guinea and volcanic eruptions beneath Iceland. He was also part of the team that monitored Mt Ruapehu before and after the 1995 eruption and 2007 lahar.

He was a committee member of the Millennium Science Initiative in Chile and was a former member of the New Zealand Science Submission for the United Nations Educational Scientific and Cultural Organisation.

Prof Neall has also been president of the Camellia Research Trust, a committee member of the Royal Society Manawatu Branch and president of the Geological Society of New Zealand. He also helped set up Te Manawa Science Centre.

During the weeks of the 4th and 11th of February, Professor Peter Buurman from Wageningen University gave a course on soil organic matter at Massey University funded by the LEARN programme. The course was video-conferenced with Waikato University at Hamilton and Landcare Research at Lincoln. A total of 30 people attended the course. The course consisted of 37 lectures, given daily in four-hour morning sessions, that offered an integrated approach at all levels of soil organic matter studies, from global cycles to molecular chemistry. Such a combination of aspects is not available in textbooks and was very well received by all attendees. Invited speakers for special topics were Dr. Miko Kirschbaum, A/Prof. Marta Camps and Dr. Bambang Kusumo. Some comments from attendees were as follows: "thought

provoking”, “over the past 2 weeks Peter has changes my understanding of soil processes and made me reconsider what I have always thought as “truth””; “the course structure was very logical, the slides clear and easy to follow”, “Peter has been a truly inspiring speaker”, “the course helped me understand the dynamics of soil carbon”, “this has been the best training event I have had in my life”; “delivery of the training was exceptional”; “the course has triggered my critical thinking”...



Peter also gave a two-week course on the application of pyrolysis-GC/MS analysis on soil organic matter studies on the weeks of the 25th February and 4th March, at Massey University, and also funded by the LEARN programme. The course was given daily in eight-hour sessions, with four hours of lectures every morning during the first week and discussions on interpretation the mornings of the second week. Twelve students attended the course. Invited speakers for special topics were Dr. Peter Bishop and Dr.

Pullanagari Reddy. The use of this technique is ideal to study the genesis of soil organic matter.

Several PhD students have recently submitted their thesis and defended their research at an oral examination. Congratulations to:

Kiran Hina

APPLICATION OF BIOCHAR TECHNOLOGIES TO WASTEWATER TREATMENT

SUPERVISORS: Mike Hedley, Marta Camps and James Hanly

Dr Kiran Hina successfully completed her PhD and finished her PhD in February 2013, on the “Application of Biochar Technologies to Wastewater treatment”. Kiran was successful in showing that Biochar made from Pine and Eucalyptus biochars/wood feedstocks could be used remove ammonium and phosphorus from wastewaters.



Amandeep Singh Ghatohra



EFFECT OF METHOD OF TILLAGE ON LOSS OF CARBON FROM SOILS

SUPERVISORS: Surinder Saggar, Mike Hedley and Craig Ross

This Ph.D. study evaluated New Zealand developed Cross Slot No-tillage seeding to reduce CO₂ losses from cropped soils and showed that Cross Slot seeding conserved up to 400kg C ha⁻¹ under controlled laboratory conditions. Autumn

and summer field cultivation resulted in combined conservation of $\sim 800 \text{ kg C ha}^{-1}$ or $\sim 3.0 \text{ Mg CO}_2 \text{ ha}^{-1}$. None of the soil labile C fractions tested were significantly correlated with CO_2 losses from soils cultivated with conventional and No-tillage practice. A simulation model was developed from CO_2 losses measured under laboratory conditions. The model accurately predicts C loss from No-tillage soils but from conventionally cultivated soil predicted values were grossly underestimated. In this study it was therefore not possible to either develop a soil test and or a simulation model that New Zealand farmers could use to determine the amount of soil C conserved following No-tillage cultivation.

Indika Herath



THE WATER FOOTPRINT OF AGRICULTURAL PRODUCTS IN NEW ZEALAND: THE IMPACT OF PRIMARY PRODUCTION ON WATER RESOURCES

SUPERVISORS: Brent Clothier, Dave Horne and Ranvir Singh

In her research, Indika worked with wine-grape production in Marlborough & Gisborne and fresh potato production in Manawatu. The study involved measuring and modelling water use, plus groundwater contamination through leaching of agrichemicals. Her work has already been well recognised through several publications including five peer reviewed papers. Her thesis was also recommended to the Dean's List of Exceptional Thesis at Massey University.



Indika sampling water from a fluxmeter under the potato crop just after sowing.

H.M.Saman K. Herath



STABILITY OF BIOCHAR AND ITS INFLUENCE ON THE DYNAMICS OF SOIL PROPERTIES

SUPERVISORS: Marta Camps and Mike Hedley

Saman's research was some of the first in New Zealand to study the long term stability of biochar in soils. The outcome of this research will be helpful to address some key issues regarding the stability of biochars and that of natural soil organic matter, as well as the effects of biochar amendment on soil water retention. It is expected that the findings will also be able to give a feasible method to estimate the intrinsic recalcitrant fraction of biochars and their value for long-term carbon sequestration in soils.

Top Massey Student receives award

Jay Howes the top 3rd year student from Massey in 2012, received his award from Past President Dr Alan Hewitt, at Palmerston North prior to the Norman Taylor Lecture being delivered. Congratulations Jay.



Canterbury

Lincoln University

Peter Almond attended a New Zealand Antarctic Research Institute (NZARI) science workshop March 12 -15 in Auckland. The workshop's goal was to determine the major science questions involving Antarctica that were both relevant to New Zealand and that needed addressing urgently in a global context. The new institute has secured philanthropic funding that it is combining with existing Antarctic science funding streams to bring about transformational change in the way science the continent is done. The institute, headed up by Prof. Gary Wilson of University of Otago, has promoted the shift from a competitive to collaborative science culture as the transformational shift needed. The area of terrestrial science was represented (amongst others) by Megan Balks, Craig Carey, Ian Hogg and Charlie Lee from Waikato University, Peter Almond from Lincoln University, Marcus Vandergoes and Simon Cox from GNS, Brian Storey of Gateway Antarctica, University of Canterbury, and Drew Lorrey from NIWA. The group considered that the effects of climate change on terrestrial ecosystems should be the major focus of attention, with an interesting proposal from Craig Carey and Charlie Lee for an Antarctic Terrestrial Ecosystem Simulator. Requests for proposals for small grants (\$100k) will be made soon, with a call for big internationally linked proposals (\$500 k) to follow.

Rob Sherlock has accepted an Honorary Associate Professorship in the Faculty of Agriculture and Life Sciences. Rob will be working on a number of research projects in the Soil Sciences Dept. Congratulations Rob. It will be great to see you around again.

The department welcomes the arrival of **Obed Lense** who is embarking on a PhD with Brett Robinson, Jürgen Esperschütz and Nick Dickinson (Ecology) on the beneficial reuse of biosolids.

Otago/Southland

AgResearch Invermay

The team down in Invermay are busy setting up trials and putting instrumentation in for this coming winter. Seth Laurenson and Team have been busy establishing large scale field plots for an up and coming effluent trial due to start in June. The trial aims to account for nutrient losses following the application of effluent collected from an off-grazing facility and subsequently applied to land during winter at very low depth and rate.

In collaboration with Plant & Food and Landcare Research, Tony van der Weerden has been studying the effects of irrigation frequency on pasture production and nitrous oxide emissions in response to deposited urine. The field component of this study required covering of plots with a “rain-exclusion shelters” (tunnel houses; see photo) which have had little use in a drought year! Solar power is being used to drive all the instrumentation, including automated chambers and N₂O analysis. As part of a SLUA (soil land use alliance) initiative, Tony is also working with colleagues from Landcare Research, Scion and Plant and Food on climate change impacts on soil C, N and ecosystems services, which included a workshop in Wellington where 50 soil scientists put their thinking hats to provide expert opinion on these impacts.



Irrigation on selected plots in progress, with automated chambers ready and waiting to close and measure the resulting nitrous oxide response

As a re-freshing change, Ross Monaghan has been assisting AgResearch colleagues with a research proposal that aims to determine the environmental impacts of dairy sheep grazing systems. This type of farming enterprise may prove to be an attractive landuse option for catchments where water quality limits constrain other future intensive landuses, such as dairy cow farming. The team is certainly getting prepared for a busy winter this year with a number of trials taking place around the region.

Rich. McDowell returned from the Organic P workshop in Panama and a week later went to the US to conduct a review for the USDA and give an invited talk at the American Water Resources Association spring conference on diffuse pollution in St. Louis Missouri. Although it was all planned down to the minute, Rich got stuck in a snowstorm and only just arrived to give his talk. In fact, he saw snow 13 out of 14 days while he was there and was very happy to return home to the “relative” warmth of a Dunedin autumn.

Soil Themes > Soil Biodiversity

Definition of SOIL BIODIVERSITY – The WHAT

The Convention on Biological Diversity (CBD) defined the **soil biodiversity** as "the variation in soil life, from genes to communities, and the ecological complexes of which they are part, that is from soil micro-habitats to landscapes".

In other terms the soil biodiversity represents the variety of life belowground. The concept is conventionally used in a genetic sense and denotes the number of distinct species (richness) and their proportional abundance (evenness) present in a system, but may be extended to encompass phenotypic (expressed), functional, structural or trophic diversity. The total biomass belowground generally equals or exceeds that aboveground, whilst the biodiversity in the soil always exceeds that on the associated surface by orders of magnitude, particularly at the microbial scale.

Some numbers describe well the soil biodiversity: a teaspoon of soil (about one gram) may typically contain one billion bacterial cells (corresponding to about ten thousand different bacterial genomes), up to one million individual fungi, about one million cells of protists, and several hundred of nematodes. Beside microorganisms and microfauna, soil harbours different species of meso and macro/megafauna represented by arthropods, earthworms and mammals.

The soil biota plays many fundamental roles in delivering key ecosystem goods and services.

Ecosystems **goods** provided by soil biota are:

- food production;
- fibre production;
- fuel production;
- provision of clean water;
- provision of secondary compounds (e.g. pharmaceuticals and agrochemicals).
-

Ecosystems **services** provided by soil biota:

- driving nutrient cycling and regulation of water flow and storage;
- regulation of soil and sediment movement and biological regulation of other biota (including pests and diseases);
- soil structure maintenance;
- detoxification of xenobiotics and pollutants and regulation of atmospheric composition.
-

In the image, you may view a round up of soil dwellers.



Ages of 24 widespread tephras erupted since 30,000 years ago in New Zealand, with re-evaluation of the timing and palaeoclimatic implications of the Lateglacial cool episode at Kaipo bog

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Abstract

Tephtras are important for the NZ-INTIMATE project because they link all three records comprising the composite inter-regional stratotype developed for the New Zealand climate event stratigraphy (NZ-CES). Here we firstly report new calendar ages for 24 widespread marker tephras erupted since 30,000 calendar (cal.) years ago in New Zealand to help facilitate their use as chronostratigraphic dating tools for the NZ-CES and for other palaeoenvironmental and geological applications. The selected tephras comprise 12 rhyolitic tephras from Taupo, nine rhyolitic tephras from Okataina, one peralkaline rhyolitic tephra from Tuhua, and one andesitic tephra each from Tongariro and Egmont/Taranaki volcanic centres. Age models for the tephras were obtained using three methods: (i) ¹⁴C-based wiggle-match dating of wood from trees killed by volcanic eruptions (these dates published previously); (ii) flexible depositional modelling of a high-resolution ¹⁴C-dated age–depth sequence at Kaipo bog using two Bayesian-based modelling programs, Bacon and OxCal's *P_Sequence* function, and the IntCal09 data set (with SH offset correction -44 ± 17 yr); and (iii) calibration of ¹⁴C ages using OxCal's *Tau_Boundary* function and the SHCal04 and IntCal09 data sets. Our preferred dates or calibrated ages for the 24 tephras are as follows (youngest to oldest, all mid-point or mean ages of 95% probability ranges): Kaharoa AD 1314 ± 12 ; Taupo (Unit Y) AD 232 ± 10 ; Mapara (Unit X) 2059 ± 118 cal. yr BP; Whakaipo (Unit V) 2800 ± 60 cal. yr BP; Waimihia (Unit S) 3401 ± 108 cal. yr BP; Stent (Unit Q) 4322 ± 112 cal. yr BP; Unit K 5111 ± 210 cal. yr BP; Whakatane 5526 ± 145 cal. yr BP; Tuhua 6577 ± 547 cal. yr BP; Mamaku 7940 ± 257 cal. yr BP; Rotoma 9423 ± 120 cal. yr BP; Opepe (Unit E) 9991 ± 160 cal. yr BP; Poronui (Unit C) 11,170 ± 115 cal. yr BP; Karapiti (Unit B) 11,460 ± 172 cal. yr BP; Okupata 11,767 ± 192 cal. yr BP; Konini (bed b) 11,880 ± 183 cal. yr BP; Waiohau 14,009 ± 155 cal. yr BP; Rotorua 15,635 ± 412 cal. yr BP; Rerewhakaaitu 17,496 ± 462 cal. yr BP; Okareka 21,858 ± 290 cal. yr BP; Te Rere 25,171 ± 964 cal. yr BP; Kawakawa/Oruanui 25,358 ± 162 cal. yr BP; Poihipi 28,446 ± 670 cal. yr BP; and Okaia 28,621 ± 1428 cal. yr BP.

Secondly, we have re-dated the start and end of the Lateglacial cool episode (climate event NZce-3 in the NZ-CES), previously referred to as the Lateglacial climate reversal, as defined at Kaipo bog in eastern North Island, New Zealand, using both Bacon and OxCal *P_Sequence* modelling with the IntCal09 data set. The ca. 1200-yr-long cool episode, indicated by a lithostratigraphic change in the Kaipo peat sequence to grey mud with lowered carbon content, and a high-resolution pollen-derived cooling signal, began 13,739 ± 125 cal. yr BP and ended 12,550 ± 140 cal. yr BP (mid-point ages of the 95% highest posterior density

regions, Bacon modelling). The OxCal modelling, generating almost identical ages, confirmed these ages. The Lateglacial cool episode (ca. 13.8–12.6 cal. ka BP) thus overlaps a large part of the entire Antarctic cold reversal chronozone (ca. 14.1–12.4 cal. ka BP or ca. 14.6–12.8 cal. ka BP), and an early part of the Greenland Stadial-1 (Younger Dryas) chronozone (ca. 12.9–11.7 cal. ka BP). The timing of the Lateglacial cool episode at Kaipo is broadly consistent with the latitudinal patterns in the Antarctic cold reversal signal suggested for the New Zealand archipelago from marine and terrestrial records, and with records from southern South America.

Quaternary Science Reviews (2013) <http://dx.doi.org/10.1016/j.quascirev.2012.11.022>

Chemical and mineralogical composition of the Mongolian rural soils and their uranium sorption behavior

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Abstract

Distribution of uranium (VI) between soil solids and solutions is a key parameter in assessing the risk to the biosphere of disposing uranium-rich waste products from nuclear plants as well as uranium (U) ore mining. Both of these topics have recently been brought to public attention in Mongolia. Regional background levels of soil elements are an important dataset for accessing the actual environmental situation and monitoring pollution levels. Little information, however, is available on background concentrations of various elements in Mongolian soils. Thirteen rural soils were sampled from six provinces in Mongolia, and concentrations of macro-, micro- and trace elements were measured. The values obtained served as a reference (baseline) for uncontaminated soils. The soils were characterized with slightly acidic to strongly alkaline pH values. With the exception of the sample from a western province, all the soils investigated contained little organic matter. The content of soil elements did not vary widely among geographical regions. The concentration of most micro elements was within the range of worldwide soil values but the value for Zn tended to be moderately higher. The U(VI) sorption into the soils was investigated using the batch technique and the ²³⁷U radionuclide tracer, produced by the photo fission reaction ²³⁸U(γ, n)²³⁷U at an electron accelerator. The ²³⁷U distribution coefficient (K_d), derived from the sorption isotherms, was related to solution pH and varying from 9 to 2547 mL g⁻¹ when the pH ranged between 3 and 7.7. The sorption process was interpreted in terms of the formation of different U(VI) species at given concentrations; calculated using the Speciation program with and without carbonate in the system. The U sorption isotherm displayed two general patterns: one where sorption decreased as solution pH increased, showing a maximum at pH

3, and another pattern revealed an adsorption maximum at pH 5 and then decreased up to pH 7.7 (the final solution pH). The observed decrease in K_d when solution pH increased from 6 to 8 was consistent with the increased formation of soluble $\text{UO}_2(\text{OH})_2$ species. A linear negative correlation between $\lg K_d$ and the solution pH was observed similarly to that reported for the soils with a $\text{pH} \geq 6$.

Journal of Environmental Radioactivity **118**: 105–112, 2013.

Catalytic wet peroxide oxidation of phenol over iron or copper oxide-supported allophane clay materials: influence of catalyst $\text{SiO}_2/\text{Al}_2\text{O}_3$ ratio

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Abstract

Allophane clay materials with $\text{SiO}_2/\text{Al}_2\text{O}_3$ ratios of 1.0 (AlSi1) and 2.2 (AlSi2) were synthesized by a co-precipitation route and further impregnated with iron or copper species. The structure of the parent AlSi1 sample is similar to that of a typical Al-rich soil allophane, while the parent AlSi2 material resembles the structure of a hydrous feldspathoid with a large interspherule surface, thereby exhibiting a large surface area. The ability of the various iron- or copper-based allophane samples to behave as efficient and stable catalysts in phenol oxidation using H_2O_2 was investigated in ambient conditions for the first time. Their structural and textural properties were determined by X-ray diffractometry, N_2 adsorption-desorption at 77 K, electrophoretic mobility measurements, infrared spectroscopy, transmission and scanning electronic microscopy as well as thermo-gravimetric analysis. The catalytic activity of the iron or copper oxide-supported allophanes was markedly influenced by their $\text{SiO}_2/\text{Al}_2\text{O}_3$ ratio and by their respective structure. The iron-based AlSi2 catalysts with tail-like structure and high surface area proved to be far more active than their corresponding AlSi1 counterparts. The highest catalytic efficiency in terms of total organic carbon abatement was obtained at 40  C for the calcined iron oxide-supported AlSi2 allophane sample, for which very low leaching level of iron species was noticed (0.37 mg L^{-1}). By contrast, large differences in terms of catalytic efficiency (conversion rates) and stability were observed for the copper-based counterparts, thereby indicating that the iron-oxide supported allophanes with a hydrous feldspathoid structure are highly active and stable in the catalytic wet peroxide oxidation of phenol.

Microporous and Mesoporous Materials, **162**: 189–198, 2012

Conferences:



Recycling of organic residues for agriculture: from waste management to ecosystem services

From the 3rd to the 5th of June 2013
Université de Versailles St-Quentin-en-Yvelines, Versailles

www.ramiran2013.org



International Interdisciplinary Conference on
Land Use and Water Quality
Reducing Effects of Agriculture
The Hague, the Netherlands, 10-13 June 2013

www.luwq2013.nl

Abstract submission possible, deadline for submission is 20 October 2012
Abstract submission extended till Wednesday 24 October 2012

NEW ZEALAND SOCIETY OF SOIL SCIENCE
NZSSS 2014 Soils Conference

Soil Science for Future Generations

December 1-4, 2014 · Hamilton, NZ



Please submit ideas for:

·Themes· ·Fieldtrips· ·Guest Speakers· ·Sponsors·

to any of the organizing committee members: Dave Houlbrooke, Gina Lucci,
Natalie Watkins, Megan Balks, Louis Schipper, Reece Hill, Hayden Jones or Sharn
Hainsworth



BIT's 3rd Annual World Congress of Agriculture-2013

Time: September 23-25, 2013, Place: Hangzhou, China

On behalf of the organizing committee of BIT's 3rd Annual World Congress of Agriculture - 2013, which will be held on September 23-25, 2013 in Hangzhou, China, we cordially welcome you to give a speech at **Track 3-6: The Significance of Soil Science in Agriculture**. WCA-2013 is always committing itself to be one of the world's leading conferences in the field of Agriculture technology. Under our theme The Key to Feeding the World a particularly rich technical program will leave you struggling to decide which concurrent session to attend.

Some Topics of the track are as the following. Please do not hesitate to contact me if you have any other ideas.

- Topic1 : Application of Soil Moisture Monitoring Technology
- Topic2 : The Role of the Soil in Planting System
- Topic3 : Soil Fertility in Agricultural Systems
- Topic4 : Soil Classification and Characterization
- Topic5 : Soil Microbiology Research
- Topic6 : Edaphology and Environmental Science
- Topic7 : Research Tendency of Soil Science
- Topic8 : Research on Soil Mineralogy
- Topic9 : Sustainable Soil Management

This conference will seek the views and creative ideas on technologies for improvement and application of agriculture technology. The sessions will present the most recent advances in the fields of Plant Biology & Plant Biotechnology, New Energy Sources from Agriculture, Crop Production and Management, Pillar Industries, Food Science and Nutrition for Agriculture, and so on. Selected high qualified speakers will be from all over the world, and heads of the most important developing projects on the use of agriculture technology in many applications. These presentations will identify or offer solutions to problems, utilize case studies, identify knowledge gaps or collaboration opportunities, and discuss broader applications and implications of material presented.

For more details about the conference, please log on:

<http://www.bitconferences.com/wca2013/>

International Conference on Recent Advances in Pollution Control and Prevention for the Livestock Farming Industry (PAPCP 2013)

Jiaxing City, Zhejiang Province, China: 25-26 October, 2013.

The economic development, population growth and demand for a better quality of life have resulted in the growth of the livestock farming industry. This industry generates a large amount of wastewater and wastes. It is one of the largest agricultural pollution sources. In China, it contributes to 96%, 38% and 56% of chemical oxygen demand (COD), total nitrogen (TN) and total phosphorus (TP) of the agricultural industry, respectively. Thus, pollution control and prevention for the livestock farming industry is critical in China and will be of increasing importance for the sustainable development of this industry.

Great efforts have been made worldwide to facilitate pollution control and prevention for this industry. Innovative technologies for pollution control have emerged in recent years, in addition with advanced management measures. Yangtze Delta Region Institute of Tsinghua University Zhejiang is organizing an **International Conference on Recent Advances in Pollution Control and Prevention for the Livestock Farming Industry in Jiaxing City, Zhejiang Province, China in 25-26, October, 2013.**

Conference themes

The topics covered in PAPCP2013 will include:

1. Policies and regulations on management of animal waste
2. Technologies for animal waste prevention
3. Pollution control technologies
4. Resource recovery technologies and practice
5. Greenhouse gas emission mitigation for livestock farming

Conference proceedings

All conference presentations will be included in conference proceedings. Papers selected from the conference proceedings will be published on Waste Management and Journal of Environmental Science and Health, Part A.

Important dates

- Abstract submission (2 page): Tuesday, the 30th April, 2013
- Invitation of submission of full papers: 30th May, 2013
- Submission of full paper: the 30th July, 2013

Contact

Submission and queries are through:

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Postcode: 314006

Conference registration Conference registration will start from Monday, the 1st April, 2012.