

Sarah Pederzani

AMBI Research Lab, Instituto Universitario de Bio-Orgánica Antonio González, University of La Laguna
Avenida Astrofísico Francisco Sánchez, 2, 38206, La Laguna, Tenerife, Spain | sarah_pederzani@eva.mpg.de

Current Employment

- 2022 German National Academy of Sciences Leopoldina Postdoctoral Fellow
Archaeological Micromorphology and Biomarker (AMBI) Research Lab
University of La Laguna, Tenerife, Spain
“Developing a multi-proxy stable isotope approach to demonstrating the climatic preferences of site-use of Late Pleistocene humans”
- 2022 Affiliated postdoctoral researcher, Department of Human Evolution, Max-Planck-Institute for Evolutionary Anthropology Leipzig, Germany

Academic Education and Employment

- 2020 – 2021 Postdoctoral researcher, Department of Human Evolution, Max-Planck-Institute for Evolutionary Anthropology Leipzig, Germany
“Reconstructing site specific palaeoclimate and –environment at Pleistocene archaeological sites using isotope geochemistry proxies”
- 2016 – 2021 PhD in Archaeology
Department of Human Evolution, MPI for Evolutionary Anthropology, Leipzig
Department of Archaeology, School of Geoscience, University of Aberdeen, UK
“Exploring Late Pleistocene intra- and inter-site climate variability and seasonality using isotope zooarchaeology”
Supervisors: Kate Britton (University of Aberdeen), Jean-Jacques Hublin (MPI EVA)
- 2014 – 2016 MA in Prehistoric and Historic Archaeology
Christian-Albrechts-University Kiel
“Effects of Heating and Fat Separation on $\delta^{13}\text{C}$ of Single Fatty Acids in Milk: Potential Uses for the Detection of Pasteurization in Prehistoric Pottery”. Final Grade 1.1
Supervisors: Cheryl Makarewicz, Cynthia Spiteri (University of Tübingen)
- 2015 Graduate Research Assistant
Institute for Pre- and Protohistoric Archaeology, CAU Kiel
Sample preparation of bioapatite and collagen for C, N, O isotope analysis
- 2014 Undergraduate Research Assistant
Institute for Pre- and Protohistoric Archaeology, CAU Kiel
Sample preparation of bioapatite for C & O isotope analysis
- 2010 – 2014 BSc in Prehistoric and Historic Archaeology and Chemistry (minor)
Christian-Albrechts-University, Kiel
“Herd Mobility in Xiongnu Funerary Contexts Assessed by Stable Isotope Analysis of Sheep Tooth Enamel from Baga Gazaryn Chuluu, Mongolia”. Final Grade 1.5
Supervisor: Cheryl Makarewicz

Grants and Funding

- 2022 – 2024 German National Academy of Sciences Leopoldina Postdoctoral Fellowship
“Developing a multi-proxy stable isotope approach to demonstrating the climatic preferences of site-use of Late Pleistocene humans” (69,500 €)

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- 2018 Co-organiser 'Gender Equality Symposium', Max-Planck-Institute for Evolutionary Anthropology, Leipzig (2,000 €)
- 2011 – 2016 German National Academic Foundation (Studienstiftung des Deutschen Volkes) scholarship (18,000 €)

Publications

1. McCormack, J., Griffiths, M.L., Shimada, K., Kim, S., Karnes, M., Maisch, H., **Pederzani, S.**, Bourgon, N., Jaouen, K., Becker, M.A., Jöns, N., Sisma-Ventura, G., Straube, N., Pollerspöck, J., Hublin, J.-J., Eagle, R.A., and Tütken, T., **in revision**. Competition between Neogene Otodus megalodon and great white sharks revealed by zinc isotopes. *Nature Communications*.
2. Britton, K., Jimenez, E.-L., Le Corre, M., **Pederzani, S.**, Daujeard, C., Jaouen, K., Vettese, D., Tütken, T., Hublin, J.-J., Moncel, M.-H., **submitted**. Multi-isotope zooarchaeological investigations at Abri du Maras: the palaeoecological and palaeoenvironmental context of Neanderthal subsistence strategies in the Rhône Valley during MIS3. *Journal of Human Evolution*.
3. Smith, G.M., Spasov, R., Martisius, N.L., Rezek, Z., Aldeias, V., Ruebens, K., **Pederzani, S.**, McPherron, S.P., Sirakova, S., Sirakov, N., Tsanova, T., Hublin, J.J., **2021**. Subsistence behaviour during the Initial Upper Palaeolithic in Europe: Site use, dietary practice, and carnivore exploitation at Bacho Kiro Cave (Bulgaria). *Journal of Human Evolution* 161, 103074.
4. **Pederzani, S.**, Britton, K., Aldeias, V., Bourgon, N., Fewlass, H., Lauer, T., McPherron, S. P., Rezek, Z., Sirakov, N., Smith, G. M., Spasov, R., Tran, N.-H., Tsanova, T., Hublin, J.-J., **2021**. Subarctic climate for the earliest *Homo sapiens* in Europe. *Science Advances* 7, eabi4642 (2021). <https://doi.org/10.1126/sciadv.abi4642> Data and code available at: <https://osf.io/tk9dc/>
5. **Pederzani, S.**, Aldeias, V., Dibble, H.L., Goldberg, P., Hublin, J.J., Madelaine, S., McPherron, S.P., Sandgathe, D., Steele, T.E., Turq, A., Britton, K., **2021**. Reconstructing Late Pleistocene paleoclimate at the scale of human behavior: an example from the Neanderthal occupation of La Ferrassie (France). *Scientific Reports*. 11, 1419. <https://doi.org/10.1038/s41598-020-80777-1> Data and code available at: <https://osf.io/sfnb8/>
6. **Pederzani, S.**, Snoeck, C., Wacker, U., Britton, K., **2020**. Anion exchange resin and slow precipitation preclude the need for pretreatments in silver phosphate preparation for oxygen isotope analysis of bioapatites. *Chemical Geology* 534, 119455. <https://doi.org/10.1016/j.chemgeo.2019.119455> Data and code available at: <https://osf.io/ug5k4/>
7. Britton, K., **Pederzani, S.**, Kindler, L., Roebroeks, W., Gaudzinski-Windheuser, S., Richards, M.P., Tütken, T., **2019**. Oxygen isotope analyses of Equus teeth evidences early Eemian and early Weichselian palaeotemperatures at the Middle Palaeolithic site of Neumark-Nord 2, Saxony-Anhalt, Germany. *Quaternary Science Reviews*. 226, 106029. <https://doi.org/10.1016/j.quascirev.2019.106029>
8. **Pederzani, S.**, Britton, K., **2019**. Oxygen isotopes in bioarchaeology: Principles and applications, challenges and opportunities. *Earth-Science Reviews*. 188, 77–107. <https://doi.org/10.1016/j.earscirev.2018.11.005>

9. Makarewicz, C.A., **Pederzani, S.**, 2017. Oxygen ($\delta^{18}\text{O}$) and carbon ($\delta^{13}\text{C}$) isotopic distinction in sequentially sampled tooth enamel of co-localized wild and domesticated caprines: Complications to establishing seasonality and mobility in herbivores. *Palaeogeography, Palaeoclimatology, Palaeoecology*. 485, 1–15. <https://doi.org/10.1016/j.palaeo.2017.01.010>
10. Hermes, T., **Pederzani, S.**, Makarewicz, C.A., 2017. Ahead of the curve? Implications for isolating vertical transhumance in seasonal montane environments using sequential oxygen isotope analyses of tooth enamel, in: Ventresca-Miller, A.R., Makarewicz, C.A. (Eds.), *Isotopic Investigations of Pastoralism in Prehistory*. Routledge. <https://doi.org/10.4324/9781315143026>

All recent publications (2019 onwards) are open access or made available online as post-prints within 3 months of acceptance.

Invited Talks

- 2021 “Molekulares Ausgraben - Isotopenwerkzeuge zur Rekonstruktion von Klima und Umwelt im Pleistozän” (in German; Eng.: “Molecular digging – stable isotope tools for reconstructing Pleistocene climate and environment”). Archaeological Colloquium, Institute for Prehistoric and Protohistoric Archaeology, Friedrich-Alexander-University Erlangen, Germany.
- 2020 “Cold climatic conditions during an early occurrence of Upper Palaeolithic *Homo sapiens* in Europe - stable isotope evidence from Bacho Kiro Cave, Bulgaria”. Seminar Series, London Geochemistry and Isotope Centre, University College London, UK.
- 2017 “Reconstructing Pleistocene Palaeoclimate and Palaeoseasonality using Oxygen Isotope Zooarchaeology”. Northern Archaeological Seminar Series, University of Aberdeen, UK.
- 2017 “Reconstructing palaeoclimate and palaeoseasonality using oxygen isotope analyses of faunal remains – possibilities, problems, and method development”. AHRC funded network project “Coping with climate: the legacy of *Homo heidelbergensis*”, University of Brighton, UK.

Selected Conference Presentations

1. **Pederzani, S.**, Britton, K., Aldeias, V., Bourgon, N., Fewlass, H., Lauer, T., McPherron, S. P., Rezek, Z., Sirakov, N., Smith, G. M., Spasov, R., Tran, N.-H., Tsanova, T., Hublin, J.-J., 2021. Cold climatic conditions for *Homo sapiens* in the Initial Upper Palaeolithic – direct evidence from Bacho Kiro Cave, Bulgaria. Oral presentation at the Hugo Obermaier Society 62 Annual meeting (virtual).
2. **Pederzani, S.**, Britton, K., Aldeias, V., Lauer, T., McPherron, S. P., Rezek, Z., Sirakov, N., Smith, G. M., Spasov, R., Tsanova, T., Hublin, J.-J., 2020. Direct evidence for climatic conditions experienced by Initial Upper Palaeolithic *Homo sapiens* at Bacho Kiro Cave, Bulgaria. Oral presentation at the 26th EAA Annual Meeting (virtual).
3. **Pederzani, S.**, Aldeias, V., Goldberg, P., Hublin, J.-J., Madelaine, S., McPherron, S., Sandgathe, D., Steele, T. E., Turq, A., Britton, K., 2019. Contextualising Neanderthal behaviour during MIS 3 and 4 at La Ferrassie, France: Seasonal palaeotemperature reconstructions from oxygen stable isotopes. Pecha Kucha presentation at the 9th Annual ESHE meeting, Liège, Belgium.

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4. **Pederzani, S.**, Aldeias, V., Goldberg, P., Hublin, J.-J., Madelaine, S., McPherron, S., Sandgathe, D., Steele, T. E., Turq, A., Britton, K., **2019**. Reconstructing patterns of palaeoseasonality during the Weichselian: Sub-annual palaeotemperatures from the La Ferrassie rock shelter. Oral presentation at the 20th INQUA Congress, Dublin, Ireland.
5. **Pederzani, S.**, Aldeias, V., Goldberg, P., Hublin, J.-J., Madelaine, S., McPherron, S., Sandgathe, D., Steele, T. E., Turq, A., Britton, K., **2019**. Using isotope zooarchaeology to reconstruct late Pleistocene climate and seasonality: new evidence from La Ferrassie, France. Oral presentation at the 2019 UK Archaeological Science conference (UKAS), Manchester, UK.
6. **Pederzani, S.**, Hublin, J.-J., Britton, K., **2018**. Reconstruction of local palaeoseasonality and palaeoclimate at Middle Palaeolithic sites in Western Europe: Sampling, data handling, and temperature conversion in oxygen isotope seasonality models. Poster presentation at the 8th International Symposium on Biomolecular Archaeology (ISBA), Jena, Germany.
7. **Pederzani, S.**, Wacker, U., Hublin, J.-J., Britton, K., **2017**. Method development in palaeoclimate and palaeoseasonality reconstruction using oxygen isotopic analyses of bioapatite phosphate of faunal remains. Poster presentation for the 2017 UK Archaeological Science conference (UKAS), London, UK.
8. **Pederzani, S.**, Wacker, U., Hublin, J.-J., Britton, K., **2017**. Reconstructing palaeoclimate and palaeoseasonality using oxygen isotope analyses of faunal remains – possibilities, problems, and method development. Oral presentation for „Coping with climate: the legacy of Homo heidelbergensis“ workshop, Brighton, UK.
9. **Pederzani, S.**, Makarewicz, C.A., **2016**. Pasteurization, Processing, Palaeoenvironment – Applicability of modern dairy reference fats in archaeological lipid residue analysis using $\delta^{13}\text{C}$ of single fatty acids. Oral Presentation for 7th International Symposium on Biomolecular Archaeology (ISBA7), Oxford, UK.

Teaching and Supervision Experience

Lectures and Tutorials

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| 2019 | MSc module “Palaeoenvironmental Research”, University of Leipzig
Designing, preparing and delivering original lecture on environmental reconstruction with stable isotopes |
| 2019 | International Max Planck Research School, MPI-EVA, Leipzig
Designing, preparing and delivering original lecture on stable isotopes and mobility lecture, and preparation of exam questions |
| 2015 | BSc module “Introduction to Archaeological Science”, University of Kiel
Design and delivery of zooarchaeology lecture |
| 2014 | BSc module “Introduction to Zooarchaeology”, University of Kiel
Teaching Assistant for Introductory Zooarchaeology modules, including assisting students during practical sessions, providing practice materials, designing and implementing formative assessment exercises |

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Programming and Reproducible Science

- 2021 Reproducible Workflows for Scientific Computing
5-day introductory level Software Carpentry programming course
Instructor for data visualisation and RMarkdown portions (2 days)
Contribution to course design, lecture design for 2 course days
- 2021 Writing Research Articles using R and RMarkdown
Half-day programming course for graduate students and researchers, MPI-EVA, Leipzig
Complete course design, preparation of materials, instruction over Zoom
- 2020 Reproducible Workflows for Scientific Computing
5-day introductory level Software Carpentry programming course
Instructor for data visualisation and RMarkdown portions (2 days)
Lecture design based on existing materials, participation in overall course design

Laboratory Instruction and Supervision

Instruction of visiting students, researchers and technicians in principles of IRMS, TC/EA-IRMS use, quality control and trouble shooting. Instruction of visiting students, researchers and technicians in sample preparation of bioapatites, collagen extraction. Teaching wet chemistry techniques and laboratory safety to visiting students without prior laboratory experience. Introduction to laboratory health and safety regulations and safe working practices.

- 2017 Laboratory instruction and supervision of 3-month placement PhD student Jeanne Marie Geiling (University of Cantabria); Instruction in laboratory protocols, TC/EA-IRMS measurements, stable isotope data processing and quality control. Assisting with interpretation of stable isotope results and giving feedback on dissertation chapters

Academic and Institute Service

- 2018 PhD representative of the Department of Human Evolution, Max-Planck-Institute for Evolutionary Anthropology, Leipzig

Peer Reviewer

Journal Articles: Rapid Communications in Mass Spectrometry, Journal of Archaeological Science, Journal of Archaeological Science: Reports, Scientific Reports, Quaternary International, PlosOne, Archaeological and Anthropological Sciences, International Journal of Osteoarchaeology, Environmental Archaeology, Journal of Asian Earth Sciences, Ecology and Evolution

Grants: The Leakey Foundation

Symposia Organised

- 2018 Co-organiser 'Gender Equality Symposium', Max-Planck-Institute for Evolutionary Anthropology, Leipzig. 2-day programme of invited lectures and workshops
Designing symposium programme, acquiring internal funding, inviting speakers, practical organisation

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Excavations and Prospection Fieldwork

- 08/2021 Pech de L'Aze IV, micorexcavation of sediment blocks, Middle Palaeolithic (2 weeks)
Site direction: Vera Aldeias (ICArEHB), Paul Goldberg (University of Tübingen), Shannon McPherron (MPI EVA), Deborah Olzewski (University of Pennsylvania), Dennis Sandgathe (SFU) and the late Harold Dibble
- 10/2019 'Ain Difla, Jordan, Initial Upper Palaeolithic rock shelter (10 days)
Site direction: Zejlko Rezek (MPI-EVA)
- 03/2019 Lichtenberg, Germany, Middle Palaeolithic open air site (1 week)
Site direction: Marcel Weiß (FAU Erlangen), Michael Hein (MPI-EVA)
- 07/2017 Ranis Ilsehöhle, Germany, Middle to Upper Palaeolithic cave site (2 weeks)
Site direction: Marcel Weiß (FAU Erlangen), Shannon McPherron (MP-EVA)
- 03/2016 Sharara, Jordan, Prepottery Neolithic A settlement site (3 weeks)
Site direction: Cheryl Makarewicz (CAU Kiel), Bill Finlayson (Oxford Brookes University)
- 04/2014 Beidha, Jordan, Prepottery Neolithic B settlement site (2 weeks)
Site direction: Cheryl Makarewicz (CAU Kiel), Bill Finlayson (Oxford Brookes University)
- 02/2014 El-Hemmeh, Jordan, Prepottery Neolithic A settlement site (5 weeks)
Site direction: Cheryl Makarewicz (CAU Kiel)
- 09/2013 Borchon-Gellinghausen, Germany, Iron Age fortification (2.5 weeks)
Site direction: Alexandra Stiehl (Johannes-Gutenberg-University Mainz)
- 07/2013 Geomagnetikprospektion Steinförde, Germany (1 week)
Site direction: Christoph Rinne (CAU Kiel)
- 08/2012 Wangels LA 69, Germany, Early Neolithic long barrow (4 weeks)
Site direction: Jan-Piet Brozio (CAU Kiel)
- 02/2012 Feldbegehung Lüdelsen, Salzwedel und Haldensleben, Germany (2 weeks)
Site direction: Carsten Mischka (FAU Erlangen), Johannes Müller (CAU Kiel)
- 09/2011 Ankum, Lkr. Osnabrück, Early Medieval fortress church (2 weeks)
Site direction: Daniel Lau (Stadt und Kreisarchäologie Osnabrück)
- 07/2008 La Salle, Frankreich, Gallo-roman quarry „Les Fossottes“ (2 weeks)
Site direction: Virginie Farget (Université de Paris 1)

Professional Society Membership

European Society for the Study of Human Evolution (ESHE)

European Association of Archaeologists (EAA)

German Chemical Society (Gesellschaft Deutscher Chemiker, GdCh)