MAY 2025

SASQUA

QUATERNARY RESEARCH

SOUTHERN AFRICAN SOCIETY FOR QUATERNARY RESEARCH

SASQUA

SOUTHERN AFRICAN SOCIETY FOR QUATERNARY RESEARCH

Letter from the President

It's been just over a year since our highly successful 24th biennial Congress was held in Cango Valley, Oudtshoorn. This meeting brought together a diverse group of people from different parts of the world, all sharing a keen interest in southern African Quaternary Science.

A key objective for the organising committee has been to boost student participation at SASQUA Congresses. The 2024 meeting achieved remarkable success in this regard, attracting 50 ECR participants, making it the largest SASQUA Congress to date! We extend our sincere gratitude to Lynne Quick for her hard work in organising and running such an outstanding event.

So, you might be wondering where your next SASQUA adventure will take you. We're excited to announce that planning is already underway for next year's meeting at the **Wits Rural Facility**, nestled in the **Bushbuckridge region of Limpopo Province**. We hope you will join us for what promises to be an engaging program, offering a variety of geological tours and, of course, a safari drive through Kruger National Park. Further details will be shared with you in the coming months.

In the meantime, I do hope you will enjoy reading about the exciting research our community has undertaken over the past year. Many thanks to Asi Ntsondwa, our dedicated Newsletter Editor, for compiling this edition.

Sincerely,
Marc Humphries

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SASQUA XXIV BIENNIAL CONGRESS RECAP!

The Southern African Society for Quaternary Research (SASQUA) encourages and advances the study of southern African research projects, arrange meetings, coordinate publications of research results, attract the interest of and boost opportunities for young scientists in the Quaternary field, assist research funding organizations, inform museums and universities about needs of Quaternary research in Southern Africa, assist authorities in connection with salvage and conservation operations.

The 24th biennial SASQUA 2024 Congress was held from the 19 –24 May, at Old Mill Lodge in the Cango Valley, Western Cape.The theme of the congress was: *Exploring the links between humans, climates, and environments through the Quaternary*.

We had over 100 registrations (nearly double the last congress in 2022) from 10 countries and ended up with 82 in person delegates at the congress, with a majority of ECRs and female delegates. Over three days we had 50 talks and 29 posters presented. The congress sessions were complemented by two field excursions. These included visiting an active archaeological excavation at Boomplaas Cave and exploring the renowned Cango Caves.

CANGO CAVE DIVING SPOOFS

The congress concluded with the presentation of awards for outstanding student contributions: Ms. Monique van Tonder received the award for best poster presentation for her project titled: *The Ichnology, Archaeology and Geology of Pleistocene Sequences in the Woody Cape Nature Reserve, Eastern Cape, South Africa*. And, Mr. Luke Nel was recognized for the best podium presentation for his project titled: *Extracting Significant Information From The Southern Cape Fossil Pollen Records: A Reassessment Of The Asteraceae Pollen Types*.

Student presentation winners. Left: Ms. Monique van Tonder. Right: Mr. Luke Nel

Post congress workshop led by Dr Saul Manzano commenced, focused on providing non-botanists with foundational skills in botany and methods for conducting plant surveys.

One of the main goals of the organizing committee was to maximise the number of students attending and presenting at the congress. We are very grateful to GENUS (Centre of Excellence Palaeosciences) for a generous amount of funding as well as the congress delegates (a portion of the registration fees went to supporting students). We thank student, Elizabeth Carr for her submission about her experience at the SASQUA Congress 24. *See next page*.

The SASQUA conference was an enlightening experience. Each moment spent at the conference contributed significantly to my understanding and enthusiasm for research.

As an honour's student, the experience of presenting a poster at the conference was particularly invaluable. It provided me with a unique opportunity to showcase my research, receive feedback from seasoned professionals, and hone my presentation skills. I am confident that this experience will be incredibly beneficial for my future presentations and research endeavours.

One of the most valuable aspects of attending the SASQUA conference was the opportunity to learn about the latest advancements and methodologies in the Quaternary research field. The discussions and presentations sparked new ideas and perspectives that I am excited to explore further.

Moreover, this conference played a crucial role in my growth as a young researcher. The interactions and collaborations I experienced have strengthened my confidence and broadened my professional network. I am inspired and motivated to continue my journey in research with a renewed sense of purpose and dedication.

-Elizabeth Carr

GENUS

SASQUA COMMUNITY UPDATES

Prof Francis Thackeray
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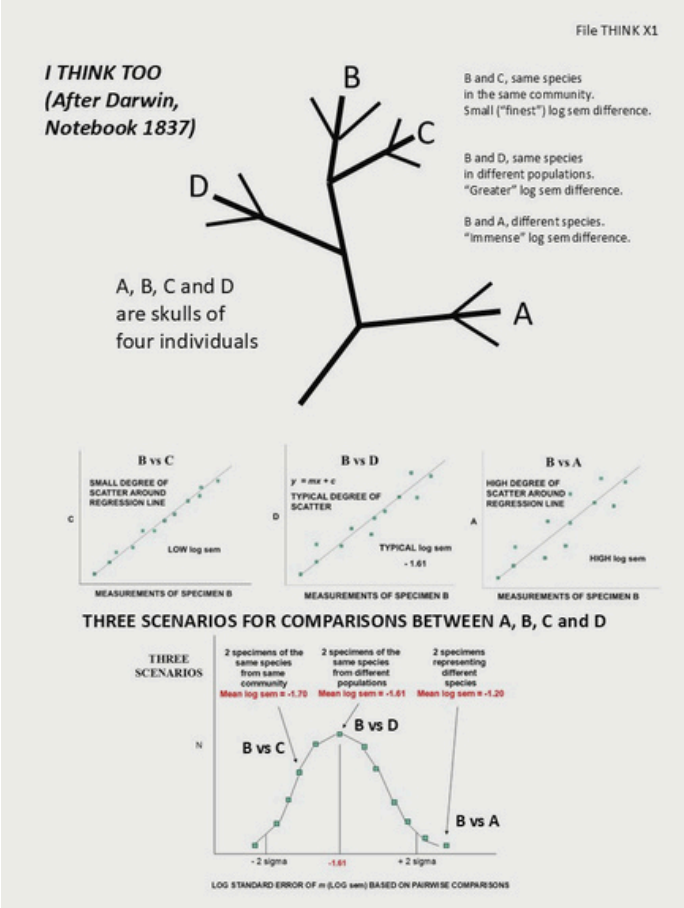
Although I have retired I remain active as an Honorary Research Associate of the Evolutionary Studies Institute at Wits. In "retirement" I work from my study which is the centre of my universe. I am a "Happy Hermit at Home".

Thackeray, J.F. 2024d. https://www.archaeopress.com/Archaeopress/download/9781803278919. (This link is for the entire book. My chapter is the first in the volume).

Towards establishing a probabilistic (morphometric) definition of a species (applicable in modern and palaeontological contexts), I continue to use my "log sem" statistic, as discussed by Thackeray (2024d). From pairwise regression equations of the form y=mx+c, the statistic is based on cranial (or other) measurements of two specimens which may or may not be the same species. The term "sem" is the standard error of the m-coefficient in the equation. In the Figure which I have prepared for this newsletter (see attachment), I present a scenario related to "log sem" statistics based on pairwise comparisons between measurements of four skulls, A, B, C and D. Theoretically it is fun to assess them in relation to Charles Darwin's iconic generalised phylogenetic tree which he sketched in a notebook in 1837, in which he compared a specimen B against A, C and D. From his graph he noted that there was the smallest ("finest") difference between individuals B and C (probably conspecific), but a "greater" difference was found between specimens B and D (which might still be the same species). However, when B is compared to A, an "immense" difference occurred, reflecting different taxa.

In his sketch in the top left-hand corner of his notebook Darwin wrote the words "I THINK". Well, I like to think that "I CAN THINK TOO" in the context of analogous theoretical concepts based on morphometric observations --- in my case, about 10,000 pairwise linear regressions of conspecific hominoids, with a mean log sem value of -1.61 and a standard deviation of 0.1, reflecting what I consider to be a typical amount of variation in hominoid species (including Plio-Pleistocene hominins), based on cranial measurements (Thackeray, 2024d).



Note the following scenario in my case:

- When cranial measurements of two conspecific specimens B and C from the same community are compared, there is little scatter ("the finest", to use Darwin's words) around the regression line (associated with y=mx+c), and the "log sem" statistic is very low (< -1.61) with a small "delta log sem" (typically < 0.03).
- When cranial measurements of two conspecific specimens B and D from the same populations are compared, the "log sem" is generally "greater", typically -1.61 ± 0.1, with a "delta log sem" of about 0.03, reflecting a high probability of representing the same species.
- When cranial measurements of two specimens B and A representing different species are compared, the "log sem" is "immensely" different, typically outside the upper 95% confidence limit of -1.61 ± 0.1 (my statistical probabilistic definition of a species), with a "delta log sem" >> 0.03.

The above relates closely to a statement in the last chapter of The Origin of Species, in which Darwin recognised the need to quantify the "amount" of variation in a species. In the case of hominoids, -1.61 ± 0.1 is my statistical probabilistic definition of a species based on log sem statistics, with a "delta log sem" typically about 0.03.

There is something remarkable about the absolute value of -1.61, which Thackery

(2007) suggested to be an "approximation of a biological species constant", designated T. In my recent article (Thackeray 2024d), based on a study of extant and extinct conspecific hominoids, I demonstrate that 1.618 is the absolute value of the "constant" based on about 10,000 pairwise linear regressions. Perhaps not coincidentally, 1.618 is the value of Phi (Φ), the "Golden Ratio", which is expressed in many ways in nature, associated with the Fibonacci sequence.

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The CGS' survey boat mapping the seafloor offshore of Clarens Drive, on the eastern margin of False Bay.

Since 2021, our Council for Geoscience marine geoscience team has worked on several projects for Eskom in order to calculate various types of seismic hazard for a potential new coastal nuclear plant, and this work was recently completed. We also carried out a probable tsunami hazard assessment for the southwestern Cape as part of this work and the results will be communicated when permitted. In parallel with this, we continue with our seafloor mapping programme at the CGS and are currently working in False Bay, Cape Town.

Look out for a new book which has just been published in December 2024 called 'Wood, Iron and Steel'. It is authored by Bruce Henderson and Kelly Graham, and features hydroacoustic data and historic accounts of many of the shipwrecks of the Cape.

See page 28 for publications

One PhD student which I have co-supervised with Dr Gavin Rishworth, NMU, has graduated in the last year and I feel extremely proud to congratulate Dr Carla Dodd on her contributions to South African Quaternary science and hydrogeology! Carla's thesis was entitled 'The Algoa Bay region groundwater cycle - linking source to coast'.

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Revisiting the Cave of Hearths in the Makapan Valley of South Africa

Photo: Shaw Badenhorst and postgraduate students on a recent visit to the Makapan Valley. From left to right: Lesedi Mankgele (for her Honours, she is studying the fauna from the surface at the Cave of Hearths), Shaw Badenhorst (Evolutionary Studies Institute, Wits), Joel Ezeimo (he is studying taphonomic aspects from Limeworks for his PhD) and Anelisiwe Siteto (for her MSc, she is analysing fauna collected by hyaenas found adjacent to the Cave of Hearths)

The Makapan Valley, close to the modern town of Mokopane (formerly Potgietersrus) in the Limpopo Province of South Africa is an important region for understanding hominin evolution, palaeoecology and animal exploitation. The Valley has several palaeontological sites, including Limeworks (the scene for Raymond Dart's Osteodontokeratic Culture theory, and where evidence for australopithecines has been found) and Historic Cave (where the Boers placed the Kekana under siege in 1854).

Another important site in the Makapan Valley is the Cave of Hearths. After initial excavations by James Kitching in the late 1940s, Revil Mason excavated the site in 1953 and 1954 (Mason 1969, 1988). The Cave of Hearths is unique in that it has a record of hominin occupation stretching from the Early, Middle and Later Iron Ages, the Iron Age, and the 19th or early 20th century. While some aspects of the lithics, fauna and other aspects have been studied (Mason 1988, McNabb and Sinclair 2009, Ogala 2009), the Cave of Hearths has always lacked secured dates for the different Pleistocene and Holocene beds. Without more secure dates, the study of the material and fossil remains from the Cave of Hearths is seriously hampered. Moreover, not all the fauna was studied at the time (Cooke 1969), and analytical procedures have greatly improved during the last few decades. This warrants the complete restudy of the fauna from the Cave of Hearths.

Recently, I initiated a renewed research programme at the Cave of Hearths. Various samples are currently being studied to date the different beds using OSL, ESR, cosmogenic nuclide and radiocarbon techniques. In addition, multiple aspects of the fauna, pollen, soil morphology, and other material remains are currently being studied by several collaborators, postgraduate students and me, and the results will be published in due course.

The research at the Cave of Hearths and postgraduate training is generously funded by GENUS, the National Research Foundation, PAST, the University of the Witwatersrand and the Department of Sports, Arts and Culture.

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2024 started with final preparations of the paper "Landscape evolution and hydrology at the Late Pleistocene archaeological site of Narabeb in the Namib Sand Sea, Namibia" for a special issue of Quaternary Science Advances on Human-Environment Interactions in African Prehistory, edited by Brian Chase, J. Tyler Faith, Simon Armitage and Sarah Wurz. This involved zoom conversations at sunrise or sunset with Dr Andrew Gunn at Monash University in Australia as we applied with mathematical equations for dune formation and migration to the dunes that now surround the Narabeb site.

Meanwhile, I was one of a group of University of Manchester and Manchester Metropolitan University academics co-hosting the annual UK Quaternary Research Association Conference from 4-7th January, with the theme of "Changing Resolutions in Quaternary Science", including a slightly chilly fieldtrip to some peatland sites north of Manchester (photo 1). At the conference, I presented on behalf of Shashank Nitundil (current PhD student at the University of Manchester), who was in the other side of the world conducting his cosmogenic nuclide dating for his PhD at ANSTO just outside Sydney. The presentation was "Using portable luminescence to explore dune dynamics in the western Thar desert, India", where we reported the development of Shashank's MSc research, including fieldwork from September 2023 is a warm and rather humid season in the Thar Desert. Sampling from five locations along a ~75 km north-south transect in the western Thar confirms the published story that the majority of the Thar dunes accumulated during the Holocene, but with a pocket of sand outside this range, identified using the portable luminescence reader.

By June 2024 this had been dated at the St Andrews University luminescence laboratory in Scotland with our collaborator Aayush Srivastava to ~44 ± 3 ka. A University of Manchester initiative to link with O.P. Jindal University on the outskirts of Delhi provides an opportunity for 18 months of collaboration with new colleagues. We now aim to explore more of the "History of the Thar", with sampling for further portable luminescence reader rapid age estimation, sending samples for provenance analysis to Italy, and exploring some remotely sensed data to see how the vegetation patterns around irrigation canals has changed in recent decades.

Photo 1: Top: Talking sand dunes in the Thar Desert, India. Bottom: QRA fieldtrip to peatlands north of Manchester in January in the UK.

At the QRA conference I also presented a poster "Dating Hominin Occupation of the Northern Sand Sea, Namibia" about the work from the Survey and Archaeology of the Namib Desert Surface (S.A.N.D.S.) team. And then, much of the year seemed to disappear into grant writing and rewriting mode, but with joy to announce that from February 2025, The Leverhulme Trust is funding 4 more years of Namib Sand Sea research, with the project "PANS: Palaeoenvironmental context of Palaeolithic Archaeology in the Namib Sand Sea".

And we are excited Tess Spano will start as a post- doc with us from February 10th, 2025. A postponed UK Royal Geographic Society Thesiger-Oman Research Fellowship "RiVER (Routes into Vleis) will also be enormously helpful in getting team members to the field.

In the Easter vacation I headed to Vienna for the EGU to co-convene "GM7.3 Drylands: Past to recent paleoenvironmental and geomorphic perspectives and challenges" and present research from both the Thar Desert and the Namib Sand Sea. After a flurry of teaching and marking, in the UK summer vacation I had my first foray in writing something for The Conversation, which was a really fun experience. Whilst the headline-writing style still makes me cringe, that's the way in the 2020s I am learning: "African archaeology has neglected Namibia's deserts, but scientists now know when an ancient lake supported human life in the Namib Sand Sea" (Photo 2 shows George Leader and Rachel Bynoe walking down a dune towards this former "lake"). A huge thanks to Adewale Fatade from The Conversation for working with me, and to Dom Stratford who co-authored this. The piece was picked up by a Cape Town drive time host John Maytham, and before I knew it I was online via a black-screen on Zoom, chatting about the desert, before getting slightly wrong-footed with his take on the "why bother" question, with "is there a beyond knowledge for knowledge's

sake benefit in doing this work?". As the adrenaline subsided, I had received a lovely WhatsApp Message from SASQUAs very own Hayley Cawthra who'd heard me in the car, which put a big smile on my face.

In June, the UK "Windy Day" meeting was hosted in Liverpool by Kaja Fenn, and I got to talk some more about the Namib Sand Sea, with a focus on the sand dune accumulation and potential migration "Shifting sand dunes amongst green corridors? Landscape evolution at the archaeological site of Narabeb in the Namib Sand Sea." And in September the UK Luminescence and ESR meeting was hosted in Oxford, and I could dwell on the dating side of the story with "Dating S.A.N.D.S." It just so happened that Frank Eckardt (UCT) was in Oxford at the same moment, and it was lovely to catch up.

The PANS team are now in the planning stages for June 2025 fieldwork, which I particularly can't wait for, given the reconnaissance trip was already a number of years ago in 2022! The selection of potential sites to work at has somewhat exploded to ~55 after colleagues George Leader and Dom Stratford took a two-week walk from east to west for a large-scale archaeological survey in July 2024. They, and the whole team are very grateful for the logistical support of Ted Marks and the also staff at the Gobabeb Namib Research Institute, particularly Eugene Marais for helping them achieve this adventure. Watch this space for where we manage to go (not on foot) in 2025.

See page 28 for publications.

Photo 2: Looking east and walking towards the former "lake" at Narabeb in the Namib Sand Sea.

RESEARCH GROUP UPDATES

MSA KNAPPING FLOOR EXCAVATIONS AND PALEO-GULLY MAPPING IN THE JOJOSI DONGAS

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While scouring the dongas of central KwaZulu-Natal, during my PhD fieldwork in the late 1980's, the association between Middle Stone Age cultural artefacts and the Masotcheni Fomation succession of colluvial layers and palaeosols became quite evident. Rare Early Stone Age hand axes were found in situ in the basal strata and provided a minimum age for the evolution of the hillslope sediment mantle in this region. It was clear that the MSA culture persisted in the region despite the long-term impacts on the environment of hillslope instability through cyclic gully erosion, colluvial/alluvial infill and palaeosol formation. The first luminescence dating (IRSL) conducted on these sediments by Shenghua Li of University of Aberystwyth provided a framework for colluvial accretion on these slopes from ~135 ka to ~30 ka which explained the prevalence of MSA artefacts weathering out of the palaeosols.

North of Nqutu in the Jojosi stream catchment is an expansive badland area covering about 30 km2 that is developed in colluvium derived from the underlying dolerite sill. Although this donga complex displayed evidence of multiple phases of donga cut-and-fill, and the only calcrete profile in KZN, the sediment was atypical of the Masotcheni Formation. Worked hornfels flakes were eroding from horizons within the colluvial succession at several places and the

donga floors and sidewalls were literally carpeted with worked MSA flakes. The attraction to MSA people was the abundant hornfels that crops out alongside the dongas at the contact between Vryheid Formation siltstone and the thick dolerite sill. I reported these finds to Aron Mazel and Natal Museum and in 1991 we excavated one of these “knapping floors” and collected many thousands of worked flakes. These were archived at the museum but no further work was done on the collection.

In 2021 Manuel Will of University of Tübingen expressed interest in visiting the Jojosi site and after finding his way into this inaccessible badland area, declared the site to be an MSA “El Dorado”. Over the past three years the Tübingen team comprising Manu Will, Matthias Blessing, Muzi Msimanga, assisted by Leah Böttger and PhD candidate Gunther Möller, have excavated other knapping floor lithic scatters in the gully sidewalls. Geographer Christian Sommer, assisted by Felix Weinschenk and MSc student Hanna Pehnert, have prepared a time sequence of orthophoto maps of the complex badland topography using drones and unravelled the complex 3D stratigraphy of the accretionary succession. During September 2024, Aron Mazel visited from Newcastle, UK and assisted the team with further excavations. Gunther analysed the Mazel sample, conducting attribute analysis and refitting studies, and was able to achieve many flake refits. The analysis of the artefacts excavated over the past three field trips will form part of his PhD research.

Given the complex 3D stratigraphic and palaeogully architecture of the site, which can be likened to an unaligned stack of egg boxes, it was clear that a chronological framework would be key to understanding the long occupation of the site. Svenja Riedesel used Post-IR IRSL dating to produce a sequence of dates that extend much further back than the typical 125ka basal ages from Masotcheni Formation deposits in the surrounding region. The Jojosi colluvia dates constrain erosional and depositional processes from ~100 ka to ~700 ka, and human occupation of the area in early MIS 5 and late MIS 6. Additional stratigraphic units have been mapped, identifying at least five phases of palaeo-gully cut-and-fill, that overlie the remnants of a thick, clay-rich dolerite saprolite on this complex hillslope.

MARINE GEOLOGY RESEARCH UNIT
UNIVERSITY OF KWAZULU-NATAL

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2024 was a busy time for the Marine Geology Research Unit at UKZN. Staffing-wise, myself and Dr. Nonkululeko Dladla held down the fort, later joined in September by Dr. Luke Engelbrecht as postdoctoral fellow working on coastal storm hazard recurrences for the Department of Cooperative Governance and Traditional Affairs. Luke has since moved onto a DSI-NRF Centre of Excellence (CoE) for Integrated Mineral and Energy Resource Analysis (CIMERA) Post-Doc examining controls of bedrock topography, sea level and sediment supply on the stratigraphic evolution of the shallow nearshore shelf of Alexander Bay. We also welcome Ms Teri Somaroo as a researcher, focusing on the production of bathymetric charts and bathymetric data processing for our data collection efforts.

The generous donation of geophysical data from Transhex's Bill Ludick and Lappies Labuschagne saw the initiation of two honours projects on the southern Namaqualand Holocene mudbelt. Jazmynn Eksteen and Bandile Mbatha were tasked with the somewhat challenging mapping of the thickness and facies distribution.

A bathymetric data set derived from the Olex data system was used by Tyrese Chetty for his thesis work on mapping submarine debris blocks and debris flows offshore Mocimboa da Praia to the Rovuma River, of northern Mozambique. This complimented an ongoing project with MARUM and Prof. Dr. Dierk Hebbeln on the cold water corals of the Western Indian Ocean. Staying in the area, Mbali Buthelezi completed her thesis work examining geophysical records from the Mozambique Island area to reconstruct the palaeo-drainage surrounding Africa's first port. Kopano Mashaba produced an excellent thesis on the incised valleys of the Durban Bay, ably supervised by Dr. Nku.

Sashan Manikam completed his MSc (with a first class pass) together with inputs by Prof. Andrew Cooper and Prof. Burg Flemming. His two papers, in Geomorphology and Continental Shelf Research, made a significant step forward in our understanding of the Transkei shelf geomorphology and process sedimentology.

2024 was a bumper year for MSc graduations and successful examinations. Liam Meltzer (now with XOcean) worked on the bypass alluvial valleys developed on the Namibian shelf offshore Hottentot's Bay. Diaksha Ramdhunee (now with Luhlaza Consulting) was similarly awarded her MSc for her work on the Lake Bhangazi stratigraphy and evolution in the context of hippopotami eco-morpho engineering. Both received first class passes. A special mention goes to my long-term partner in crime (grime) Prof. Marc Humphries of Wits, who supervised an honours project on the same data and who published this recently in QSR!

2025 MSc graduations are on the cards for Henna Draycott (Shoreface Stratigraphy, Evolution and Morphology: observations from southern Mozambique), Tamera Heeralal (Genesis and preservation of composite gravel deposits on the accommodation limited shelf of south-central Namibia), and Marinja Bester (Submerged barrier evolution along the Mittag inner continental shelf, southern Namibia) are forthcoming. All passed with distinction and have made significant steps forward in their respective fields.

On the new project front, we undertook a comprehensive sub-bottom profile and bathymetry survey in the Singapore straits with Drs. Stephen Chua and Ega Nugraha and Professor Adam Switzer, all hailing from the Nanyang Technological University, Singapore. The Blue Action Fund supported an estuary mapping program in which we collected bathymetry for several estuaries on the South African east coast for our PI, Dr. Fiona MacKay. Christmas came early with sunburn, mosquito bites and crocodile sitings for Gaynor Deacon and myself. Unfortunately, the data collection suffered as we did. We are now in a follow up phase of collecting sub-bottom profiles and side scan sonar imagery to marry with our sediment sampling phase in 2024.

Our NRF/ACEP funded SoundSeas project also kicked off well. Significant detail was added to our maps of the Kei River and Gqunube Shelves, and some important multibeam and sub-bottom profiler data from the PE Corals Marine Protected Area were collected to help better understand dredge samples and video footage we took in 2016.

We also recently started the process of writing up the geoscience component of the recent SAEON-led Madagascar Ridge seamount cruise aboard the Ocean Explorer. Amina Makori of the Kenyan Marine Fisheries Research Institute will lead on the first paper to describe the submarine geomorphology and habitat of Walters Shoal.

We welcomed a solid influx of new students to our research program, drawing heavily from industry. DeBeers' Rachel Mpofu (Coast-parallel incisions offshore southern Namibia) and Elina Kaasheka (Stratigraphy of a submerged paraglacial delta, Nome Alaska) joined for their MSc and PhD respectively. The CGS' Sashan Manikam started his PhD on the mapping of False Bay and adjoining shelf in the southern Cape. Sasol's Nonkululeko Gasa also began her MSc on the bedform dynamics and submerged geomorphology of the Agulhas Bank. Jazmynn Eksteen returned with another former Honours student, Ishta Maharaj, to pursue their MSc work. Jazmynn continues on the mudbelt with ~250 vibracores to sift through; Ishta will examine the bedrock structures and integrate machine learning to predict their relative influences on gravel trapping.

Research-wise, 2024 was a dry year for me personally. The shock of having to teach first years and the three afternoon practicals per week (as a geomorphologist and now hard rock geologist) meant pressure was placed on the research aspects of the job. Our unit output suffered accordingly. Our research associates will however have added much volume to the final outputs of the unit as a whole. Andrew Cooper, Carlos Loureiro, Derek Jackson, Greg Botha, Maria Ovechkina and Mike Mostovksi all added to the team effort. 2025 has so far been better, with three papers accepted and several in review.

The WIO-BENTH project (Identification, characterization and vulnerability assessment of benthic ecosystems in the Western Indian Ocean) was completed by Drs Sean Fennessy and Fiona MacKay at the Oceaonographic Research Institute, with inputs from Sashan Manikam (my PhD student who helped stitch all the available bathymetry in the Western Indian Ocean together) and myself. To conclude our roles in the project, we ran a three day international workshop on seafloor mapping and geophysics for the various project member countries.

My personal highlight for the 2024-2025 period was a trip to Lupari in the Aeolian Islands as a keynote speaker for the 2nd International Conference on Seafloor Forms, Processes and Evolution. This was a great experience for me and I will forever be indebted to the scientific committee of Aaron Micallef, Alessandra Savini and Sebastian Krastel for the invitation. Fantastic news to follow in that our unit was selected to host the 3rd of these meetings in 2026, at Phumula beach Hotel on KZN's south coast. A close second was representing South

A close second was representing South Africa in a workshop in Mombasa to compile all the available bathymetry data for the western Indian ocean with colleagues from Mozambique, Tanzania, Kenya, Mauritius, Seychelles, Madagascar and the Comoros.

For 2025, several exciting proposals have been submitted. They are with a fun, dynamic team of scientists and we eagerly await their outcomes. As we speak, Teri prepares for her second project of the year mapping offshore the Mauritian isles, fresh from several weeks in Angola mapping a large embayment there. The sustainability of our unit thus appears to be relatively sound, though who can know given the global escapades at play now.

See publications on page 28

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

AFRICAN CENTRE FOR COASTAL PALAEOSCIENCE'S PALAEOECOLOGY LABORATORY
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2024 has been another busy year for the Palaeolab with research efforts focussing on contributing significantly to our understanding of past environments and their impact on early human life.

Key highlights of recent activities include hosting and participating in the SASQUA Congress in May and being involved in several fieldwork campaigns in June and July. These campaigns were directly associated with the two large interdisciplinary and multinational research projects that are currently ongoing: The Succulent Karoo Vaarshe Rivier Project and the Southern Cape Boomplaas Project.

We started working on an exciting new research avenue in the form of palaeoecological studies on Marion Island, three final-year Botany undergrad students produced pollen and fungal spore records for two sediment cores to investigate the relationship between invasive mice populati-

-ons and the growth and persistence of keystone plants on the island.

We enjoyed hosting Dr Irene Esteban from the University of Barcelona – a phytolith expert and co-supervisor of one of our MSc students.

We are very proud of Asithandile Ntsondwa who graduated with her MSc in April and started her PhD at New York University under the mentorship of Justin Pargeter. We're also happy to report that two Master's candidates – Marishka Govender and Luke Nel - submitted their theses in early December 2024 and will be graduating within the first quarter of 2025.

We also continue to manage Gqeberha's only pollen and spore trap and generate weekly pollen and spore data for the city. This work forms part of a national monitoring network (www.pollencount.co.za).

COMMISSIONS/COMMITTEE MEMBERSHIP:

- Deputy Director of the African Centre for Coastal Palaeoscience
- ISC/ICSU/SANC-INQUA committee member
- AFQUA (The African Quaternary) Scientific Steering committee member
- Neotoma Data Steward, southern African regional representative of the African Pollen Database (APD)

SASQUA CONGRESS PRESENTATIONS

We enjoyed hosting this year's SASQUA congress and believe it was a resounding success for everyone who attended.

- **S. Davids** and L.J Quick. Validating the dung fungi spectra of herbivores: A Coprophilous Fungal Spore calibration study from the Eastern Cape, South Africa. Southern African Society for Quaternary Research (SASQUA) 24th Biennial Congress, Cango Valley,South Africa, 19-24 May 2024
- R. Mey, M. S. Humphries and **L.J. Quick**. Unravelling late Quaternary climate variability along the southern Cape coast: Insights from a 30,000-year geochemical record at Pearly Beach. Southern African Society for Quaternary Research (SASQUA) 24th Biennial Congress, Cango Valley, South Africa, 19-24 May 2024
- S. Manzano, **L.J. Quick**, B.M. Chase, M.T. Hoffman, L. Gillson. Patterns and processes of vegetation change in highly biodiverse arid and Mediterranean ecosystems of the Cape Floristic Region (South Africa). Southern African Society for Quaternary Research (SASQUA) 24 th Biennial Congress, Cango Valley, South Africa, 19-24 May 2024

- S. Manzano, **L.J. Quick,** B.M. Chase, M.T. Hoffman, L. Gillson. Patterns and processes of vegetation change in highly biodiverse arid and Mediterranean ecosystems of the Cape Floristic Region (South Africa). Southern African Society for Quaternary Research (SASQUA) 24 th Biennial Congress, Cango Valley, South Africa, 19-24 May 2024
- S.G. Mosher, M.J. Power, **L.J. Quick**, T. Haberzettl, T. Kasper, K.L. Kirsten, D.R. Braun, J.T. Faith. Fire-climate-pastoralist links in the Cape Floristic Region: High-resolution sedimentary charcoal records from Verlorenvlei and Eilandvlei, South Africa. Southern African Society for Quaternary Research (SASQUA) 24 th Biennial Congress, Cango Valley, South Africa, 19-24 May 2024
- **A. Ntsondwa**, S. Manzano, M.S Humphries and **L.J Quick.** Reconstructing the fire history and palaeoenvironment at Thyspunt, southern Cape coast, Eastern Cape. Southern African Society for Quaternary Research (SASQUA) 24 th Biennial Congress, Cango Valley, South Africa, 19-24 May 2024
- **M. Govender,** I. Esteban, B.A. Grobler and **L.J. Quick.** Reconstructing past environments: a new phytolith record covering the Holocene from the Baviaanskloof, southern Cape interior, South Africa. Southern African Society for Quaternary Research (SASQUA) 24 th Biennial Congress, Cango Valley, South Africa, 19-24 May 2024
- **E. Hilmer,** A.C.M. Julier, B.A. Grobler and L.J. Quick. Establishing connections between contemporary vegetation distributions and modern pollen representation in the Nelson Mandela University Reserve. Southern African Society for Quaternary Research (SASQUA) 24th Biennial Congress, Cango Valley, South Africa, 19-24 May 2024

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Top left: Column chemistry setup for Rb-Sr and Sm-Nd isotopic systems. Top right: Prof Grant Bybee (Head of School of Geosciences), Caitlyn Kelly (Visiting student from Constructors University Bremen, Germany), and me in the Wits clean lab.

Ms. Rachel Mey
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Growing in Geochemistry and Palaeoclimate Research

In December 2023, I graduated with an MSc in Chemistry from the University of the Witwatersrand under the supervision of Dr. Lynne Quick and Prof. Marc Humphries. My research focused on reconstructing Late Quaternary environmental change along the southern Cape coast, by analysing a 30,000-year sedimentary record from Pearly Beach. Through geochemical analysis, I explored how the region responded to global climate shifts, particularly during the Last Glacial-Interglacial transition. This work provided interesting insights into past climate variability and climate forcing mechanisms. I am currently working on publishing these findings. In May 2024, I attended my first SASQUA conference, where I presented a talk on some of my MSc research: “Unravelling Late Quaternary Climate Variability Along the Southern Cape Coast.” The conference was an eye-opening experience, exposing me to the diversity of Quaternary research, with studies ranging from palaeoclimate reconstruction and landscape evolution to archaeological.

I enjoyed engaging with researchers across these fields, learning how different proxies and approaches are used to understand past environments. A highlight was visiting the Boomplaas Cave excavation, where I got to see firsthand how archaeological and palaeoenvironmental records are uncovered.

In June 2024, I started my current role as a research assistant in the isotope labs at the School of Geosciences, Wits. My work involves assisting users to conduct column chemistry separations of their rocks and minerals, along with high-precision mass spectrometry analysis of Lu-Hf, Rb-Sr, and Sm-Nd isotope systems. Additionally, I assist users with laser-ablation ICP-MS of minerals to obtain their trace element and U-Pb isotopic compositions.

The isotope labs at Wits Geosciences is one of the few isotope geochemistry facilities of its kind in Africa, and I feel incredibly fortunate to be part of a lab with such cutting-edge capabilities. This role has significantly expanded my technical expertise in isotope geochemistry, and I am excited to keep refining my skills as I specialise further in palaeoclimate reconstruction using geochemical and isotopic techniques.

Looking ahead, I am preparing to start my PhD in 2025, where I will investigate the long-term development and response of Overberg wetlands to climate and anthropogenic pressures.

My research will integrate multiple geochemical and isotopic techniques. I will be working with different research groups, gaining further experience in palaeoclimate, geochemistry, and continuing to explore the intricate connections between climate, sedimentary processes, and environmental change.

As I embark on this next stage of my research career, I am excited to remain engaged with the SASQUA community, collaborate with fellow researchers, and contribute to the growing field of Quaternary palaeoclimate reconstruction.

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Tracing Earth's Past: My Unexpected Journey into Earth Science

As a second-year BSc Chemistry student with plans to shift to Chemical Engineering, I never anticipated that a field trip to Lake Bhangazi North in the iSimangaliso Wetland Park would completely change my academic trajectory. When I arrived at the ORI research cottage—a modest setup of four shipping containers arranged around a makeshift living room—I had little idea what a sediment core was, and terms like bathymetry were foreign to me.

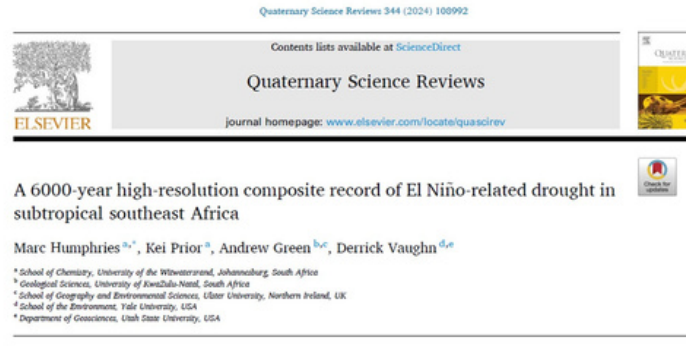
I joined the research team through my analytical chemistry lecturer, Prof. Marc Humphries (WITS), who, alongside Prof. Andrew Green (UKZN), had chosen Lake Bhangazi as part of their broader paleoclimate and geophysical research in the region.

Their previous work had focused on the Mkhuze Delta and Lake St. Lucia, but Lake Bhangazi offered an unstudied site to expand their understanding of past environmental changes in northern KwaZulu-Natal.

Our field expedition involved several days of manual sediment coring, constructing a makeshift seismic survey system on a small rubber duck, and many braais and fireside conversations. It was in these informal settings that I learned the most, connecting lessons from the professors to what I was seeing at the lake and have seen in the natural spaces in South Africa. I was able to ask questions that pushed my understanding beyond the classroom and the laboratory.

Although I had assisted with subsampling the core in my third year and we had already received our age model, it wasn't until my Honours year that I fully took ownership of the project. In the lab, I worked on grain size analysis to assess sediment deposition patterns, XRF analysis to identify elemental composition shifts, and I even worked in the ultra-clean laboratory at WITS to investigate $^{87}Sr/^{86}Sr$ and $^{143}Nd/^{144}Nd$ ratios as tracers of sediment provenance. One of our most striking findings was the presence of prominent sand lenses throughout the core, confirmed through grain size and elemental data We attributed these lenses to prolonged drought periods, during which reduced vegetation cover and lower moisture availability would increase sediment erodibility. Our findings aligned with Prof. Humphries' previous research, which linked intensified drought cycles to harsh El Niño phases in the region.

To strengthen our conclusions, we combined data from three core sites—Lake Bhangazi, the Mkhuze Delta, and Lake St. Lucia—into a multi-proxy composite record. The results showed a statistically significant correlation between major periods of drought in KZN and a longstanding El Niño proxy record from Ecuador. The results of this work were recently published in Quaternary Science Reviews: "A 6000-year high-resolution composite record of El Niño-related drought in subtropical southeast Africa."



Quaternary Science Reviews 344 (2024) 100992

Contents lists available at ScienceDirect

Quaternary Science Reviews

journal homepage: www.elsevier.com/locate/quascirev

A 6000-year high-resolution composite record of El Niño-related drought in subtropical southeast Africa

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[c] School of Geography and Environmental Sciences, Ulster University, Northern Ireland, UK
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[e] Department of Geosciences, Utah State University, USA

The experience altered my academic direction. Instead of pursuing chemical engineering or chemistry, I have decided to continue my research in earth sciences and have accepted an offer for a PhD at Macquarie University, under the supervision of Dr. Tim Ralph and co- Prof. Humphries.

My PhD will expand on my interest in extreme climate events, specifically investigating how the Black Summer fires have impacted coastal wetlands in New South Wales. Focusing on freshwater wetlands upstream of coastal mangroves, I aim to conduct source-to-sink geochemical analyses to track sediment transport post-fire and to develop expertise in radioisotope and compound-specific isotope analysis as well as geochemical modelling and remote sensing.

Although I never set out to pursue a PhD in Geochemistry and Environmental Science, I am incredibly grateful to have landed here. The field offers a rare opportunity to blend my deep curiosity for the natural world with my fundamental understanding of chemistry, as I intend to embrace an interdisciplinary approach to addressing climate and environmental challenges.

PUBLICATIONS

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Braun, K., Bar-Matthews, M., Ayalon, A., Matthews, A., Zilberman, T., Zolotovae, N. Cowling, R.M., Karkanas, P., **Cawthra, H.C.,** Fisher, E.C., Edwards, L., Lii, X., Marean, C.W. 2024. A new MIS 5 to MIS 2 speleothem record from Sandkraal Cave on the South African Cape south coast. *Quaternary Research* 118, 142–161.

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Oster, S., Reynard, J.P., **Cawthra, H.C**., Esteban, I., Pargeter, J., Fisher, E.C., 2024. Late Pleistocene and Holocene fauna from Waterfall Bluff Rock Shelter, Mpondoland, South Africa. *South African Journal of Science* 120, 11 - 12.

Prof Francis Thackeray
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Thackeray F. 2024a. A biochronological date of 3.6 million years for "Little Foot" (StW 573, Australopithecus prometheus from Sterkfontein, South Africa). *Evolutionary Anthropology*, 33 (6):1-6, e22049.

This date of 3.6 Ma (Thackeray, 2024a) for Ron Clarke's Little Foot skull and skeleton (based on measurements of lower first molars, measurable from CT scans) is generally consistent with a cosmogenic age estimate of 3.67 Ma determined by Granger et al (2014).

Thackeray, F. 2024b. How old are South African fossils like the Taung Child? New study offers an answer.

Thackeray (2024b) reports an age of 2.58 Ma for the Taung Child in particular, again based on a biochronological approach using measurements of lower first molars, notably MD (mesiodistal) and BL (buccolingual) dimensions to quantify MD/BL ratios. This is referred to as "the MD/BL" dating method for Plio-Pleistocene hominins attributed to Australopithecus and Early Homo from South Africa as well as East Africa.

Thackeray, F. 2024c. Palaeospectroscopy, sigma taxonomy and lineages in the context of hominin evolution: Is Homo habilis an australopithecine ? The Digging Stick 41(1):17-18.

Thackeray (2024c and elsewhere) is suggesting that there is not necessarily a clear boundary between Australopithecus and Homo about 2 million years ago. It is suggested that the transition between Australopithecus africanus and Homo habilis about 2 million years ago may constitute a chronospecies, with episodic geneflow occurring between hominin populations in East Africa and South Africa, analogous to hypothesised episodic (vicariant) geneflow between wildebeest in Kenya and Tanzania to the north, and wildebeest maintained as the same species (Connochaetes taurinus) in South Africa, Zimbabwe and Zambia, in response to episodic expansion and contraction of grassland habitats, linked to variability in global temperature and regional rainfall.

Thackeray, F. 2024d. Quantification of morphological variability expressed by a "log sem" statistic in the context of human evolution (Australopithecus, Paranthropus and early Homo). In Les sociétés humaines face aux changements climatiques 3. Proceedings of the International Academy of Prehistory and Palaeoanthropology (AIPP), 2023. Pages 1-14. François Djindjian (ed). Archaeopress, Oxford.

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Humphries, M., Prior, K., Green, A., Vaughn, D. 2024. A 6000-year high-resolution composite record of El Niño-related drought in subtropical southeast Africa. *Quaternary Science Reviews* 344, 108992.

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Mosher, S.G., Power, M.J., **Quick, L.J.,** Haberzettl, T., Kasper, T., Kirsten, K.L., Braun, D.R. and Faith, J.T., (2024). *Examining the effects of climate change and human impacts on a high-resolution, late Holocene paleofire record from South Africa's winter rainfall zone.* Quaternary Science Advances, 14, p.100194.

Abstract

Fire is central to the Cape Floristic Region's highly biodiverse and disturbance-adapted Fynbos Biome. However, prehistoric fire regimes, their ecological consequences, and their relationships with large-scale climate drivers and human activities remain poorly understood. Here, we use a high-resolution sedimentary charcoal record from Verlorenvlei, a coastal lake situated on the west coast, to interrogate links between fire, climate, and pastoralism in the Fynbos Biome. Our record has a robust chronology supported by 24 radiocarbon dates and provides a continuous sedimentary sequence spanning the last 4200 years, documenting fire activity before and after the local arrival of pastoralists in the Verlorenvlei area 1500 cal years BP. Fire at Verlorenvlei over the last 4200 years is variable, with relatively low activity until 2000 cal years BP, after which variable but generally higher fire activity occurs until the highest period of fire activity from 1450 to 1800 CE (500–150 cal years BP). The increase in fire activity 2000 years ago corresponds with a shift in the diatom assemblage at Verlorenvlei from marine towards brackish and freshwater species, reflecting increased precipitation derived from a strengthening of the southern westerly winds. The peak in fire activity beginning 1450 CE (500 cal years BP), near the onset of the Little Ice Age, tracks a second diatom-inferred strengthening of the westerly winds. Other southern hemisphere and Antarctic records further corroborate this increased westerly influence after 2000 years. Linear regression modeling on the fire record indicates that moisture availability is the primary driver of fire at Verlorenvlei, with little evidence that human populations influenced fire.

Our reconstruction suggests that fire activity at Verlorenvlei is limited by moisture availability and that wetter conditions facilitate increased vegetation (i.e., fuel) and intensified fire at this otherwise fuel-limited site. This work has implications for management and conservation decisions in response to future predictions of a warmer and drier climate along South Africa's west coast.

Quick, L.J., Chase, B.M., Chevalier, M., Grobler, B.A., Manzano., S (2024). *Fire drives major Holocene vegetation shifts between subtropical and Mediterranean-type ecosystems: a case study from a biodiversity hotspot in South Africa.* Ecography.

Abstract

Fire plays a pivotal role in driving ecological shifts between Mediterranean-type vegetation and subtropical ecosystems in South Africa. This study investigates long-term environmental dynamics and ecological regime changes at the Mediterranean-type vegetation /subtropical boundary using a 6000-year palaeoecological sequence from the Baviaanskloof – a region of South Africa characterized by high levels of biodiversity and climate dynamism. Combining fossil pollen and microcharcoal data from a rock hyrax Procavia capensis midden, we analyse vegetation responses to environmental changes. Our findings reveal that Mediterranean-type vegetation resilience prevailed until ca.2800 cal year BP when a major fire event triggered a transition to a subtropical thicket-dominated environment.

Gharbi, D., Berman, D., Neumann, F.H., Hill, T., Sidla, S., Cillers, S.S., Staats, J., Esterhuizen, N., Ajikah, L., Moseri, M.E., **Quick, L.J., Hilmer, E.,** Van Aardt, A., John, J., Garland, R., Finch, J., Hoek, W., Bamford, M., Seedat, R.Y., I. Manjra, A., Peter, J., 2024. *Ambrosia (ragweed) pollen — A growing aeroallergen of concern in South Africa.* World Allergy Organization Journal 17, 101011.

Background

Ragweed is an invasive, highly allergenic weed predicted to expand its habitat with warming global temperatures. Several Ambrosia species have been identified in South Africa for well over a century; however, its presence remained undetected by allergists and aerobiologists until the development of an extensive aerospora monitoring system across South African urban areas since 2019. This paper presents the inventory of preliminary investigation of the Ambrosia airborne pollen and the taxonomic identification of ragweed species.

Methods

Burkard volumetric spore traps for collecting pollen samples are set up in 9 South African cities (Johannesburg, Cape Town, Pretoria, Kimberley, Durban, Potchefstroom, Ermelo, Bloemfontein, and Gqeberha). Light microscopic identification was combined with environmental DNA metabarcoding analysis to confirm the species level of airborne Ambrosia at selected monitoring stations. Ragweed sensitisation was examined in Cape Town between February 2019 and February 2024, using Allergy Xplorer (ALEX2) multicomponent allergen array.

Results

Ambrosia pollen was detected in 5 aerobiological monitoring stations over the sampling period (Durban, Kimberley, Pretoria, Potchefstroom, Johannesburg). Periods of 4 consistent pollination years were observed in Kimberley (min: 1; max: 16 p.g/m3) and Durban (min: 26; max: 66 p.g/m3). In Pretoria, ragweed pollen was detected for 2 years (2020–2021; 2022–2023) with average total annuals (5-17 p.g/m3). A peak flowering period between March and April was observed in Potchefstroom, and several ragweed pollen peaks were present between the end of December and the beginning of May in Durban. The highest number of *Ambrosia* pollen grains was recorded in Potchefstroom, with 308 grains, and a maximum peak of 47 p.g/m3. eDNA metabarcoding confirmed the presence of Ambrosia artemisiifolia and *A.trifida* species. The overall prevalence of *Ambrosia*-sensitisation amongst 673 tests (age range 7–72 years) was 8.2% (55/673), with no significant difference in sensitisation patterns between age groups. This abrupt ecological turnover underscores the significance of fire as a major driver of vegetation change at the Mediterranean-type vegetation/subtropical boundary.

Our study emphasizes the vulnerability of Mediterranean-type vegetation ecosystems to global environmental change, suggesting potential implications for similar biome boundaries worldwide. By integrating multi-proxy palaeoecological evidence, we gain insights into the resilience and vulnerability of these ecosystems, aiding in understanding future responses to climate change scenarios.

Chapman, E., Liddle, C.R., Williams, B., **Hilmer, E., Quick, L.J**., Garcia, A.G., Suárez, D.C., White, D., Bunting, M.J., Walker, P. and Cabaneros, S.M.S. (2024). Airborne microplastic monitoring: developing a simplified outdoor sampling approach using pollen monitoring equipment. *Journal of Hazardous Materials,* p.136129.

Abstract

A novel, yet simple, airborne microplastic (MP) sampling approach using global pollen monitoring equipment was applied to identify, characterise and quantify outdoor airborne MPs for the first time. Modification of Burkard spore trap tape adhesive provided particle capture and facilitated downstream spectroscopy analysis. Thirty-six polymer types were identified from a total of 21 days sampling using Burkard spore traps at two locations (United Kingdom and South Africa). MPs were detected in 95 % of daily samples. Mean MP particle levels were 2.0 ± 0.9 MP m-3 (11 polymer types) in Hull (U.K.), during March, 2.9 ± 2.0 MP m-3 (16 types) in Hull in July, and 11.0 ± 5.7 MP m-3 (29 types) in Gqeberha, (South Africa) in August 2023. The most abundant polymer type was nylon (Gqeberha). The approach was compared with two passive sampling methods whereby 27 polymer types were identified and of these, 6 types were above the limit of quantification (LOQ), with poly(methacrolein:styrene) (PMA/PS) the most abundant. Irregularly shaped MPs < 100 µm in length were predominant from all sampling approaches. For the first time, airborne MPs were chemically characterised and quantified using volumetric pollen sampling equipment, representing a viable approach for future airborne MP monitoring.

Conclusions

Our study confirms the need to monitor the spread of ragweed, and an increasing awareness of Ambrosia as an allergen of concern in Southern Africa. Extension of aerobiological networks and testing for Ambrosia sensitisation across urban and rural sites will be required.

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Cescon, A.L., Cooper, J.A.G. and Jackson, D.W., 2024. Nature and distribution of beach ridges on the islands of the Greater Caribbean. *Journal of Marine Science and Engineering*, 12(4), p.565.

Claassen, D., **Botha, G.** and Linol, B., 2024. An integrated assessment of erosion drivers facilitating gully expansion rates—A near century multi-temporal analysis from South Africa. *Land Degradation & Development,* 35(11), pp.3675-3699.

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