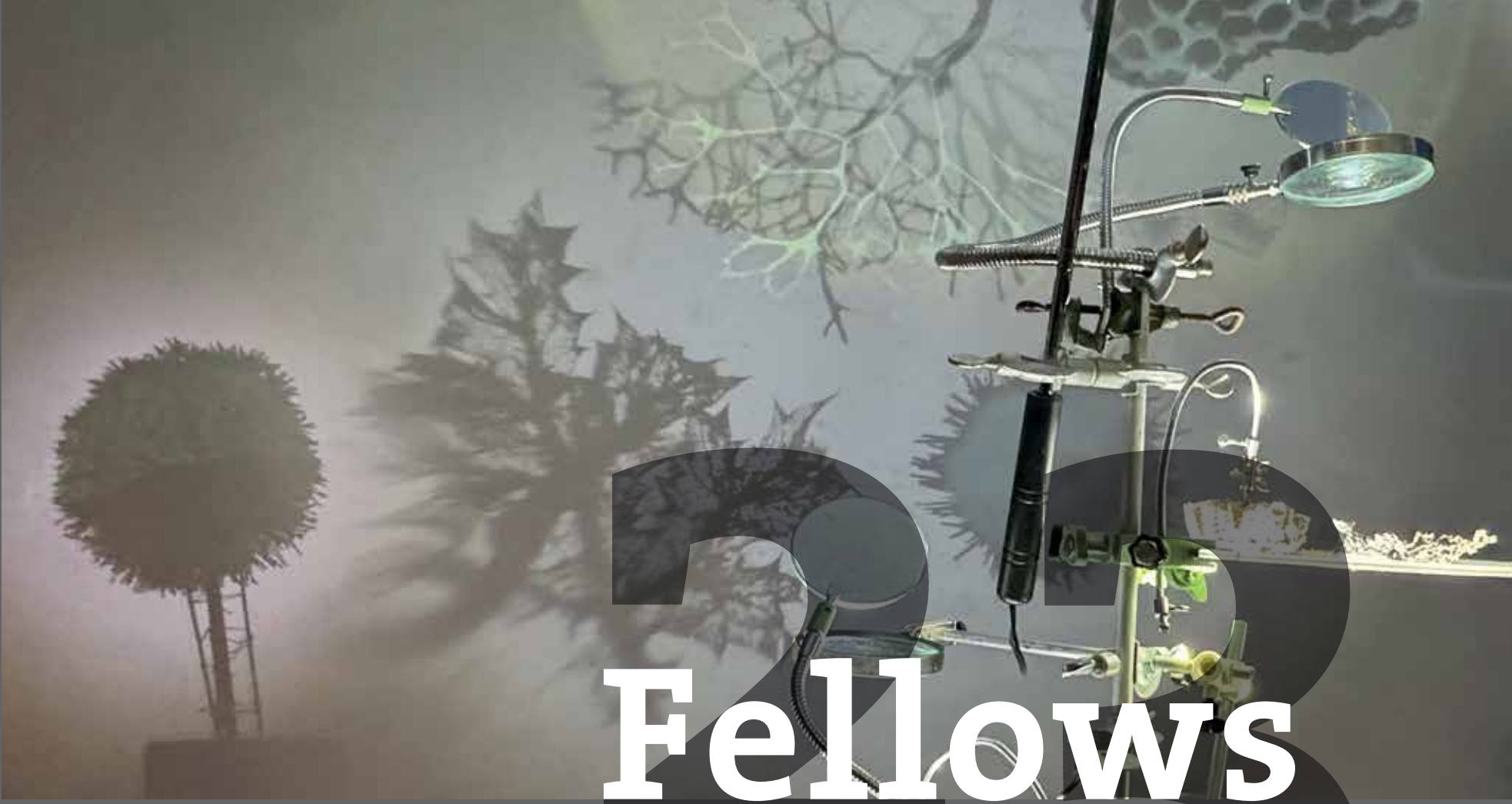

23 Fellows

Hanse-Wissenschaftskolleg
Institute for Advanced Study

Fellows 23

Hanse-Wissenschaftskolleg
Institute for Advanced Study

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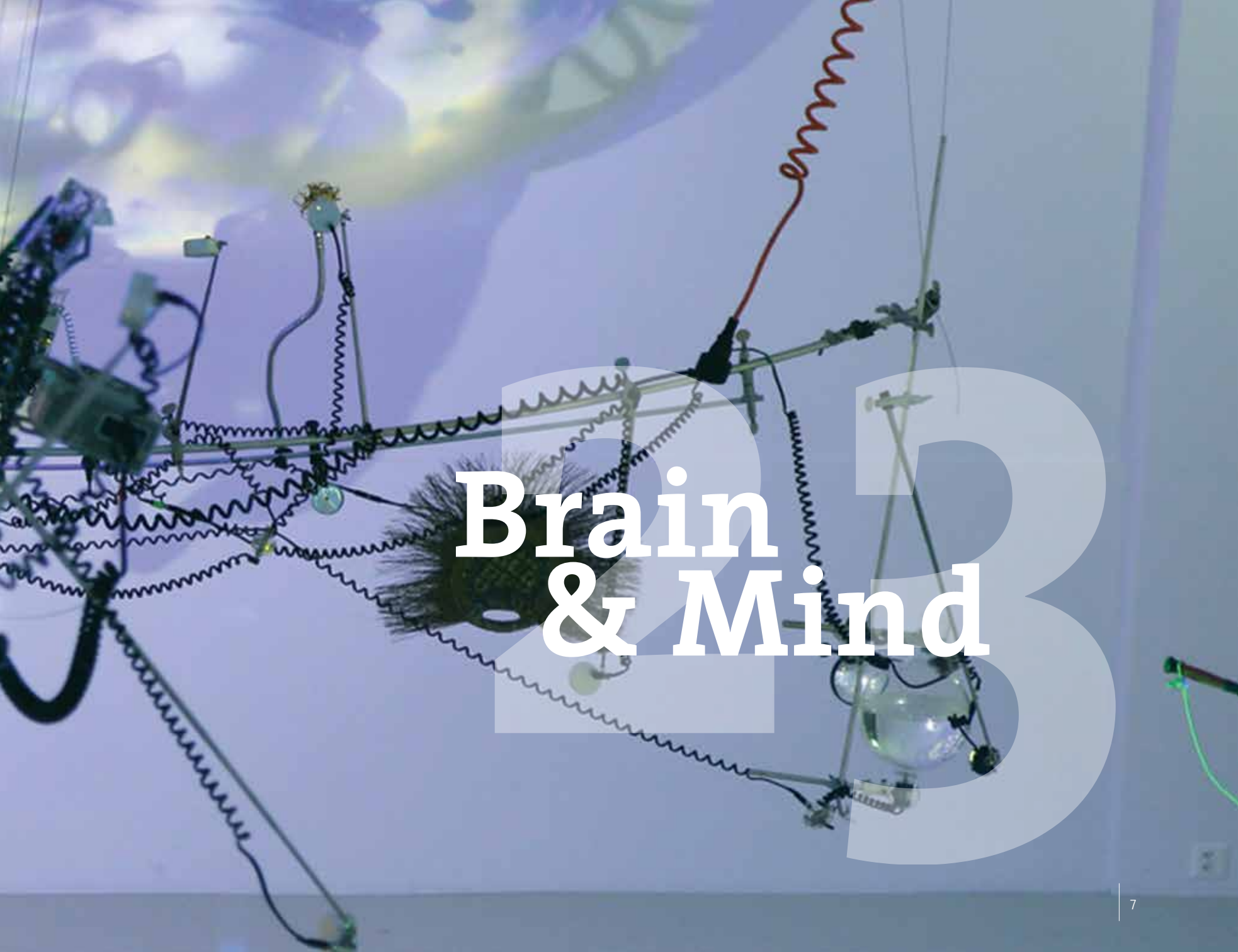

Brain & Mind

Dr. Lukas Bugiel

Junior Fellow

Fellowship
Juli–August 2023

Home institution at time of application
Universität zu Köln
Institut für Musikpädagogik
Köln
Germany

Cooperation Partner
Prof. Dr. Lars Oberhaus
Universität Oldenburg

Media of Music Education—A Philosophical Approach in Music Education Research

Although the terms "musical teaching" and "musical learning" are commonly used, concrete definitions are difficult to find, especially if one wants to know what is special about these kinds of activities. When we speak of "teaching" or "learning" music, we mean specific types of actions that can be successful under certain conditions. This is the starting point of my research project, in which I try to explain these basic concepts of scientific music education. I do this by describing forms of action, which I call "media." I argue that showing should be understood as a medium of music teaching and practicing as a medium of musical learning: our common understanding of what it means to teach music, in the case of early-childhood education, usually includes singing something that the child will be able to imitate. If the child then imitates what it hears and reflects back properties that we deem relevant, then we could say the child has learned to listen.

This research will result in (1) a subchapter of my habilitation on education media more generally and (2) a lecture in which I will reflect on this approach as a form of Analytic Philosophy. I will give this lecture at the conference Philosophy of Music Education, which I will plan together with Prof. Dr. Lars Oberhaus at the HWK.

Prof. Dr. Laurel Carney

Fellow

Fellowship
September 2023–February 2024

Home institution at time of application
University of Rochester
School of Medicine and Dentistry
Department of Biomedical Engineering
Rochester, NY
USA

Cooperation Partner
Prof. Dr. Christine Köppl
Universität Oldenburg

The Auditory Efferent System's Role in Shaping Neural Fluctuations

Auditory neurons must encode the information in all sounds of importance to listeners, including speech and music. The responses of the first neurons in the auditory pathway are strongly influenced by complex properties of the inner ear; these responses are distorted by common forms of hearing loss. Neural responses are then transformed as they ascend through the auditory pathway towards the cortex. The transformation of information along the ascending pathway has been the topic of most auditory research. However, there is a descending pathway, referred to as the efferent system, that is as large as the ascending pathway.

This system ultimately controls the sensitivity of the inner ear. This project is motivated by the fact that the auditory efferent system, in listeners with and without hearing loss, and especially in the context of aging, is still relatively poorly understood. We will use a computational model for the lower (sub-cortical) auditory system that includes both ascending and descending pathways. We will use the model to test hypotheses related to the encoding of sounds and the control of inner-ear sensitivity to maintain neural codes across a wide range of sound levels and in background noise.

Dr. Abhishek Cukkemane

Fellow

Fellowship
November 2023–April 2024

Home institution at time of application
Forschungszentrum Jülich GmbH
Structural Biochemistry
Jülich
Germany

Cooperation Partner
Univ.-Prof. Dr. Dr. René Hurlemann
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Universitätsklinik für Psychiatrie
und Psychotherapie
Bad Zwischenahn

Universität Oldenburg
Department für Humanmedizin
Oldenburg

Solving the Biochemical Jigsaw Puzzle of Schizophrenia by Combining Traditional Clinical Diagnostic Practices along with Modern-Day Metabolic Profiling Approaches

Schizophrenia is a debilitating psychotic disorder (PDs) and has been known to share genetic vulnerability to bipolar disorders, major depressive disorders, and autism. These represent neurodevelopmental disorders that do not manifest for decades, usually during the onset of adolescence, and involve significant comorbidity. With an incidence of 1%, schizophrenia represents a major social and economic burden. Taken together with related PDs, the lifetime rate increases to 2.3 to 3.5%.

According to a recent population-based meta-analysis conducted by NIMH-NIH, USA, schizophrenia represents among the 15 leading causes of disability globally. Therefore, it is imperative to understand the biochemical basis for the disorder and explore new diagnostic approaches to aid psychiatrists in the evaluation and save time and effort for all stake holders.

In a collaborative effort with the department of psychiatry at Universität Oldenburg, we are employing magnetic resonance (NMR) spectroscopy to identify relevant biochemical molecules that are vital for day-to-day functioning and their pathways from fluid samples from patients to understand schizophrenia pathology. The prerogative of this proposal is to facilitate a marriage between traditional psychopathological diagnosis with modern OMICS technology namely, metabolomics. In parallel, using digital technologies of big-data analytics and machine-learning approaches, we are investigating the possibility of a biochemical diagnostic approach to the disorder, which is highly desirable.

Dr. Daniel Kristanto

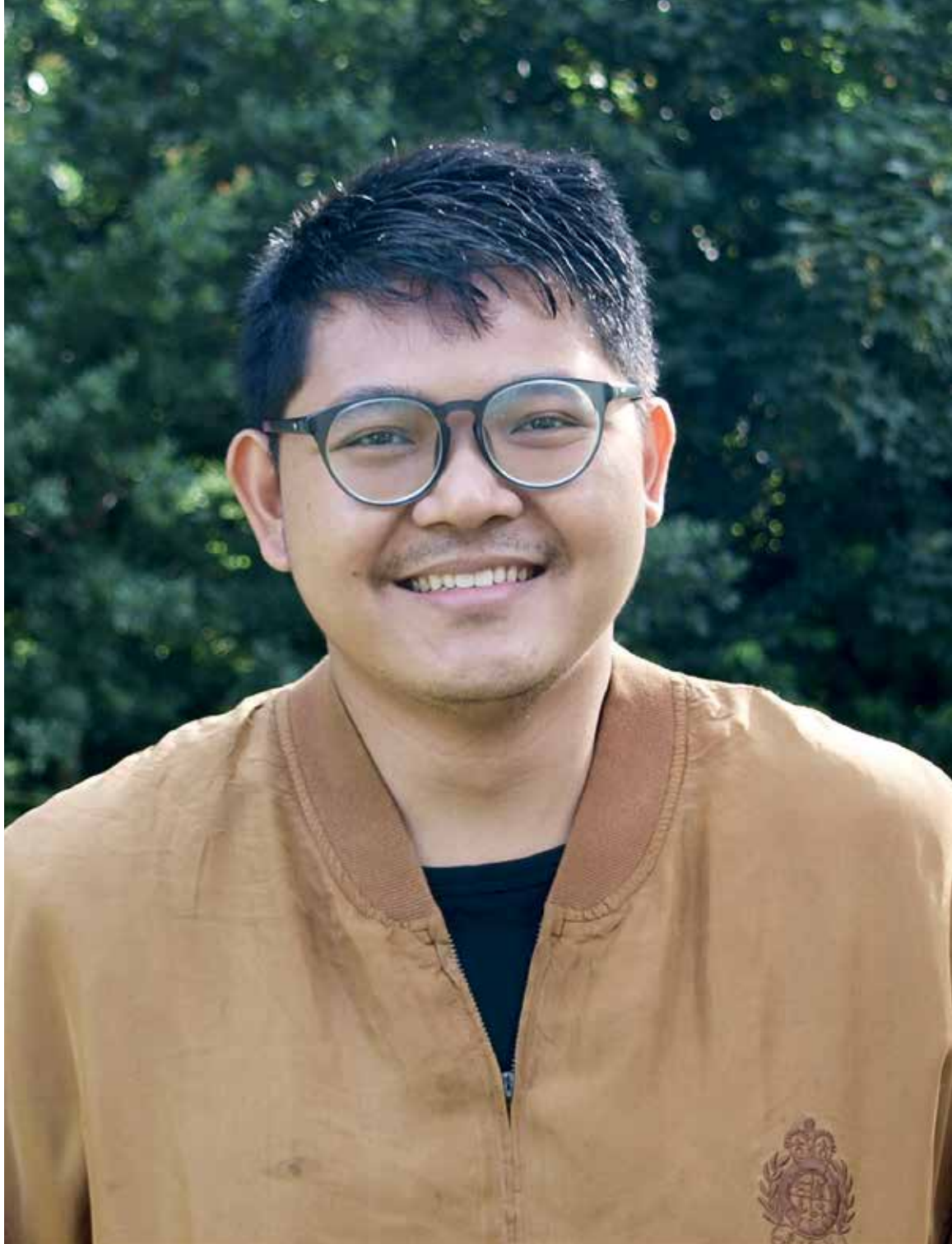
Joint Research Fellowship
Funded by Medical Faculty Oldenburg

Fellowship
July 2022–January 2023

Home institution at time of application
Hong Kong Baptist University
Institute of Computational and Theoretical Studies
Hong Kong
People's Republic of China

Cooperation Partners
Prof. Dr. Andrea Hildebrandt
Universität Oldenburg

Prof. Dr. Dr. René Hurlemann
Karl-Jaspers-Klinik
Universitätsklinik für Psychiatrie
und Psychotherapie
Bad Zwischenahn



Mining the Adolescent Brain to Create Predictive Profiles of Substance Use Vulnerability

Substance use is known for its negative effects on individuals' cognitive development and mental health and it may even lead to premature death. Thus, the development of effective, early, and accurate preventive interventions is of high relevance to society. This project aims to contribute to addiction disorder prevention by identifying vulnerability on the basis of neural properties before behavioral manifestations become evident. We thus aim to develop a predictive model that builds upon state-of-the-art data analysis techniques of multimodal neuroimaging data.

The anticipated results have the potential to significantly contribute to the development of purposeful, individualized healthcare interventions for addiction disorders. Furthermore, the findings could inspire future basic research on the development of brain properties during adolescence that lead to substance use, as well as the cognitive processes associated with the identified neural vulnerability profiles toward addiction disorders.

Prof. em. Dr. Clayton Lewis

Fellow

Fellowship
October–December 2023

Home institution at time of application
University of Colorado, Boulder
Department of Computer Science
430 UCB
Boulder, CO
USA

The Prediction Room: Learning from the Artificial Psychology of Large Language Models

What does the success of predictive large language models (PLLMs) like GPT3 or chatGPT mean? While many hope for widespread practical applications and others are skeptical, this book project argues that the larger significance of these models is what they suggest about human cognition. The book will review many issues and topics in cognitive science and identify ways in which these predictive models offer new ideas, or reinforce older ideas, about the mental mechanisms involved. The presentation starts with a description of the Prediction Room, in which a Prediction Agent is enclosed. The basic operations of PLLMs, and the Prediction Agent, are to create and use a predictive model of the flux of events they observe. For current PLLMs this flux of events is limited to a stream of text, but the Prediction Agent is presumed to be able to carry out physical actions, and to perceive the effects of such actions, and other physical events in the outside world, things that current PLLMs cannot do. The presentation then considers a wide-ranging collection of topics in cognitive science. For each topic, phenomena for which the Prediction Room model might provide an account, and ones for which it is unable to account, are discussed. The book closes with a general discussion that takes stock of the ideas, and challenges, that have emerged.

Dr. Iris Mencke

Junior Fellow
Cofunded by Cluster of Excellence H4All

Fellowship
January–June 2023

Home institution at time of application
Max-Planck Institute for Empirical Aesthetics
Department of Music
Frankfurt/Main
Germany

Cooperation Partners
Dr. Kai Siedenburg
Dr. Sebastian Puschmann
Universität Oldenburg

Tracking Uncertainty: Neural and Behavioral Correlates of Auditory Uncertainty

In daily life humans are often exposed to uncertain environments, which can be challenging because outcomes of decisions are difficult to predict with sufficient certainty. However, humans are intrinsically curious and possess an inherent drive to explore uncertain environments. Thus far, we lack a full picture of the dynamics and mechanisms with which human individuals process sensory uncertainty and how they successfully reduce uncertainty. The proposed project investigates how the human brain and behavior respond to auditory uncertainty by utilizing the inherent complexity of music, particularly that of twentieth century Western atonal music, which intrinsically possesses a high degree of uncertainty.

A variety of different analysis techniques will be employed to investigate how auditory uncertainty is represented in the brain. Additionally, by drawing on a unique sample of musicians specialized in atonal music, we will look at the effects of long-term training in this style of music. This project promises to discover novel information about how humans deal with and successfully mitigate uncertainty. It also focuses on a musical style that has largely been neglected in empirical research. Benefitting from a unique interdisciplinary convergence of neuroscience and musicology, the findings will have broad implications for the field of cognitive neuroscience and further elucidate the role that atonal music plays in Western society.

Dr. Justin Moskolai Ngossaha

Junior Fellow

Fellowship
January–May 2023

Home institution at time of application
Université de Douala
Faculté de Sciences, Départment des
Mathématiques et de l'Informatique
Douala
Cameroon

Cooperation Partner
Prof. Dr. Anna Förster
Universität Bremen

Contribution of Urban Computing for Improving Quality of Services of Urban Mobility Systems in the Context of Developing Countries

Current trends in urban mobility go beyond infrastructure investments and incorporate new technologies and services reflecting new user requirements and regulations, as well as increasingly rigorous and sustainable governance. In this context, urban data management and analysis is an important lever for the progressive improvement of people's lives, the environment and mobility systems. However, developing countries are marked by rapid and uncontrolled urbanization of cities, which results in traffic jams, high accident rates, air pollution, etc. In this situation, how could urban managers use urban data to improve urban mobility?

The issue addressed in this project is a current and innovative subject with a very strong societal impact. It aims to contribute to the improvement of the design and implementation of sustainable urban mobility systems through decision support tools. This is a multidisciplinary field, very broad and with interesting perspectives.
In this project, we are particularly interested in eliciting knowledge and assessing the sustainability of an urban mobility system through simulation to guide urban managers in decision making toward the implementation of smart cities.

23 Earth

Prof. Dr. Raeid M. M. Abed

Fellow

Fellowship
June–August 2023

Home institution at time of application
Sultan Qaboos University
Biology Department
College of Science
Muscat
Sultanate of Oman

Cooperation Partners
Dr. Dirk de Beer
Prof. Dr. Rudolf Amann
Max-Planck-Institut für Marine Mikrobiologie
Bremen

Metabolic Activity of Microorganisms in Microbial Mats Thriving at Saturation-Level Salinity and Their Potential Use in Biofuel Production

Man can tolerate only a limited range of environmental conditions, whereas microbes thrive under the most intense circumstances. We now know that where there is liquid water, there is life. So what we previously considered an inhospitable environment is now seen as yet another habitat for extremophilic microbes.

In this project, I will study microbial mats from Oman subject to multiple extreme environmental conditions. These mats are found under a layer of 3-5 centimeters of salt and exposed to temperatures that can reach up to 60° Celsius, and very high UV and light intensities. I will investigate the types and activity of microbes in these mats—particularly the archaeal community.

I will also explore the potential use of halophilic and halotolerant archaea and microalgae in these mats in the production of biogas and biodiesel, respectively. Furthermore, I will use a suite of molecular and geochemical techniques to study the adaptation and tolerance of these microbes to salt saturation and during tidal events.

The project will reveal which microbial processes are susceptible to very high salt stress and which ones remain viable to maintain the functioning and survival of the whole ecosystem. Such data are important for greater understanding of Earth's past and future, and for astrobiologists in their search for life on other planets.

Prof. Dr. Peter D. Clift

Fellow

Fellowship
May–August 2023

Home institution at time of application
Louisiana State University
Department of Geology and Geophysics
Baton Rouge, LA
USA

Cooperation Partners
Prof. Dr. Katharina Pahnke-May
Universität Oldenburg

PD Dr. Mahyar Mohtadi
MARUM – Zentrum für Marine Umweltwissenschaften
Universität Bremen

Temporal Evolution of the Asian-Australian Monsoon and its Impact on Global Climate

Collisions between continental plates cause mountains to be uplifted which then affect regional climate by diverting and reshaping atmospheric currents. The collision between India and Asia starting 55 million years ago has formed the largest mountains on Earth and strongly affected climate. Sediment eroded from these peaks by monsoon rains breaks down in the hot, wet conditions and removes CO_2, a greenhouse gas from the atmosphere, thereby cooling the Earth over millions of years.

Recent work suggests that parts of SW Asia and southern China may not be responsible for cooling since 16 million years ago after all, but in this case why is the Earth cooling? Other regions have been less closely examined, like the Bay of Bengal, Sea of Japan and NW Australia, although they have been sampled by scientific drilling.

In this fellowship I will compile existing data from across the Asia-Pacific region to see how they compare and test if other regions, especially New Guinea where mountains have formed more recently, are critical in driving climate change. Where needed, new geochemical data will be collected.

The work will be used to plan future collaborative expeditions by US, German, and Asian scientists. Understanding how the climate in this densely settled and economically significant region is affected by long-term changes improves our overall ability to predict future climate change driven by other factors such as solar heating or greenhouse gas concentrations.

Dr. ir. Veerle Ann Ida Huvenne

Fellow

Fellowship
November 2022–March 2023

Home institution at time of application
National Oceanography Centre
Marine Geoscience
Southampton
United Kingdom

Cooperation Partners
Prof. Dr. Gerhard Bohrmann
Prof. Dr. Dierk Hebbeln
MARUM – Zentrum für Marine
Umweltwissenschaften
Universität Bremen

Multi-Scale Habitat Mapping of Deep-Sea Environments Based on Marine Robotic Survey Data

The deep ocean is the last frontier on the planet, but is increasingly impacted by human activities. To support its effective management, there is an urgent need for a better understanding of its spatial patterns in biodiversity. While it is impossible to sample every part of the ocean, habitat mapping (a series of techniques to map the spatial distribution of environmental conditions) can provide crucial information and allows to predict species occurrences based on environmental information.

The aim of my project is to map the habitats, quantify the spatial environmental variability, and investigate its influence on the distribution of specific species in two complex deep-sea environments: a region of cold-water coral mounds, and a hydrothermal vent field.

Because of their distinct 3D morphology, complex deep-sea environments host a high biodiversity, making them priority areas for conservation. However, they are particularly challenging to study. Thanks to the latest marine robots, they can now be investigated in detail.

During my project, habitat mapping will be adapted to the particular scales of the two study areas, incorporating fine-scale information collected with marine robots. Predictive maps of cold-water coral species will result in a better understanding of their environmental requirements, while habitat maps of the hydrothermal vent field will show the relation between species, the rapidly changing terrain characteristics, and geochemical gradients.

Assoc. Prof. Dr. Benoît Lebreton

Fellow

Fellowship
September 2023–July 2024

Home institution at time of application
CNRS – Université La Rochelle
Institut du Littoral et de l'Environnement
La Rochelle
France

Cooperation Partners
Dr. Martin Graeve
Prof. Dr. Boris Koch
Dr. Inka Bartsch
Alfred-Wegener-Institut, Helmholtz-Zentrum
für Polar- und Meeresforschung (AWI)
Bremerhaven

Flows and Trapping of Organic Matter in Polar Coastal Ecosystems: Functioning and Role of Subtidal Mudflats

Polar fjords are places in the Arctic where growth of marine micro- and macroalgae can be extremely high. This production likely changes significantly between summer and winter (i.e., no growth due to polar night) and may be strongly altered due to global warming. Complex food webs rely on this production of micro- and macroalgae, with food web characteristics likely changing depending on habitats (i.e. water, bedrock, mud).

In fjords, shallow mudflats are habitats where food sources can be stored in the sediment and can therefore be available all year long to their consumers. Besides this potential role, shallow mudflats' role and links to adjacent habitats have been poorly studied. Assessing the links between habitats may help us define the degree of cascading effects if one habitat changes dramatically.

The aim of this project is to determine to which extent shallow mudflats can act as reservoirs of food for animals and what is the fate of these food resources in winter, when growth is very low. We will also determine what food sources are available to the fauna in shallow mudflats, what is trapped long-term into the sediment, and what is used by the fauna.

Our final aim is greater understanding of food flows in such polar ecosystems, which will provide knowledge and tools to better anticipate changes related to global warming and to better manage polar coastal ecosystems in the following decades.

Daniel Leeb

Twin Fellow

Fellowship
March 2023

Home institution at time of application
Iceland Space Agency
Reykjavik
Iceland

Cooperation Partner
Research Asst. Prof. Dr. Roy Price (Fellow EARTH)
Hanse-Wissenschaftskolleg

Inspiring the Next Generation of Planetary Scientists Through a Publication in *Frontiers for Young Minds*

To inspire the next generation of planetary scientists, it is vital to capture, engage, and inspire young minds between the ages of five and twelve, planting seeds that can grow into a professional pursuit in the fields of science and exploration. Children today have very little exposure to actual scientific research. This is due to their limited exposure to published research, the inaccessible language in which the research is written, and a lack of physical access to both the science and the scientists who could otherwise stimulate interest and a potential career path.

The journal *Frontiers for Young Minds* provides a platform for cutting-edge science discoveries for younger audiences. Distinguished scientists are invited to write about their cutting-edge discoveries in a language that is accessible for young readers, and the kids themselves provide feedback and explain to the authors how to best improve the articles for younger audiences.

Daniel Leeb, Mission director of the Iceland Space Agency (ISA), will help create content for submission of an article to *Frontiers for Young Minds*. While at HWK, he will work with Dr. Roy Price to reframe a recent publication from the Price laboratory, converting the research article into language that can be understood by a younger audience.

Dr. Christian Mohn

Fellow

Fellowship
September–December 2023

Home institution at time of application
Aarhus University
Applied Marine Ecology and Modelling
Department of Ecoscience
Roskilde
Denmark

Cooperation Partner
Prof. Dr. Dierk Hebbeln
MARUM – Zentrum für Marine Umweltwissenschaften
Universität Bremen

Modelling Motion and Commotion at Carbonate Mound Provinces in the Southeast Atlantic off Angola and Namibia

Deep-sea benthic ecosystems, remote from the productive surface layer of the ocean, can be severely deprived of food. However, this organic matter-poor environment contrasts with the often high species-richness of the deep sea.

Cold-water corals form highly specialized and enigmatic communities at the bottom of the ocean. Ocean currents and their spatial and temporal variability are important drivers for the feeding of corals. Recent studies have shown that cold-water coral reefs are abundant and thrive at local hydrodynamic hotspots, where currents interact with the steep and complex seafloor and generate vigorous mixing.

This project will, using observational data and modelling techniques, investigate hydrodynamic framework conditions for cold-water coral growth and reef formation in a dynamic oceanographic setting along the Angolan slope and Namibian shelf in the Southeast Atlantic.

Cold-water coral reefs have high conservation value due to important ecosystem services they provide. Consequently, they are on the OSPAR list of threatened species and habitats. In close collaboration with expert teams from MARUM (Universität Bremen, Germany) and GEOMAR (Kiel, Germany), we aim for significant progress in developing a process-understanding of the functioning and development of these fascinating deep-sea ecosystems.

Prof. Dr. Shuhei Ono

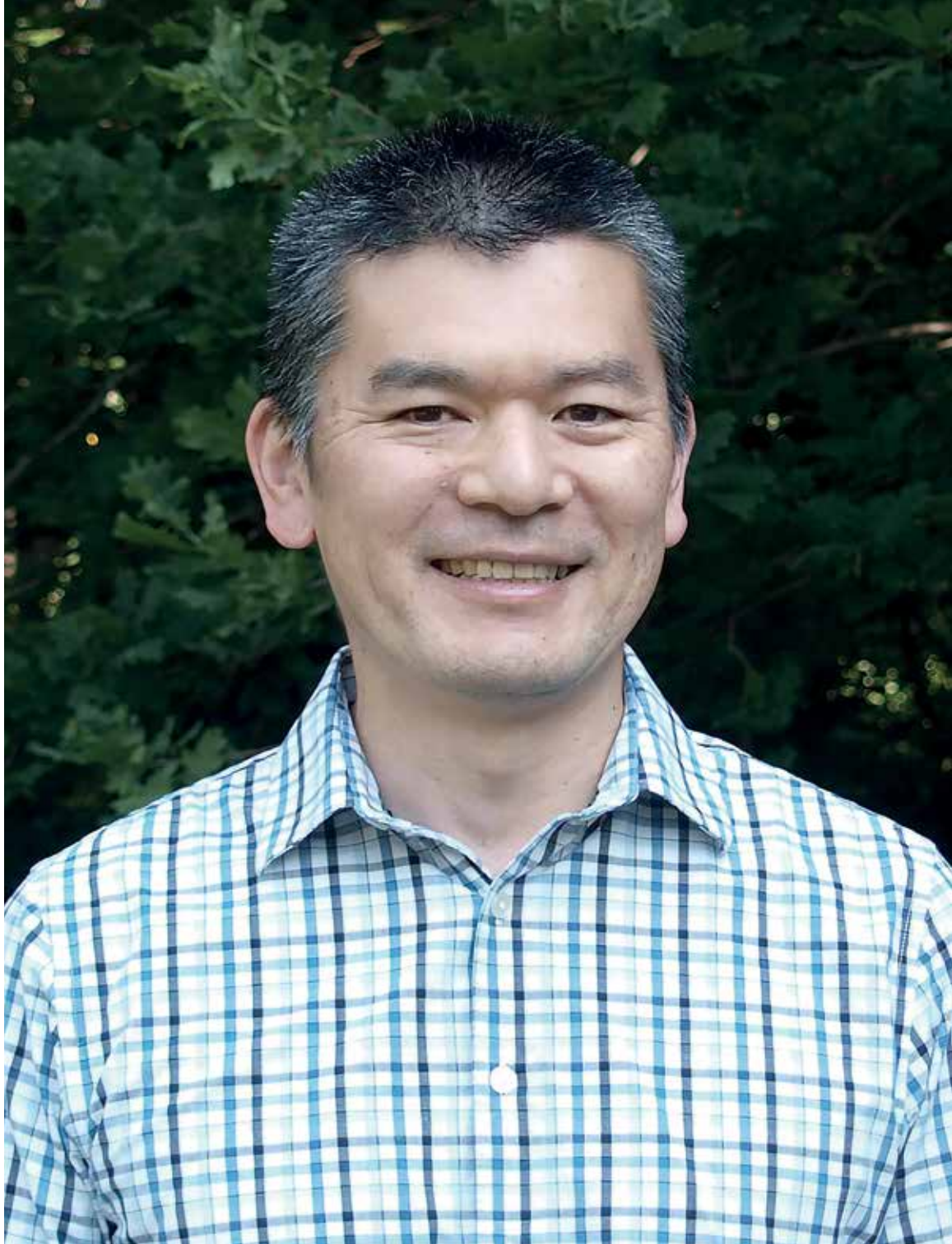
Fellow

Fellowship
June–August 2023

Home institution at time of application
MIT – Massachusetts Institute of Technology
Department of Earth, Atmospheric,
and Planetary Sciences
Cambridge, MA
USA

Cooperation Partners
Prof. Dr. Kai-Uwe Hinrichs
MARUM – Zentrum für Marine
Umweltwissenschaften
Universität Bremen

Dr. Gunter Wegener
Max-Planck-Institut für Marine Mikrobiologie
Bremen



Isotopologue Fractionation by Cultures Performing Anaerobic Oxidation of Methane under High Pressure

Methane is both an important energy source and a strong greenhouse gas. Understanding the sources of methane and its emission rates to the environment is essential in securing a transitional energy resource and designing a mitigation strategy for climate change.

Methane comes in different isotope configurations called isotopologues. Our laboratory has developed a novel spectroscopy technique to measure doubly isotope-substituted isotopologues ($^{13}CH_3D$ and $^{12}CH_2D_2$) to gain new insights into the biogeochemical cycles of methane in the environment. Studies so far have shown that isotopologue ratios of methane from deep marine sediments can tell the temperature of methane generation or consumption and indicates *in situ* microbe cycling of methane. However, laboratory cultures of methanogenic and methanotrophic microbes have not reproduced signals observed in natural environments.

During my sabbatical at the HWK, I propose to collaborate with Drs. Kai-Uwe Hinrichs and Gunter Wegener at MARUM – Center for Marine Environmental Sciences and Max Planck Institute for Marine Microbiology in Bremen to investigate the methane isotopologue exchange catalyzed by laboratory cultures performing anaerobic oxidation of methane.

High-pressure (50 to 100 bars) culturing will better reproduce the natural geochemical conditions of marine sediments and is expected to promote a high rate of methane activation. The knowledge gained by this project will be used to estimate the geographical distributions of microbes in deep marine sediments.

Prof. Dr. Silvio Pantoja Gutiérrez

Fellow

Fellowship
December 2022–January 2023

Home institution at time of application
Universidad de Concepción
Department of Oceanography and FONDAP
Concepción
Chile

Cooperation Partner
Prof. Dr. Kai-Uwe Hinrichs
MARUM – Zentrum für Marine Umweltwissenschaften
Universität Bremen

Zooming into Laminated Sediments of the Southeastern Pacific Ocean Margin: Sub-Annual Variability and Millennial Trends in Redox Conditions, Sea-Surface Temperature, and Primary Poduction in the Upwelling Ecosystem off Northern Chile

Expansion of oxygen-poor marine waters due to global warming and eutrophication will enhance anaerobic metabolism that will replace large organisms such as fish and mollusks, for which continuous long-lasting ocean monitoring of those processes are needed to examine trends through time that would allow us to anticipate effects to ocean and human well-being. We propose to analyze molecular indicators (biomarkers) of relative oxygenation of the water column, sea surface temperature and primary production, to be recorded in well-preserved laminated sediments with an innovative application of Mass Spectrometry Imaging developed in Prof. Hinrichs's group in Bremen that would allow us to take measurements every six months or once a year from a thousand years ago. We will analyze sediments underneath the Oxygen Minimum Zone off northern Chile (Bay of Pisagua at 19°S).

If we are successful, this research would provide an unprecedent record of intra-annual variability of relevant ocean conditions for the last thousand years until today that could connect with modern instrumental monitoring of the ocean that started only a century ago at most.

Assoc. Prof. Dr. Ryan Pereira

Fellow

Fellowship
November 2022–January 2023,
June–August 2023

Home institution at time of application
Heriot-Watt University
The Lyell Centre
Edinburgh
United Kingdom

Cooperation Partners
Prof. Dr. Thorsten Dittmar
Prof. Dr. Oliver Wurl
Institut für Chemie und Biologie des Meeres (ICBM),
Universität Oldenburg

Prof. Dr. Gesine Mollenhauer
Prof. Dr. Boris Koch
Alfred-Wegener-Institut, Helmholtz-Zentrum
für Polar- und Meeresforschung (AWI)
Bremerhaven

Advancing our Understanding of the Role of Organic Matter in Surface Films of Oceanic Air-Water Gas Exchange

Oceans are a global reservoir of greenhouse gases, estimated to account for 20–40 % of the post-industrial sink for anthropogenic carbon dioxide (CO_2). However, quantifying the exchange of gases such as CO_2, methane (CH_4), and nitrous oxide (N_2O) between the ocean and atmosphere is a major challenge. Understanding how the ocean's organic skin layer modulates this exchange is critical to estimating the intrinsic oceanic sinks and sources of these key greenhouse gases both now and in the future. Organic substances in the skin layer, known as surfactants, span across traditional operational definitions and are derived from multiple sources undergoing biotic and abiotic transformations along the land-ocean continuum.

This proposal will investigate a land-ocean transect from South America toward the African Continent to investigate organic matter control of air-water gas exchange. Central to this work is the application of new advanced geochemical characterization techniques to constrain the sources and reactivity potential of surfactants. This new and unique data will be incorporated into climate simulation models to examine the surfactant suppression of gas exchange, both now and in the future.

Research Asst. Prof. Dr. Roy E. Price

Fellow

Fellowship
August 2022–May 2023

Home institution at time of application
Stony Brook University
School of Marine and Atmospheric Sciences
Stony Brook, NY
USA

Cooperation Partners
Prof. Dr. Wolfgang Bach
Prof. Dr. Thomas Pichler
Fachbereich Geowissenschaften
Universität Bremen

Fluid-Mineral-Microbe Interactions in Saponite-Rich Hydrothermal Systems

A growing body of evidence supports the existence of hydrogen-based microbial communities using hydrogen (H_2) generated from water-rock reactions in the subsurface. However, little is known about how H_2 is generated from water-rock reactions in basalts with groundwater aquifers.

With this HWK fellowship, I am attempting to dramatically improve our understanding of the mineralogical changes during water-rock reactions in the low- temperature settings of northwestern Iceland. My approach will be to use fresh tholeiite basalts from the now erupting Fagradalsfjall volcano, providing an accurate picture of the evolution of rocks and fluids over time. Perhaps the most significant contribution will come from using the unique hydrothermal flow- through apparatus coupled to µ-CT imaging.

For the first time, this approach will allow us to evaluate, in real-time, mineral evolution/dissolution of basaltic rocks, as well as porosity and permeability changes over time. My ongoing work on these systems includes artificial saponite chimney growth, which to date is a unique approach. These artificial chimneys will be evaluated in detail to determine their usefulness as astrobiology analogs.

Finally, data from these experiments will be used in thermodynamic models designed to predict the liberation of H_2 from basalts and the precipitation of saponite upon mixing of vent fluids with seawater. Broadly, this work will significantly improve our understanding of the fluid- mineral-microbe interface.

Dr. Philippa Rickard

Twin Fellow

Fellowship
June 2023
August 2023

Home institution at time of application
Heriot-Watt University
The Lyell Centre
Edinburgh
United Kingdom

Cooperation Partner
Assoc. Prof. Dr. Ryan Pereira (Fellow EARTH)
Hanse-Wissenschaftskolleg

Expanding our Understanding of the Surface Ocean Microlayer

At the ocean surface, there is an organic skin that is less than one millimeter thick. This skin, or the surface microlayer (SML), sits at the interface between air and water, and is physically, chemically, and biologically distinct from the underlying water column. The SML is made up of a complex mixture of organic matter that is central to the cycling of greenhouse gases at the ocean basin scale, where estimates of carbon dioxide (CO_2) uptake may be overestimated by up to 9%. Understanding how and why the composition of the SML changes seasonally and regionally is critical to accurately estimate sources and sinks of oceanic climate active gases.

This work applies a novel combination of analytical techniques to deconstruct organic matter composition in the SML and underlying water column, across a 50° South to 50° North transect on the Atlantic Ocean (Falkland Islands to United Kingdom), to explore spatial relationships with air-sea gas transfer estimates. This approach offers first insight into understanding how variability in SML organic matter composition can affect air-sea gas exchange, and how this may impact the current and future climate of our planet.

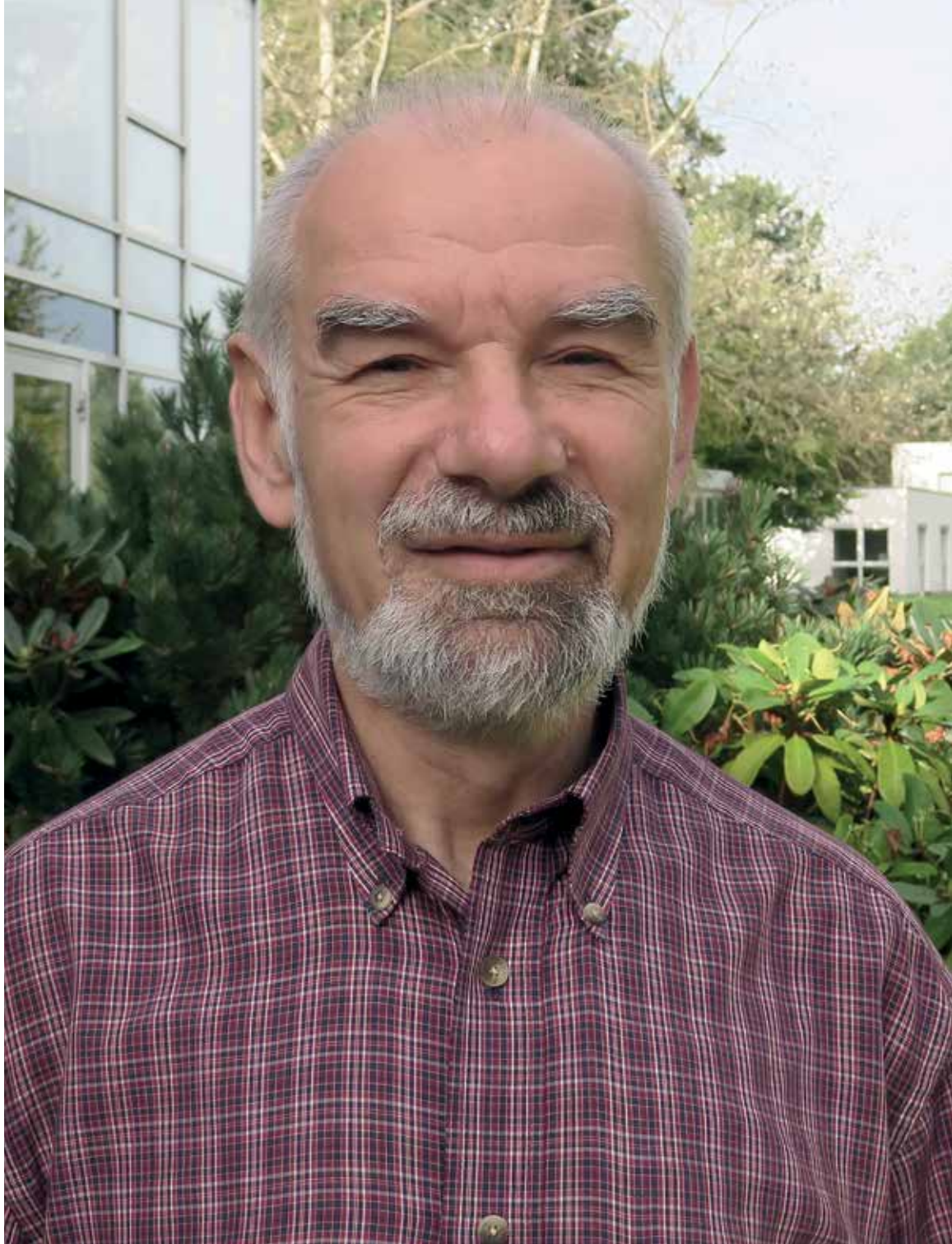
Assoc. Prof. Dr. Alexey A. Sukhotin

Fellow
Co-funded by DAAD

Fellowship
September–November 2023

Home institution at time of application
White Sea Biological Station
Zoological Institute of Russian Academy
of Sciences
St.-Petersburg
Russia

Cooperation Partner
Prof. Dr. Hans-Otto Pörtner
Alfred-Wegener-Institut, Helmholtz-Zentrum
für Polar- und Meeresforschung (AWI)
Bremerhaven



Contribution of Cell Size and Number of Mitochondria to Metabolic Allometry in Ectotherms

The metabolic rate is a fundamental biological characteristic that determines the physiological and vital parameters of organisms and hence their adaptability and ecological role. Metabolic rate is highly dependent on the body size of living organisms, and this phenomenon is called metabolic allometry (MA). Mass-specific metabolic rate decreases with increasing body size, so that larger organisms have a lower energy turnover rate per unit mass than do smaller organisms. This pattern holds true both when comparing animals of different taxa and within the same species, and even within a single individual in ontogeny. The search for the causes and mechanisms of MA has a long history and is still an important question in biology.

Obviously, the whole-animal metabolic rate is associated with the metabolism of tissues and organs, which, in turn, is determined by cellular energetics and the functioning of subcellular organelles – mitochondria. We assume that the allometry of cellular metabolism and of mitochondrial activity can help to explain the phenomenon of MA at the organism level.

The goal of our project is to reveal the relationship between ultrastructural changes in tissues—quantitative and morphological characteristics of mitochondria—and body mass. We explore the contribution of the cell size, as well as abundance, volume, morphology, and functional properties of mitochondria to the MA in marine invertebrates.

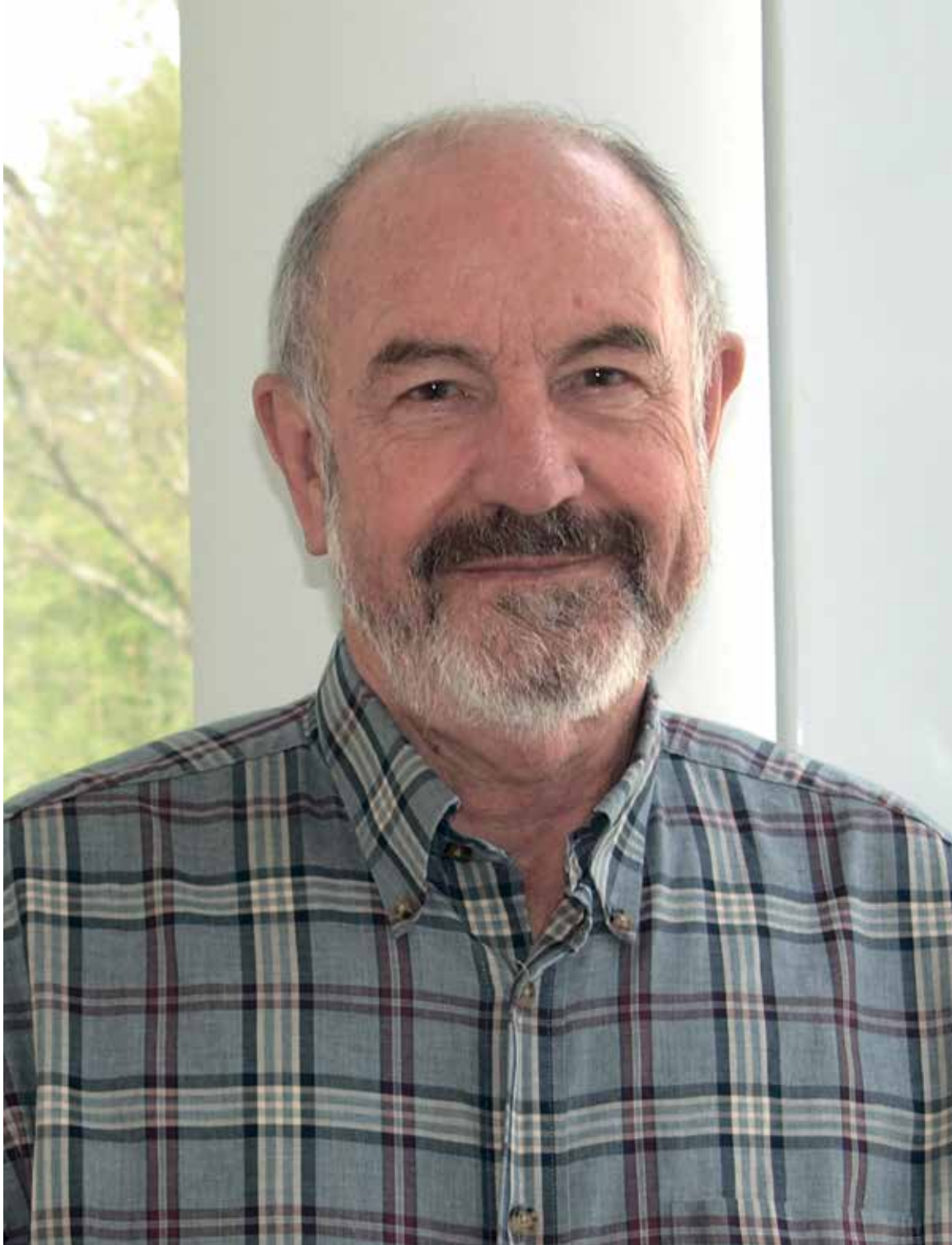
Prof. Dr. Roger Everett Summons

Honorary Fellow

Fellowship
April–July 2023

Home institution at time of application
MIT – Massachusetts Institute of Technology
Department of Earth, Atmospheric,
and Planetary Sciences
Cambridge, MA
USA

Cooperation Partner
Prof. Dr. Kai-Uwe Hinrichs
MARUM – Zentrum für Marine
Umweltwissenschaften
Universität Bremen



Mass Spectrometry Imaging of the End-Cretaceous Impact Horizon Preserved at Stevns Klint, Denmark

The end-Cretaceous mass extinction is well-known for the demise of the dinosaurs and for the fact that it was caused by a meteorite. In the latter respect, it differs from all other known biological extinctions. One of the outcomes of my 2008 HWK Fellowship was a study of this event based on samples collected from a sedimentary rock section on the Baltic Sea coast of Southern Denmark. In that work, and contrary to expectations, we were able to show that the photosynthetic ecosystem recovered on a timescale of just decades rather than millions of years.

Developments in mass spectrometry instrumentation opened the way to take a closer look at this phenomenon with a very high sampling resolution. That is, with a laser-based approach, we could potentially query samples for molecular markers of photosynthesis at a micron scale as opposed to the centimeter scale of our earlier work. Accordingly, a new collaboration was established with scientists from the MARUM – Center of Marine Environmental Science at Universität Bremen and the University of Copenhagen returning to this iconic site in July 2023. Our analyses are not yet complete, but we are hopeful that this new data will provide a fresh view of the time it takes for primary productivity to recover following a bolide impact.

Assoc. Prof. Dr. Laura Wehrmann

Fellow

Fellowship
August 2022–May 2023

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Stony Brook University
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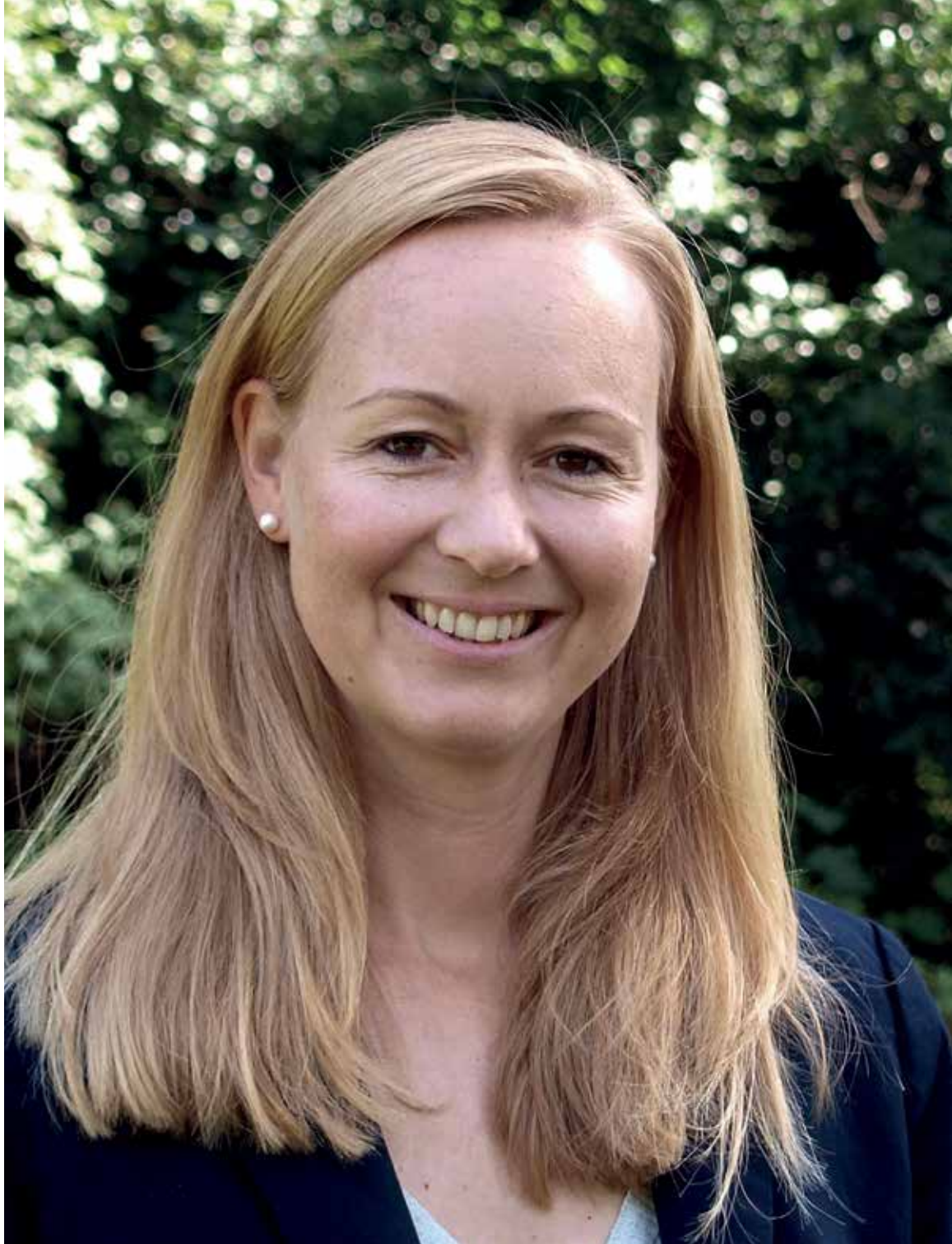
Cooperation Partners
Prof. Dr. Sabine Kasten
Dr. Grit Steinhöfel
Dr. Susann Henkel
Alfred-Wegener-Institut, Helmholtz-Zentrum
für Polar- und Meeresforschung (AWI)
Bremerhaven



The Role of Reverse Weathering for Element Cycling in Glacially Impacted Arctic Fjords

Over long time scales, the inputs of major and minor elements to the ocean by rivers and hydrothermal vents must be balanced by removal mechanisms of these elements in the marine realm for ocean chemistry to remain relatively constant. A long-debated process that sequesters elements in ocean sediments is reverse weathering, which involves the transformation of biogenic silica, such as diatom frustules, to new clay material. However, many aspects of this process remain unknown, such as reaction rates and products and global distribution. Previous studies of this process have focused on tropical deltaic systems.

Coastal polar regions, including glacially influenced fjords, likely represent another hotspot of reverse weathering because they receive high inputs of key "ingredients": biogenic silica and reactive iron (Fe) and aluminum (Al) oxides.

The aim of this project is to study the role of reverse weathering in glacially influenced fjords with a focus on identifying a set of key geochemical indicators in the fjord sediments and enveloping estimates of associated element fluxes across the sediment-water interface. Polar coastal ocean regions are currently undergoing rapid changes due to anthropogenic climate shifts. A further objective of this project is to gain first insights into how climate change may affect reverse weathering processes in these environments.

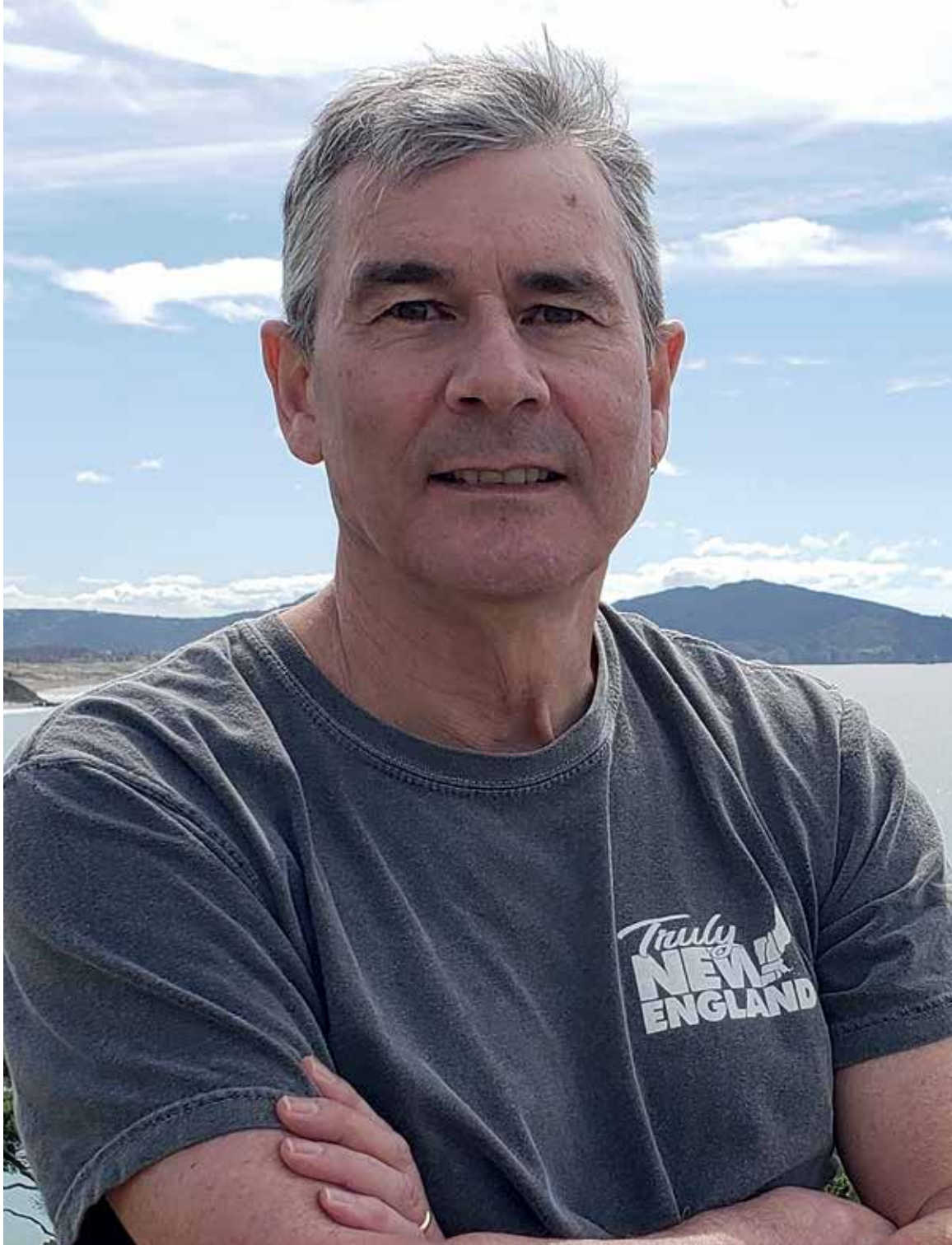
Prof. Dr. John Wilkin

Fellow

Fellowship
July–September 2023

Home institution at time of application
Rutgers, The State University of New Jersey
Department of Marine and Coastal Sciences
New Brunswick, NJ
USA

Cooperation Partner
Prof. Dr. Oliver Zielinski
Leibniz-Institut für Ostseeforschung Warnemünde



Incorporating Satellite Observations of Ocean Color into Coastal Ocean Forecasting Systems by Directly Modeling the Absorption and Reflectance of Light Due to Plankton, Organic Matter and Sediments

Successful weather forecasting depends, among other things, on the skillful merger of observations with computer models of atmospheric physics. In coastal oceanography, similar systems are emerging that combine data and models to enable predictions of oceanic conditions in support of decision-making related to maritime safety, water quality, ocean acidification, hypoxia, fisheries, and the fate of pollutants and microplastics.

Ocean physical conditions such as sea level, temperate and currents are routinely observed by satellites, radars and increasingly by novel platforms in the water such as profiling floats and autonomous underwater vehicles. These data are incorporated into ocean forecast models in much the same way as in weather prediction. But a voluminous data set that goes largely unused in constraining coastal ocean forecasts are patterns in the ocean's ecosystem revealed by satellites that observe ocean color at numerous different wavelengths of visible light.

Using established methods for calculating the apparent color of seawater due to the absorption, scattering and reflection of visible light by plankton, organic matter and sediments within the water column, this project will invert that relationship and use satellite ocean color data to infer what those ecosystem characteristics must be, and what underlying patterns of oceanic currents best explain the turbulent eddies and fronts that are so readily apparent in ocean color imagery.

Prof. Dr. Ulrich G. Wortmann

Fellow

Fellowship
June–October 2023

Home institution at time of application
University of Toronto
Department of Earth Sciences
Toronto, ON
Canada

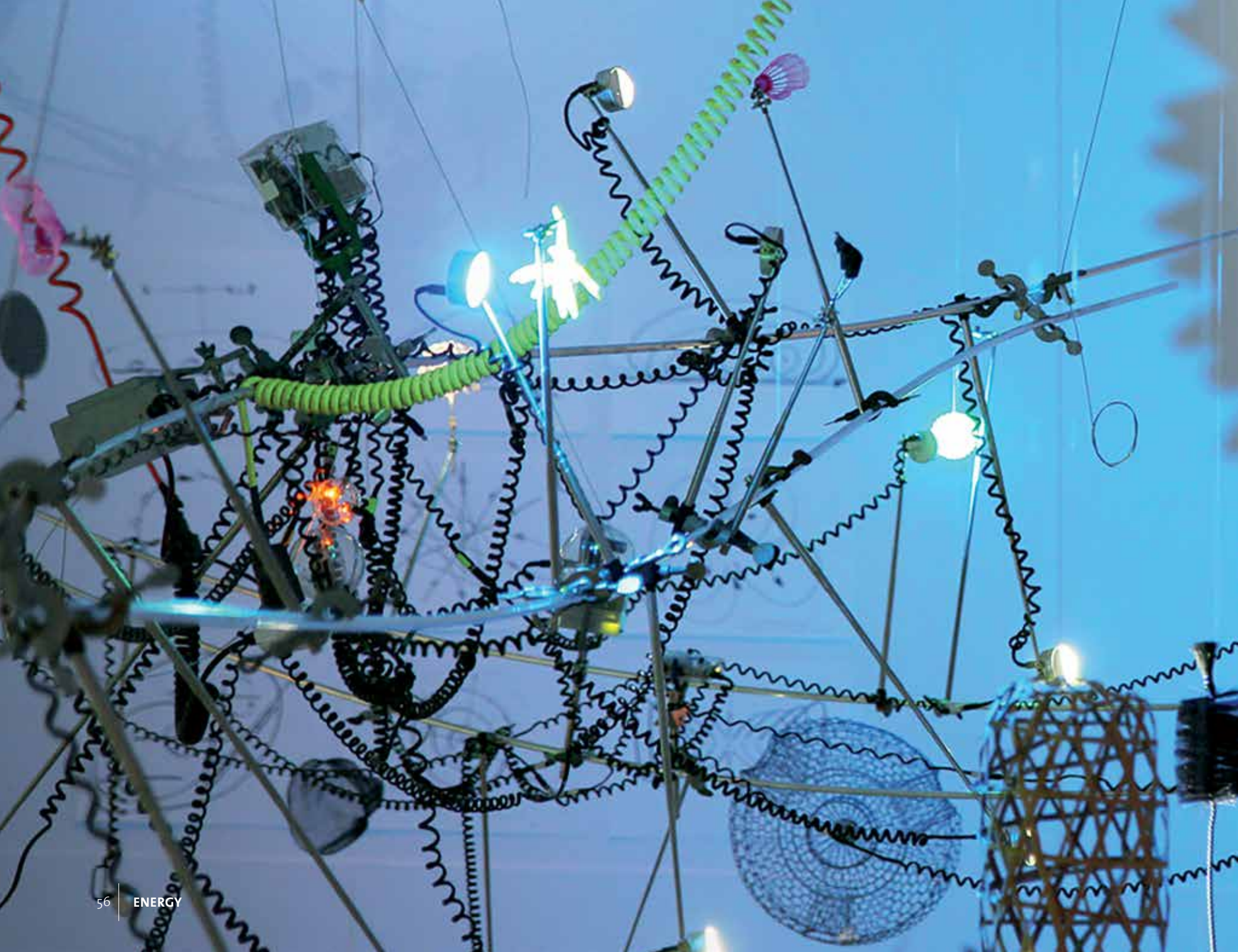
Cooperation Partner
Prof. Dr. Heiko Pälike
MARUM – Zentrum für Marine Umweltwissenschaften
Universität Bremen

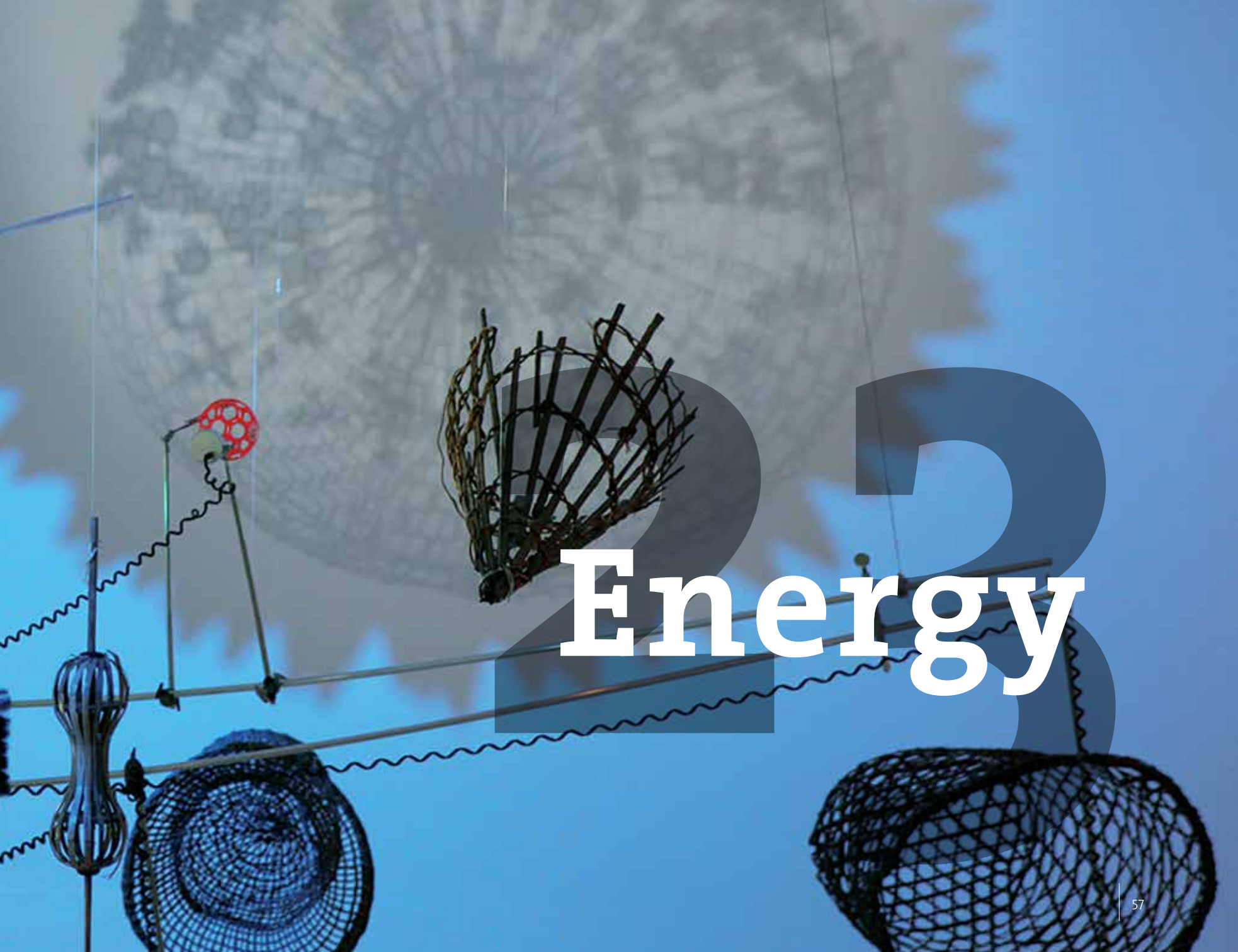
Ocean Chemistry in a Warming World: Exploring the Oxygenation-Alkalinity Connection

The ocean absorbs large amounts of carbon dioxide (CO_2), buffering much of the anthropogenic CO_2 release. The ocean's buffering capacity depends on the interaction of biological and chemical processes, e.g., photosynthesis and organic matter decomposition. These are processes understood well enough to create computer models that accurately describe, e.g., ocean acidification in response to the anthropogenic CO_2 release.

Current ocean models typically assume that there is always enough oxygen to facilitate organic matter decomposition. However, increasing temperatures will reduce marine oxygen concentrations, possibly to the point of complete oxygen loss. Earth's history is indeed full of examples where this process resulted in large ocean areas devoid of oxygen, inhospitable to all higher life forms. The transition from oxygen-bearing to oxygen-free waters, not only affects higher life forms, but also fundamentally affects the ocean's ability to absorb CO_2 (also known as alkalinity).

This project aims to understand how the changeover from oxygen-based to sulfate-based organic carbon remineralization changes the distribution of alkalinity between the surface and intermediate waters, and how this affects atmospheric pCO_2.





22 Energy

Assoc. Prof. Dr. Mandana Amiri

Fellow

Fellowship
June–September 2023

Home institution at time of application
University of Mohaghegh Ardabili
Department of Chemistry
Ardabil
Iran

Cooperation Partner
Prof. Dr. Michael Wark
Universität Oldenburg

Development of New Electrocatalysts based on Metal Organic Frameworks (MOFs) for Oxygen Evolution Reaction

With increasing energy and environmental problems, human beings are exploring ways to rely on clean and sustainable energy rather than on fossil fuels. Hydrogen is clean energy and considered a good alternative for fossil fuels due to its valuable benefits, including high energy density, high calorific value, and potential for energy storage. Electrochemical water splitting is a promising reaction for storing sustainable but intermittent energies. The critical bottleneck of the water-splitting process is the slow kinetics of the so-called oxygen-evolution reaction taking place at the anode. Transition-metal-based catalysts have shown outstanding electrocatalytic performance for water splitting and especially for the oxygen-evolving reaction, such as metal carbides, metal alloys for hydrogen evolution reaction; hydroxides, metal oxides; and metal organic frameworks. In recent years, metal organic frameworks have been extensively investigated for diverse heterogeneous catalysis due to the diversity of their structures and outstanding physical and chemical properties. In this research, we are going to synthesize conductive metal organic frameworks by using different metal centers such as Co, Ni, and Fe and two different linkers such as Fumaric acid and Gallic acid. To obtain the greatest efficiency toward oxygen evolution reaction, bimetallic frameworks will be also synthesized.

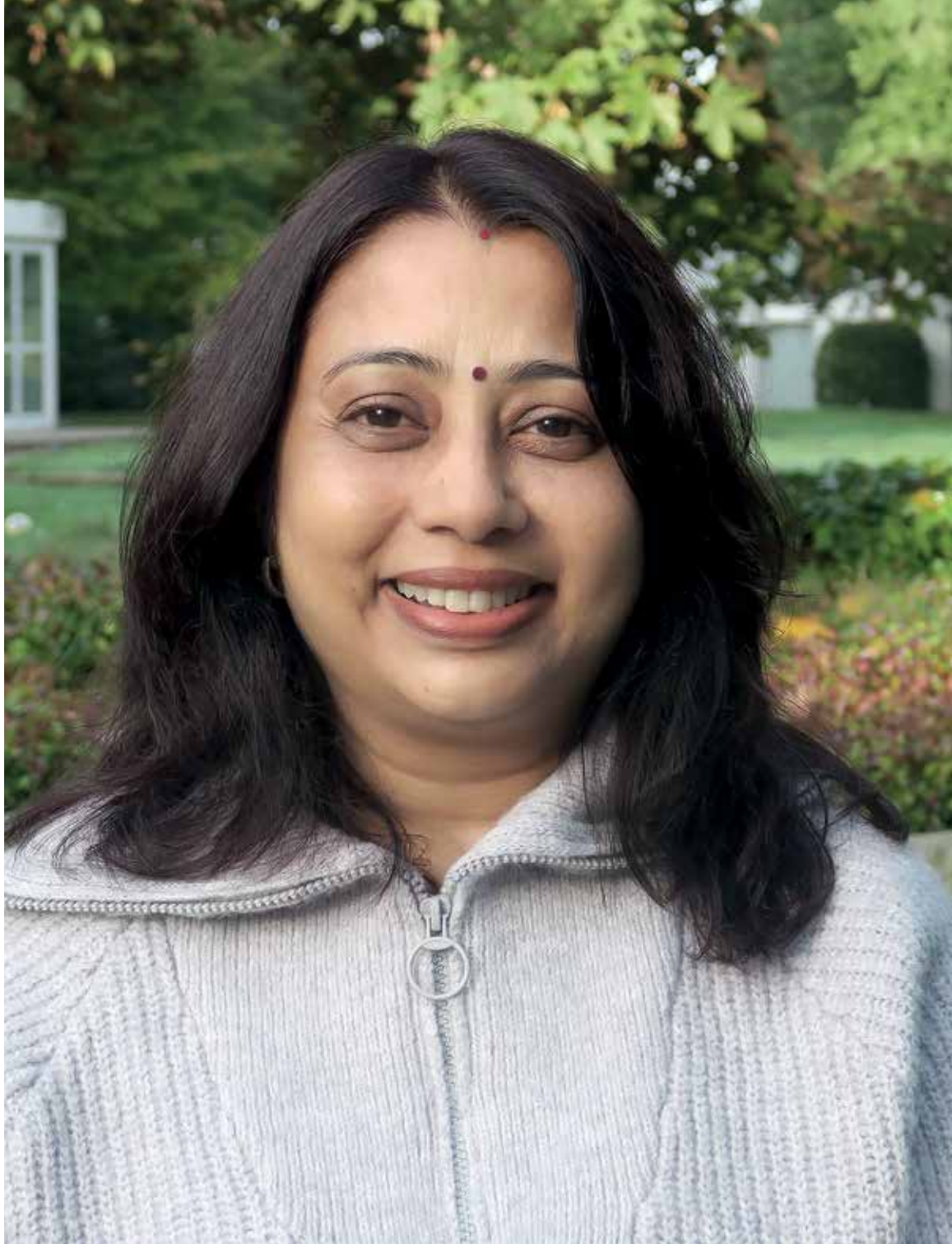
Dr. Sudeshna Chandra

Fellow

Fellowship
October 2023–August 2024

Home institution at time of application
Independent
India

Cooperation Partner
Prof. Dr. Gunter Wittstock
Universität Oldenburg



Understanding the Electron Transfer Process of Hybrid Nanocomposites for Energy Devices using the Surface Interrogation Mode of Scanning Electrochemical Microscopy

Today, conserving energy and enhancing the performance of energy-storage devices is crucial to sustainable development. Most available energy-storage devices and solutions do not deliver the desired performance and thus have limited commercial use. Recent technological advancements help in creating inorganic nanomaterials that can deliver the desired performance in energy-storage devices. These nanomaterials are environmentally benign and act as effective electrode materials in electrochemical energy devices. Although research on inorganic nanomaterials as electrode material has progressed in recent years, it has yet to become commercial. A thorough understanding of changes in metal oxidation states and their associated charged structure involving specific counter-ions is required to elucidate the mechanism underlying electrochemical storage activity. The crystal structure and ionic conductivity of inorganic nanomaterial directly influences the charge storage capacity of energy device. In my project, I am planning to use a new nanocomposite of zinc sulfide and copper sulfide (ZnS-CuS) as electrode material. I will use scanning electrochemical microscopy (SECM) to understand reaction kinetics and perform electrochemical characterization at higher spatial resolution. This will allow us to elucidate the efficacy of the nanomaterial and devise strategies to enhance electrochemical performance to desired levels.

Dr. Sanchari Deb

Junior Fellow

Fellowship
November 2023–May 2024

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Newcastle University
Newcastle
United Kingdom

Artificial Intelligence for Local Energy-System Planning and Operation

Energy systems across the world are becoming localized, decarbonized, and digitalized. In local energy systems, energy is produced and consumed locally without requiring transmission facilities. Beyond decarbonization, smart local energy systems are expected to provide a wide range of other benefits such as alleviating fuel poverty and generating community income. They also help to improve network management, reduce operating costs, and overcome energy-system constraints. The increase in the deployment of local energy systems has been the subject of intensive research and development in recent years.

There are still some challenges, however, such as proper planning and operation of local energy systems, maturity of technology, and storage facilities, which hinder upscaling of local energy systems. To address these challenges, this project aims to focus on the planning and operation of smart local energy systems. Specifically, my research will focus on the use of intelligent algorithms and parallel computing for solving the complex planning and operation of local energy system problems.

Asst. Prof. Dr. Christian Furrer

Junior Fellow

Fellowship
September–December 2023

Home institution at time of application
University of Copenhagen
Department of Mathematical Sciences
Copenhagen
Denmark

Cooperation Partner
Prof. Dr. Marcus Christiansen
Universität Oldenburg

MISS: Modeling and Learning Insurance Risks Subject to Systematic Changes in Information

The design, pricing, and management of insurance products, including pensions, is based on actuarial calculations. Historically, actuaries have used all available data when performing these kinds of calculations. In the current information era, data availability is growing at a remarkable rate, but at the expense of data privacy and security. This encourages active information control in accordance with, for instance, the well-known "right to be forgotten" stipulated in Article 17 of the General Data Protection Regulation of the European Union. Furthermore, in recent years, we have also observed that some tech companies have implemented data-control features, such as auto-deletion, to distinguish themselves from competitors. However, active information control leads to systematic changes in information that may bias classic actuarial calculations. This research project seeks to address that issue by exploring how we could model and understand insurance risks subject to systematic changes in information as well as how we could design and manage insurance products based on systematic changes in information. The main goal is to develop new, universal mathematical concepts and methods tailored to the currently developing information era.

Prof. Dr. Stefan Heinz

Fellow

Fellowship
April–August 2023

Home institution at time of application
University of Wyoming
Department of Mathematics
Laramie, WY
USA

Cooperation Partner
Prof. Dr. Joachim Peinke
ForWind – Center for Wind Energy
Universität Oldenburg

Cutting-Edge Turbulence Simulation Methods for Wind-Energy Problems

Wind-energy problems (air flow around turbines in wind farms) are characterized by extremely challenging flow regimes. The accurate and efficient analysis of these flow patterns via computational fluid dynamics (CFD) poses a huge challenge. Basically, standard CFD methods are incapable of dealing with reliable and feasible predictions of such flow regimes: they are either way too expensive computationally or are known to often provide unreliable results. Combinations of existing methods have been suggested as an alternative. However, existing methods face significant problems because of the uncontrolled balance of their elements. As a consequence, existing combination methods do not yet offer an alternative to pure methods.

I have developed a mathematical exact solution to the combination of existing computational methods. First applications in real-world conditions show the huge potential of these novel methods. For the first time, we have access to reliable simulation methods that behave stably in strongly variable conditions. In particular, for the first time we can provide reliable predictions for extreme flow regimes relevant to wind-energy problems (where all existing methods are hardly applicable). The goal of my project is to explicitly demonstrate the advantages of our new methods for wind-energy simulations based on an existing long-term collaboration with colleagues at the Universität Oldenburg.

Prof. Dr. Jing Jiang

Fellow

Fellowship
May–September 2023

Home institution at time of application
University of Western Ontario
Dept. of Electrical & Computer Engineering
London, ON
Canada

Configuration and Component Sizing in Integrated Energy Systems to Reduce Carbon Footprints

Energy is the lifeblood of our modern societies. However, traditional energy systems use centralized facilities to generate electricity (e.g., use fossil fuels or nuclear units) and to process natural gas (e.g., Wintershall Dea AG), and then transfer them to consumers through power transmission lines and gas pipes. As such, (1) large energy transmission facilities may be needed even for small and remote communities; (2) such energy systems are not sustainable and can produce Green House Gas (GHG) emissions; (3) it is more difficult to incorporate locally available energy resources; and (4) as energy delivery systems span wide geographical regions, they are more susceptible to extreme weather, earthquakes, or even sabotage.

To improve overall reliability and efficiency and to reduce GHG emissions, locally available renewable energy resources should be utilized whenever possible. As a result, a new type of energy system, known as Integrated Energy Systems, has emerged. By combining electrical thermal energy with a variety of energy storage devices, one can provide a reliable energy supply to local customers. However, there are still many unanswered questions and technologies to be developed for such systems. This project investigates lifecycle carbon footprints of several energy resources commonly adopted by Integrated Energy Systems, and develops methodologies to rank them and finally determine the optimal strategies to ensure the entire system work in harmony.

Assoc. Prof. Dr. Martin Obligado

Fellow

Fellowship
May 2023

Home institution at time of application
Laboratoire des Ecoulements Geophysics
et Industriels (LEGI)
Grenoble
France

Cooperation Partner
Prof. Dr. Joachim Peinke
Universität Oldenburg

A Wind-Tunnel Study on the Wake of Vertical- and Horizontal-Axis Wind Turbines

I propose an experimental study on the wake structure of vertical- and horizontal-axis wind turbines under different laminar and turbulent inflow conditions. This will be achieved by testing scaled models in a wind tunnel that enables bespoke turbulent inflows. Both types of turbines have several advantages and disadvantages for onshore and offshore wind farms, and there is an intense debate in the wind-energy industry and research community about how each type of rotor would perform in different layouts and atmospheric conditions.

The aim of this study is to better understand and characterize the turbulent flow created by wind turbines. Nevertheless, my research has a direct practical application as it will provide the wind-energy industry with a systematic comparison of two types of turbines on the same wind tunnel under realistic inflow conditions. The advantage of this approach is that the comparison of wakes will not be biased by the effects of different experimental setups, known to significantly affect wake structure and properties.

Thus, the main objective of this project is to provide a database and back-of-the-envelope models that will help the research community and wind-energy industry to choose between the two different families of turbines for a given terrain and operating conditions.

Prof. Dr. Lucy Pao

Fellow

Fellowship
June 2023–January 2024

Home institution at time of application
University of Colorado Boulder
Electrical, Computer, and Energy Engineering Department
Boulder, CO
USA

Cooperation Partners
Prof. Dr. Martin Kühn
ForWind – Center for Wind Energy
Universität Oldenburg

Prof. Dr.-Ing. Andreas Rauh
Universität Oldenburg

Control Co-Design of Extreme-Scale and Floating Wind Turbines and Wind Farms

To combat climate change, many countries are decarbonizing their electric power grids by significantly increasing power generated from wind, solar, and other renewable energy sources. To further decrease the cost of wind energy to accelerate the deployment of wind farms, wind turbines are being designed at ever-larger scales, which is challenging due to greater structural loads and deflections. Large-scale systems such as modern wind turbines increasingly require a control co-design approach, where the system design and control design are performed in a more integrated fashion. I propose to investigate the control co-design of extreme-scale wind turbines (with blade lengths greater than 150 meters), floating wind turbines, and wind farms.

With 80% of offshore wind resources over waters deeper than 60 meters, floating wind turbines are needed to harness this vast energy source offshore, as it becomes cost-prohibitive to install fixed-bottom wind turbines in such deep waters. With floating wind farms, there are additional degrees of freedom such as being able to move each floating turbine to continuously optimize the wind farm layout as wind speeds and directions change. Hence, there are opportunities to reduce the cost of floating wind energy to be competitive with fixed-bottom offshore wind energy. Both conceptual and simulation studies as well as experimental campaigns will be pursued collaboratively with fellows at HWK and colleagues at nearby institutions.

Prof. Dr. Mohammad Reza Rahimi Tabar

Fellow

Fellowship
July 2023–February 2024

Home institution at time of application
Sharif University of Technology
Department of Physics
Tehran
Iran

Cooperation Partners
Prof. Dr. Joachim Peinke
Universität Oldenburg

Prof. Dr. Ulrike Feudel
ICBM – Institute for Chemistry and Biology of the Marine Environment

Higher-Order Interactions in Complex Systems with Application in Renewable Energies

Complex systems are composed of many components (subsystems) whose states change over time and result in multidimensional stochastic dynamics. Examples of complex systems include human economies, climate, nervous systems, internet, power grid, etc. Generally, it is assumed that the interactions between the subsystems occur in pairs. However, today, it is believed that interactions in such systems often occur between multiple nodes.

In this project, we show that pairwise, three-way, and also higher-order interactions in such systems can be derived exactly from the statistical properties of measured time series in subsystems. We demonstrate the substantial potential for applications of our new approach by a data-driven reconstruction of interactions in various multidimensional and networked dynamical systems. As a real-world example, we construct the flow of dynamics in the power curve of a wind turbine by means of the measured time series of velocity and power in a wind turbine.

Prof. Dr. Yakov Shnir

Fellow

Fellowship
October 2023–July 2024

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Belarusian State University
Minsk
Belarus

Cooperation Partners
Prof. Dr. Jutta Kunz-Drolshagen
Universität Oldenburg

Prof. Dr. Claus Lämmerzahl
Universität Bremen

Multipolar Boson Stars and Hairy Black Holes

One of the most interesting recent breakthroughs in modern physics is related to the experimental observation of gravitational waves, produced in the collision of black holes. Emerging gravitational-wave astronomy opens a new way of investigating neutron stars and black holes and provides unique insight into various cosmological phenomena. On the other hand, numerical simulation of collisions of black holes and neutron stars on supercomputers allows us to compare predictions of General Relativity with experimental data, dramatically improving the capacity of numerical relativity to correctly reproduce various properties of cosmological objects.

Black holes, boson stars, and other cosmological objects are the focus of research for many physicists, among them the Models of Gravity research teams based in the Bremen-Oldenburg region. The proposed research project is a natural continuation of our previous collaboration with members of this group over the last two decades. It serves the purpose of investigation of new types of black holes with synchronized matter fields. This study promises interesting new results, which may find various astrophysical applications in particular and provide new opportunities for observational tests of the classical theory of gravity. On the other hand, the study is related to the application of new advanced computational methods, which are being developed to study complicated non-linear problems in various physical systems.

Assoc. Prof. Dr. Morgan Stefik

Fellow

Fellowship
September 2022–January 2023

Home institution at time of application
University of South Carolina, Columbia
Department of Chemistry and Biochemistry
Columbia, SC
USA

Cooperation Partner
Dr. Julian Schwenzel
Fraunhofer IFAM, Bremen

Development of Advanced Porous Battery Electrodes

Broadly, this project examines how function follows form in the context of batteries. The form under investigation is similar to a kitchen sponge. The function of a sponge is as much defined by its positive space, its material, as it is defined by its negative space, the voids. Similarly to how a sponge soaks up spills, battery materials soak up ions when charging or discharging. In a battery, the speed with which it can charge is similarly determined by how these components are organized in space.

Specifically, this project examines how function follows form in a class of ultrafast battery materials called pseudocapacitors. My group's PMT process allows independent variation of the material and void dimensions which uniquely informs design improvements by separating the effects of each space. Translating these lab-scale methods to industrial manufacturing remains a challenge, in part due to the 1000x gap in length scale between the micrometer-sized particles used in modern battery manufacturing and the nanometer-sized features needed for pseudocapacitance. This project will first extend our PMT approach to nanoporous microparticles that are compatible with industrial manufacturing and then study their performance. Advancing the capabilities of energy-storage devices will support broader use of sustainable energy resources.

Prof. Dr. Venkataraman Thangadurai

Fellow

Fellowship
May–July 2023

Home institution at time of application
University of Calgary
Department of Chemistry
Calgary
Canada

Cooperation Partners
Dr. Julian Schwenzel
Fraunhofer IFAM, Bremen

Solid State Electrolytes for Next Generation Li Batteries

Li–air batteries have attracted a great deal of attention in the recent past because of their large theoretical specific energy density, but the challenges with the liquid electrolytes are the major issue for the development of practical utilization of Li–air batteries. In particular, the decomposition of non-aqueous organic electrolyte and its severe side reaction with the discharge product (Li_2O_2) is one of the major problems. Replacing the liquid non-aqueous organic electrolyte with a solid-state electrolyte can solve the problems. Additionally, the flammability and the environmental hazard of the liquid organic electrolytes are also a major obstacle to the successful commercialization of this battery.

The solid-state electrolytes (including inorganic, polymer, and composite electrolytes) are considered stable and compatible with the discharge product (Li_2O_2), and have potential to develop safe , environmentally friendly, and efficient Li-air batteries. In this proposal, we develop a solid-state Li-air battery with composite polymer electrolyte for commercial applications.

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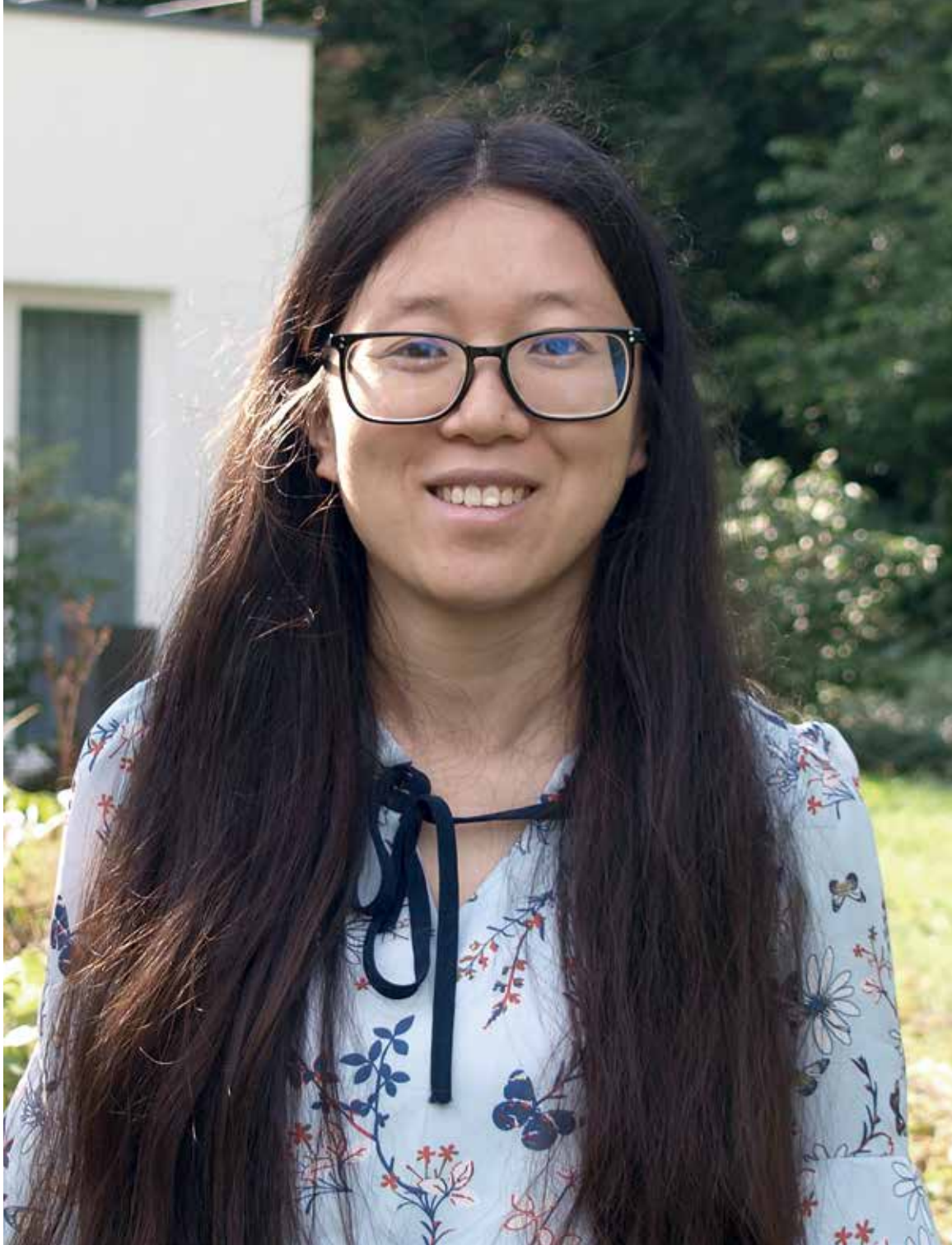
Dr. Ying Wang

Junior Fellow

Fellowship
August 2022–February 2023

Home institution at time of application
Adam Mickiewicz University Poznań
Nanobiomedical Centre
Poznań
Poland

Cooperation Partner
Prof. Dr. Niklas Nilius
Universität Oldenburg



Tailoring the Structure of Step Edges by Stoichiometry Adjustment in Two-Dimensional Ternary $(V, Fe)_2O_3$ Monolayer Oxides

Increasing environmental issues and the imminent shortage of fossil fuels are motivating researchers to exploit clean, efficient, and sustainable technologies to store and convert energy. Although binary oxide materials have shown promising properties, the flexibility for relevant applications is often limited. Ternary oxides, formed by doping additional elements into binary oxides, have the potential to overcome these problems and therefore attract more attention. Varying composition ratios can precisely tune the properties of these mixed oxides, allowing the nanoscale control of future materials production. One exciting feature of these hybrid oxide materials is their step edges, as most catalytic reactions actually take place at the step edges of a catalyst; the possibility of tuning the properties of edge sites in mixed oxides is, therefore, of utmost importance for improving and controlling the catalytic properties of surfaces. Our previously published results successfully show the synthesis and characterization of monolayer mixed vanadium and iron oxide supported on Pt(111) substrate. Based on the results, our current and future work will focus on identifying the variation of the edge structures for both the pure vanadium oxide and the mixed oxide. The nature of edge atoms and species, the relation of edge structure, equilibration, and potential properties as a function of preparation methods (by varying the Fe content and the oxidation condition) will be discussed and reported. The technique involved in the project is a combination of experimental data and theoretical calculation. The experimental data will be obtained by scanning tunnelling microscopy (STM) and calculations performed by density functional theory (DFT) and Monte Carlo simulation, obtained with the support of collaborating theoretical physicists at the Sorbonne University, Paris.

23 Society

Prof. Dr. Anja Louise Bandau

Fellow

Fellowship
October 2023–March 2024

Home institution at time of application
Leibniz Universität Hannover
Romanisches Seminar
Hanover
Germany

Cooperation Partners
Dr. Sarah Lentz
Prof. Dr. Rebekka von Mallinckrodt
Universität Bremen

How Not to Speak of Slave Revolution: A Cross-Genre Study on Racialized Genres and Modes in French Literature

How did Enlightenment discourse mold and channel the way in which the revolution of enslaved people has been talked about or silenced? And how do these forms frame how we perceive and talk about people of African descent and of black bodies today? How is the image and economic situation of a post-colonial state like Haiti related to this history? The recent debate in the New York Times (May 2022) attests to the timeliness of these questions. Finally: How do literary formats undermine or perpetuate social norms and practices that consolidate (post-)colonial societies? Does literary production create horizons of expectation and open up potential spaces for projects of abolition and of inclusion into citizenship?

My project addresses a set of tropes in French-speaking literature that helped create a reservoir of racialized micro-narratives remembering slave revolution until the twentieth century. It contributes to a cross-media history of racialized conflict. At the same time, it uses examples to explore the globalizing of modes of representation that can be traced up to the present as the historical conflict is mirrored in current conflicts and negotiations of citizenship. How Not to Speak of Slave Revolution wants to show how modes of writing circulating between Africa, Europe and the Caribbean reach out into neo- and postcolonial constellations (as the second French colonial empire in Africa, and the postcolonial memory of the Revolution).

Dr. Eleonora Carinci

Twin Fellow

Fellowship
September–October 2023

Home institution at time of application
Universidad de Sevilla
Seville
Spain

Cooperation Partner
Prof. Dr. Francesca Fulminante (Fellow SOCIETY)
Hanse-Wissenschaftskolleg

Binary and Non-binary Representation of Gender Found in Literary Sources

During the late Middle Ages and the early-modern period, the codification and sedimentation of gender differences and binarisms—such as masculine vs. feminine; culture vs. nature, soul vs. body etc. —were crucial to creating the basis of modern western culture and society. In this period, many gender stereotypes were codified and attested to in written sources, and they largely influenced the perception we have of the past. However, it is worth pondering to what extent these sources reflect what happened in people's lives and minds and to illuminate the complexity of reality.

My research aims to consider to what extent the literary sources—from classical literature to Renaissance treatises which in most cases reused and reinterpreted classic authors—reflect the binary and non-binary elements emerging from material and other written sources from the same periods. This project would help to identify, confirm, or reject some aspects of continuity and discontinuity with the past with regard to the representation of gender and its stereotypes, and aims to complement Francesca Fulminante's research.

Asst. Prof. Dr. Michael Eisenberg

Fellow

Fellowship
March–June 2023

Home institution at time of application
University of Haifa
The Zinman Institute of Archaeology
Hippos Excavations Project
Haifa
Israel

Cooperation Partners
Prof. Dr. Michael Sommer
Universität Oldenburg

Prof. Dr. Tassilo Schmitt
Universität Bremen

Three Spheres of Memory—The Saddle Necropolis at Hippos of the Decapolis as Part of Funerary Practices and Collective Memory in Roman Syria

Funerary practices, burials, and grave monuments were a vital part of the Roman world. In the Roman East, they take the shape of various burial and mourning traditions, exhibited in a wide array of types of burials and funerary monuments that correlate to the socioeconomic and cultural strata of the local society. The ongoing excavations at Hippos of the Decapolis, co-directed by the applicant, are among the largest Classical period excavations in Israel (second century BC–eighth century CE). In recent years, the research has concentrated on the Roman period cemeteries, in particular the most impressive Saddle Necropolis. The finds from the Hippos necropolis, among them pit graves, various tomb stones with and without inscriptions, simple and more elaborate sarcophagi, family burial caves, funerary podia, and mausolea, emphasize the socioeconomic stratification of the society within the *polis*. The extent of the excavations allows us to better understand the burial practices at Hippos and its region, as well as the funerary culture of Roman Syria in general. The fellowship will allow a comparison of the Hippos' unique series of funerary podia to the famous Palmyra tower tombs, analyses of the funerary figurative tombstones, and a theoretical examination of the new "three spheres of memory" idea (circle of family and the immediate memory, circle of the *polis*' inhabitants and city's local memory, and the wider circle of passers-by and those observing the city from a distance).

Prof. Dr. Francesca Fulminante

Fellow

Fellowship
October 2022–April 2023,
August–November 2023

Home institution at time of application
Bristol University
University of Oxford
United Kingdom

Roma Tre University
Italy

“Warriors” and “Weavers”: Gender Stereotypes, Identity, and Demographic Dynamics from Italy (approx. 1000–300 BC) To Face Modern Challenges and Impact Current Policies

The “Warriors and Weavers” project aims to challenge current gender stereotypes by studying burial practices and human remains of ancient Italian populations (approx. 1000–300 BC). In particular, it will adopt a comparative perspective by studying different ethnic and cultural groups such as the Latin, the Etruscans, the Greeks, and the people of Abruzzo that inhabited the Italian Peninsula during the first millennium BC at a time of great ethnic, economic, social, and political changes that led to the formation of the first cities in Western Europe. By analyzing burial rituals and demography dynamics through a gender perspective, it will be possible to reveal the role of women and more generally gender in shaping and maintaining socio-economic and political relations in those communities. By discussing gender issues in the past, we create a distance that might allow for engagement with our own present-day gender stereotypes and gender practices and we may help contemporary communities better understand themselves as well as guide policymakers.

Dr. Silvia Gazzoli

Twin Fellow

Fellowship
April 2023

Home institution at time of application
IMT School for Advanced Studies Lucca
Lucca
Italy

Cooperation Partner
Prof. Dr. Francesca Fulminante (Fellow SOCIETY)
Hanse-Wissenschaftskolleg

Children and Maternal Mortality from the Cities of Roman Italy: Case Studies

The aim of this project is to investigate, from an epigraphical perspective, the evidence related to children and maternal mortality in Roman times in selected territories. Inscriptions provide us with useful information about the deceased, their social and economic context, and the funerary ritual. In particular, a deeper analysis of the selected documentation will lead to considerations of the language used (poetic or prose), the representation (or self-representation) of the deceased and their family, and the purpose of inscriptions as media to share mourning within the community.

Asst. Prof. Dr. Lasisi Adeiza Isiaka

Junior Fellow
Co-funded by the HANSA-FLEX Stiftung

Fellowship
May–July 2023

Home institution at time of application
University of Toronto
Toronto
Canada

Cooperation Partners
Dr. Inke Du Bois
Prof. Dr. Marcus Callies
Universität Bremen

Diasporic Spaces: Rethinking Digitality, Language, and Mobility

My work seeks to understand the combined impacts of language and the new media on transnational movements among West African migrants in Germany, and, specifically, to assess the ways in which migration experiences, social memberships, integration, and prospects are determined and made visible by digital linguistic practices. I focus on the reliance of migrants on digital means for reorganizing relationships, maintaining identity, and interacting with host communities.

Drawing on concepts in language and diversity (ethnolinguistics, digital ethnography, and superdiversity), I examine the linguistic practices of prospective and resident migrants with a view to better understanding how the new mediascapes transform virtual togetherness, socialization processes, and mobility. While this has implications for theories of communication in transnational contexts, our understanding of mobility and sociality vis-à-vis the notion of globality can refine diasporic discourse and relevant socio-political engagements.

Dr. Stephan Köppe

Fellow

Fellowship
June–August 2023

Home institution at time of application
University College Dublin
School of Social Policy Social Work
and Social Justice
Dublin
Ireland

Housing Wealth in Germany: Inequalities, Inheritance and Political Attitudes

Access to affordable housing has made the front pages of German newspapers and become an election topic. Although Germany did not experience the astronomical rise in rent or housing prices that affected other nations in the run-up to the financial crisis, affordable housing has since become a concern across the country. Germany has also been long championed as a society of renters, but in the last decade home-ownership rates have increased gradually. This project aims to understand this dual trend of rising house prices and home ownership from the perspective of housing wealth inequalities and politics. The research draws on existing information from people since 1990 and aims to understand who has increased their housing wealth and who has lost out. Two aspects are of particular concern. First, who has benefitted from increased house prices? We follow these people over time and aim to identify those that were left behind and those that profited, with a particular focus on younger generations. High rents reduce their savings potential for a deposit and short-term contracts limit their credit rating. Therefore, the research looks at how young Germans depend upon parents to acquire housing wealth. Second, these inequalities also shape political attitudes. The project asks if these new homeowners turn to more conservative parties that promise to protect their wealth.

Prof. Dr. Annette Leibing

Fellow

Fellowship
January 2023–May 2023

Home institution at time of application
Université de Montréal
CREGÉS
Faculté des sciences infirmières
Montréal
Canada

Cooperation Partner
Prof. Dr. Mark Schweda
Universität Oldenburg

Situating the "New Dementia": A Transcultural Study on Prevention-as-Assemblage

Dementia (e.g., Alzheimer's disease) affects 50 million people around the world. Dementia prevention has been, for many years, a rather uncertain idea of "brain training" (e.g., doing crossword puzzles when getting older). In 2017, however, the authors of a Lancet Report claimed that one in three cases could be prevented if nine (in 2020: 12) risk factors were addressed: education, hypertension, obesity, hearing loss, smoking, depression, physical inactivity, social isolation, and diabetes, as well as excessive alcohol consumption, traumatic brain injury, and air pollution. Most preventive public health campaigns target the individual ("don't smoke"), although most of the new risk factors are profoundly social (access to health care, access to healthy food, etc.); and a number of studies have shown that in countries where individuals have good access to good health care and education, dementia rates went down over time. This project is about situating this major change in conceptualizing dementia (including early detection). "Situating" here means that, methodologically, the context of prevention is being studied at several analytical levels: historically, nationally (in Germany, Canada, Switzerland, Brazil), in the translation of science discourses, and in media images, among others. Multi-site ethnographies further allow us to study prevention in practice. This juxtaposition of perspectives — assemblages— should help to avoid simplifying recommendations and prescriptions.

Prof. Dr. Yaron Matras

Fellow

Fellowship
October 2022–February 2023

Home institution at time of application
Aston Institute for Forensic Linguistics
Birmingham
United Kingdom

Cooperation Partner
Prof. Dr. Thomas Stolz
Universität Bremen

Language, Diaspora and Civic Belonging: An Urban Case Study

This project explores attitudes to multilingualism in a global city, based on the example of Manchester, UK. I draw on collaboration between researchers and practitioners in a variety of sectors, including the city council, the health care sector, schools, community-run weekend schools that teach heritage language, local museums, and others. Using observations and interviews, I examine how practitioners experience encounters with languages in the urban environment, and how those encounters prompt them to draft and implement solutions to the challenges of providing services to a multilingual population. I describe how informal networks of practitioners, activists, and researchers help consolidate practical strategies to address language needs, and how these help forward policies that support equal access to services, cultivation of heritage and skills, and celebration of multilingualism as a collective experience, giving rise to what I call a "city language narrative" that is used as a kind of municipal identity badge. I demonstrate how these developments contrast with language policy and statements at national level, which emphasize uniformity and tend to view language difference as a barrier to social inclusion. By contrast, the ideologies and policies that emerge in the city around practical encounters with multilingualism have the potential to offer a counter-weight to current populist movements and to strengthen commitments to multiculturalism.

Asst. Prof. Dr. Inna Melnykovska

Fellow

Fellowship
November 2022–May 2023

Home institution at time of application
Central European University
Political Science Department
Vienna
Austria

Cooperation Partners
Prof. Dr. Heiko Pleines
Prof. Dr. Michael Rochlitz
Universität Bremen

Global Money, Local Politics: Big Business, Capital Mobility and the Transformation of Crony Capitalism in Russia and Ukraine

How can we effectively manage financial globalization without feeding corruption in democratizing, institutionally weak states and without empowering illiberal, kleptocratic regimes? This is a core concern of Western societies because the legitimacy of modern capitalism and democracy depends on it. Furthermore, it is crucial to promoting the values of Western democracy and to security policies around the globe, particularly in Eurasia. This project takes innovative approaches to accomplishing the goal of effective management tracing the influence of the global capital mobility of Russian and Ukrainian holdings and the off-shoring of their corporate activities on business behavior and the political and economic systems, characterized by "crony capitalism," in Russia and Ukraine. It highlights a new channel of external influences that has been largely overlooked in studies on democratization, Europeanization, and promoting autocracy. It contributes to an understanding of the determinants of business political strategies. It also contributes to the debates across political science, international relations, sociology, and history about the mechanisms of institutional diffusion and the interplay of agency and structures in these processes. Finally, it is policy-relevant, as it helps hone U.S. and EU financial regulations for more precise financial sanctions and effective engagement policies.

Prof. Dr. Andrei Yakovlev

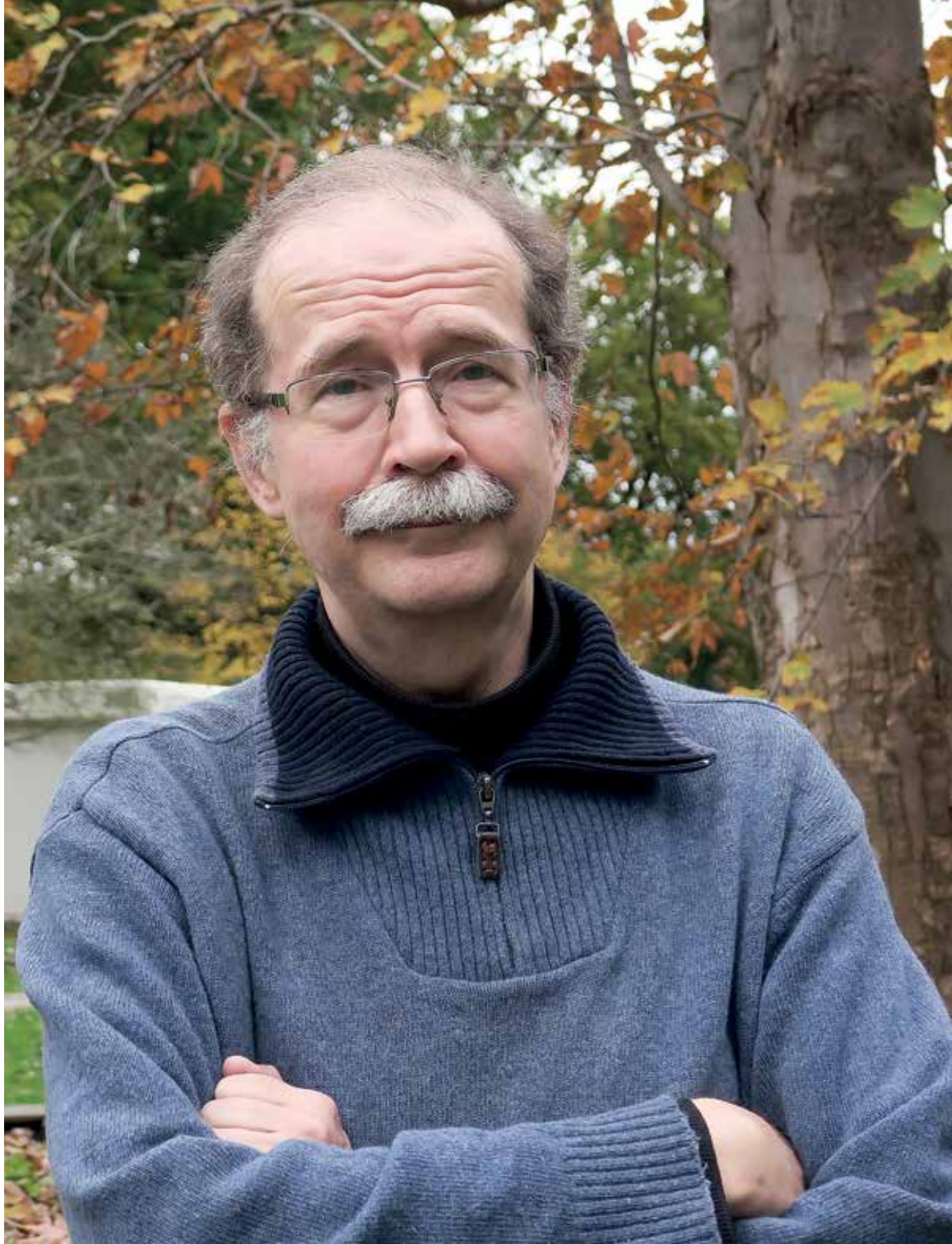
Fellow

Fellowship
November 2023–April 2024
July–October 2024

Home institution at time of application
Harvard University
Davis Center for Russian and Eurasian Studies
Faculty of Arts and Sciences
Cambridge, MA
USA

Cooperation Partners
Prof. Dr. Heiko Pleines
Forschungsstelle Osteuropa
an der Universität Bremen

Assoc. Prof. Dr. Michael Rochlitz
Oxford University
United Kingdom



Global World and Regress of Russia's Limited Access Order: Ways Out of the Crisis and Lessons for the Future

Twenty years ago, one could hardly imagine there would be a full-scale war in Europe. Nevertheless, in February 2022, the Russian army launched such a war against Ukraine, triggering one of the gravest crises in modern history. This project is an attempt to understand why such degradation of political and social institutions has become possible in Russia and what actions by internal and external actors can prevent similar processes in other countries. The project will focus on a political economy analysis of relationships between the main groups among the Russian elite and society over the past 30 years, as well as an analysis of the interactions of the Russian elite with external actors represented by international organizations, transnational companies, and foreign governments. One of the goals of the project is to show who and how—after the collapse of the Putin regime—could build a state in Russia that would be accountable to its citizens and capable of constructive cooperation with other countries. As a theoretical foundation, the project will use a limited-access orders framework elaborated in the late works of Nobel Laureate Douglass North combined with a varieties-of-capitalism approach. The project will employ large-scale empirical datasets collected by the HSE International Center for the Study of Institutions and Development in 2011–2021 in cooperation with prominent US and German scholars and will continue previous collaboration with researchers from Universität Bremen.

Assoc. Prof. Dr. Jens Oliver Zinn

Fellow

Fellowship
October 2023–May 2024

Home institution at time of application
University of Melbourne
School of Social and Political Sciences
Victoria
Australia

Cooperation Partners
Prof. Dr. Thomas Alkemeyer
Prof. Dr. Martin Butler
Universität Oldenburg

Towards a Sociological Theory of Risk Communication

Present-day societies are confronted with a growing number of crises from climate change to the recent coronavirus pandemic and the Ukrainian war. All these require legitimate political responses that include encouragement of public commitment, for example, to sustainable living, vaccination, and less use of fossil fuel and gas. However, successful responses require voluntary support or even enforced compliance with political measures. For democratic societies, public debate is central to provide a sense of legitimacy and support for state responses, but it is increasingly characterized by controversial debate, social divisions, and fragmentation. Therefore, social-risk communication has become a major concern to secure public compliance with recommendations and legislation. Risk communication experts have argued for broader public engagement that would foster better regulative outcomes. However, while there is already advice literature on good risk communication available, application and implementation are limited. Available knowledge lacks conceptual integration and the consideration of broader societal conditions and changes as well as an understanding of people's engagement with risk in everyday life. This fellowship revisits key social science theories on risk and discourses in the public sphere and reviews empirical research to enhance the understanding and practices of risk communication.

23 Postdoc Program

Dr. Stefanie Arndt
Associate Junior Fellow
July 2021–June 2024

Project Title
Snow Depth on Antarctic Sea Ice: A Big Unknown

Affiliation
Alfred-Wegener-Institut, Helmholtz-Zentrum für Polar- und Meeresforschung (AWI)
Bremerhaven
Germany

Dr. Go Ashida
Associate Junior Fellow
July 2020–June 2023

Project Title
Computation in the Auditory Periphery: Physiological Foundations and Comparative Modeling

Affiliation
Universität Oldenburg
Exzellenzcluster "Hearing4all"
Oldenburg
Germany

Jun. Prof. Dr. Katharina Block
Associate Junior Fellow
July 2020–June 2023

Project Title
Digitalization and Society: Do Social Transformations Call for New Theoretical Paradigms?

Affiliation
Universität Oldenburg
Institut für Sozialwissenschaften
Oldenburg
Germany

Cooperation Partner
Dr. Thorsten Peetz
Universität Bremen

Dr. Jan-Claas Dajka
Associate Junior Fellow
July 2022–June 2025

Project Title
Thresholds and Biodiversity—False Friends?

Affiliation
Helmholtz-Institut für Funktionelle Marine Biodiversität (HIFMB) an der Universität Oldenburg
Oldenburg
Germany

Dr. Marijke de Belder
Associate Junior Fellow
July 2020–January 2023

Project Title
The Morphology-Phonology Interface

Affiliation
Universität Oldenburg
Institut für Niederlandistik
Oldenburg
Germany

Dr. Jan Matti Dollbaum
Associate Junior Fellow
July 2020–June 2023

Project Title
Bottom-Up Policy Change in Autocracies

Affiliation
Universität Bremen
Research Centre for East European Studies
Bremen
Germany

Dr. Johan C. Faust
Associate Junior Fellow
July 2022–June 2025

Project Title
Fossil Remains of Glacial Ice Algae as a New Tool to Reconstruct Past Ice-Sheet Activity

Affiliation
MARUM – Zentrum für Marine Umweltwissenschaften der Universität Bremen
Bremen
Germany

Dr. Nicolas W. Jager
Associate Junior Fellow
July 2021–June 2024

Project Title
Social-Ecological Fit and Intergovernmental Cooperation in Federal Systems

Affiliation
Universität Oldenburg
Department of Ecological Economics
Oldenburg
Germany

Dr. Rosine Kelz
Associate Junior Fellow
July 2022–June 2025

Project Title
Environmental Political Thought for the Anthropocene

Affiliation
Universität Bremen
Institut für Interkulturelle und Internationale Studien
UNICOM
Bremen
Germany

Jun. Prof. Dr. Johanna Kuhlmann
Associate Junior Fellow
July 2022–June 2025

Project Title
Emotions and Social Policy

Affiliation
Universität Bremen
SOCIUM Forschungszentrum Ungleichheit und Sozialpolitik
Bremen
Germany

Dr. Sarah Lentz
Associate Junior Fellow
July 2021–June 2024

Project Title
Abolitionists at Home—Slaveholders Abroad?
The Involvement of People of German Origin in Slavery and the Slave Trade, 1700–1850

Affiliation
Universität Bremen
AG Frühe Neuzeit
Bremen
Germany

Dr. Kerem Gabriel Öktem
Associate Junior Fellow
July 2023–June 2026

Project Title
Autocratization and the Welfare State

Affiliation
Universität Bremen
SOCIUM
SFB 1342: Globale Entwicklungsdynamiken von Sozialpolitik
Bremen
Germany

Dr. Ekaterina Paustyan
Associate Junior Fellow
July 2023–June 2026

Project Title
Regional Dimension of Ukraine's Resilience and Post-War Reconstruction

Affiliation
Universität Bremen
Wirtschaftswissenschaft
Bremen
Germany

Dr. Thorsten Peetz
Associate Junior Fellow
July 2020–June 2023

Project Title
Digitalization and Society: Do Social Transformations Call for New Theoretical Paradigms?

Affiliation
Universität Bremen
SOCIUM Forschungszentrum
Ungleichheit und Sozialpolitik
Bremen
Germany

Cooperation Partner
Jun. Prof. Dr. Katharina Block
Universität Oldenburg

Dr. Ravi Ranjan
Associate Junior Fellow
July 2022–June 2025

Project Title
Temperature-Nutrient Interactions in Plants and Algae: When Do They Matter?

Affiliation
Helmholtz Institut für Funktionelle Marine Biodiversität (HIFMB) an der Universität Oldenburg
Oldenburg
Germany

Jun. Prof. Dr. Mandy Roheger
Associate Junior Fellow
July 2023–June 2026

Project Title
Ambulatory Assessment in Public Health Research

Affiliation
Universität Oldenburg
Department für Psychologie
Oldenburg
Germany

Dr. Juliane Schlesier
Associate Junior Fellow
July 2021–June 2024

Project Title
Promoting Teacher-Student Interaction in Achievement-Emotions Situations

Affiliation
Universität Oldenburg
Institut für Pädagogik
Oldenburg
Germany

Dr. Ricarda Schmidt-Scheele
Associate Junior Fellow
July 2022–June 2025

Project Title
Organizations in Transitions: Understanding the Interplay of Organizational Change and Sustainable Energy Transitions

Affiliation
Universität Oldenburg
Institut für Sozialwissenschaften
Oldenburg
Germany

Jun. Prof. Dr. Katharina Schuhmann
Associate Junior Fellow
July 2023–June 2026

Project Title
Processing and Comprehension of a Second Language in Adverse Listening Conditions

Affiliation
Universität Oldenburg
Institut für Germanistik
Oldenburg
Germany

Dr. Cassie Ann Short
Associate Junior Fellow
July 2023–June 2026

Project Title
Increasing the Validity of Event Related Potential (ERP) Biomarkers of Individual Differences through Individualized ERP-Parameterisation Techniques

Affiliation
Universität Oldenburg
Department für Psychologie
Oldenburg
Germany

Dr. Tim Ziemer
Associate Junior Fellow
July 2020–June 2023

Project Title
Interactive Sonification

Affiliation
Universität Bremen
Medical Image Computing Group
Bremen
Germany

Jun. Prof. Dr. Tyler Zoanni
Associate Junior Fellow
July 2023–June 2026

Project Title
Beyond Demographic Destiny

Affiliation
Universität Bremen
Institut für Ethnologie und Kulturwissenschaft
Bremen
Germany

Non-resident Fellowships

23

Prof. Dr. Oleksandr Fisun
Fellow
Co-funded by University Bremen
November 2022–April 2023

Project Title
The Puzzle of Post-Soviet Regime Change: Informal Institutions and the Origins of Competitive Politics

Home institution at time of application
V.N. Karazin Kharkiv National University
Department of Political Science
Charkiv
Ukraine

Cooperation Partner
Prof. Dr. Heiko Pleines
Universität Bremen

Prof. Dr. Natalia Kudriavtseva
Fellow
October 2022–May 2023

Project Title
Crossing the Borders and Balancing Boundaries: Language Choice and Identity-Building in Ukraine's Border Zones

Home institution at time of application
Kryvyi Rih State Pedagogical University
Kryvyi Rih
Ukraine

Dr. Volodymyr Kulyk
Fellow
August 2022–March 2023

Project Title
National Identity and Anti-Russian Sentiment in War-Time Ukraine

Home institution at time of application
National Academy of Sciences of Ukraine
Institute of Political and Ethnic Studies
Kyiv
Ukraine

Dr. Oleksandr Kruglov
Fellow
Co-funded by University Bremen
January 2023–March 2023

Project Title
Scientific Description of Criminal Cases from the Security Service of Ukraine (SBU) Archives against Former Police Officers and Other Accomplices of the German and Romanian Occupiers

Home institution at time of application
Independent
Beregevo
Ukraine

Dr. Artem Oliinyk
Fellow
August 2022–March 2023

Project Title
Controllable Transport of Quantum Vortices in Atomic Bose-Einstein Condensates for Quantum Sensors

Home institution at time of application
Taras Shevchenko National University of Kyiv
Kyiv
Ukraine

Dr. Lesia V. Smyrna
Fellow
October 2022–May 2023

Project Title
The Role of Social Traumatism in Provoking Artistic Discourse: War, Society, and Artistic Consciousness

Home institution at time of application
The Modern Art Research Institute of the National Academy of Arts of Ukraine (MARI)
Kyiv
Ukraine

Dr. Olena Uvarova
Fellow
August 2022–March 2023

Project Title
Human-Rights Oriented Model of Business Conduct in Times of Conflict

Home institution at time of application
Yaroslav Mudryi National Law University
International Lab on Business and Human Rights
Kharkiv
Ukraine

23 Arts & Literature

Emanuela Assenza

Artist in Residence

Fellowship
September 2023–January 2024

Home institution at time of application
Alanus Hochschule für Kunst und Gesellschaft
Alfter
Germany

Material Aesthetics: The Phenomena of Textures in Drawing

Since modernity, the artistic value of material in terms of texture has attracted little attention due to greater interest in an image's message. This project will look at the inherent value of material based on textures in drawing with the aim of developing an aesthetics of material in line with these questions:

- Properties of material: what is in the image when there is no form?
- Material-form dualism: to what extent does the nature of the texture create the form and how does the form emerge without design intention?
- What does the ability to perceive mean for grasping material properties?

The research project covers the realization of six large-scale drawings, descriptions of the phenomenological process and images, and a justification for a monistic understanding of material and form. The cornerstones of this research project can be described with the terms "atmosphere" (M. Seel), "aura," (W. Benjamin), "the inconspicous" (G. Figal), "looking through" (E. Alloa), and the "immanent tendencies" of material (Th. W. Adorno). Turning attention to textile phenomena of imagery without the intention of design actualization is a willingness to forego power. This aspect of the research project is of cultural and sociopolitical relevance at the junction of art and society.

Aladin Borioli

Artist in Residence

Fellowship
October2022–March 2023

Home institution at time of application
Independent
Bevaix
Switzerland

Cooperation Partner
Dr. Dorothea Brückner
Universität Bremen

Therianthropy

I will continue to work on the film Therianthropy. I will focus especially on chapters 3, 4, and 5, which, while not yet fully realized, are most strongly related to the residency program and the cognitive neuroinformatics research group I wish to collaborate with. More concretely, I will edit the film, particularly the footage we made last summer with Prof. Dr. Menzel during his fieldwork near Amöneburg (Germany), where we will also film again this summer before the residency starts. In addition, I will focus on developing experimental videos that I make with my analogue visual synthesizer.

Alongside this video work, I will interview scholars directly in Bremen but also abroad using online tools and continue working on the narrative. Finally, we will develop 3D models of flying bees under the influence of pesticides using data collected by Prof. Dr. Menzel. At the end of the residency, I would like to have a public screening of the film with the residency program members and other colleagues.

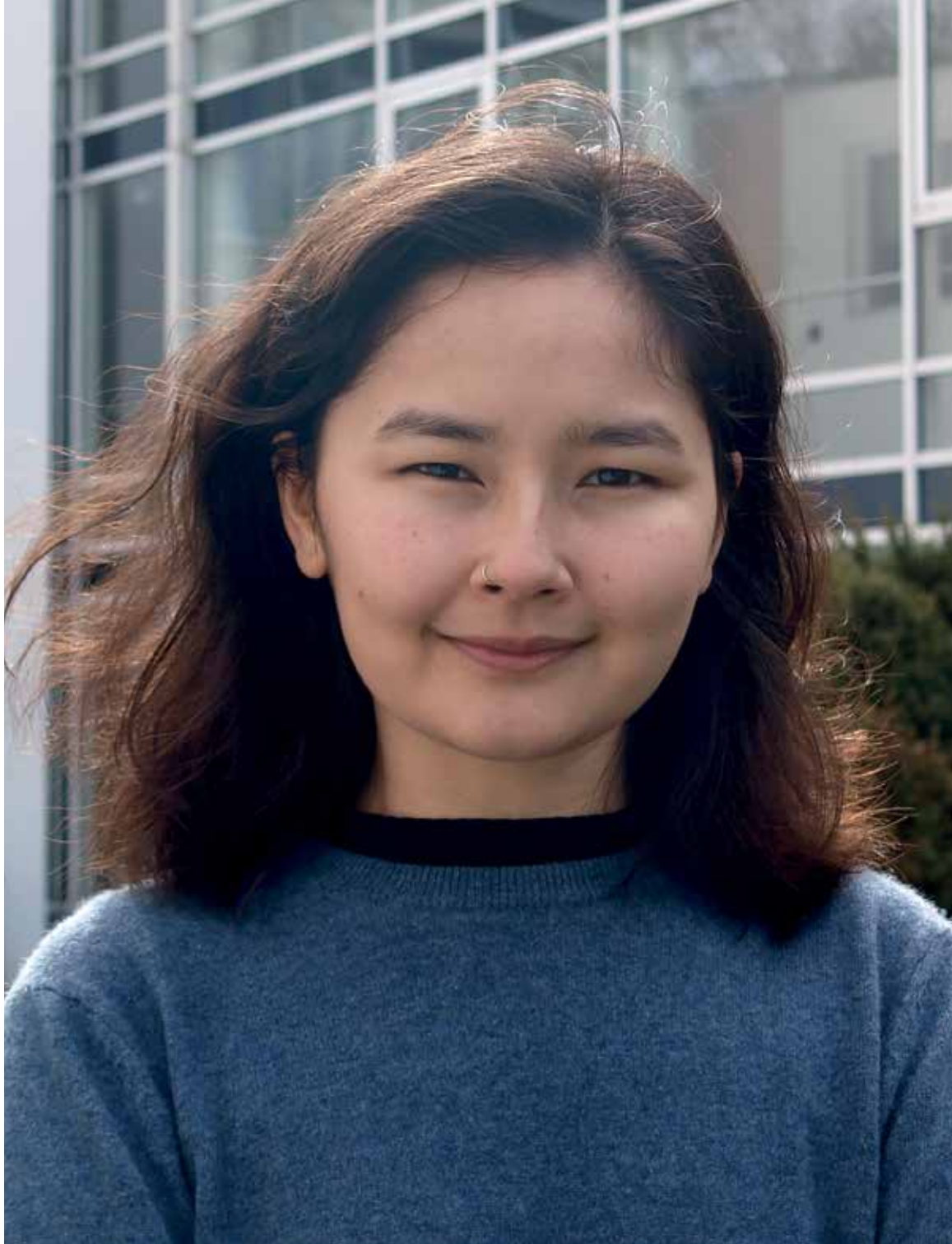
Parwana Haydar

Artist in Residence

Fellowship
March–May 2023

Home institution at time of application
Independent
London
United Kingdom

Cooperation Partner
Aneta Palenga
Städtische Galerie Delmenhorst



Gathering Childhood Memories from the Afghan Diaspora

Gathering Childhood Memories from the Afghan Diaspora is a film project that seeks to locate and collect memories of childhood amongst the Afghan Diaspora in Delmenhorst and Hamburg. Ultimately, the goal is to produce a film for showing at the Städtische Galerie Delmenhorst. I will use anthropological methods such as fieldwork that I conducted for my BA (Hons) in Anthropology and Persian. I will spend most of my time meeting local people and doing interviews to build trusting relationships with the people that I want to work with. I have already asked friends and family in Delmenhorst and Hamburg who have shown interest in the project. These include Moshtari Hilal, Shahrbanoo Sadaat, and Zamarin Wahdat, who are all Afghan artists and filmmakers that have already agreed to collaborate on the project. I see access as one of the biggest challenges in any art project and fieldwork. I believe that it is beneficial that I already have a network that will also help me translate when I need help understanding German. I have anthropological experience with fieldwork that I conducted during my bachelor's degree in anthropology. I believe I can surmount this challenge and I would be eager to try out the methods I have developed through years of filmmaking as well as years of studying anthropology. As an Afghan woman also fluent in Persian, which I have studied since childhood, and a university degree, I have insight into and understanding of the culture amongst diaspora Afghans that other people might not have.

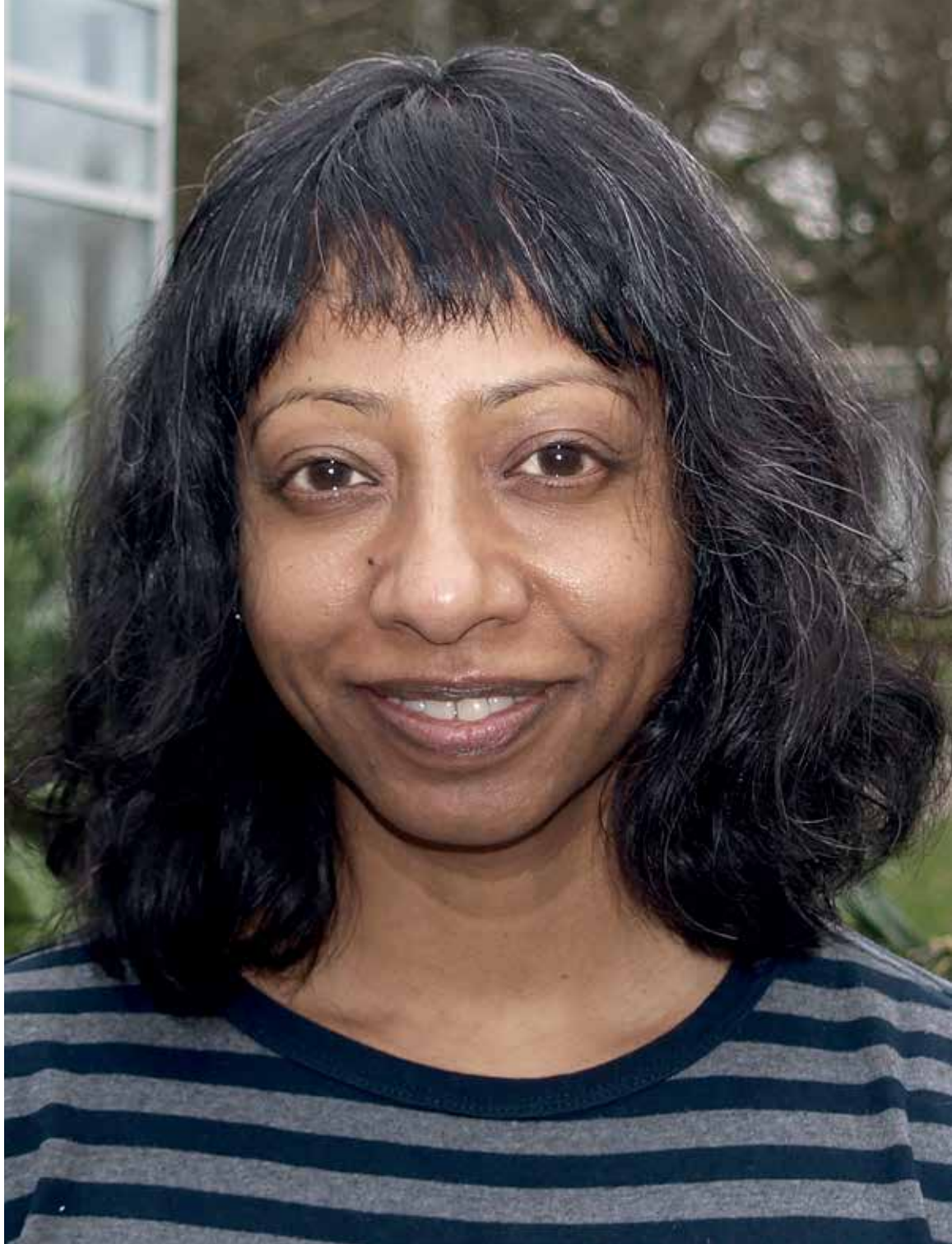
Dr. Susmita Mahato

Artist in Residence
ArtWaves project in cooperation with Helmholtz-Institut für Funktionelle Marine Biodiversität (HIFMB) an der Universität Oldenburg

Home institution at time of application
January 2023–April 2023

Location
Independent
Seattle, WA
USA

Cooperation Partners
Prof. Dr. Kimberley Peters
Dr. Silke Laakmann
Helmholtz-Institut für Funktionelle Marine Biodiversität (HIFMB) an der Universität Oldenburg



Water Book: Connecting to Marine Biodiversity through Poetry Comics

Water Book invites artists, scientists, and participants of all ages to experiment with collage and poetry comics to think with, in, under, between, and through water. The central aims of the project are to foster understanding of the importance of marine biodiversity, appreciate connections between ocean biomes and terrestrial counterparts, understand the threats facing marine life due to climate change and associated capitalist policy, and imagine futures of thriving ecosystems. There are three intertwined components:

1. A series of public conversations and workshops that connect local water issues to marine environments
2. A creative research project focused on the unique ecosystem of whale falls
3. A collaborative print project that weaves together the first two components.

The comics medium informs the project at every level: the dynamic and kinetic aspects of the medium make it well-suited to convey trans-corporeal marine realities and relations, while its approachable form is accessible to a broad range of people who may or may not be familiar with artistic processing. Moreover, integrating collage technique and poetic strategies into the comics medium invites representations of life that are many-headed, many-appendaged, and (simply put) made of many. Water Book emphasizes a necessarily communal, social, and systemic approach to understanding the ocean as a space that is in relation—as composed of organisms and processes that are vitally enmeshed.

Alexander Masters

Writer in Residence

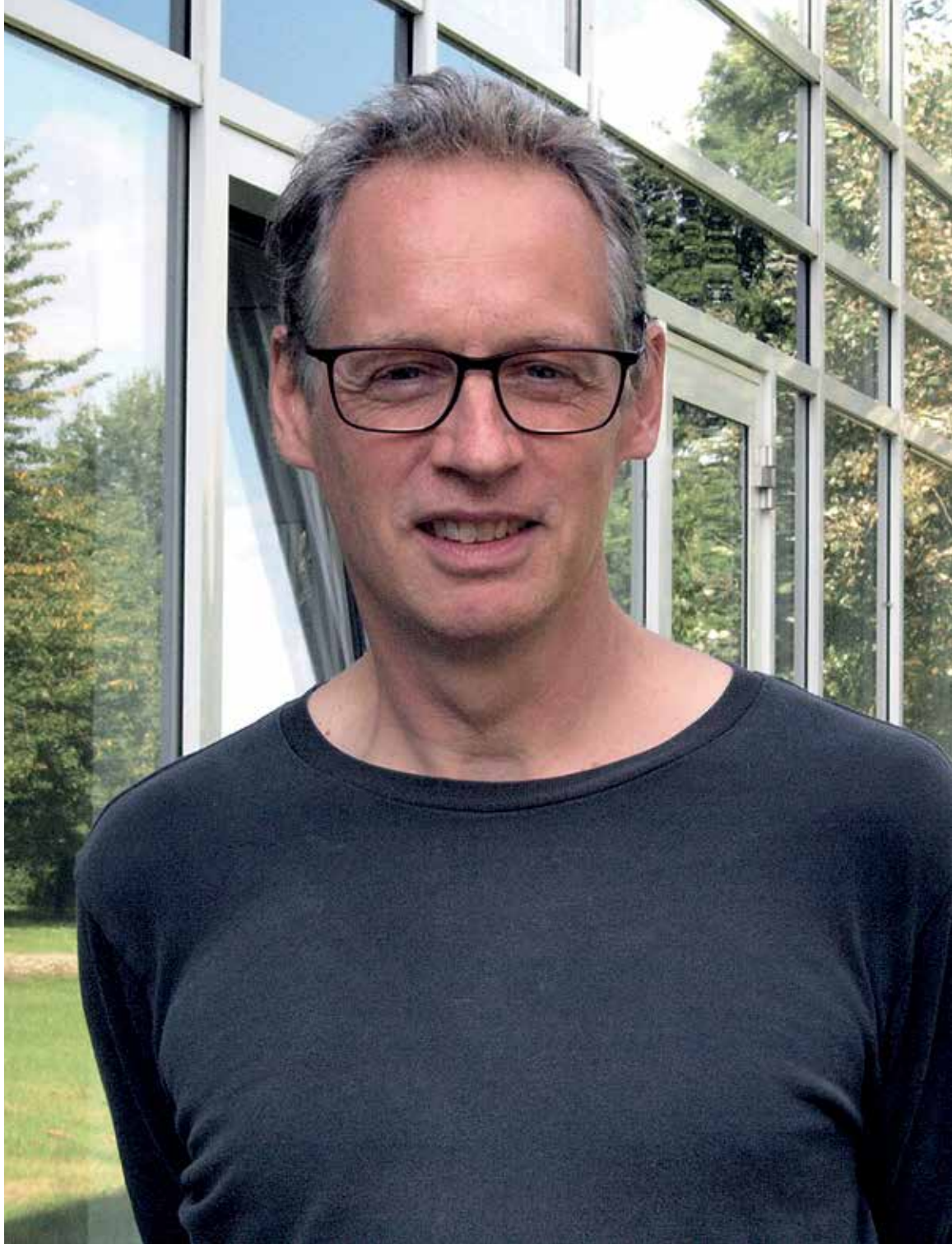
Fellowship

August 2023–April 2024

Home institution at time of application

Independent

United Kingdom



The First Patient: Novel, Ethical Ways for Patients to Finance and Participate in Neglected Clinical Research

The *First Patient* is a project in bioethics, patient activism and investigative science reportage. It will result in a book of non-fiction. It unites the scientific detective story of a search for a potential cancer treatment with the ethical dilemmas of human experiments, and the personal stories of three people, all hoping to be "the first patient" in the subsequent clinical trial. The *First Patient* is an investigation into moral ambiguity, the agonizing and broken pace of drug-development and the scientific frontiers of immunology and virotherapy. The book will explore science and bioethics using creative non-fiction, interviews and cartoons, as written by a biographer, illustrator and memoirist.

It is also a personal story: in 2012 I ran a campaign that raised around £1.5 million to rescue a clinical trial of a neglected therapeutic virus, at Uppsala University, to help a friend of mine suffering from pancreatic neuroendocrine cancer.

To non-specialists, the idea of a virus that specifically targets cancer sounds too good to be true: a divine gift. To virologists and cell biologists it makes perfect sense. The *First Patient* investigates two profound and wide-ranging medical problems in the very particular context of the Uppsala virus. One is scientific: how researchers and clinicians engineer viruses to fight disease. The other, political and ethical: how patients can cooperate in this process, to help fund, direct and salvage promising, peer-reviewed research.

Prof. Frederick J. Reiken

Writer in Residence

Fellowship
March 2023–August 2023

Home institution at time of application
Emerson College
Department of Writing, Literature & Publishing
Boston, MA
USA

Science and Fiction and the Anthropocene

I am in the beginning phase of a new novel, one that builds on some of the scientific themes from my previous novel, *Day for Night*, which was a finalist for the Los Angeles Times Book Prize and featured a marine biologist as one of its protagonists, in narrative contexts related to endangered marine mammals as well as coral reef ecology. Though my new project is still in its nascent stage, I am drawn again to some of the same questions, with the same two indicators of ocean health—coral reefs and marine mammals—in the foreground of the narrative. I intend to explore questions related to what possibilities remain for the preservation of these and other archetypal, wonder-inducing life forms, as we face the sobering understanding of current global warming trends and other effects of what scientists are now calling the Anthropocene epoch. As with my prior novels, I will be open to shifts in my plan as I make new discoveries in the writing process.

Isaac Yuen

Writer in Residence

Fellowship
January–May 2023

Home institution at time of application
Independent
Berlin
Germany

Our Museum of the Future: A Short Story Collection

Our Museum of the Future, a short story collection in progress comprises a series of environmental narratives exploring science, science practitioners, and their subjects of study. Ranging across multiple disciplines, each story is conceived as part of a larger ensemble, embodying the notion that science in the twenty-first century is a collaborative venture, filled with voices spanning perspectives. Embracing the flexible and fragmentary quality inherent in short fiction, *Our Museum of the Future* will be an experiment in form, delivering narrative through field notes, abstracts, and symposium schedules, all in the service of exploring the outer workings of science and the inner workings of scientists—the institutional barriers and existential crises, the personal motivations and doubts. Drawing stylistic inspiration from short fiction masters (Italo Calvino, Donald Barthelme, George Saunders) and nature writers (Brian Doyle, Amy Leach, Megan Mayhew Bergman), the collection will also seek to forge connections between the human and non-human world through tales that brush up against the sublime, that liminal space containing both the horror and beauty of lived experience, ever more relevant in this age of climate grief and systemic breakdown.

23 Future Fellows

Prof. Dr. Janine Rogers

Fellow

Fellowship
February–May 2024

Home institution at time of application
Mount Allison University
Department of English Literature
Sackville
Canada

Cooperation Partners
Prof. Dr. Anton Kirchhofer
Dr. Anna Auguscik
Universität Oldenburg

The Nature of Knowledge: Evolving Humanities and Global Challenges in Museums of Science

Museums of natural history and other museums of science are where we learn about the world and our place in it. We now live in a time of global social and environmental challenges that will require complex solutions. These solutions will not be purely scientific: the problems and solutions are located at the point at which science and technology meet culture and society. Therefore, the arts and humanities are a critical part of understanding these issues. In museums of science, especially natural history museums, there are unique opportunities to connect the sciences, arts and humanities. This collaborative research program considers medieval book culture as a meeting place, both historically and in contemporary museumship, for connecting the humanities and the sciences. Medieval manuscripts were literally "books of the world": they were made of animals, plants and minerals. Medieval people thought of books as not only pages with words on them, but also as a kind of scientific instrument—a thinking device—for understanding our existence. To read was to connect to the world physically as well as mentally. We need this kind of "ecological thinking" now to raise science literacy and awareness around global challenges (climate change, migration, border conflicts, food security, species extinction, decolonization and indigenization). Museums of science can rediscover medieval ways of thinking, as seen in manuscript culture, to help us understand and respond to our new world.

Prof. Dr. Fumio Inagaki

Fellow
Co-funded as the laureate of the Philipp Franz von Siebold Award 2023, sponsored by the German Federal President

Fellowship
July–September 2024

Home institution at time of application
Japan Agency for Marine-Earth Science and Technology (JAMSTEC)
Yokohama, Sendai
Tohoku University
Japan

Cooperation Partners
Prof. Dr. Kai-Uwe Hinrichs
MARUM – Zentrum für Marine Umweltwissenschaften
Universität Bremen

Prof. Dr. Wolfgang Bach
Fachbereich Geowissenschaften
Universität Bremen

Geobiology on Carbon Cycle Management in the Subseafloor Biosphere

Geobiology, the fusional scientific discipline to understand dynamic interactions between life and the Earth's physical environment, is becoming increasingly significant for carbon and energy cycle management, with its potential to mitigate global warming and ultimately create sustainability in human society. One of the potential ways for carbon dioxide reduction (CDR) is to utilize the vast space and structure of the subsurface environment, known as carbon dioxide (CO_2) capture and storage (CCS).

The highly fractured oceanic crust is referred to as *subseafloor ocean*, and it represents Earth's most prominent subseafloor permeable space, where humanity could store the necessary amount of CO_2 and fix it as mineral carbonates semi-permanently. Almost all subseafloor environments currently considered for CCS are in the deep biosphere where microorganisms reside.

This project aims to conduct rock-fluid-life interaction experiments under the assumption of various oceanographic and geological settings for CCS and to understand how subseafloor microbial ecosystems contribute to the carbon transformation and mineralization processes in response to the CO_2-rich fluid injection into crustal environments.

Dr. Anita Cymann-Sachajdak

Junior Fellow

Fellowship
July 2024–April 2025

Home institution at time of application
Gdansk University of Technology
Institute of Energy Conversion and Storage
Poland

Cooperation partner
Prof. Dr. Gunther Wittstock
Universität Oldenburg

Investigation of Solid-Electrolyte Interphases in Sodium-Ion Batteries by Scanning Electrochemical Microscopy and X-Ray Photoelectron Spectroscopy

The demand for portable gadgets and environmentally friendly transportation is skyrocketing, leading to a booming battery industry. While lithium-ion batteries have been the technology of choice, concerns about limited resources and ethical mining practices are driving the search for alternatives. Sodium-ion batteries (SIBs), due to the abundance of sodium, now offer a promising solution. However, SIBs pose challenges due to the stability of their electrode-electrolyte interface.

In this project I delve into the fascinating world of battery interfaces and seek to unlock their secrets and improve battery performance. Using advanced techniques like scanning electrochemical microscopy (to prepare maps of the battery's electrode surface) and X-ray photoelectron spectroscopy to find out what grows there, I aim to understand the intricate chemistry of the interface. My objectives include characterizing the interface, pinpointing degradation mechanisms, developing strategies for stabilization, and evaluating performance enhancements. I want to answer the question: Why is the battery losing its capacity over time and how can we avoid this?

I want my research to pave the way for next-generation batteries that are more efficient, longer-lasting, and environmentally sustainable. By unraveling the mysteries of battery interfaces, we can unlock the true potential of energy storage and power the future with clean and reliable technologies.

Asst. Prof. Dr. Christine Andrä

Junior Fellow

Fellowship
September 2024–June 2025

Home institution at time of application
Rijksuniversiteit Groningen
The Netherlands

Cooperation Partner
Prof. Dr. Klaus Schlichte
Universität Bremen

Problematizing War in International Politics: From Critique to Reconstruction of the Modern Problem of War

While the condemnation of war for moral and religious reasons has a long history, the understanding that humans need not passively accept war's existence but can take practical action against it has only developed more recently. Emerging in the nineteenth century, it became consolidated in the first half of the twentieth and today, it is taken for granted within the international politics of the Global North/West.

As existing research has shown, this understanding is an historical achievement, yet it also entails several dilemmas: it makes some wars problematic while normalizing other wars; it ascribes a capacity for taking action against war to some people, but not to others; and it occludes how modernity was brought about inter alia through war and violence. These dilemmas are founded upon discriminatory and exclusionary civilizational ideas. Therefore, my project studies the history of the understanding of war as a problem against which humans can act not only to question some of its constituent parts, but also to enable its reformulation.

The project focuses on war as a problem of deviance from behavioral norms that can be addressed by means of empirical social-scientific and humanistic knowledge. Drawing on multi-sited archival research, it shows how this logic of deviance, and this knowledge were historically both co-constituted and contingent. These insights take us from the critique of the modern problem of war to a more inclusive reconstruction.

Dr. Frederico Ozanam Câmara

Artist in Residence

Fellowship
May–September 2024

Home institution at time of application
Independent
Lagoa Santa MG
Brazil

The Aesthetic Experience of Science

How important is it to have an aesthetic experience of science? What contemporary scientific research will provide material for an aesthetic experience of science? Those questions will guide this fellowship, which will be an artistic exploration on the aesthetic experience of science in scientific institutions located in Northwest Germany, and on the role of drawing and photography in historical and contemporary science.

For this exploration, I will pursue four activities:

1. A walk in the forest is a non-traditional method of research in which the artist and the scientist exchange ideas during a walk in an informal setting, different from the formality of a symposium.
2. A visual ethnography of contemporary science will create artworks in photography that explore the aesthetic experience of science in objects, spaces, people, and events at scientific institutions in Northwestern Germany (Bremen, Bremerhaven, Delmenhorst, Hamburg, Hanover, Oldenburg, Osnabrück, Wilhelmshaven).
3. Drawing on Science will create drawings, in response to my observations on the walks in the forest and the visual ethnography.
4. Library research and writing on the historical and contemporary instances of the scientific image (in photography and drawing), and their role in forming and changing our relationships with science and our natural environment.

Karen Fowler

Writer in Residence

Fellowship
September–December 2024

Home institution at time of application
Independent
USA

A Novel Examining the Possible Effects of De-Extinction

It's early days so everything is still vague. But I'm envisioning a novel in three parts, all around the issues of extinction and de-extinction, set around the Monterey Bay.

Part 1: the past. Julia Platt was the mayor of Pacific Grove in the early 1900s. She had a PhD in embryology from Freiburg. She turned to politics when, as a woman, she was unable to move forward professionally. At that time, the California sea otter was believed to have been hunted to extinction. Her policies around marine conservation allowed the species, not quite gone as it turned out, to make a comeback. This part will be done by the time I arrive.

Part 2: the present. Beth Shapiro works at UCSC as a professor of ecology and evolutionary biology. Her specialties appear to be speciation and extinction; she is considered an expert in ancient DNA. For this current section, I would feature a fictional woman, but her work would be similar to Shapiro's. I'm particularly interested in the ways she recovers ancient DNA.

Part 3: the future. I'm envisioning a sort of Frankenstein story. A woman is working on a de-extinction project. Early attempts have created only stunted approximations of the original. As techniques are refined, it is hoped the results will be better. But what to do with the sorry creatures already created?

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