

Fellows

2016



Hanse-Wissenschaftskolleg
Institute for Advanced Study



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Fellows 2016



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Institute for Advanced Study



Brain

- 6 | Prof. Dr. Laurel Carney
- 8 | Assoc. Prof. Dr. Wai-Tat Fu
- 10 | Dr. Franz-Benjamin Mocnik
- 12 | Prof. Dr. Magdalena Götz
- 14 | Prof. Dr. Peter Haddawy
- 16 | Prof. Dr. Michael Heinemann
- 18 | Dr. Ronit Sharon
- 20 | Prof. Dr. Dror Sharon
- 22 | Prof. Dr. Marc Schönwiesner
- 24 | Dr. Kirsten Weber



Earth

- 28 | Prof. Dr. Carol Arnosti
- 30 | Dr. Hongyan Bao
- 32 | Dr. Jacopo Dal Corso
- 34 | Prof. Dr. Gregor P. Eberli
- 36 | Assoc. Prof. Dr. Mohamed A. Farag
- 38 | Prof. Dr. Sean P. S. Gulick
- 40 | Dr. Mati Kahru
- 42 | Prof. Dr. Carina B. Lange
- 44 | Prof. Dr. James W. Moffett
- 46 | Assoc. Prof. Dr. Vera Pospelova
- 48 | Prof. Dr. Karsten Reise
- 50 | Assoc. Prof. Dr. Justin B. Ries
- 52 | Assoc. Prof. Dr. Sylvia Sander
- 54 | Dr. Gabriel A. Singer
- 56 | Prof. Dr. Roger Summons
- 58 | Dr. Maria Vernet
- 60 | Prof. Dr. Alexandra Worden
- 62 | Prof. Dr. Mikhail V. Zubkov



Energy

- 66 | Prof. Dr. Stefan Heinz
- 68 | Prof. Dr. Lucy Pao
- 70 | Ass. Prof. Dr. Amretashis Sengupta




Society

- 74 | Assoc. Prof. Dr. Tamer Amin
- 76 | Prof. Dr. Margarita Balmaceda
- 78 | Dr. Sergiu Buscaneanu
- 80 | Dr. Srikumar Chattopadhyay
- 82 | Dr. Jean-Claude Dreher
- 84 | Dr. Seongmin Park
- 86 | Prof. Dr. Steffen Hillmert
- 88 | Prof. Dr. Otto Kallscheuer
- 90 | Ass. Prof. Dr. Clémence Ledoux
- 92 | Prof. Dr. Christian Leuprecht
- 94 | Prof. Dr. Lucia Quaglia
- 96 | Dr. Thierry Ribault



Arts & Humanities

- 100 | Tammam Azzam
- 102 | Natalie Grenzhaeuser
- 104 | Nadira Husain
- 106 | Janet Laurence
- 108 | Julia Schnittger
- 110 | Adjunct Ass. Prof. Dr. Elisa Tamar Albert
- 112 | Tobias Ginsburg
- 114 | Assoc. Prof. Dr. Elisabeth-Ann Sheffield
- 116 | Assoc. Prof. Dr. Edward Schwarzschild



Outlook

- 120 | Prof. Dr. Hong Young Yan
- 122 | Assoc. Prof. Dr. Iliana Baums
- 124 | Dr. Haley Cawthra
- 126 | Prof. Dr. Traian Dumitrica
- 128 | Prof. Dr. Kathryn Edwards
- 130 | Nicole Schuck
- 132 | Rebekka Kricheldorf



2016 Brain



Prof. Dr. Laurel Carney

HWK Fellow

Brain

Fellowship period

01.06.16 - 30.11.16

01.06.17 - 31.07.17


Home institution

University of Rochester
Biomedical Engineering and
Neurobiology & Anatomy
Rochester, New York
USA

Cooperation partner

Prof. Dr. Georg Klump
University of Oldenburg





Physiological, perceptual, and computational modeling studies of temporal fine-structure and envelope cues in the Mongolian gerbil

A number of recent studies in human listeners suggest that one effect of common forms of hearing loss is a change in the ability to use different features of sounds. This question is important to improve our understanding of the huge effect of even mild hearing loss on the ability to detect and identify complex sounds, such as speech, in the presence of background noise. In particular, the ability to use the detailed timing of sound waveforms (i.e. “fine-structure”), as opposed to the slower fluctuations in amplitude (i.e. “envelopes”), has been hypothesized to change with hearing loss. We will study physiological responses in the auditory regions of the gerbil brain and compare neural sensitivity

to the already established perceptual abilities of these animals. My contributions to the study will be to participate in the physiological experiments and to help develop computer models for the responses of brain cells. These models can be used to test hypotheses concerning the roles of these two types of features in perception. The results of this study will improve our understanding of how complex sounds are encoded by auditory brain cells in healthy animals and in animals with hearing loss. My recent experience in a study that used responses of human listeners to identify the roles of these different sound features for detection of signals in a noisy background will be useful for the proposed work.

Assoc. Prof. Dr. Wai-Tat Fu

HWK Fellow

Brain

Fellowship period

01.03.16 - 30.05.16

Home institution

University of Illinois at Urbana-Champaign
Department of Computer Science
and Beckman Institute
Urbana, Illinois
USA

Cooperation partners

Prof. Dr. Christian Freksa
Dr. Holger Schultheis
Dr. Thomas Barkowsky
University of Bremen

Dr. Thora Tenbrink
Bangor University





Developing Computational Cognitive Models of Remote Spatial Reasoning

The proposed research aims at understanding the nature of the cognitive computations involved in a Remote Spatial Reasoning (RSR) task, in which two persons remotely communicate to perform spatial reasoning. In an RSR task, two persons process and exchange spatial information (e.g., from a map) remotely to find a solution (e.g., identify a location), make inferences (e.g., relative locations of two points), or solve problems (e.g., path planning). Given that the persons need to incrementally transform the representations of spatial information between those in external visualizations and internal memory, as well as between perceptual and linguistic forms, the task is ideal for the study of the nature and computational properties of human spatial representations. In

particular, the research will focus on developing computational cognitive models to characterize the role of qualitative reasoning in an RSR task, and the extent to which visualizations will moderate qualitative reasoning and communication. The models will be developed based on a cognitive architecture, which serves as a general theoretical framework governing the representations and processes of spatial representations. It is expected that the research will lead to extensions of existing cognitive architectures to account for the processes that emerge from spatial reasoning and communication, and lead to a research paradigm that enhances our understanding of the nature of human spatial reasoning.

Dr. Franz-Benjamin Mocnik

HWK Twin Fellow of Assoc. Prof. Dr. Wai-Tat Fu
Brain

Fellowship period

01.03.16 - 28.04.16


Home institution

Technische Universität Wien
Department of Geodesy and Geoinformation
Vienna
AUSTRIA

Cooperation partner

Assoc. Prof. Dr. Wai-Tat Fu
Hanse-Wissenschaftskolleg





Developing Computational Cognitive Models of Remote Spatial Reasoning

The proposed research aims at understanding the nature of the cognitive computations involved in a Remote Spatial Reasoning (RSR) task, in which two persons remotely communicate to perform spatial reasoning. In an RSR task, two persons process and exchange spatial information (e.g., from a map) remotely to find a solution (e.g., identify a location), make inferences (e.g., relative locations of two points), or solve problems (e.g., path planning). Given that the persons need to incrementally transform the representations of spatial information between those in external visualizations and internal memory, as well as between perceptual and linguistic forms, the task is ideal for the study of the nature and computational properties of human spatial representations.

In particular, the research will focus on developing computational cognitive models to characterize the role of qualitative reasoning in an RSR task, and the extent to which visualizations will moderate qualitative reasoning and communication. The models will be developed based on a cognitive architecture, which serves as a general theoretical framework governing the representations and processes of spatial representations. It is expected that the research will lead to extensions of existing cognitive architectures to account for the processes that emerge from spatial reasoning and communication, and lead to a research paradigm that enhances our understanding of the nature of human spatial reasoning.

Prof. Dr. Magdalena Götz

OLB Fellow

Brain

Fellowship period

15.11.16 - 30.11.16


Home institution

Helmholtz Zentrum München
German Research Center
for Environmental Health
Institute of Stem Cell Research
Munich
GERMANY

Cooperation partner

Prof. Dr. Reto Weiler
Hanse-Wissenschaftskolleg





Die besonderen Stammzellen unseres Gehirns: Bildung neuer Nervenzellen nach Hirnverletzungen mit Hilfe der Stützzellen

Dass das Gehirn vor allem aus Nervenzellen besteht, die für die Weiterleitung von Reizen zuständig sind, ist allgemein bekannt. Es gibt aber noch eine weitere Art von Zellen im Gehirn, die lange auch durch die Fachwelt unbeachteten sogenannten Gliazellen. Unbeachtet, denn den Gliazellen wurden nur einfache Stütz- und Ernährungsfunktionen zugeschrieben.

Frau Professor Götz fand aber heraus, dass Gliazellen viel mehr sind als nur eine Art Gerüst:

Während der Entwicklung des Gehirns haben Gliazellen die Funktion von Stammzellen, aus denen verschiedene Zellarten hervorgehen, unter anderem die Nervenzellen des Gehirns. Was aber passiert im erwachsenen Gehirn? Ist es möglich, dass sich auch im reifen Gehirn noch neue Nervenzellen bilden?

Nach Verletzungen der Hirnsubstanz vermitteln Gliazellen zwar die Wundreaktion, können aber beim Menschen abgestorbene Nervenzellen nicht ersetzen. In anderen Organismen, beispielsweise Zebrafischen, können die Gliazellen aber genau das – nämlich die Bildung neuer Nervenzellen übernehmen!

Können wir diese Funktion der Gliazellen, also die Neubildung von Nervenzellen, auch beim Menschen aktivieren? Für die Behandlung von Patienten mit Schlaganfällen, Schädel-Hirn-Traumata oder anderen Schädigungen des Gehirns, wäre das ein großer Schritt. Magdalena Götz berichtet über die neuesten Ergebnisse ihrer Forschung zu diesem spannenden Thema.

Prof. Dr. Peter Haddawy

HWK Fellow

Brain

Fellowship period

27.06.16 - 31.12.16

01.06.17 - 31.08.17

Home institution

Mahidol University

Faculty of Information and
Communication Technology

Bangkok

THAILAND


Cooperation partners

Prof. Dr. Christian Freksa

Prof. Dr. Ron Kikinis

University of Bremen





Intelligent Environments Supporting Learning and Decision Making in Complex Dynamic Medical Domains

The proposed work on intelligent environments for learning and decision making in complex dynamic medical domains will be approached from two perspectives. Work on Intelligent Surgical Training Systems will seek to help realize the potential of surgical simulation to revolutionize the teaching of surgery. While simulation has the promise to address numerous challenges facing medical schools, current simulation environments have not yet fully realized this promise due to the lack of intelligence in the simulations. We will address teaching of psychomotor skills by developing techniques to objectively assess surgical procedures, outcomes, and the relation between the two and to use this to generate tutorial feedback. We will address teaching of decision making by developing student modeling techniques and automated pedagogical strategies to teach pre-operative and intra-operative decision making. Work on Dynamic Model Construction for Situation Awareness in Crowdsourcing for Disease Surveillance seeks to leverage the availability of smartphones and network coverage in developing countries to address the problem of rapidly and precisely detecting disease outbreaks. We will develop techniques to automatically construct ecological niche models for vector borne diseases to perform integration and interpretation of crowdsourced data.

Prof. Dr. Michael Heinemann

HWK Fellow

Brain

Fellowship period

01.04.16 - 29.07.16

Home institution

The University of Music

Carl Maria von Weber

Dresden

GERMANY

Cooperation partner

Prof. Violeta Dinescu

University of Oldenburg





Beethoven Diskursivieren

Über Musik zu schreiben, ist weithin mit der Schwierigkeit behaftet, eine Terminologie zu verwenden, die mit der sinnlichen Erfahrung wenig konvergiert: ein Problem nicht nur allgemein eines Medienwechsels vom Klang zur Schrift, sondern auch einer Fachsprache, die „Musik“ als „Text“ versteht und für die Beschreibung von Aufführungssituationen, erst von klanglichen Eindrücken bislang nur wenig Begriffe bereithält. Gerade im Fall des Spätwerks von Beethoven wird diese Differenz zwischen Studien zur subtilen kompositorischen Arbeit und einem ideengeschichtlichen Gehalt von Musik – einer Differenz, die als Gegenüberstellung von Mitteln und Gegenstand beschrieben werden kann – besonders deutlich. Das Ausweichen in Biographik (und mitunter

naiver Hermeneutik) kann jedoch ebenso wie die Flucht in die Metaphorik eine Lösung sein, da sich hier – oft unreflektierte – Fiktion vom Werk entfernt und damit zugleich vom Anspruch einer Wissenschaftlichkeit, sofern diese ein Minimum an Objektivierbarkeit gewähren können soll. Ziel des Projekts ist es, diese Lücke zu schließen und jenseits des musiktheoretischen Jargons eine Sprache zu entwickeln, mit der sich der Gegenstand eines Musikstücks – als ein im Notentext mit kompositorischen Mitteln fixiertes sinnliches Ereignis – diskursiv fassen lässt: als Entwurf einer Narration, die den klanglichen Eindruck einer Komposition wie ihre Dramaturgie, aktualisiert in der performativen Repräsentation, zum Ausgangspunkt nimmt.

Dr. Ronit Sharon

HWK Fellow

Brain

Fellowship period

01.07.16 - 30.09.16


Home institution

Hadassah-Hebrew University
Faculty of Medicine
Jerusalem
ISRAEL

Cooperation partners

Prof. Dr. Christiane Richter-Landsberg
Prof. Dr. Karl-Wilhelm Koch
University of Oldenburg





Alpha-Synuclein and lipid signalling in myelination: in health and disease

This application focuses on studying the associations between Alpha-Synuclein protein; a specific fraction of brain lipids, present in myelin sheath that cover axons of neuronal cells; and the myelin forming cells, e.g., oligodendrocytes. We plan to study the effect of Alpha-Synuclein expression on the expression levels of other gene in oligodendrocytes. We expect that identified changes in gene expression following Alpha-Synuclein expression may provide clues regarding genes and signals that associate with neurodegeneration, in addition to normal mechanisms of neuronal development and maturation of oligodendrocytes in the healthy brain. Elucidating the role of neuronal

Alpha-Synuclein in communicating with oligodendrocytes and synthesis of myelin is critical for the development of novel strategies for treatment. The elucidation of specific pathways and their relevance to the normal (physiologic) function and pathogenic conditions in oligodendrocytes, will be performed in collaboration between Profs. Drs. Christiane Richter Landsberg and Karl Wilhelm Koch from the Oldenburg University and Dr. Ronit Sharon, from the Hebrew University. This collaboration is built upon shared interests in elucidating the biochemical, cellular and molecular biology aspects of neuronal function and dysfunction in the mammalian brain.

Prof. Dr. Dror Sharon

HWK Fellow

Brain

Fellowship period

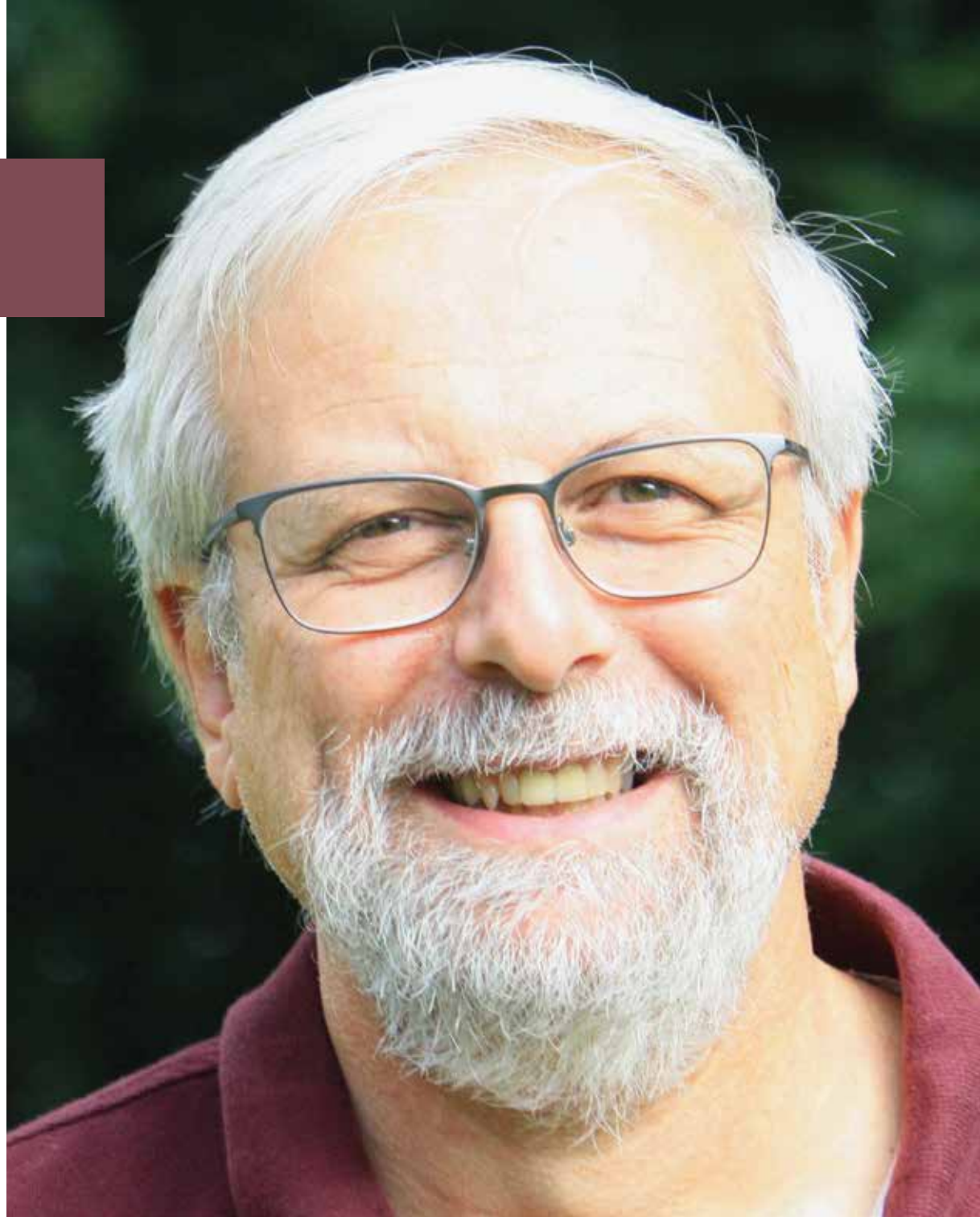
01.08.16 - 30.09.16

Home institution

Hadassah-Hebrew University Medical Center
Department of Ophthalmology
Israeli Society for Vision and Eye Research (ISVER)
Jerusalem
ISRAEL

Cooperation partner

Prof. Dr. Karl-Wilhelm Koch
University of Oldenburg





Genetics and Therapy of Blindness due to Inherited Retinal Diseases

Inherited retinal degeneration is one of the most common causes of blindness in the young population with no available cure for the disease. The disease can be caused by mutations in a very large number of genes (at least 250) and is considered the most heterogeneous genetic disease in humans. Since 2002 my research group studies this set of diseases with the following major aims:

1. Identification of genes causing retinal degenerative diseases.
2. Studying the function of retinal proteins encoded by identified retinal disease genes.
3. Developing therapy for specific types of inherited retinal diseases.

We recruited so far over 1500 Israeli and Palestinian families with retinal diseases and identified the causative genes in about 40% of families. In many families we identified novel genes as the cause of disease. One of which, FAM161A, is the most common cause of retinal degeneration in Israel. We have recently established a mouse model for this disease that is being treated by the gene therapy approach as a first step towards treating human patients. In addition, we have recently identified GUCY2D as the major causes of cone-rod degeneration in the Israeli population. In a follow-up study, together with Prof. Karl Koch of Oldenburg University, we are studying the biochemical aspects of the identified mutations. Our hope is that our studies will enable us to restore vision in human patients in the near future.

Prof. Dr. Marc Schönwiesner

HWK Fellow

Brain

Fellowship period

09.12.15 - 24.01.16


Home institution

Université de Montréal
Department of Psychology
Montréal, Quebec
CANADA

Cooperation partner

Prof. Dr. Stefan Debener
University of Oldenburg





In-Ear Brain-Computer Interface / Near-Infrared Spectroscopy of Auditory Cortex

Im Projekt 1 soll ein miniaturisiertes Brain-Computer Interface Geräte zur Messung und Verarbeitung von elektrischen Hirnsignalen im Gehörgang entwickelt werden. Ein solches Gerät ermöglicht Anwendungen im Bereich der personalisierten Medizin (durch kontinuierliche Messung von Hirn- und Körperfunktionen) und der Hörgeräteentwicklung. Das HWK-Fellowship ermöglicht die Testung eines Prototypen und die Optimierung der EEG-Messung im Gehörgang. In Projekt 2 soll Nahinfrarotspektroskopie

(NIRS), ein nicht-invasives bildgebendes Verfahren, zur Messung von Aktivität im menschlichen Hörkortex verwendet werden. NIRS erlaubt die zeitlich hochaufgelöste Messung der durch Nervenaktivität hervorgerufenen Blutzufuhr zum Gehirn. Diese Antwort liegt auch der funktionellen Magnetresonanztomographie zugrunde. Ein besseres Verständnis der Form und Variabilität dieser Antwort im Hörkortex würde die Auswertung von fMRT-Daten deutlich verbessern.

Dr. Kirsten Weber

HWK Junior Fellow

Brain

Fellowship period

01.06.15 - 31.03.16


Home institution

Max Planck Institute for Psycholinguistics
Department of Neurobiology of Language
Nijmegen
THE NETHERLANDS

Cooperation partners

Prof. Dr. Esther Ruigendijk
Prof. Dr. Jochem Rieger
University of Oldenburg





Predictive Influences on Language Processing: An fMRI Connectivity Study

Language is a core part of the human experience. It engulfs our everyday life and enables communication and thought. Language processing is highly complex, we do not process words in isolation, but in rich contexts; words are embedded in sentences, sentences in discourse. All these elements of language have to be understood within the short time frames that the information comes in (be it in the form of speech, signs or text). Consequently, language processing is highly predictive, we use context to form expectations, to predict which type of information will come next, down to the level of specific words. If I say “It was a windy autumn day. The girl went outside to fly her...” you expect the ending to be “kite”. These predictive processes, that enable our

quick online processing of language, rely on a broad language network, encompassing frontal and temporal regions of the brain. To accomplish this task these regions have to communicate with each other. However, the exact nature of this interaction is understudied. We therefore propose to investigate the dynamic interactions between frontal and temporal regions in the brain during language processing using connectivity analysis with fMRI, a neuroimaging technique. Understanding these dynamic interplays between brain regions has important implications for understanding what goes wrong in disorders such as schizophrenia where a break-down in predictive processes causes language processing problems.



2016 Earth



Prof. Dr. Carol Arnosti

HWK Fellow
Earth

Fellowship period

15.12.15 - 23.06.16

Home institution

University of North Carolina at Chapel Hill
Department of Marine Sciences
Chapel Hill, North Carolina
USA

Cooperation partners


Prof. Dr. Jürgen Rullkötter

Prof. Dr. Meinhard Simon
University of Oldenburg

Prof. Dr. Bo Barker Jørgensen
Aarhus University

Prof. Dr. Rudolf Amann
*Max Planck Institute for Marine Microbiology,
Bremen*





Connecting Microbial Community Composition and Carbon-Cycling Capabilities: Linking Composition and Extracellular Enzymatic Function Across Diverse Marine Environments

Heterotrophic microbial communities produce extracellular enzymes to hydrolyze substrates to sizes sufficiently small for cellular uptake. The structural specificities of these enzymes thus determine the rate and location of carbon cycling in the ocean. We have recently found that the enzymatic capabilities of surface water communities vary systematically with latitude, with high latitude microbial communities hydrolyzing a narrower range of substrates than their temperate counterparts. We have also found systematic differences between benthic and pelagic microbial communities, with pelagic communities typically hydrolyzing only a subset of substrates compared to their benthic counterparts. We hypothesize that these differences in enzymatic function are

linked to differences in microbial community composition, differences that extend to their genetic capabilities to produce specific enzymes. To investigate this hypothesis, we will analyze enzymatic capabilities, microbial community composition, and metagenomic data related to specific hydrolytic enzymes in samples from the water column and sediments of the Arctic Ocean, and in surface waters of the North and South Atlantic Ocean. These investigations will be extended through bioinformatic searches of metagenomic databases from other regions of the world's oceans. Our interdisciplinary approach will open up a new quantitative understanding of key steps in marine organic matter cycling.

Dr. Hongyan Bao

HWK Junior Fellow
Earth

Fellowship period

01.08.15 - 31.05.16

Home institution

Xiamen University
State Key Laboratory of Marine
Environmental Science
Xiamen
CHINA

Cooperation partner

Prof. Dr. Thorsten Dittmar
University of Oldenburg





How do Extreme Events Affect the Riverine Export of Dissolved Organic Matter to the Ocean?

Rivers are important ecosystem to humans as they are the major freshwater and food sources to us. However, rivers are not only important to humans, but also to the organism living in as well as the estuarine and oceanic organisms partly because of the dissolved organic matter (DOM) in the waters. Moreover, the transport of riverine dissolved organic matter to the oceans also plays important roles in the global carbon cycle, e.g., the degradation of terrestrial organic matter could be a source of CO₂ to the atmosphere. The transport of riverine DOM is closely related with the hydrology. Extreme climate, such as typhoon, can not only affect our daily life, but also riverine DOM. However, little is known about how extreme rain events would affect the DOM composition and flux,

especially from molecular level. To fills this gap, the challenges are to get river samples during the typhoon and characterize the DOM compositions. The present study aims to understand how extreme events affect the riverine export of DOM to the oceans. Comprehensive sampling in the river and estuary is planned pre-, during and post- typhoon. We will apply state-of-the-art technology – Fourier-transform ion cyclotron resonance mass spectrometry (FT-ICR-MS) – to trace the DOM in a general way and quantify specific molecules, including dissolve black carbon and lignin phenols. Our present study could help us better understanding how the terrestrial ecosystem will response to the future climate change.

Dr. Jacopo Dal Corso

HWK Junior Fellow
Earth

Fellowship period

07.09.16 - 06.03.17


Home institution

University of Ferrara
Department of Physics and Earth Sciences
Ferrara
ITALY

Cooperation partner

Prof. Dr. Agostino Merico
*Leibniz Center for Tropical Marine Ecology (ZMT),
Bremen*





Carbon Cycle Perturbation and the Birth of Pelagic Calcification in the Carnian (Late Triassic)

A major injection of carbon dioxide into Earth's atmosphere and oceans occurred ca. 230 million of years ago. It caused an abrupt climate change called the "Carnian Pluvial Event", which is characterized by increasing temperatures, heavy rainfall and ecosystems reorganization. During this period many biological groups experienced major turnover and extinction both on land and in the oceans. However, this was not only a time of harsh environmental changes. A major revolution for the entire Earth's system actually occurred during the "Carnian Pluvial Event" that deeply modified the seawater chemistry, transforming the oceans into the systems that today we

know. This revolution was the appearance of a peculiar trait among a group of tiny free-living microscopic organisms that live in the open ocean waters: the secretion of a calcium carbonate skeleton. Today billions of planktonic calcifiers produce a huge amount of calcium carbonate that, at the end of their life cycle, is accumulated in the oceans floor. This huge calcium carbonate store stabilizes the global carbon cycle and prevents abrupt modifications of seawater chemistry. This project aims to explore the conditions under which this revolution occurred by integrating empirical geological data with cutting-edge model simulation techniques

Prof. Dr. Gregor P. Eberli

HWK Fellow
Earth

Fellowship period

17.05.16 - 30.09.16


Home institution

University of Miami
CSL - Center for Carbonate Research
Rosenstiel School of Marine and
Atmospheric Research
Miami
USA

Cooperation partner

Prof. Dr. Dierk Hebbeln
University of Bremen





Processes Controlling Cold-Water Coral Systems from the Gulf of Mexico to the Western Atlantic

Cold water corals (CWC) thrive without sunlight in cold ocean waters in usually several hundred meters of water depth where they form highly diverse ecosystems. Like their shallow water relatives in the tropics, they form large sea floor structures with heights up to 380 m. Only recent advances in ocean technology now allow studying the factors controlling the initiation and growth of these systems. During an expedition in 2012, a formidable data set on the distribution of CWC in the Gulf of Mexico Florida region has been collected. Linking the distribution pattern of CWC in this region to the environmental forcing conditions and to the sea floor topography will be in the focus of the HWK fellowship project “Processes controlling

cold water coral systems from the Gulf of Mexico to the western Atlantic” proposed by Gregor Eberli from the University of Miami and to be carried out in close collaboration with Dr. Hebbeln’s team at the University of Bremen. It aims to unravel how physical and sedimentological processes influence the development of CWCs and of the large sea floor structures they form. As this expedition was of a rather exploratory nature, the knowledge gained will be analyzed in a workshop at the HWK aiming to develop a proposal for a follow up research cruise to the region. A third and exciting aspect will be to show the general public the beauty of these corals in an exhibition of ultradeep underwater photographs that were collected by remotely operated vehicles.

Assoc. Prof. Dr. Mohamed A. Farag

HWK Fellow
Earth

Fellowship period

13.07.16 - 05.10.16

Home institution


Cairo University
Faculty of Pharmacy
Department of Pharmacognosy
EGYPT

Cooperation partners

Prof. Dr. Hildegard Westphal
*Leibniz Center for Tropical Marine Ecology (ZMT),
Bremen*

Dr. Andrea Porzel
*Leibniz Institute of Plant Biochemistry,
Halle*





Soft Coral Biodiversity and the Bleaching Problem in the Egyptian Red Sea: A Comparative MS and NMR Metabolomics Approach

Chemical substances play an important role in the interaction between all living organisms and their environment. The research that considers the impact of naturally occurring substances in the interaction between organisms, is called chemical ecology. Research in chemical ecology in marine environments is still in the beginning of its exploration and it is reasonable to assume that it has a great potential. The Red Sea is an epicenter for marine biodiversity with a high percentage of endemic soft corals. Indeed, of the 180 soft coral species identified world-wide, approximately 40% are native to the Red Sea. Such coral reef ecosystems support enormous biological diversity, including structurally and functionally

complex living organism communities. Corals, when exposed to elevated seawater temperatures, will exhibit “bleaching”; i.e., they lose their algal partnership, which provide color to the host coral tissue, leaving the tissue transparent and eventually to die. In this project, we will utilize cutting edge analytical techniques for metabolites analysis (metabolomics) to understand potential chemical aspects of the mechanism of bleaching in soft corals in response to elevated water temperatures and how it occurs in soft corals. In order to better understand this relationship, we plan to examine soft corals specimens from different species and at different locations and depth levels in the Red Sea, by utilizing large scale untargeted chemical analyses.

Prof. Dr. Sean P. S. Gulick

HWK Fellow
Earth

Fellowship period

30.06.16 - 31.10.16

Home institution


University of Texas at Austin
Jackson School of Geosciences
Institute for Geophysics & Department
of Geological Sciences
Austin, Texas
USA

Cooperation partners

Prof. Dr. Heinrich Villinger
Dr. Ursula Röhl
University of Bremen

Dr. Gabriele Uenzelmann-Neben
*Alfred Wegener Institute
Helmholtz Center for Polar and Marine
Research (AWI), Bremerhaven*





Earth Transitions Explored through Scientific Drilling: Chicxulub Impact and the End-Cretaceous Mass Extinction Event and Formation of the Antarctic Ice Sheet from Eocene to Miocene

Two key changes to the Earth in the last 100 million years were: 1) 66 million years ago a 14 km diameter meteor struck what is now Mexico, creating the Chicxulub impact crater and causing the extinction of 75% of life, and 2) the Antarctic ice sheet formed associated with the Greenhouse to Icehouse climate transition ~34 million years ago. As an HWK Fellow, Prof. Gulick will partner with the University of Bremen to study cores from the Chicxulub impact crater, as well as oversee (as co-chief scientist) measurements of these cores by the 32 scientists who are the International Ocean Discovery Program Expedition 364 team. They seek to understand how rocks are affected by such impacts to the point that they can effectively flow like a fluid

forming topography observed on other planets and the Moon. The team will also study the environment of impact site after the event. Prof. Gulick will also partner with colleagues at Alfred Wegner Institute to use subsurface images of continental shelves and deep sea areas offshore Antarctica to help understand the formation of the Antarctic ice sheet, types of glaciations through time, and the importance of the creation of gateways for ocean currents by plate tectonics in climatically isolating Antarctica. Key locations could be identified in Antarctica where future scientific drilling could help unravel the questions about this key transition that resulted in 10s of meters of sea level being stored in Antarctic ice.

Dr. Mati Kahru

HWK Fellow
Earth

Fellowship period

04.01.16 - 31.01.16

03.06.16 - 30.06.16

Home institution

University of California

San Diego

Scripps Institution of Oceanography

Integrative Oceanography Division

La Jolla, California

USA

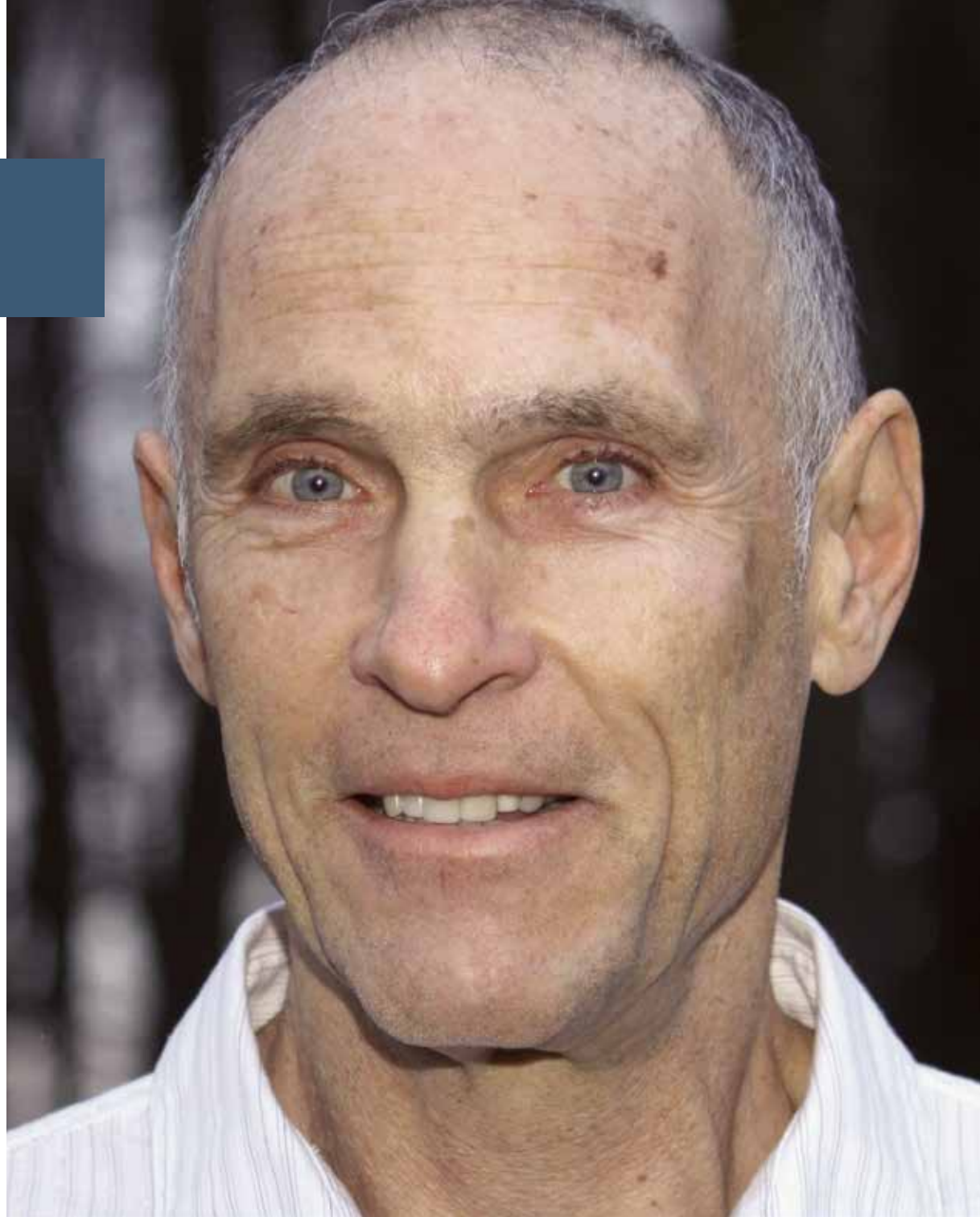
Cooperation partner


Prof. Dr. Astrid Brachez

Alfred Wegener Institute

Helmholtz Center for Polar and Marine

Research (AWI), Bremerhaven





Satellite Detection of Global Change in Phytoplankton and of the Causing Factors with Emphasis on European Marine Waters

The oceans are a fundamental component of the Earth's biosphere, producing about half of the oxygen on the planet. Climate change is affecting marine and terrestrial environments with economic and human health consequences. Due to the global scale of these changes, satellite observations are essential to detect and understand these changes. Here we propose to develop new methods and perform new analysis that will document and explain changes in phytoplankton communities in the oceans. Phytoplankton are microscopic plants in oceans and other water bodies that are the base of the food chain and produce almost all of the oxygen originating from the oceans. We will study European marine

waters such as the Baltic and North Seas but will modify and extend our analysis to other oceanic areas. We already have compiled a 36-year long time series of cyanobacteria accumulations in the Baltic Sea (Kahru and Elmgren 2014) which is the longest satellite-derived time series of a marine biological variable anywhere in the world. Toxic cyanobacteria blooms are a worldwide phenomenon associated with eutrophication and associated with undesirable effects on the ecosystems. In our time series we see dramatic changes in the frequency of these toxic accumulations during the last 36 years in the Baltic Sea but we still cannot explain these dramatic temporal changes.

Prof. Dr. Carina B. Lange

HWK Fellow
Earth

Fellowship period

25.08.16 - 28.09.16

Home institution

University of Concepción
Department of Oceanography
COPAS
Concepción
CHILE

Cooperation partners


Prof. Dr. Dr. h.c. Gerold Wefer
University of Bremen

Dr. Frank Lamy

Prof. Dr. Ralf Tiedemann

*Alfred Wegener Institute
Helmholtz Center for Polar and Marine
Research (AWI), Bremerhaven*





Southern Hemisphere Climate and Ocean Variability from Marine Archives in Southern Chile

The proposal by Dr. Carina Lange (University of Concepción, Chile) aims at reconstructing southeast Pacific natural climate and ocean variability throughout the present Holocene and back into the last glacial, based on high resolution studies of sediment cores from the Chilean fjords and the continental margin around the southern tip of South America. What makes this region so unique and important?: i) It is the only land mass intersecting the core of the Southern Westerly winds which are the drivers of high precipitation and snow accumulation in the western part of the Andes and which also play a crucial role for Drake Passage throughflow and the Antarctic Circumpolar Current; ii) it holds a key position within the global atmospheric and

oceanic framework providing insights into key processes including atmospheric CO₂ variations; and iii) it is still considered to be a pristine zone with the largest freshwater reserves of the planet although the region is showing clear signs of environmental/ anthropogenic stress. Because instrumental climate timeseries from the Patagonian region only cover the past few decades, the long term perspective we can acquire from highly resolved marine sediment archives, as proposed here, is crucial for the understanding of Southern Hemisphere climate dynamics. Additionally, the proposed work will strengthen German Chilean academic ties even further since it includes collaboration with researchers from the Alfred Wegener Institut in Bremerhaven.

Prof. Dr. James W. Moffett

HWK Fellow
Earth

Fellowship period

17.05.16 - 13.08.16

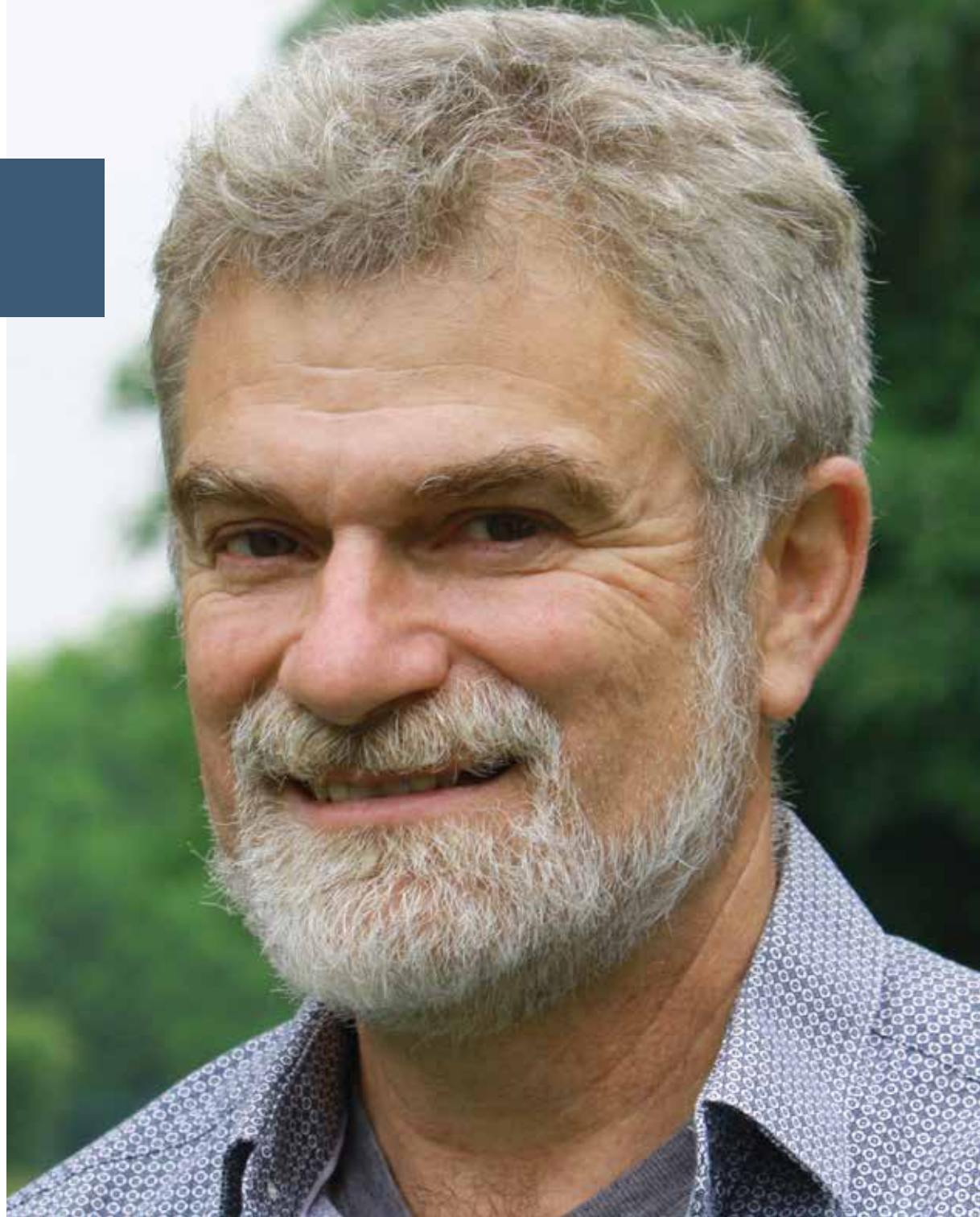
Home institution


University of Southern California
Marine and Environmental Biology Section
Department of Biological Sciences
Los Angeles, California
USA

Cooperation partners

Prof. Dr. Marcel Kuypers
*Max Planck Institute for Marine Microbiology,
Bremen*

Prof. Dr. Thorsten Dittmar
Dr. Katharina Pahnke
University of Oldenburg





Towards a Molecular-Level Understanding of Copper Interactions with Organic Matter and Its Implications for the Global Nitrogen Cycle

James Moffett is interested in how biologically active metals in the oceans interact with marine organic matter to influence key steps in the nitrogen cycle. Research carried out by him and others shows that organic matter can bind copper, inhibiting the activity of key steps in the nitrogen cycle. This effect is enhanced in regimes polluted with excess nitrogen (e.g. in the Baltic Sea) which can become depleted of oxygen. Such disruptions can lead to the accumulation of nitrous oxide, a greenhouse gas which is often considered to be one of the most dangerous side-effects of hypoxia and eutrophication. Research is proposed with Thorsten Dittmar to further the molecular basis of interactions between

copper and marine organic matter using Fourier Transform Ion Cyclotron Resonance Mass Spectroscopy, a technique Dittmar has pioneered. The approach builds on work recently carried out by Moffett during his sabbatical with Dittmar. They will test the hypothesis that chemical changes take place during hypoxia and eutrophication increasing the binding of copper, and use this information to frame additional hypotheses about how these changes arise. The collaboration will benefit from the vast expertise in nitrogen cycle processes at the MPI in Bremen. Field samples will be collected from sites actively studied by these workers, giving the research a direct environmental context.

Assoc. Prof. Dr. Vera Pospelova

HWK Fellow
Earth

Fellowship period

30.01.16 - 25.05.16

Home institution

University of Victoria
School of Earth and Ocean Sciences
Victoria, British Columbia
CANADA

Cooperation partners

Dr. Gerhard Fischer
PD Dr. Karin Zonneveld
Prof. Dr. Michal Kucera
University of Bremen





Production, Transport and Preservation of Organic-Walled Dinoflagellate Cysts

Understanding of mechanisms behind climate change, and its influence on Earth's ecosystems is an important and challenging task. My work is motivated by fundamental questions: how changing climate impacts marine environments, how abrupt climatic changes and human activity affect marine primary productivity, and how to reliably extract information on paleoenvironments from marine sediments. More specifically, this proposal deals with organic-walled microscopic organisms, primarily dinoflagellate cysts. These microfossils are well preserved in sediments, and their records contain a great deal of information about environmental conditions at the time of deposition, which will be used to investigate sea-surface conditions, ocean circulation, climate, and marine productivity

both now and in the geological past. To calibrate this method, scientists moor sediment traps that collect sinking material, including microfossils, to be analyzed later along with measured environmental parameters. I propose a joint project between MARUM (University of Bremen) and SEOS (University of Victoria) that will enhance understanding of cyst production, particle flux, transport and preservation potentials in sediments by combining the existing sediment trap data from high-productivity areas in the North Pacific and the Atlantic off Cape Blanc. Additional new inter-annual sedimentary sequences from the Cape Blanc will be studied, and the results will be published in high-impact scientific journals.

Prof. Dr. Karsten Reise

Associate Fellow
Earth

Fellowship period

01.08.16 - 30.09.16

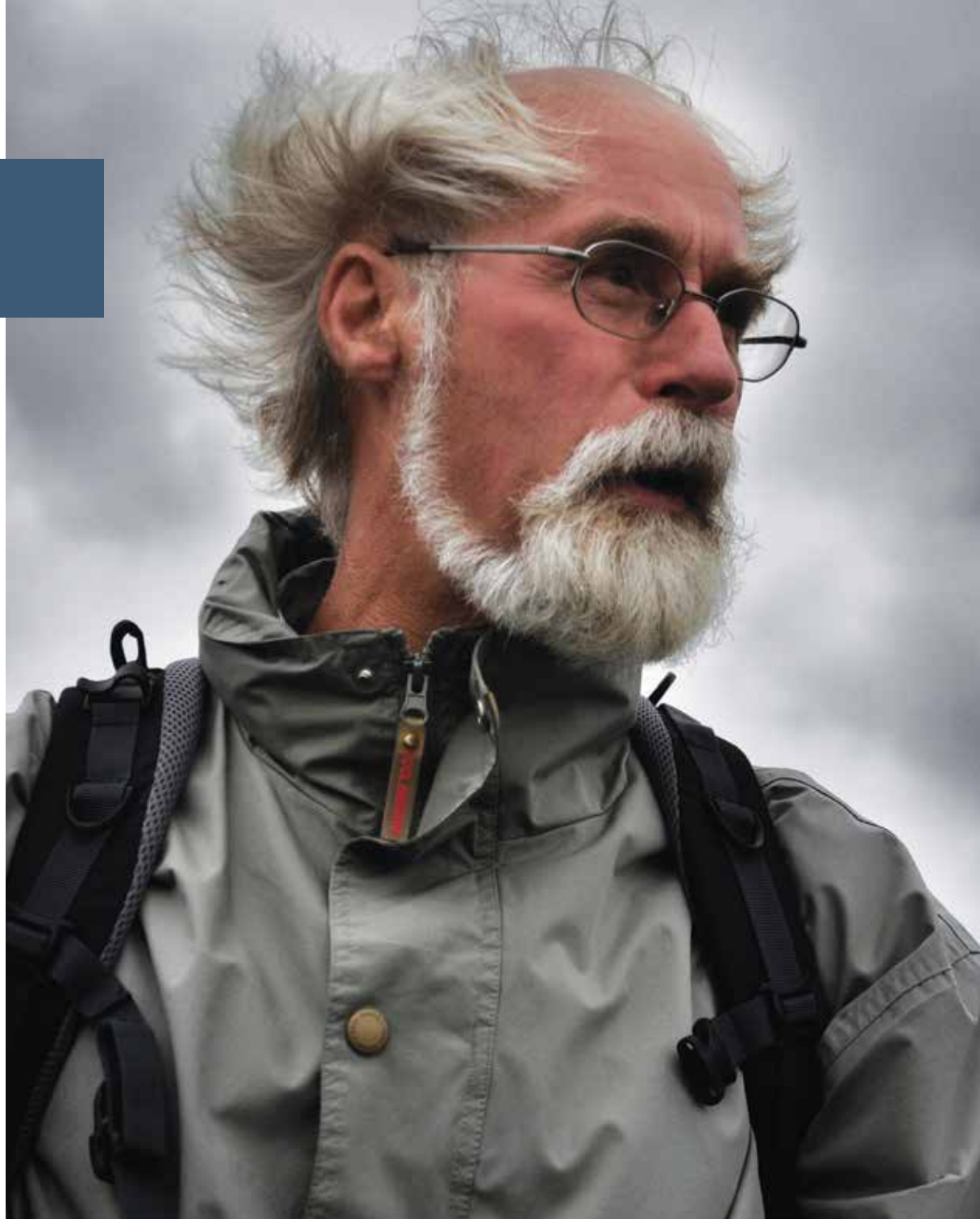
Home institution


Alfred Wegener Institute,
Helmholtz Center for Polar and Marine
Research (AWI), Bremerhaven
List/ Sylt
GERMANY

Cooperation partners

Dr. Doris Meyerdierks
Hanse-Wissenschaftskolleg

Alex S. MacLean
Landslides Aerial Photography
Lincoln, MA, USA





Mensch und Küste: Was tun, wenn die Nordsee steigt?

Die Ausstellung „Mensch und Küste: Was tun, wenn die Nordsee steigt?“ vereint den Blick des Künstlers mit der Analyse des Wissenschaftlers und basiert auf der Kooperation zweier Fellows des Hanse-Wissenschaftskollegs. Hier haben sich der amerikanische Fotokünstler Alex S. MacLean und der Küstenforscher Prof. Karsten Reise gemeinsam der Aufgabe gestellt, die Folgen des Klimawandels für die Nordseeküste aus ihren ganz unterschiedlichen Perspektiven zu thematisieren. Gemeinsam flogen sie über das Wattenmeer Niedersachsens und Schleswig-Holsteins, um diese einzigartige Landschaft aus der Luft zu dokumentieren und natürliche Prozesse ebenso wie menschliche Eingriffe professionell ins Bild zu setzen.

Vorläufer der Ausstellung ist das Buch „Kurswechsel Küste: Was tun, wenn die Nordsee steigt?“ mit Karsten Reise

als Herausgeber und Luftbildern von Alex S. MacLean, das Denkanstöße für den Umgang mit dem stetigen Anstieg des Meeresspiegels in Küstenregionen bietet und Ende 2015 erschienen ist. Für die Ausstellung wurden 21 Fotografien ausgewählt, die nicht nur die einmalige Schönheit des Wattenmeeres im Großformat zeigen, sondern auch die in den Küstenregionen zum Teil dramatischen Eingriffe des Menschen. Flankiert werden die Bilder von Schautafeln, die zugrunde liegende naturwissenschaftliche Phänomene und Sachverhalte verständlich aufbereitet darstellen.

Die Ausstellung wird vom 29. Oktober 2016 bis 23. April 2017 im Landesmuseum Natur und Mensch in Oldenburg präsentiert.

Assoc. Prof. Dr. Justin B. Ries

HWK Fellow
Earth

Fellowship period

01.12.15 - 15.08.16

Home institution

Northeastern University
Department of Marine and
Environmental Sciences
Marine Science Center
Nahant, Massachusetts
USA

Cooperation partners

Prof. Dr. Jelle Bijma
*Alfred Wegener Institute,
Helmholtz Center for Polar and Marine
Research (AWI), Bremerhaven*

Dr. Dirk de Beer
*Max Planck Institute for Marine Microbiology,
Bremen*

Prof. Dr. Hildegard Westphal
*Leibniz Center for Tropical Marine Ecology (ZMT),
Bremen*



Using a Combined Microelectrode/Boron-Isotope Approach to Measuring the pH of Corals' Calcifying Fluids Under Normal and CO₂-Acidified Conditions

Anthropogenic elevation of atmospheric pCO₂ is causing our oceans to acidify. Experiments show that ocean acidification (OA) impairs the ability of some marine calcifiers to build their protective skeletons and shells, while other species appear more resilient. This variability in calcifiers' response to OA is poorly understood. Corals and other marine calcifiers are thought to induce mineralization of CaCO₃ by elevating pH of their calcifying fluid, thereby converting HCO₃⁻ (~90% of seawater carbon) to CO₃²⁻, the form of carbon used in calcification. Calcifying fluid pH should therefore be a key determinant of how different marine calcifiers respond to OA—yet we have trouble measuring it in most calcifiers. The boron isotopic composition

(¹¹B) of non-biological CaCO₃ precipitated directly from seawater is controlled by and, thus, reflects seawater pH. However, since corals appear not to precipitate their skeletal aragonite directly from seawater, but rather from a discrete 'calcifying fluid', coral δ¹¹B may record calcifying fluid pH rather than seawater pH. Our initial measurements of shell/skeletal δ¹¹B for a range of calcifiers are consistent with microelectrode pH measurements of their calcifying fluids. Here, I propose to combine pH microelectrode measurements (with Prof. Dirk DeBeer at MPI) and coral skeletal δ¹¹B (with Prof. Jelle Bijma of AWI) to constrain calcifying fluid pH of three coral species cultured under normal and elevated CO₂ (with Prof. Hildegard Westphal at ZMT).

Assoc. Prof. Dr. Sylvia Sander

HWK Fellow
Earth

Fellowship period

01.09.16 - 31.10.16


Home institution

University of Otago
Research Center for Oceanography
Department of Chemistry
Dunedin
NEW ZEALAND

Cooperation partner

Prof. Dr. Andrea Koschinsky-Fritsche
Jacobs University Bremen





Comprehensive Characterization of Fe-Binding Ligands in Hydrothermal Vents - Understanding the Sources and Roles of Ligands in Hydrothermal Iron Flux

Deep-sea hydrothermal vents were discovered only 38 years ago. Today, their role in the bio-geochemical cycling of iron, a micro-nutrient for all living organisms, including marine phytoplankton responsible for up to 50% of global primary production and thus CO₂ uptake, is still largely unknown. The critical linkage between the iron and carbon cycle, makes it a hot topic for marine and climate research. Our 2011 prediction (as published in *Nature Geoscience* 4(3): 145-150), that dissolved iron, stabilized by organic compounds, could leave the hydrothermal vents to be transported

into the surrounding ocean, has since been confirmed empirically as a result of several GEOTRACES cruises transecting over midocean ridges and other hydrothermally active areas. In this proposal, with a team of leading experts in the field using the most sophisticated analytical instrumentation, we will answer critical questions around the compounds stabilizing hydrothermal iron, like their chemistry, as well as rates of production and decay, to improve global climate models by better constraining the uptake of CO₂ by the ocean and thus better predict future climate change.

Dr. Gabriel A. Singer

HWK Junior Fellow
Earth

Fellowship period

01.01.16 - 28.04.16

Home institution


Leibniz-Institute of Freshwater Ecology
and Inland Fisheries, IGB
Department I, Ecohydrology
Berlin
GERMANY

Cooperation partners

Prof. Dr. Thorsten Dittmar
University of Oldenburg

Dr. Tom J. Battin
University of Vienna





Linking Diversity of Dissolved Organic Matter (DOM) to Ecosystem Functioning - Implications of Network-Induced Resource Mixing and Diversity-Enhancement of DOM for CO₂-Evasion in Fluvial Ecosystems

Fluvial ecosystems (streams, rivers, estuaries) are recognized as important components of the carbon cycle, actively metabolizing terrestrially derived organic matter during downstream transport from the continents to the oceans. The resulting CO₂-evasion fluxes are in stark contrast to the commonly perceived recalcitrance of terrestrial organic matter. The metabolism of dissolved organic matter (DOM), the dominant fraction of fluvial organic matter with tremendous molecular diversity, is controlled by its chemical composition and origin but also depends on the environmental context, which follows distinct geophysical gradients along the fluvial continuum, where mixing of water bodies and contained resources occurs at multiple interfaces. I propose to study the linkages of DOM-diversity to ecosystem functioning given by bacterial production and respiration, which ultimately translate into resource provisioning for the aquatic food web and evasion of climatically active CO₂ to the atmosphere. I propose to use junctions in the fluvial network, where tributaries meet and form a confluence, as prominent situations inducing resource mixing and increasing DOM diversity. By combining bioassays with ultrahigh-resolution mass-spectrometry of DOM and potentially also in-situ, field-based measurements of metabolism, I aim at characterizing DOM diversity and bioavailability at a molecular level and assessing its implications for bacterial production and respiration.

Prof. Dr. Roger Summons

HWK Honorary Fellow
Earth

Fellowship period

23.05.16 - 15.08.16

Home institution

Massachusetts Institute of Technology
Department of Earth Atmospheric and
Planetary Sciences
Cambridge, Massachusetts
USA

Cooperation partner

Prof. Dr. Kai-Uwe Hinrichs
University of Bremen





Studies of Microbial Lipids at Small Spatial Scales

Microbes are key players in the biogeochemical cycles that operate on Earth and which sustain complex life through the production of oxygen and the recycling of other nutrients on a global scale. Our understanding of these processes has been developed over many years through the fields of microbiology, geochemistry and, most recently, genomics. These studies have revealed, in some detail, a myriad of interdependencies in these biogeochemical processes whereby numerous groups of microbes shuffle carbon and electrons through complex networks at small (millimetric to micron) spatial scales. A key issue that begs further research is to gain a better understanding about how microbes interact with each other at these scales. Microelectrodes can tell us about subtle fluxes of electron donors (e.g. H₂, H₂S) and electron acceptors (e.g. O₂, nitrate, sulfate). An additional and valuable adjunct to these data would be the ability to understand the spatial arrangements of the microbes

themselves. Microbial lipids are one tool that we can use to improve understanding in this respect. In collaboration with Professor Kai-Uwe Hinrichs I will use the opportunity afforded by this HWK Fellowship to investigate the distribution of lipids in microbial mat communities from ice-covered lakes in Antarctica using a new combinatorial analytical technique known as Laser Desorption Ionization-Fourier Transform-Ion Cyclotron Resonance Mass Spectrometry (LDI-FT-ICRMS). With this equipment, a laser is deployed to vaporize and ionize biosignature lipids (diagnostic pigments, fragments of membrane etc.) at micron scales (LDI). An ultra-high resolution mass spectrometer (FT-ICRMS) is then used to accurately identify these molecules. In this way, we hope to build 2D, or even 3D, maps of these lipids within the biological community. It may even be possible to extend the technique to fossilized microbial communities.

Dr. Maria Vernet

HWK Fellow
Earth

Fellowship period

01.01.16 - 06.03.16

Home institution

University of California, San Diego
Scripps Institution of Oceanography
Integrative Oceanography Division
La Jolla, California
USA

Cooperation partners

Dr. Mario Hoppema
Dr. Ilka Peeken
*Alfred Wegener Institute,
Helmholtz Center for Polar and Marine
Research (AWI), Bremerhaven*

Assoc. Prof. Dr. Tammi Richardson
University of South Carolina, Columbia





Small Might not Mean Less: Phytoplankton Cell Size and Carbon Cycling in Polar Waters

Phytoplankton are single-cell algae that float at the surface of the ocean where well-illuminated, nutrient-rich waters are found. These algae are responsible for making organic carbon, food for animals in the ocean, including those living on the seafloor. The present understanding is that only phytoplankton species with large cells can support the carbon rain to depth. This last statement is not true, as data and models support the idea that small cells can also be involved in loss of carbon from the surface. As small cells are increasing in number and diversity in Arctic waters, it is essential to understand what role they play in polar systems. My idea is that the relationship between cell size and carbon rain to depth depends on who

eats the phytoplankton, that is to say, the food web that they support. This project plans to study the role that small cells can have on carbon loss to depth through a critical re-vision of existing data, with the addition of modeling to understand the underlying processes of carbon cycling through polar food webs. Experts from AWI, Dr. Ilka Peeken and Dr. Mario Hoppema, and a modeler, Dr. T. Richardson, will participate in an interdisciplinary team to carry out this project. They will contribute data and their knowledge of polar ecosystems, and will help in construction of the polar food webs. Results will be published in scientific journals of wide distribution to scientists studying carbon cycling and high-latitude marine systems.

Prof. Dr. Alexandra Worden

HWK Fellow
Earth

Fellowship period

02.16 - 16.04.16

Home institution

Monterey Bay Aquarium Research Institute (MBARI)
Moss Landing, California
USA


Cooperation partners

Prof. Dr. Meinhard Simon
University of Oldenburg

Prof. Dr. Antje Boetius
*Max Planck Institute for Marine Microbiology,
Bremen*

Dr. Björn Rost
*Alfred Wegener Institute,
Helmholtz Center for Polar and Marine
Research (AWI), Bremerhaven*





Making Connections in the Marine Carbon Cycle: Distributions and Strategies of Eukaryotic Picophytoplankton

Abstract Climate change is expected to have major impacts on marine phytoplankton and the biogeochemical transformations they mediate. This places tremendous urgency on gaining mechanistic understanding of how the photosynthetic organisms responsible for CO₂ uptake will respond, and the downstream consequences for fisheries (which rely on phytoplankton growth) and sequestration of CO₂ in the deep sea. At a more basic level, a simple baseline of today's communities must be established, against which change can be assessed. This project will establish the distributions of marine picophytoplankton (photosynthetic microbes <2 μm in cell diameter) in cold water and polar environments. Climate change effects have already been reported

in the Canadian Arctic where the abundance of picophytoplankton appears to have increased, especially members of the green algal genus *Micromonas*. However, in such high-latitude environments, the overall distributions and relative importance of *Micromonas*, and other small phytoplankton is not well characterized. This project will evaluate the diversity of polar picophytoplankton in multiple regions. It will also provide genomic information on a polar *Micromonas* strain. Collectively, these studies will greatly enhance our understanding of phytoplankton diversity and distributions in the Arctic, alongside insights to the basic biology and evolution of the widespread marine alga *Micromonas*.

Prof. Dr. Mikhail V. Zubkov

HWK Fellow
Earth

Fellowship period

08.03.16 - 31.05.16

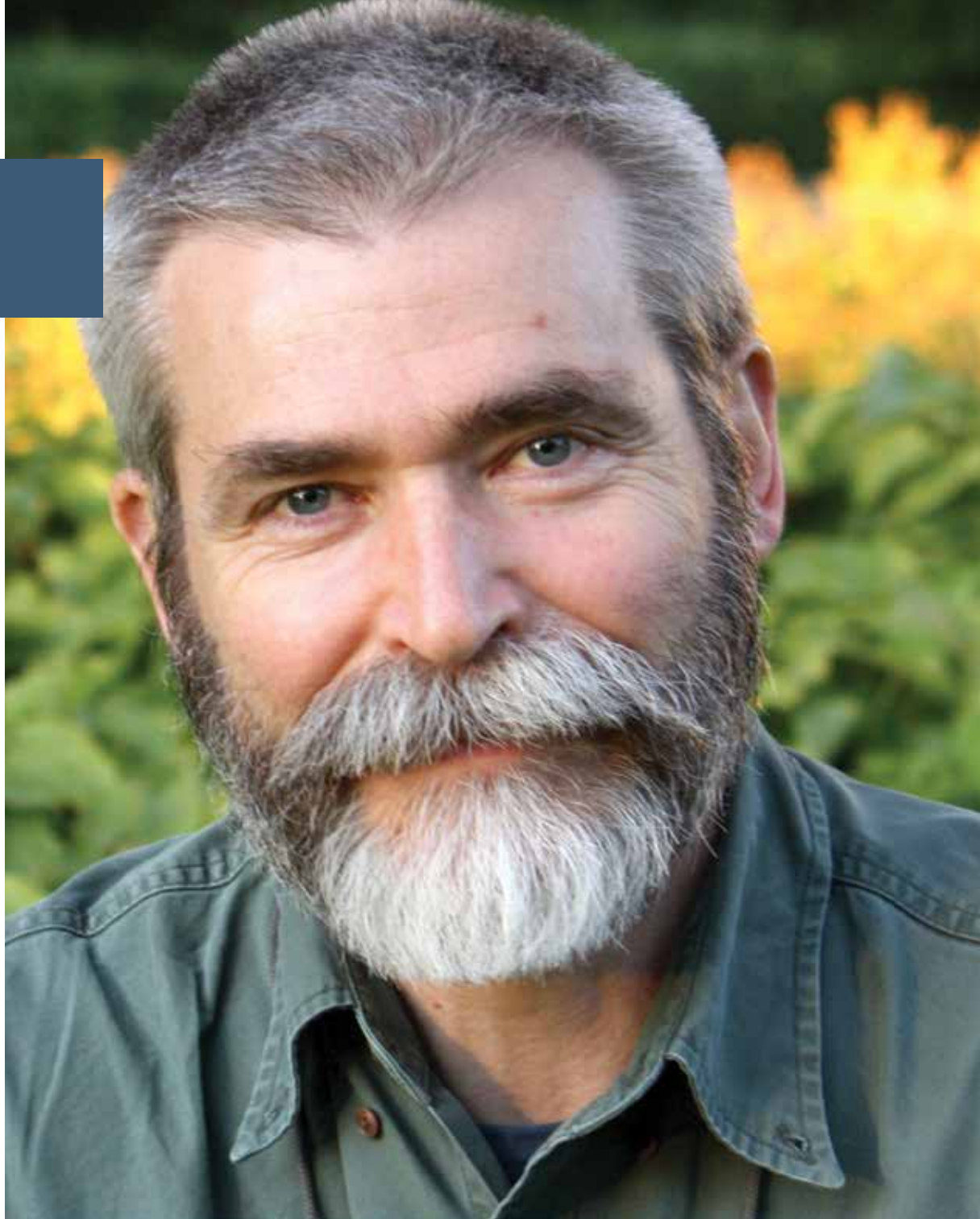
Home institution


National Oceanography Centre, Southampton
Ocean Biogeochemistry and
Ecosystems Research Group
Southampton
UNITED KINGDOM

Cooperation partners

Prof. Dr. Rudolf Amann
Dr. Timothy Ferdelman
PD Dr. Bernhard Fuchs
*Max Planck Institute for Marine Microbiology,
Bremen*

Prof. Dr. Dörte Becher
University of Greifswald





How do Prokaryotic Phototrophs Co-Exist with more Abundant Heterotrophs on the Oligotrophic Ocean Covering 40 % of Earth?

The principal goal is to explain the ecological basis of the most extensive biome on Earth. The paradox is that biomass of bacterial plants (Prochlorococcus) is less than biomass of bacteria (SAR11) consuming organic matter of plant origin. We hypothesise that the two most abundant oceanic microbes co-exist because of slower growth of SAR11. We seek answers to the following questions: What are the growth rates of Prochlorococcus and SAR11? How much is growth of SAR11 enhanced by light? Can selective feeding by protist predators control growth of Prochlorococcus and/or SAR11? We find out how general the answers are by focusing on experimental work in the subtropical gyres of the Pacific and Atlantic Oceans, which comprise ~75% of the total oligotrophic open ocean area.

We will use $^{14}\text{CO}_2$ tracer incubations in combination with cell flow sorting to measure Prochlorococcus growth rates. We will use amino acid labelling combined with analyses of proteins of flow sorted cells to compare growth rates of SAR11 and Prochlorococcus. Flow sorted bacteria and bacterial prey inside protist cells will be identified using taxon-specific molecular probes. The experimental evidence will be synthesised to explain the mechanism of Prochlorococcus and SAR11 co-existence in waters of increasing global biogeochemical significance owing to expansion of the oligotrophic ocean under the influence of modern climate changes.

Energy

2016



Prof. Dr. Stefan Heinz

HWK Fellow
Energy

Fellowship period

15.05.16 - 17.06.16


Home institution

University of Wyoming
Department of Mathematics
Laramie, Wyoming
USA

Cooperation partners

Prof. Dr. Joachim Peinke
Prof. Dr. Ulrike Feudel
Dr. Bernhard Stoevesandt
University of Oldenburg





Understanding of Fluid-Boundary Interactions: A Unique Challenge

One of the most challenging and pressing problems of fluid dynamics is unsolved over decades: the sound physical explanation of how a fluid interacts with boundaries, first of all solid walls. There are serious consequences of this lack of understanding. The most important problem is that we are unable to use numerical simulation methods to really make predictions of realistic fluid flow problems, e.g., wind energy problems. All results need to be validated by observations. This is expensive and usually only partially doable. The main thrust of this project is to develop a theory of how a fluid interacts with walls and to demonstrate its benefits. This will be done as follows. In collaboration with Prof. J. Peinke (University Oldenburg) and his research group, observations will be used to derive

a model for the stochastic physics of wall bounded turbulent flows. Together with Dr. B. Stoevesandt (Fraunhofer Institute for Wind Energy and Energy System Technology, Oldenburg) and his group we will use this model for the design of hybrid turbulence models enabling accurate computational wind energy predictions that are currently infeasible. In addition to these project goals, we will prepare the use of our methods to solve corresponding marine and climate research problems. This will be done in collaboration with Prof. J. Wolff and Prof. U. Feudel (both ICBM, Oldenburg). Our stochastic modeling strategy to explain the dynamics of complex disordered systems can also be of interest for Neurosciences, Cognitive Sciences, and Social Sciences.

Prof. Dr. Lucy Pao

HWK Fellow
Energy

Fellowship period

24.10.16 - 08.07.17

Home institution

University of Colorado
Electrical, Computer, and Energy
Engineering Department
Boulder, Colorado
USA

Cooperation partner

Prof. Dr. Martin Kühn
University of Oldenburg





Control of Wind Turbines and Wind Farms

The United States, the European Union, and many other countries and regions around the world are working to increase the amount of electrical power generated from renewable energy sources in an effort to combat climate change. In the wind energy area, despite the amazing growth in global wind power installations in recent years, science and engineering challenges still exist. Megawatt wind turbines are large, flexible structures that operate in uncertain and continually changing wind and weather conditions. I propose to investigate methods that can enable wind turbines and wind farms to be operated more efficiently and reliably. The techniques I propose to develop can help increase efficiencies and thus enable more energy capture in wind

turbines and wind farms, and also can reduce structural wear and tear and hence yield longer lifetimes of the components and turbine structures. For the Fellowship project, I propose to carry out research in the advanced control of (i) wind turbines that will enable extreme-scale 50 MW wind turbines that may provide reductions in the cost of energy of offshore wind and (ii) wind farms to track power reference signals to ensure the reliability of utility grids even in the presence of large amounts of renewables on the grid. Both conceptual and simulation studies as well as experimental campaigns will be pursued collaboratively with fellows at HWK and colleagues at nearby institutions.

Ass. Prof. Dr. Amretashis Sengupta

HWK Fellow

Energy

Fellowship period

18.08.16 - 18.06.17

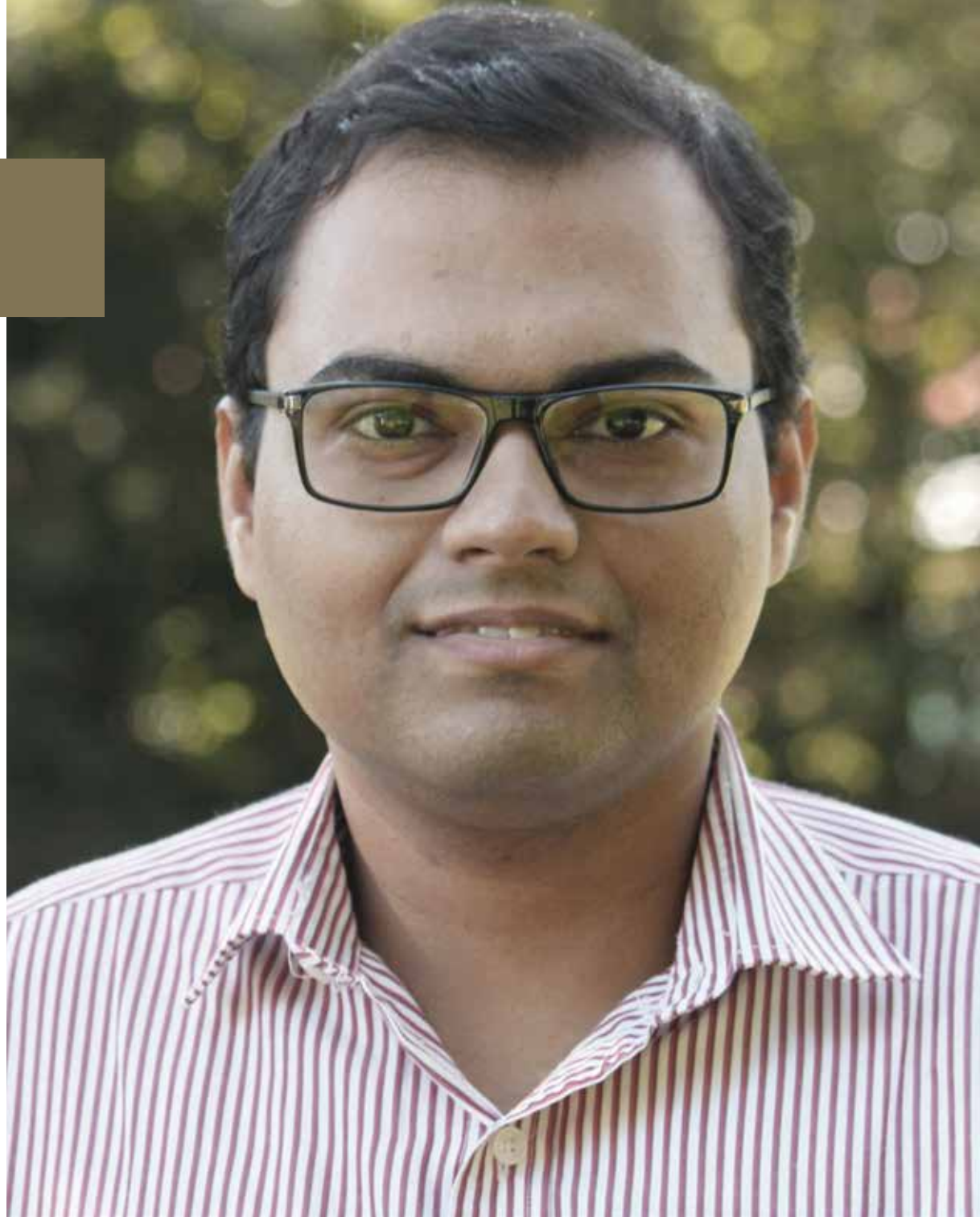
Home institution

Indian Institute of Engineering Science
and Technology
School of VLSI Technology
Shibpur, Howrah
West Bengal
INDIA

Cooperation partners

Prof. Dr. Thomas Frauenheim
University of Bremen

Prof. Dr. Thomas Heine
University of Leipzig





Two Dimensional Materials for Low Power Electron Devices and Clean Energy Application

With recent advances in nanotechnology and nanofabrication techniques it has become possible to isolate / synthesize materials having only one (or few) atoms in thickness. Graphene was the first such material to be isolated from graphite by Andre Geim and Konstantin Novoselov, for which they shared the 2010 Nobel Prize in physics. In such materials the electrons can move only in two directions (in plane) and are confined in the third, thus the name 2 dimensional (2D) electronic materials. It is this confinement of the system that gives rise to some excellent electrical and optical properties in graphene and other such materials, which can have wide ranging applications in nanoelectronics and energy research. If stacked one on top of another such 2D materials form the so-called van der Waals (vdW) stacks in a heterostructure, which can allow tailoring of material properties to suit the application areas. This proposal seeks to study, by means of quantum atomistic methods, the novel electronic and optical properties of these 2D materials and vdW stacks and analyze the possibility for applications in three important areas of energy research namely energy savings, energy storage and clean energy generation.

Society

2016



Assoc. Prof. Dr. Tamer Amin

HWK Fellow
Society


Fellowship period

08.09.16 - 30.06.17

Home institution

American University of Beirut
Mathematics Education Center
Department of Education and Science
Beirut
LEBANON





Conceptual Change: How we Develop an Understanding of Scientific Concepts

The book entitled: “Conceptual Change: How We Develop an Understanding of Scientific Concepts.” will tackle the question “How do we develop an understanding of scientific concepts?” by synthesizing research from a number of different disciplines: science education, developmental psychology and cognitive science.

There still is no unified account that brings together the progress made in these diverse disciplines. We rarely find attempts to identify consensus within disciplines. Even more rare is a cross-disciplinary, theoretically coherent synthesis that allows us to formulate our best available answer to the question “How do we develop an understanding of scientific concepts?” I hope to make a contribution to filling these gaps with the book project proposed.

I will tackle the question of how we come to understand scientific concepts at a broad metatheoretical level and, at a more narrow, theoretical level within particular conceptual domains. At the metatheoretical level, I will first synthesize current understanding within the fields of science education, developmental psychology and cognitive science regarding the nature of concept representation, how concepts are used in the context of reasoning and problem solving, and how novel conceptual understanding emerges. The metatheoretical synthesis will describe a broad theoretical framework and will then be used to propose specific accounts of how understanding develops in three specific domains: the particulate theory of matter, energy, and the theory of evolution by natural selection.

Prof. Dr. Margarita Balmaceda

HWK Fellow
Society


Fellowship period

05.10.16 - 31.07.17

Home institution

Seton Hall University
School of Diplomacy and International Relations
South Orange, New Jersey
USA





Chains of Value, Chains of Power: Russian Energy, Value Chains and the Remaking of Social Relations from Vladivostok to Brussels

Despite diversification measures and gains in renewables, Russian hydrocarbons continue to play a key role in EU states, and discussions of Russia's use of state-controlled energy power abound. While such power has indeed been used, framing the question in terms of "state energy power" neglects the role of other actors above and beyond the central state, and of differences between energy sources. In contrast to energy as state power over consumers, the project focuses on how the material specificities of different energy sources (coal, oil, gas, renewables) help organize social actors throughout the entire chain from producer to end-user. Case studies focus on Russian gas, oil, and coal from production to final use by EU consumers. This project constitutes the first systematic attempt to

understanding how differences between various energy commodities matter in the development of social and political relations around each. At the policy level, it provides important clues for understanding the sources and limits of Russia's use of energy commodities as leverage. In a post-Crimea environment where economic sanctions and counter-sanctions have entered the picture, understanding the political relationships emerging from each of Russia's main energy exports can also be of use in understanding the possible effects of concrete measures. Looking ahead, the project provides insights into what social relations an energy transition (not only to renewables but also to fracking-derived unconventional oil and gas) may entail.

Dr. Sergiu Buscaneanu

HWK Junior Fellow
Society


Fellowship period

01.12.15 - 02.06.16

Home institution

Humboldt-Universität zu Berlin
Berlin Graduate School of Social Sciences
Berlin
GERMANY





Strategic U-Turns Between the EU and Russia: Explanatory Prospects of Prospect Theory

When asked if they prefer a gamble of 50% chance to win 1000\$ (or nothing) over the sure gain of 500\$, most people would tend to be risk averse and opt for the sure gain. Conversely, when asked if they prefer a gamble of 50% chance to lose 1000\$ (or nothing) over the sure loss of 500\$, the majority of people would tend to be risk seeking and choose the gamble. These choices are rationally inconsistent. This logical inconsistency is explained by prospect theory. Prospect theory explains how people make decisions when faced with probabilistic alternatives that involve uncertainty and risk. The proposed project to be started at the HWK seeks to apply

prospect theory propositions in order to explain why some countries located in the shared neighbourhood between the EU and Russia select the European Union (EU) integration project, while others choose the alternative of joining the Eurasian Economic Union (EaEU). The project will explain how perceived gains and losses associated with the perspective of joining the EU or EaEU determine – under conditions of uncertainty and risk – the choice of one or another strategic alternative. This effort is going to be the first application of prospect theory to the strategic alternatives faced by countries in the concerned region.

Dr. Srikumar Chattopadhyay

HWK Fellow
Society

Fellowship period

15.01.2016 - 12.07.2016

Home institution


Center for Earth Science Studies
Kerala
INDIA

Cooperation partners

Prof. Dr. Michael Flitner
University of Bremen

Prof. Dr. Tim Jennerjahn
*Leibniz Center for Tropical Marine Ecology (ZMT),
Bremen*





Human Dimension of Environmental Change in Water System and Water Governance: A Comparative Study of India (Vembanad Lake Basin, Kerala), Indonesia (Segara Anakan and Brantas River Basin) and Germany (Weser River Basin)

Water plays an important role in all walks of human life. Rivers, wetlands, estuaries and coastal waters are fundamental to food security, industrial development, economic growth and human well-being. However, water can be used provided its quality is maintained. All water systems, whether fresh or coastal are affected by various direct and indirect human actions. The problem of water system is not limited to any group of countries and warrants global attention. The globalization has initiated a process of widening, deepening and speeding up of worldwide interconnectedness in all aspects of contemporary social life. The present study covering India, Indonesia and Germany is an attempt to learn from country specific experiences and exchange ideas. Case study sites covering fresh and

coastal waters are chosen considering nature of environmental and socio-economic problems and availability of studies. Both technical and non-technical issues in water management will be examined. The aim is to bring out country specific information, document management initiatives and laws and compare them for mutual understanding. Germany has achieved water management admirably. German experience on water management can help both India and Indonesia in their pursuit to improve water system. This study will be taken up in cooperation with colleagues from the ZMT and Artec, Bremen University. Outcome of this project will be useful for the academicians, policy makers and the society at large.

Dr. Jean-Claude Dreher

HWK Fellow
Society


Fellowship period

02.09.15 - 09.06.16

Home institution

French National Centre for Scientific
Research (CNRS)
Bron
FRANCE





The Psychological and Neurobiological Basis of Social Decision Making in Humans

Although social decision making is ubiquitous and central to human society, its underlying neural mechanism remain poorly understood. There is a need for understanding social decision processes at different levels, bridging the gap between fundamental computational principles and the brain system level. In particular, the fact that complex social decision making relies on probabilistic knowledge about the possible outcomes of choices and on the intentions and cooperativeness of other individuals has been underappreciated.

The current project seeks a better understanding of the psychological and neurobiological basis of social decision-making in humans. We propose to develop a new theoretical computational neuroscience framework of social decision making.

The general goal is to characterize the computational principles and the neural mechanisms underlying social decision making. Our main hypothesis is that when we are in an interactive social setting, our brain performs Bayesian inferences using probabilistic representations of other individuals' intentions and cooperativeness. We will use such probabilistic approaches as Bayesian inference and partially observable Markov decision processes to model ways in which we might predict hypothetical action outcomes, the intentions of others and whether the other is cooperative or competitive.

Dr. Seongmin Park

HWK Twin Fellow of Dr. Jean-Claude Dreher
Society

Fellowship period

01.02.16 - 29.02.16


Home institution

French National Centre for Scientific
Research (CNRS)
Bron
FRANCE

Cooperation partner

Dr. Jean-Claude Dreher, CNRS





Cerebral Mechanisms Underlying Social Decision Making in Humans: A Theoretical Bayesian Perspective

Through this project, we aim to explore the microscopic physical principles and potential applications of a novel electron microscope with femtosecond or even sub-femtosecond time resolution. An ultrafast electron emission source shall be implemented by illuminating a sharp metallic tip with few cycle laser pulses and the temporal duration of the emitted pulses shall be characterized with femtosecond precision. To reach this goal, we will try to explore the pondermotive potential supplied by few-cycle carrier-envelope phase (CEP) stabilized laser pulses to achieve both sub-femtosecond pulse duration and monochromatic kinetic energy distribution of the emitted electron

packet. To confirm the short time duration of the electron pulse, a novel electron autocorrelation technique is suggested, involving the acceleration of electrons by the pondermotive potential at the metal surface due to the SPP excitation. We anticipate reaching electron pulse durations of less than a few tens of fs, more than an order of magnitude lower than those available in currently existing time-resolved electron microscopes. Based on our results, we will explore possible applications of this microscope in such areas as exciton-plasmon coupling, metamaterials or light-induced energy conversion.

Prof. Dr. Steffen Hillmert

HWK Fellow
Society

Fellowship period

15.09.15 - 15.03.16


Home institution

University of Tübingen
Department of Sociology
Tübingen
GERMANY

Cooperation partner

Prof. Dr. Klaus Schlichte
University of Bremen





The Conceptualisation and Implementation of Flexible Spatial Contexts in Life-Course Research

In both social science and the public, there is a growing awareness of the relevance of specific context conditions for individual life chances. However, it is often controversial “how large” relevant contexts are and at which level of aggregation particular social phenomena should best be observed. The aim of the proposed research project is to better understand how causal factors located in specific, spatially defined socio-structural contexts contribute towards explaining life-course developments and how this

affects the conceptualisation, definition and measurement of such contexts. Existing concepts of contextual settings such as social space, neighbourhoods and local labour markets are further developed and integrated to form a comprehensive and flexible conceptualisation of relevant spatial contexts. An enhanced analytical concept is applied to a selection of multi-level data on educational and occupational careers. This allows reanalysing traditional questions of unequal living conditions and individual chances of education and employment.

Prof. Dr. Otto Kallscheuer

HWK Fellow
Society

Fellowship period

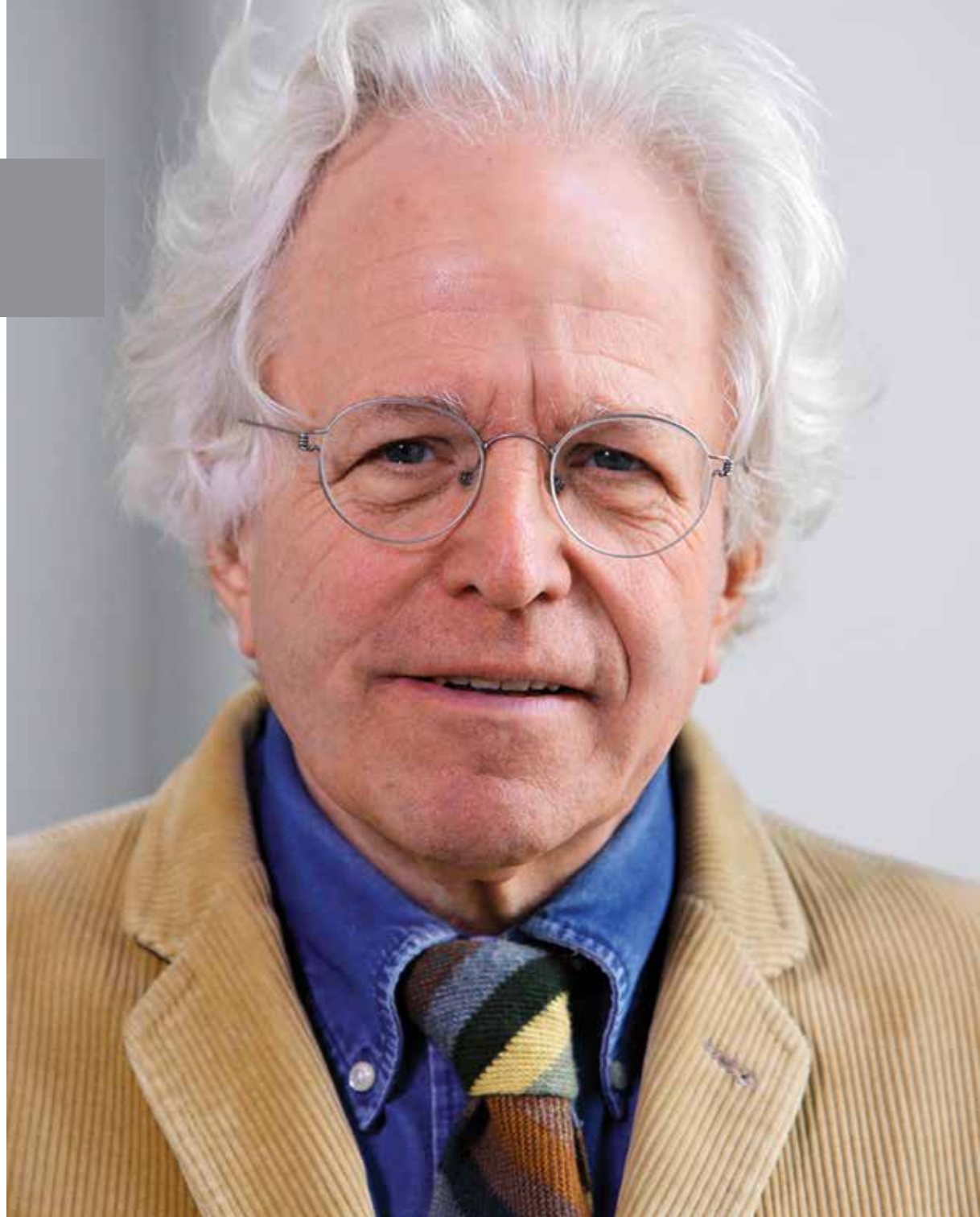
01.04.16 - 31.08.16

Home institution

University of Osnabrück
Institut für Evangelische Theologie
Osnabrück
GERMANY

Cooperation partner

Prof. em. Dr. Dr. Ulrich K. Preuß
Hertie School of Governance





Political Space and World Religions

More and more people are crossing national boundaries, legally or illegally; so do their ideas. World religions not only spread as elements of inherited cultural identities of migrant communities, they also contain a universal message or a missionary obligation, destined to save all mankind. Transcendent religions do appeal to a ,higher authority' than to the state. It is true that in the second half of the 20th century very important ,higher-order-norms' (Human Rights) have been formally accepted by an overall majority of the states represented in the U.N., but the exact role and reach of religious liberty amongst them still remains a matter of dispute. As long as transnational migration was confined to small religious

minorities, it did not present a challenge to the international political system of nation-states. Is the political regulation of religion affected by the growing transnationalization of migration? And the globalization of religious communication is not only a question of numbers, it is also a question of compatibility between competing universal messages and missions. The nation-state is historically a recent acquisition - ,invented' to deal not least with religious conflicts. So my research projects will also look at other forms of ,governance' of religious competition: city-states, multi-religious empires, trading routes, the accommodation of religious diasporas. Can we learn from them?

Ass. Prof. Dr. Clémence Ledoux

HWK Fellow
Society

Fellowship period

03.06.16 - 05.08.16


Home institution

University of Nantes
Faculty of Law and Political Science
Nantes
FRANCE

Cooperation partner

Prof. Dr. Karin Gottschall
University of Bremen





Auswirkung der Transformation des Staates auf den Status der care-Arbeitnehmer

Das Projekt wird den Status von unterschiedlichen Diensten vergleichen, die oft nicht gemeinsam gedacht werden und die zu den care-Tätigkeiten gehören. Zwei unterschiedliche wissenschaftliche Debatten bezeichnen diese Tätigkeiten: die philosophische und soziologische Debatte über Pflege und personenbezogene Dienstleistungstätigkeiten und die Debatte über die Veränderung der öffentlichen Beschäftigung. Frankreich und Deutschland entsprechen zwei ähnlichen Staaten mit sozialer Marktwirtschaft, mit standardisierter Art der Rekrutierung und Lebensläufen im öffentlichen Sektor, aber die Transformation des Staates hat sich unterschiedlich vollzogen. Als case studies sind der Müllsektor und die häuslichen personenbezogenen Dienstleistungen in Frankreich und in Deutschland ausgewählt

worden, weil diese zwei Sektoren der gleichen care-Phase entsprechen und von Personen, die den unteren sozialen Schichten angehören, ausgeführt werden. In beiden Sektoren gibt es einen hohen Anteil von Migranten, aber die gender balance ist sehr unterschiedlich. Die Frage stellt sich, inwieweit die Veränderungen des Staates und seiner policies einen Einfluss auf den Status der Berufe ausgeübt hat. Der Aufenthalt am Hanse-Kolleg in Delmenhorst würde mir die Möglichkeit geben, zwei Projekte, an denen ich zurzeit arbeite, zu vertiefen: die Forschung zu meinem Dissertationsthema und meine Mitarbeit an einem Projekt „Der Staat als Arbeitgeber“ am Sonderforschungsbereich 597, das von Prof. Dr. Karin Gottschall und Prof. Dr. Bernard Kittel geleitet wird.

Prof. Dr. Christian Leuprecht

HWK Fellow
Society

Fellowship period

06.01.16 - 02.06.16


Home institution

Royal Military College of Canada
Department of Political Science and Economics
Kingston
CANADA

Cooperation partner

Prof. Dr. Matthijs Bogaards
Jacobs University Bremen





Vectors of Transborder Deviance: The Structure, Drivers and Dynamics of Globalization's Illicit Networks

That terrorists and organized criminals leverage international networks to procure weapons, money, militants and ideas is uncontroversial; but what to do about it? Although their impact is readily apparent and measurable, the illicit transborder networks that underpin such activity are not well understood. As result, we default to enforcement even though a focus on perverse policy effects that encourage the exploitation of the marginal costs of border to deviant ends would have a far greater impact. Moreover, the countries in which these illicit international networks are having the most deleterious effects are also the ones where data are least available and empirical data collection particularly

difficult. The proposed study builds on a series of plausibility probes that apply Social Network Analysis to analyze transborder terrorist and criminal networks. To map, understand and control for variation in the structure, nature and drivers, the proposed project will systematically compare organized crime versus terrorist transborder networks. The scholarly dimensions of this project aside, its findings will expand decision-makers' range of policy levers to discourage the exploitation of marginal costs of borders for deviant purposes, and disentangle those drivers that stand to be subdued by through international collective action from effects that are largely endogenous.

Prof. Dr. Lucia Quaglia

HWK Fellow
Society

Fellowship period

31.08.16 - 28.02.17

Home institution

The University of York
Department of Politics
UNITED KINGDOM

Cooperation partner

Prof. Dr. Susanne K. Schmidt
University of Bremen





Transatlantic Economic Cooperation and the Changing Global Order

This research examines the evolution and the dynamics of transatlantic economic cooperation in the context of the changing global order. It asks what explain the intensity, forms, and outcomes of transatlantic economic cooperation across policies and over time. It focuses on four key economic policies, namely trade, development, finance and macroeconomic governance, over the last two decades. The analysis is articulated in three interconnected steps. The first step is a domestic political economy analysis of preference formation in the US and the EU (and its member states). The second step

analyses the international context in which transatlantic cooperation takes place (or fails to take place). The third step examines how the factors discussed in Step 1 and Step 2 play out with a view to explaining the outcomes of cooperation, teasing out generalisable explanations. The research is interdisciplinary: it is primarily grounded in political science and political economy, but it requires a good understanding of the economic incentives for and economic effects of cooperation, as well as the legal issues concerning it. The academic research output will be a monograph and two journal articles.

Dr. Thierry Ribault

HWK Fellow
Society

Fellowship period

06.09.16 - 30.06.17

Home institution

CLERSE - UMR CNRS 8019
Villeneuve d'Ascq Cedex
FRANCE





Role of Knowledge in a Nuclear Society

My research focuses on the nature, place and role of knowledge in a nuclear society, and it aims to bring out the critical articulation between knowledge production and human protection. The case of the Fukushima nuclear disaster will be the central “empirical experience” I will mobilize.

A growing empirical and epistemological literature has documented the ways in which scientific and technical understanding is not produced. Thus, in situations where the production and circulation of knowledge are critically involved, what we do not know and why should be a crucial starting point for asking what it is we want to protect, and the Fukushima nuclear disaster is a paradigmatic in this respect.

“Agnotology” makes ignorance itself a subject of study, and, rather than asking what science is or what grounds it, asks how and why we end up not knowing certain things, even when trustworthy and attested knowledge is available. Identifying the processes, context,

and strategies that produce ignorance opens new perspectives in areas as varied as the tobacco industry, asbestos, global warming, as well as in nuclear technology, a domain where the culture of secrecy leads to ignorance not only on the part of the public, but also on the part of a large segment of the scientific world itself.

My ambition is to extend the methodology developed in the field of “the production of ignorance” and to test the relevance of the concept of “agnotology” in the nuclear context – i.e. post-disaster Fukushima-and to examine the deliberate creation of ignorance in the field of science and nuclear technology and the epistemological and political consequences of this and, as well as the removal of knowledge from the public but also from academic research, done in the name of the supposed risk of “politicizing” scientific problems. My aim is not to confine the production of ignorance to be the result from deviant science, but to contribute to the theorization of ignorance as a regular feature of scientific production.



Arts & 2016



Humanities

Tammam Azzam

Artist in Residence
Arts & Humanities

Fellowship period

19.01.16 - 31.07.16

Location

Dubai
UNITED ARAB EMIRATES

Cooperation partner

Dr. Monica Meyer-Bohlen
Hanse-Wissenschaftskolleg





The Road

Tammam Azzam dokumentiert in seinen Arbeiten seine intensive Auseinandersetzung mit dem Themenkomplex Zerstörung und Entwurzelung am Abgrund der Sinnlosigkeit vor dem Hintergrund kriegerischer Ereignisse in seiner Heimat.

Neben der Malerei produziert Tammam Azzam digitale Fotocollagen und Grafiken. In seinen Bildern sind zerstörte syrische Wohngebäude das wiederkehrende Bildmotiv, Orte, die ihrer ursprünglich schützenden Funktion beraubt sind, von denen Trümmer und Schutt übrig geblieben sind.

Tammam Azzam zeigt in seinen Werken die Wunden, die fortwährende kriegerische Zerstörung seines Landes in ihm erzeugen. Sie sind seinen Arbeiten immer immanent, doch geht es ihm nie darum, sogenannte „politische Kunst“ zu machen. Vielmehr will er Kunst politisch machen, indem er Realitäten in seinen Collagen transzendiert und zeigt, wie er sie sieht, wenn er sagt, „ja, ich bin Syrer, aber ich bin niemandes Sprachrohr. Ich spreche als Künstler für mich“. Als Artist in Residence arbeitete er im HWK an seinem Projekt „The Road“.

Natalie Grenzhaeuser

Artist in Residence
Arts & Humanities

Fellowship period

17.08.15 - 06.02.16


Location

Berlin
GERMANY

Cooperation partner

Dr. Monica Meyer-Bohlen
Hanse-Wissenschaftskolleg





Metamorphosen - Klimaphänomene und Landschaftsräume aus künstlerischer Sicht

Die Berliner Künstlerin Nathalie Grenzhaeuser arbeitet im Medium Fotografie und war nach sechswöchiger Vorbereitungsphase im März und April 2015 während ihres AWI/HWK Fellowship „Wissenschaft und Kunst“ drei Wochen zu Gast auf der wissenschaftlichen AWIPEV Station in Ny Alesund auf dem arktischen Inselarchipel Spitzbergen. Ihr Projekt mit dem Titel „Metamorphosen, Klimaphänomene und Landschaftsräume aus künstlerischer Sicht“ widmet sich der arktischen Forschung im 21. Jahrhundert mit den Fragen: Wie sieht Forschung an einem gleichermaßen unwirtlichen wie unwirklichen Ort aus und wie gestaltet sich diese? Vor diesem Hintergrund hat sie sich auf der Station vor allem mit den klimarelevanten Messmethoden- und Anlagen auseinandergesetzt, die den Luftraum betreffen, wie den Aerosol-, Treibhausgas- und Ozonmessungen. Weitere Arbeitsansätze galten der unterschiedlichen

Materialität von Schnee und Eis, den Mythen und Science Fiction Aspekten, die mit dem arktischen Landschaftsraum kulturgeschichtlich verbunden werden, sowie dem Wandel Ny Alesunds, von einem Bergbauort hin zu einer Basis internationaler Forschungsarbeit. Auf dieser Basis entstanden Bild-, Film- und Audioskizzen, die auch die - neben klimarelevanten Phänomenen - astronomischen und meteorologischen Phänomene mit einbezogen, die ihren Aufenthalt auf der Station geprägt haben wie: die totale Sonnenfinsternis am 20 März, Stürme, Halos und Whiteouts. Ihr zweiter Aufenthalt am HWK vom August 2015 bis Ende Januar 2016 gilt der Nachbereitung des Materials. Die Resultate wurden zusammen mit bereits realisierten Arbeiten in einer zweiteiligen Soloshow unter dem Titel The Arctic Series am 29 Januar 2016 in der Städtischen Galerie Delmenhorst und im März/April in der Kunsthalle Bremerhaven gezeigt.

Nadira Husain

Artist in Residence
Arts & Humanities

Fellowship period

05.09.16 - 21.12.16


Location

Paris
FRANCE

Cooperation partner

Dr. Monica Meyer-Bohlen
Hanse-Wissenschaftskolleg





Puberté,

An analogy of a painting process and development

Our relation to images is conditioned by various pictorial conventions. Whether they are cultural, economical or social they are able to feed our capacity to reproduce (even non intentionally) systems of domination. Nadira Husain addresses them in her work, albeit decidedly not from a traditional Western male perspective.

Puberté, An analogy of a painting process and development, is the research Husain will activate during her residency at HWK. Considering her painting process as an ongoing construction of a visual language, she draws her attention to potential links between perception, conventions and the possibilities of emancipation through the practice of painting. Furthermore, the artist explores the empowering capacity the painting project activates, especially since

she has been in the last years developing a practice of painting which also activates the space.

During her residency, she has conceived an in-situ installation in the HWK lobby, titled *An Active Line on a Walk*.

Here the artist works with the architecture's lines and orientation. By using basic modernist principles such as lines and colors, she intends to add another dynamic to the space without radically transforming it. The pictorial installation dissolves into the space, generating a subtle dialogue in between a functional architecture and an art installation.

Janet Laurence

Artist in Residence
Arts & Humanities

Fellowship period

25.08.16 - 07.10.16

Home institution

Chippendale
AUSTRALIA

Cooperation partner

Dr. Monica Meyer-Bohlen
Hanse-Wissenschaftskolleg





Blood and Chlorophyll. My Heart Wears Flowers and Fruits in the Night

Blood and Chlorophyll. My Heart Wears
Flowers and Fruits in the Night

Janet Laurence ist eine der bekanntesten
zeitgenössischen Künstlerinnen Australiens.
In ihren multimedialen Arbeiten erforscht
sie seit mehr als zwei Jahrzehnten die
Vielfalt der Natur und deren Fragilität im
Zeitalter des Anthropozäns.

In ihren fotografischen Arbeiten, die
sie in transparenten Schichten auf
Aluminium, Glas und Acryl überträgt, oder
in raumgreifenden Installationen weist

die Künstlerin auf Eingriffe des Menschen
in die Natur hin. So thematisiert sie
Verbindungen zwischen Kultur und Natur
und mit zusätzlichen Texten evoziert sie
beim Betrachter die unterschiedlichsten
Assoziationen.

Janet Laurence kehrt im Jahr 2017 als Artist
in Residence zum HWK zurück, um sich auf
die Thematik ihrer kommenden Ausstellung
im *Niedersächsischen Landesmuseum für
Kunst und Kulturgeschichte Oldenburg*
vorzubereiten.

Julia Schnittger

Artist in Residence
Arts & Humanities

Fellowship period

01.12.15 - 31.07.16

Location

Berlin
GERMANY

Cooperation partner

Dr. Monica Meyer-Bohlen
Hanse-Wissenschaftskolleg





Gedächtnisverlust

„Gedächtnisverlust“ ist die Überschrift für mein künstlerisches Projekt am Hanse-Wissenschaftskolleg in Zusammenarbeit mit dem Alfred-Wegener-Institut für Polar- und Meeresforschung. Ein Bohrkern aus antarktischem Eis, für Klimaforscher ein Zeittunnel. In ihm gespeicherte Vergangenheit, die nur überlebensfähig ist in Kälte, so leicht zum Verschwinden zu bringen mitsamt all den eingeschlossenen Geschichten. Das Gedächtnis aus Eis zerfließt, die Merkfähigkeit ist verloren mit der Unmöglichkeit des Eises zur Erneuerung. Der „Whiteout“ schien mir als optisches Sinnbild dem Gedächtnisverlust verwandt. Man bewegt sich in einem weißen Raum ohne Horizont, Orientierung ist unmöglich gemacht. Weder ist sichtbar, woher man kommt, noch wohin man sich

bewegt. Gerät man in ein Whiteout, wird empfohlen erst weiterzugehen, wenn der Spuk vorbei ist. Bleibt die Frage, ob man sich am gleichen Ort wiederfindet, an dem man stand, als der weiße Vorhang sich schloss oder ob sich ein völlig unbekanntes Bild eröffnet, wenn der Vorhang beginnt sich zu lichten. Gedächtnisverlust als Zäsur. Als Bühnenbildnerin ist mein „Forschungsprojekt“ der Raum. Mich interessiert die antarktische Landschaft auch als der Körper, in dem das Gedächtnis wohnt, das die Wissenschaft erkundet. Und Erinnerung als fiktiver Raum, für den erst eine Form der Darstellung gefunden werden muss. Im Rahmen meiner Recherche soll eine begehbare musiktheatrale Installation entstehen, in der Objekte, Raum und Klang als „Darsteller“ sprechen.

Adjunct Ass. Prof. Dr. Elisa Tamar Albert

Writer in Residence
Arts & Humanities

Fellowship period

13.06.16 - 15.08.16

Location

Columbia University,
College of Saint Rose
New York
USA

Cooperation partner

Prof. Dr. Reto Weiler
Hanse-Wissenschaftskolleg





Little Sister (A Novel)

Uses of Assisted Reproductive Technologies (ART) have skyrocketed in the 38 years since the first “test tube” baby was born in the UK. By now utterly normalized -- especially within privileged castes -- ART is a for-profit industry with zero regulation or oversight in the United States. The culture has embraced it fully: if and when “mother nature” doesn’t comply with our desires, we simply override her with any and every tool in our arsenal. Trouble is, there have been no longitudinal studies of the effects of ART on women or children, and many ethicists and philosophers believe that we are failing to consider the heavy and complex issues at stake. My novel-in-progress attempts

to explode some of the complacency and heedlessness at play in my generation’s no-questions-asked embrace of ART, via a comic narrator whose visceral refusal to hand herself over to the fertility industry (despite her powerful longing to bear a child) baffles even her. Romping through the shadow lands of feminism, science, medicine, alternative medicine, magic, mysticism, longing, grief, hope, fear, and rage, sisterhood, sexuality, our narrator grapples mightily with ideas about the body, the self, addiction, greed, power, and consumerism in a world ever-confused about the almighty resource that is the female body.

Tobias Ginsburg

Writer in Residence
Arts & Humanities

Fellowship period

05.01.16 - 05.05.16

Home institution

Munich
GERMANY

Cooperation partner

Prof. Dr. Reto Weiler
Hanse-Wissenschaftskolleg





Der Golem

Tobias Ginsburg war Teil des Autorenkollektivs am Staatstheater Oldenburg, zu dem die Regisseurin Luise Voigt, die Dramaturgin Daphne Ebner und der Sound- und Raumdesigner Matthias Mohr. Aus dieser Kooperation entstand das Bühnenstück „Der Golem“, das aus unterschiedlichen Perspektiven die Themen

Transhumanismus und künstliche Intelligenz beleuchtet. Im Zentrum des Stückes steht die mittelalterliche Legende um den Golem von Prag, der von einem jüdischen Rabbi durch ein magisches Zahlenwort zum Leben erweckt wird. Am 26. August 2016 wurde das Stück in der Exerzierhalle in Oldenburg uraufgeführt.

Assoc. Prof. Dr. Elisabeth-Ann Sheffield

Fiction Meets Science
Arts & Humanities

Fellowship period

01.11.16 - 11.05.17

Location

University of Colorado
Department of English
Boulder, Colorado
USA





Misfabrications: A Novel

The main character and narrator of my novel is a German medical librarian who was once employed at a research hospital in a village in upstate New York in the mid nineteen sixties. He tells his story from a contemporary vantage point, after the 2016 American presidential election. In part, I see his German origins and postwar perspective as a means to trace and explore the troubled past of genetics from the Austro-German Mendel to Ernst Haeckel to Eugen Fischer and Josef Mengele, and the implications of that past for the discoveries and developments in genetic science in the present. In his nineteen sixties story, the librarian is at the center of a cast of other characters, some doctors and researchers, but also villagers, each of whom has someone at home who is in some way developmentally disabled.

The nineteen sixties were a time of intellectual, technological and institutional transformation in the field of genetics. Due to

new findings and lab technologies, such as the discovery of chromosomal linkages for both Down Syndrome and Klinefelter Syndrome in 1959, and the rise of amniocentesis for prenatal diagnosis, inherited disorders became subject in new ways to intervention (e.g. certain inherited disorders, by the early 1970s, could be detected and prevented altogether, via “prophylactic abortion”), which in turn effected “the most technical and the most intimate interactions, between parent and child, physician and patient, scientist and research subject.” I am interested in imagining how such interactions might have played out. Additionally, I am interested in the way mistranslations and miscommunications at the cellular level impact individual human beings. Finally, this novel is an investigation of the different varieties of developmental “deviation” (physiological, psychological and social) and how people assimilate these into their lives.

Assoc. Prof. Dr. Edward Schwarzschild

Writer in Residence
Arts & Humanities

Fellowship period

20.06.16 - 22.08.16

Location

University of Albany
Fellow of the New York State Writers Institute
Albany
USA

Cooperation partner

Susan M. Gaines
University of Bremen





The Schwarzschild Radius: A Novel

My novel-in-progress, *The Schwarzschild Radius*, is inspired by Karl Schwarzschild (1873-1916), the German astronomer most famous for figuring out the first exact solution to the Einstein field equations of general relativity in 1915. His work has led to many original concepts that now bear his name including: Schwarzschild coordinates, the Schwarzschild metric, the Schwarzschild radius, the Schwarzschild singularity, Schwarzschild black holes and Schwarzschild wormholes.

After completing an assignment to write a few paragraphs to commemorate the 100th anniversary of Schwarzschild's death in 2016, my novel's central character, Jake Strosser, grows increasingly obsessed with Schwarzschild's life and work. He wonders, for instance, why Einstein both praised and criticized Schwarzschild, at

one moment asserting that "among the living there remain probably only a few who know how to apply mathematics with such virtuosity as he did" and, at another moment, suggesting that Schwarzschild "would have been a gem, had he been as decent as he was clever." He wonders about the contours of Schwarzschild's marriage to a non-Jew. He wonders about Schwarzschild's decision, at age 40, to leave behind his young family and prestigious position (director of the Potsdam Observatory) to volunteer for service in the army in World War One. As Jake's deepening obsession begins to cause trouble in his own family, he encounters a man who claims to be Schwarzschild's grandson, the offspring of an affair Schwarzschild had while serving on the Russian front. Is this "grandson" a con artist or a genuine relative? The

attempt to unravel this mystery of relativity not only leads Jake further into Schwarzschild's work, but also puts his whole family in danger.

The ongoing research necessary for this novel continues to be fascinating. It is research that would have been almost impossible without the assistance and support of the Fiction Meets Science Program. I have benefitted immensely from conversations with scientists associated with the *Fiction Meets Science* Program. In addition, with the crucial help of the HWK, I've been able to spend time meeting with experts at observatories in Göttingen and Potsdam. I'm looking forward to returning to those places as well as exploring other locations central to Schwarzschild's life and work.



2017

Outlook



Prof. Dr. Hong Young Yan

HWK Fellow

Brain

Fellowship period

01.03.17 - 31.12.17

Home institution

Marine Research Station

Academia Sinica

I-Lan County

TAIWAN





The Sensory Physiology and Behaviors of Fish

The writing of two books. *“The Sensory Physiology and Behaviors of Fish”*. The first book is in English as a scientific reference book. The second book is in Chinese as a popular science book for general readers from junior high and up education levels.

The acquisition of scientific knowledge is carried out by professional scientists and the findings are published in journals which could only be comprehended by trained scientists. The general publics are rarely told of the newest developments. Therefore, it is imperative that scientists should try to propagate the accumulated scientific knowledge to the publics as well as to the peers.

The aim of my proposal is to pen two books. The first book *“Every thing you want to know about how fish sense the world*

around them” will be written in Chinese with layman language intended for readers in Taiwan and those overseas Chinese. The second book will be in English entitled *“The sensory biology and behaviors of fish: An integrated approach”* and its style and contents are intended for peers and to be used as a reference book. Both books will cover the subjects of auditory, lateral line, vision, olfaction, taste, electric and magnetic senses of fish. The background of each sense will be presented with anatomical structures and its electrophysiological properties and the associated behaviors will be delineated. Most of all, the main theme of both books is to highlight how the understanding of the sensory physiology of fish could assist human develop proper ways to conserve fish resources with sensible and sustainable ways of fishing and farming the fish

Assoc. Prof. Dr. Iliana Baums

HWK Fellow
Earth

Fellowship period

17.05.17 - 21.08.17

15.05.18 - 17.08.18

Home institution

Pennsylvania State University,
State College,
USA

Cooperation partners


Prof. Dr. Nicole Dubilier

MPI for Marine Microbiology, Bremen

Prof. Dr. Christian Wild

University of Bremen, Marine Ecology, Bremen





The role of microbes in mitigating stress of deep-sea corals in response to oil and dispersant exposure

The project will examine the role of partnerships between microbes and deep-sea coral animals in mitigating environmental stress. Corals provide the structure of marine ecosystems similar to trees. Yet, corals are severely threatened. Coral stressors range from oil spills to a warming ocean, but interactions with microbes might reduce some of this stress. My past work has concentrated on the interaction between shallow corals and their eukaryotic partners, single-celled algae. During my stay in Germany, I will expand this work to include the understudied prokaryotic microbes of deep sea corals found inside the animal tissue. The 2010 Deep Water Horizon Oil spill was the largest oil spill in history and large quantities

of oil and dispersant reached deep sea corals. To understand the effects of the spill, we experimentally exposed deep sea corals to a range of oil and dispersant concentrations. Surprisingly, corals, or more likely their microbes, seemed to be able to utilize the oil to an extent. Thus, the host and microbial community were processed with metagenomic and metabolomics methods. Analysis of these data requires computational techniques that I hope to learn from experts in the field. Thus, I am proposing to work with Prof. Nicole Dubilier from the MPI for Marine Microbiology and Prof. Christian Wild from University of Bremen. The result will be a groundbreaking assessment of the role of microbes in mitigating oil stress in deep sea corals.

Dr. Hayley Cawthra

HWK Junior Fellow
Earth

Fellowship period

01.11.17 - 31.01.18


Home institution

Council for Geoscience
Bellville
SOUTH AFRICA

Cooperation partner

PD Dr. Matthias Zabel
MARUM – Center for Marine Environmental Sciences
University of Bremen





Sea-level fluctuations, submerged landscapes on the South African continental shelf, and the implications for human evolution

Sea level changes constantly, in accordance with glacial-interglacial cycles every ~100,000 years. A certain consequence is that during the glacials, what is now seafloor becomes exposed subaerially as a coastal plain. This project aims to understand a submerged terrestrial landscape on the continental shelf of the South African South Coast. This region has one of the richest Middle Stone Age archaeological records in the world, holding rich archives of early modern humans. During the time of occupation, sea level has been significantly lower than it is at present for about 90% of this time, so understanding this shelf is critically important. The bilateral German-South African RAIN (Regional Archives for Integrated iNvestigations) project aims to expand the current state of knowledge on the dynamics of South African Late Quaternary climate change by comparing marine and terrestrial proxy-records. The link between the palaeoclimate research in RAIN, and this approach of considering human evolution at a regional hotspot, is where the novel approach of this collaborative work lies. The South Coast is situated at the juncture of winter- and summer rainfall zones as well as the Benguela and Agulhas Currents, contains rich palaeoenvironmental archives, and is ideally located to study past sea-level change. The anticipated benefits include geological information which will be fed into holistic models for changing ecosystems and how it may have affected human use of this landscape.

Prof. Dr. Traian Dumitrica

HWK Fellow

Energy

Fellowship period

01.09.17 - 31.05.18

Home institution

University of Minnesota

Minneapolis


USA

Cooperation partner

Prof. Dr. Thomas Frauenheim

University of Bremen





SCC-DFTB Objective Molecular Dynamics Investigations of ZnO Nanomaterials Targeting Thermoelectricity and Energy Conversion Applications

The advancements brought by nano-technology enable the development of novel energy applications. The scale itself – so small that individual atoms matter – poses inherent experimental difficulties. To make progress, the development of theoretical models is essential. Because of the small scale, nanostructures are most accurately modeled using atomistic simulations – computer simulations that consider individual atoms. Until recently, atomistic simulations could only be easily carried out on structures that are straight – that possess translational atomic symmetry. A recently developed method termed objective molecular dynamics (OMD) generalizes this treatment to angular and helical symmetries. Thus, OMD allows for efficient and accurate simulation of

nanostructures that are twisted or helical, whether by an external force or inherently. The project concerns the development of new OMD capabilities, by coupling OMD into the popular DFTB+ code developed at University of Bremen, and the application of the developed numerical capability to uncover the thermoelectricity and energy harvesting capabilities of twisted and helical nanostructures. The proposed OMD simulations will break new grounds in exploring the emerging space of screw-dislocated twisted ZnO nanostructures in order to understand their ability to convert heat into electric energy, as well as in exploring the capabilities of ZnO nanobelts to transfer mechanical deformations into electric energy.

Prof. Dr. Kathryn Edwards


HWK Fellow
Society

Fellowship period 2017

Home institution

University of South Carolina
History Department
Columbia
USA





Living with Ghosts: The Dead in European Society from the Black Death to the Enlightenment

Medieval and early modern Europe was filled with ghosts. They wafted through churchyards, sent household objects flying, and harassed residents of villages where they once lived. Treasure hunters depended on their insights, and nuns prayed for their salvation—and departure! *Living with Ghosts* tells the stories of such spirits, especially the belief in their existence, interests, and activities, during an era when Europeans were facing profound religious, social, political, and intellectual change. Drawing on over 2,000 accounts of hauntings from countries throughout Europe, it reveals for modern readers pre-modern attitudes to such revenants and embeds ghosts in a community of the living and the dead. Fifteenth-century Europeans

could accept a ghost's ability to offer legal testimony, a dearly departed father returning to advise his daughter, and an evening swapping tales with a disembodied spirit. During the debates of the Reformation and Enlightenment, however, ghosts' connections to European society became more fraught; those who saw spirits worried that they might be demons, and a sign of an appropriate education became skepticism, at least in public. *Living with Ghosts* thus allows readers to use ghosts as a means of understanding an era in European history that faced profound change and the debates over the natural, supernatural, and evidence that would transform European thought. vorhanden

Nicole Schuck

Artist in Residence
Arts & Humanities

Fellowship period

23.01.2017 - 31.03.2017

Location

Berlin
GERMANY

Cooperation partner

Dr. Monica Meyer-Bohlen
Hanse-Wissenschaftskolleg





Tier Wert Bezeichnen

Eine künstlerische Forschung zur Ökosystemdienstleistung Meeresfauna

Im Fokus des Projektes von Nicole Schuck am HWK und am AWI auf Helgoland steht die Inwertsetzung der Meeresfauna mittels Bewertungs- und Monetarisierungsmethoden. Wie werden Bewertungssysteme für die Meerestiere der Nordsee festgelegt? An welchen Kriterien orientiert sich die Wissenschaft hier? Welche technischen Mittel kommen dabei zum Einsatz? Ist das „Wissen“ der Tiere relevant für ihre Inwertsetzung? Beispielsweise die Schwarmintelligenz bei Fischen, wie wertvoll ist dieses „Wissen“? Welchen Nutzen ziehen wir daraus? Fließen in die Bewertung von Arten die Beziehungen zu den Systemen, von denen die jeweiligen Tiere abhängen, mit ein? Wie werden stetige und plötzliche potenzielle Veränderungen von Lebensräumen/ Lebensgemeinschaften – wie Umwelt- und Klimaveränderungen – mit in die Bewertung einbezogen? Haben die Wissenschaftler/innen ein „persönliches“ Wertesystem? Was ist die Farbenpracht von Fischen wert?

Diesen Fragen und weiteren Aspekten wird Nicole Schuck primär zeichnerisch auf der Spur sein. Helgoland ist ein komplexes Ökosystem im „Kleinen“, das sich aufgrund seiner Größe in seinen Zusammenhängen und Einflüssen gut erforschen lässt. Biodiversität, Artenverschiebungen und Besonderheiten – etwa der blaue Hummer – können hier unmittelbar beobachtet werden. Aus den potenziellen Meerestieren wählt Nicole Schuck einzelne aus, die ihr speziell interessant erscheinen und die sie unter selbst entwickelten Aspekten analysiert, um ihren Wert/Nutzen zu bestimmen. Die aktuelle wissenschaftliche Forschung bezüglich der jeweiligen Tiere, ihrer Lebensbedingungen und des In-Bezug-Seins mit ihrem Umfeld stellt sie ihrer eigenen Feldforschung gegenüber.

Rebekka Kricheldorf

Writer in Residence
Arts & Humanities

Fellowship period

01.09.17 - 31.12.17

Location

Berlin
GERMANY

Cooperation partner

Prof. Dr. Reto Weiler
Hanse-Wissenschaftskolleg





PLEASURE CENTER - Ein Theaterstück

Schon seit längerem befasse ich mich dilettantisch, aber obsessiv mit dem nucleus accumbens aka Belohnungszentrum. Ohne seine Existenz würde sich kaum einer von uns je zu irgendeiner Tätigkeit aufraffen, wir würden wohl alle einfach still und faul aussterben. Welche neuronalen Trampelpfade er wählte (oder welche ihn wählten), um zu seiner täglichen Dosis Dopaminausschüttung zu gelangen, gehört zum Charakteristikum eines Menschen dazu wie andere Persönlichkeitsmerkmale auch. Nahezu jede menschliche Tätigkeit kann mit der Motivation erklärt werden, die körpereigene Hausapotheke zu plündern. In diesem Zusammenhang interessieren mich ein paar Fragen besonders, zum

Beispiel, wann eine Gewohnheit zur Sucht wird und worin der Unterschied überhaupt besteht, warum und wodurch Menschen unterschiedliche Mechanismen der Glücksgewinnung ausbilden und ob man seine Schaltkreise selbst neu programmieren könnte. Eine weiterführende, gesellschaftspolitische Frage wäre, ob eine bewussterer Umgang mit der eigenen Körperchemie Möglichkeiten böte, sich von den Verheißungen des kapitalistischen Konsums zu emanzipieren. Das aus diesen Fragestellungen im HWK entstandene Theaterstück soll am Oldenburgischen Staatstheater zu Beginn der Spielzeit 2018/19 uraufgeführt werden.



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