Membrane staining of calcifying sea urchin larvae. The primary skeleton (spicules) of the larvae and enables its formation from calcium carbonate. The meshwork of membranes from primary mesenchyme cells covers the renal tubule. These proteins provide selective permeability for ion transport. At the same time they form a barrier between organism and environment.

**Interdisciplinary Research Activities**

Our basic interest in pH regulation and biocalcification, from cellular mechanism to integration, resulted in a variety of interdisciplinary projects. Biological function and mechanistic understanding brought us together with biogeochemistry and geology as well as biogeochemical modeling. Together with the working group of Otto Riebesell (GEOMAR) our common targets have been calcifying algae which are an important part of the ecosystem. We asked for their vulnerability towards ocean acidification. Another collaboration was developed based on the fact that calcifying marine species could provide proxies for the estimation of paleo-climate conditions if we understand how the calcium-carbonate is composed and constructed. This important mechanism to integration, resulted in a variety of interdisciplinary projects.

**Abstract**

We will to continue our basic research on the overarching theme of pH regulation and biocalcification in marine species. We integrate our findings and translate our understanding on pathophysiological questions in human diseases.

**Current Projects**

- **since 2014**: Research on proton pump regulation and ammonia excretion in bivalves. Funded by DFG (PRIME program).
- **since 2009**: Research on sea urchins and their larvae for the basic mechanisms of skeleton formation. Investigation of extracellular buffer systems and the effects of ocean acidification on calcification and its secondary consequences for energy budgets. Funded by DFG (FOR 1731).
- **since 2007**: Research on coccocolithophorids: biocalcification and pH regulation. Funded by DFG (FOR 1731).
- **since 2006**: Establishment and further development of the Integrated School of Ocean Science (ISOS). Speaker since 2007.
- **since 2004**: Contributions to the Cluster of Excellence ‘Future Ocean’. Main topic ocean acidification.

**Main Publications**


**Research Questions**

- How do organisms respond to ocean acidification in regulating their cellular pH?
- How are salt-, water- and acid/base homeostasis integrated in the whole animal?
- What controls and regulates cellular membrane transport?
- How is membrane transport characterized pharmacologically?
- How does the selectivity and regulation of tight and septate junctions take place?
Thomas Bosch studied Biology at the University of Munich and Swansea University College in the UK from 1976 to 1983. He earned his doctorate from the University of Munich in 1986. From 1986 to 1988, Bosch held a postdoctoral position at the University of California, Irvine, USA. After a position as research associate at the University of Munich, he was appointed to professorship for Zoology at the Friedrich Schiller University of Jena in 1997. Since 2000 Bosch is Professor of General Zoology at Kiel University. From 2010 to 2013 he served as Vice-President of Kiel University and was responsible for Kiel University’s institutional strategy and international relations. Bosch is managing editor of ’Zoology’. He is also a member of several national and international Academic Committees and Boards. His awards include a Dr. honoris causa degree from St. Petersburg State University, Russia (2004).

The Bosch lab studies the evolution of animal complexity and considers an organism a multispecies metaorganism consisting of a multicellular host and a community of associated microorganisms. Our recent discoveries in marine and freshwater polyps have contributed to a paradigm shift in immunity: the innate immune system with its host-specific antimicrobial peptides and rich repertoire of pattern recognition receptors has evolved in response to the need for controlling resident beneficial microbes rather than to defend against invasive pathogens. These findings are providing new insight into how developmental pathways beyond those associated with the immune system, such as stem cell transcriptional programs, interact with environmental cues such as microbes. Using a combined bioinformatics and high throughput genomics approach coupled to functional analyses using transgenics, we investigate the evolution and functioning of metazoans. Finally, we recognize evolution as a basic science for medicine and attempt to understand why diseases which affect barrier organs often develop from the interaction between microbes and individual genetic susceptibility.

RESEARCH INTERESTS
For a long time, the main purpose of host-associated microbiology was to study pathogenic bacteria and infectious disease; the potential benefit of good bacteria remained unrecognized. In the last 10 years, biology has made revolutionary changes from century-old debates about the relative importance of non-pathogenic bacteria. Today we know that individuals are not solitary, homogenous entities but consist of complex communities of many species that likely evolved during a billion years of coexistence. Many questions arise when considering an organism a multispecies metaorganism. For example:

▶ How has the immune system been shaped by the need to accommodate symbionts?
▶ How does it coevolve with a symbiotic microbiota to both shape and accommodate community assembly?
▶ How do the resident symbionts influence fitness and thus ecologically important traits of their hosts?
▶ Is there a mutual intertwining between the stem cell regulatory machinery of the host and the resident symbiotic microbe composition, such that disturbances in either trigger a restructuring and restetting of the other?

CURRENT PROJECTS

2014 - 2017 DFG Normalverfahren Sachbeihilfe (Bo 848/17-2) ’Epileptogene Altersveränderungen in Hydra’


2015 CNRS and Inserm Conferences Jacques Monod “Comparative Biology of Aging.”


INTERDISCIPLINARY RESEARCH ACTIVITIES
**Prof. Dr. Malte Braack**

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**Abstract**

Many physical, chemical and geological phenomena, as well as technical processes, can be described by partial differential equations. These equations are usually only solvable approximately by numerical schemes and the use of computers. In climate research the necessary computing facilities can be very large and expensive. In order to reduce the numerical costs of such simulations, advanced numerical schemes are essential. Among others these are adaptive methods, locally refined grids, stable and accurate discretizations, and efficient solution techniques. Moreover, one is often interested in controlling the arising errors due to several simplifications and approximations. Mathematical techniques are needed to address these issues. In the context of Marine Research typical application areas are: numerical prediction of ocean changes, simulation of biogeochemical phenomena, mathematical description of fish stocks and their dynamics.

**Current Projects**

- 2008 - 2014 DFG SPP 1376 ‘MetStröm’
- 2010 - 2012 DFG SPP 1253: ‘Optimization with Partial Differential Equation’
- 2012 - 2015 ERC Future Ocean CP 1336: ‘Improved sea-floor representations in ocean models’
- 2013 - 2014 ERC Future Ocean CP 1356: ‘Analysis of spatial differentiated shadow prices using the example of the Pacific skip-jack tuna’

**Main Publications**

- M. Braack, A. Prohl, Stable discretization of a diffuse interface model for liquid-vapor flows with surface tension, ESAIM M2AN 47, 401-420, 2013. DOI:10.1051/m2an/2012032.

**Interdisciplinary Research Activities**

**Prof. Dr. Gernot Friedrichs**

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**Institutional Research Activities**

**Prof. Dr. Friedrichs:** CRDS based isotope detection, field-going instrumentation

**Prof. Dr. H. Bange:** Boknis Eck Time Series Station

**Prof. Dr. A. Engel:** ocean microlayer analysis

**Prof. Dr. D. Wallace (Halifax, Canada) & Dr. B. Quack:** development of state-of-the-art CRDS detection schemes for organohalogen detection in marine environments

**Dr. N. Lamoureux, Dr. Elke Gose:** Raman imaging and synchrotron measurements of the NCN radical

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**Main Publications**


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**Research Areas**

- How can modern laser spectroscopic methods be used to advance our molecular level understanding of marine processes?
- What determines the composition, structure and reactivity of the marine organic nanolayer?
- How can trace gases and their isotopologues be selectively and sensitively detected?
- To what extent do oxidation processes alter the organic coating of atmospheric particles?
- Can optical sensors be applied in field settings?
- How does high temperature gas phase kinetics influence the formation of pollutants in combustion processes?
- How to design functionalized surfaces that can be optically switched?

**Current Projects**

2012 – 2018 **KOF: Helmholtz Research School of Ocean System Sciences and Technology (PhD scholarship).**

2008 – 2017 **Cluster of Excellence 'The Future Ocean', Sea Surface Chemistry; in Phase II: principal investigator of research theme ‘Ocean Interfaces’ (postdoc program 353, research platform investment (cw-in-laser source).**

2011 – 2015 **SFB 677, SP B8: Spectroscopic Investigations of Switching Properties of Azo-Benzene-Based Surface Monolayers on Gold and SiO2 (cw-IR-laser source).**

2009 – 2013 **The Role of NCN and HNO Reactions During NOx Formation in Combustion Processes (cw-IR-laser source).**

**Abstract**

Current research projects are in the field of ocean surface chemistry, combustion chemistry and surface spectroscopy. Within the Cluster of Excellence ‘The Future Ocean’, a new optical detection laboratory has been set up making available surface sensitive vibrational cw-cRDS and mid-infrared cw-cRDS spectroscopy. vSFG is used to investigate the composition, structure, and reactivity of the organic nanolayer, which is prevalent at natural water-air interfaces. In the framework of SFB677/7 ‘Function by Switching’ we also apply the vSFG technique to study functionalized, optical switchable interfacial systems. Other optical lab-based and field-deployable sensors are developed for isotope selective detection of CO₂ for sensitive organohalogen detection, and for monitoring processes at liquid/gas and liquid/solid surfaces. Additionally, time-resolved measurements are performed by UV laser absorption and frequency modulation spectroscopy in combination with a photolysis shock tube experiment. Here, present investigations are concerned with elementary reactions of NCN and HNO, both key species for modeling NOx formation in hydrocarbon combustion. The experimental work is complemented by theoretical analysis based on quantum-chemical calculations and molecular modeling techniques.
Stefan Garthe studied Biology at Hamburg and Kiel University. In 1997 he earned his doctorate in Zoology studying seabirds in the North Sea. From 1997-2000 he held a postdoc position at the Institute of Marine Science in Kiel, followed by an Assistant Professorship at the Research and Technology Centre (FTZ), in Büsum. He completed his habilitation in 2005 (Zoology, Biological Oceanography). In 2007 he became a senior scientist at the FTZ and was appointed professor at Kiel University in 2014. Since 2004, he is also Adjunct Professor at Memorial University of Newfoundland in St. John’s, Canada. Since 2013, he is president of the German Ornithologists’ Society.

RESEARCH AREAS
The fundamental and applied aspects of the research belong thematically to marine ecology. The main focus is on the ecology of seabirds, whereas the geographical center lies in the offshore areas of the North and Baltic Seas, the Wadden Sea and near-coastal inland areas. The main topics are the distribution, population development and living habits of seabirds and their space-time patterns (tracking with GPS data loggers and other methods).

INTERDISCIPLINARY RESEARCH ACTIVITIES
His work on seabirds is embedded in collaborations with national and international research teams, mainly from around the North Atlantic. In Kiel, collaborations exist within the FTZ (geology: K. Rickels, physics: K. Vanselow), with the Institut für Geowissenschaften (geology: K. Schwarzer), with the Institut für Natur- und Ressourcenforschung (ecology: W. Windhorst), with the Institut für Volkswirtschaftslehre (fisheries: M. Quaas) and with the GEOMAR (ecology: S. Ismar). Research is often linked with teaching so that the latest research developments become part of teaching contents.

RESEARCH QUESTIONS
Most of the research of Stefan Garthe is dedicated to the role of seabirds in coastal and marine ecosystems. Central research questions include:

- What are the main habitats used by seabirds in offshore and coastal areas of North and Baltic Sea?
- What are the spatio-temporal patterns of seabird distribution?
- What are the foraging strategies of various seabird species?
- What can we learn from seabird behaviour to detect and understand changes in the marine environment?
- To what extent do offshore wind farms, fisheries, ship traffic and litter affect the environment?

STEFAN GARTHE

CURRENT PROJECTS
2014 – 2016 Monitoring of litter in German waters: plastic particles in seabirds
2014 – 2016 Development and standardisation of digital aerial census methods for marine top-predators as related to offshore wind farm monitoring
2013 – 2015 Mammalian ground predators and breeding seabirds in the Wadden Sea
2013 – 2016 Collaborative research project STOpP: From Sediment to Top Predator - Influence of the Characteristics of the sea floor on Benthos and Benthivorous Birds, Part B (Kiel University FTZ and Institute of Geosciences)

MAIN PUBLICATIONS
Stanislav Gorb studied Zoology at Taras Shevchenko National University in Kiev, Ukraine. He earned his doctorate in 1991 at the Schmalhausen Zoological Institute of the Ukrainian Academy of Sciences in Kiev, Ukraine. Following further research stays in Vienna, Kiev, Tübingen and Jena he completed his habilitation at the Zoological Institute of Freiburg University. Subsequently he spent several years at the Max Planck Institute of Metals Research in Stuttgart before he accepted the offer of a professorship in Functional Morphology and Biomechanics at Zoological Institute of Kiel University in 2008. He is member of two faculties: Faculty of Mathematics and Natural Sciences and Faculty of Engineering.

### ABSTRACT

Stanislav Gorb’s research includes approaches of several disciplines: zoology, botany, structural biology, biomechanics, physics, and materials science. Using a wide variety of methods, his group studies mechanical systems and materials, which appeared in biological evolution.

The research is mainly focused on biological surfaces specialised for enhancement or reduction of frictional or adhesive forces. Such surfaces are composed of highly-specialised materials and bear surface structures optimised for a particular function. In order to show different functional principles, we experimentally test many different systems and try to outline general rules of the interrelationship between structure and function. Since comparative studies on the microscale, ultrastructure, material properties, and attachment-detractment performances of several functional systems include a wide variety of organisms, some questions about the evolution of these systems can be resolved.

Part of the research in Gorb’s group is devoted to the transfer of ideas from studies on biological systems to materials science (biomimetics of new surface-active materials with enhanced frictional or adhesive properties).

### CURRENT PROJECTS

- Functionality by hierarchical structuring of materials (DFG SPP1420)
- Carbon nanotubes for mimicking gecko-like adhesives (DFO)
- Bioinspired adhesives (Gottlieb Binder GmbH & Co. KG)
- Microattachment devices (Bishop-GmbH)
- ‘Zukunft Meer’ in the Framework of FET- and TRIR initiative (Ministry of Economic Affairs, Employment, Transport and Technology of Schleswig-Holstein)

### HONOURS AND AWARDS

- Fellow of the German National Academy of Sciences, Leopoldina (2011)
- Fellow of the Academy of Science and Literature, Mainz (2011)
- Science Award of the donors’ Association for the Promotion of Science and Humanities (Stift verband fuer die Deutsche Wissenscha -ft) – together with E. Arzt, H. Gao, and R. Spolenak (2005)

### MAIN PUBLICATIONS

Wilhelm (Willi) Hasselbring studied Information Technology at the Technical University of Braunschweig. He earned his doctorate at Dortmund University in 1994. After further career stations in Essen and in the Netherlands, he was offered a professorship at Carl von Ossietzky (CvO) University in Oldenburg in 2000. In 2008 he was named Professor of Software Engineering at Kiel University and has been Dean of the Technical Faculty since 2011.

RESEARCH QUESTIONS
In PubFlow (Publication Workflows for Scientific Data – From acquisition and processing toward archival and publication), for instance, we address the following research questions:
• Which provenance data is required for scientific workflows?
• Which parts of scientific workflows may be automated?
• How to realize a scientific workflow system based on business workflow technology?

CURRENT PROJECTS
2012 – 2015 HOPIST: Helmholtz Research School Ocean System Science and Technology
2012 – 2015 Science 2.0: New Ways of Science and Publication Processes

MAIN PUBLICATIONS

ABSTRACT
The research of the Software Engineering Group focuses on Software Engineering for parallel and distributed systems. One goal of the Software Engineering Group is to investigate innovative techniques and methods for engineering, evolving, and operating continuously running software systems. PubFlow invents new approaches and a pilot application to work with scientific data in scientific workflows to increase the productivity in scientific work. PubFlow provides a data publication framework for scientific data, build on top of proven business workflow technologies such as BPEL and BPMN. It brings automation and role-based working models to the domain of scientific data management. In PubFlow, data managers create data management workflows with a graphical, domain-specific modeling language and scientists execute these workflows to automatically upload their data to the repositories. Besides providing workflow support, PubFlow also serves as a data-integration framework among heterogeneous systems. PubFlow automatically collects provenance information during data processing and stores it in an integrated, W3C Prov-O compliant, archive. In the first project phase, PubFlow is applied to the domain of marine sciences, which we intend to extend to the life sciences in a second phase.

INTERDISCIPLINARY RESEARCH ACTIVITIES
The working group of Willi Hasselbring contributes to several research data management activities, for instance in the cluster of excellence The Future Ocean, in the project MaWiFo on research data management in economics (with the ZBW, Leibniz-Informationszentrum Wirtschaft), and in the project PubFlow on publication workflows for research data with GEOMAR.
**Prof. Dr. Frank Kempken**

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**Research Questions**

Most of the research of Frank Kempken is related to molecular genetics and cell biology of filamentous fungi. Central research questions include:

- What is the biological function of fungal secondary metabolites?
- What is the coding potential of fungi from marine sources?
- Can we use fungal transposons as mutagenesis tools in filamentous fungi?
- Are there true marine fungi and what specific adaptations may exist?

**Abstract**

The major focus of our work lies in the molecular genetic analysis of filamentous fungi. This includes the use of transposable elements, evolutionary conserved protein families, and especially fungi genomes that come from marine sources. Within the framework of the EU project 'Marine Fungi', we have sequenced and annotated three fungi genomes as part of a subproject. Moreover we employed RNAseq for expression analyses. Of particular interest are secondary metabolite clusters. In a related project we have a strong focus on the biological function of fungal secondary metabolites.

**Main Publications**


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**Interdisciplinary Research Activities**

My research is carried out in collaboration with a number of national and international collaborators. In Kiel I am a member of both clusters of excellence and also of the International Max-Planck Research School for Evolutionary Biology. I further collaborate with the Kieler Wirkstoffzentrum and I am part of the EU project QuantFung (http://intern.mikrobiologie.tu-berlin.de).

**Current Projects**

- **since 2014** EU project FP7-PEOPLE-2013 ITN ‘QuantFung’  
  Subject: ‘Quantitative biology for fungal secondary metabolite producers’
- **2011-2014** EU project FP7-265926 ‘Marine Fungi’  
  Subject: ‘Natural products from marine fungi for the treatment of cancer’

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**TOP**: Fungal secondary metabolites – medical use & biological function
ABSTRACT

Sebastian Krastel is a specialist in high-resolution acoustic imaging of marine and lake sediments. He successfully collected high-quality multi-channel seismic and hydroacoustic data on regular research vessels but also on small boats. He is currently heading the group 'Marine Geophysics and Hydroacoustics' at Kiel University. His main interests are investigations of gravity-driven sediment transport processes and associated hazards as well as fluid migration at continental margins. Sedimentation processes, slope stability and associated hazards were intensively studied along active margins (e.g., off Chile, Mediterranean Sea), passive margins (e.g., northwest-African Continental margin, off Uruguay, Andaman Sea, off Svalbard) as well as in lakes (e.g., Lake Van in Turkey, Lake Ohrid in Macedonia/Albania). Fluid migration was studied in the Black Sea and off Svalbard.

RESEARCH QUESTIONS

Most of the research of Sebastian Krastel is related to sediment transport processes and associated geohazards. Central research questions include:

- What processes control sediment (re)deposition and transport on the shelf, across the shelf break and on the continental slope?
- What are the dominant processes and environmental controls of mass wasting?
- How dangerous are slope failures on continental margins and in lakes?
- How can we use sedimentary archives in lakes in order to reconstruct their geological evolution?
- How do submarine volcanoes and volcanic islands evolve?

MAIN PUBLICATIONS


INTERDISCIPLINARY RESEARCH ACTIVITIES

Sebastian Krastel’s group has manifold cooperations with groups investigating similar and other aspects of sediment transport and associated hazards at continental margins as well as the evolution of lakes. Main cooperation partners in Kiel are the groups ‘Applied Geophysics’ (Wolfgang Rabbel), ‘Marine Climate Research’ (Ralph Schneider) the ‘Sedimentology, Coastal and Continental Shelf Research Group’ (Karl Stuttegger, Klaus Schwarzer), as well as the GEOMAR Department ‘Dynamics of the Ocean Floor’ (Christian Berndt, Jörg Bialas). On the national and international level, close cooperations exists (among others) with the Universities of Cologne and Bonn (Evolution of Lakes) as well as the National Oceanography Centre Southampton (UK), NIWA (NZ), and the University of Rome La Sapienza (sediment transport processes and associated hazards). Sebastian Krastel plays a very active role in the ICGF Project E-MARSHAL (Earth’s continental MARgins: assessing the geohazard from submarine Landslides).

CURRENT PROJECTS

- since 2013 PLOT: Paleolimnological transect – Quaternary climate gradients along Northern Eurasia and potentials for deep drilling, funded by DFG.
- since 2013 Understanding slow-slipping submarine landslides: 3D seismic investigations of the Tushenli landslide complex, off New Zealand.
- since 2012 Morphology, processes and geohazards of giant land-slides in and around Agadir Canyon, northwest Africa, RV Merian Cruise MSM32.
- since 2011 Assessing the geoHazard from submarine Landslides).
- since 2010 Seismogenic faults, landslides, and associated tsunami’s off southern Italy, funded by DFG.
- since 2010 Cluster of Excellence ‘The Future Ocean’ Research Topic 6: Dangerous Ocean, funded by DFG.
- since 2009 Bathymetric Survey of Lake Van (BathyVan), Turkey – finding answers to objectives not directly addressed by icdp drilling at Lake Van, funded by dfg.
- since 2008 Drilling campaign Lake Ohrid ‘Scientific Collaboration on Past Speciation Conditions in Lake Ohrid’ – funded by DFG, DFRF and ICDP.
- since 2008 Drilling campaign Lake Ohrid ‘Scientific Collaboration on Past Speciation Conditions in Lake Ohrid’ – funded by DFG, DFRF and ICDP.
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- since 2008 Drilling campaign Lake Ohrid ‘Scientific Collaboration on Past Speciation Conditions in Lake Ohrid’ – funded by DFG, DFRF and ICDP.
In her research on marine protected areas (MPAs), one issue addressed by Prof. Matz-Lück concerns the OSPAR network. Various international institutions continuously urge States to establish a network of marine protected areas in areas beyond the limits of national jurisdiction (ABNJ). Although this goal is far from being reached, the OSPAR Convention may serve as an example illustrating the efforts made on a regional level for the North-East Atlantic. However, these efforts to effectively protect the marine environment are subject to limitations under the Convention on the Law of the Sea (UNCLOS). Likewise, the OSPAR Convention itself restricts the scope of such protected areas. It does not adequately cover all uses of the oceans that may interfere with an MPA, and it lacks opportunities for enforcement measures. Consequently, the responsibility for effective conservation measures ultimately remains with individual Contracting Parties, i.e. their commitment to set stricter standards and to agree on their enforcement.

Newly, soft obligations such as reporting duties are suitable for collecting data on the need for protection and the utilisation of MPAs. Additionally, cooperation with regional fisheries management bodies allows for better protection of the living resources in these areas. Finally, OSPAR MPAs can draw attention to particularly vulnerable ecosystems and promote conservation standards and measures such as those developed under the auspices of the FAO.
Prof. Dr. Roberto Mayerle

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RESEARCH INTERESTS

• What are best suited strategies for predicting the effects of sea level rise, tsunami and extreme storms on coastal hydrodynamics and morphodynamics?
• What are best suited strategies for predicting human impacts in coastal regions?
• How can direct and indirect measurements and process-based models be combined to design strategies for coastal protection?
• How should effective decision support systems for coastal uses (e.g., aquaculture, harbor operation, renewable ocean energy extraction) be designed?
• How can the predictive ability of sediment transport and morphodynamic models be improved?
• How can coastal information systems be set up for the prediction of water levels, currents and waves in quasi real time?

CURRENT PROJECTS

2012 – 2015  ORE-12, Development of a Decision Support System for Site Selection and Power Yield from Ocean Renewable Energy Facilities in Indonesia
2011 – 2014  FLASH, Development of a Decision Support System for the Sustainable Coastal Environmental Planning of the Shandong Peninsula, China
2009 – 2014  AKUST, Changing Coastal Climate, Assessment of adaptation strategies for coastal protection, Germany
2010 – 2013  JEDD TRANSPECT, Development of a Coastal Monitoring System for the Sustainable Environmental Planning of Jeddah Coastline, Saudi Arabia
2009 – 2014  Predictions of the morphological changes due to extreme events and tsunami, Germany
2012 – 2015  EMS I: Morphodynamic modeling for the assessment of the effectiveness of changes to the Ems Storm Surge Barrier in the reduction of sediment concentration and dredging, Germany
2012 – 2015  EMS II, Hydrodynamic and morphodynamic investigations of the effectiveness of measures for improving the ecological conditions of the Ems Estuary, Germany
2012 – 2015  MAST, Set-up of a Nowcasting Modeling System for the Submarine Area near Kota Kinabalu, Malaysia

INTERDISCIPLINARY RESEARCH ACTIVITIES

• Prof. Dr. F. Fodor, Institute for the World Economy: Resource management, fish farming
• Prof. Dr. A. Vafeidis, Institute of Geography: Coastal Processes and risks
• Prof. Dr. T. Slaug, Institute for Computer Science: Climate models and simulations
• Prof. Dr. S. Krastel, Institute of Geosciences, Modelling of tsunami

MAIN PUBLICATIONS

• G. Bruss, G. Gönnet, R. Mayerle: Extreme scenarios for coastal protection at the North Sea. A numerical model study. 32nd ICC, Shanghai, China, 2010
• R. Mayerle: Strategies for enhancing the predictive ability of coastal area sediment transport models. US-China workshop on advanced computational modeling in hydroscience and engineering, Honolulu, Hawaii, USA, May 14, 2008

ABSTRACT

Prof. Mayerle gives emphasis to applied research in coastal environments. He works in close cooperation with the industry and coastal authorities. A combination of process based field investigations and numerical modeling is used. The strategies for handling coastal problems are developed and tested on the North Sea coast near the research centre and near Kiel on the Baltic Sea. Applications are done to coastal areas all over the world. It includes the selection of sites suitable for the installation of ocean renewable energy converters, selection of optimal sites for ensuring sustainable fish farming operations and the development of coastal monitoring systems for predictions in quasi real time.
The research of Kerstin Odendahl covers a wide range of topics of public international law. Central research questions include:

- Which rules apply to the protection of the environment, including the marine environment?
- Which methods of peaceful dispute settlement are the best to be applied for solving the various international conflicts including conflicts on the law of the sea?
- Which is the best way to cope with security problems, including piracy, organized crime at sea etc.?
- How is the underwater cultural heritage protected?

CURRENT PROJECTS

Since 2013, Cluster of Excellence ‘Future Ocean’


2014: Symposium ‘100 Years of Peace through Law: Past and Future’ (together with Nele Matz-Lück and Andreas von Arnim)

2015: Book on ‘International Dispute Settlement’

INTERDISCIPLINARY RESEARCH ACTIVITIES

Kerstin Odendahl is member in three interdisciplinary research programmes at Kiel University: the Cluster of Excellence ‘The Future Ocean’, the ‘Gustav-Radbruch-Netzwerk für Philosophie und Ethik der Umwelt’ as well as a project to start a new ‘Sonderforschungsbe-reich’ named ‘Distributive Justice in a Globalized World’. In all of these interdisciplinary research programmes she works in the field of international environmental law focusing on the protection of the marine environment, on climate engineering and on nuclear law.

MAJOR PUBLICATIONS


P R E S E N T A T I O N

Environmental ethics is a field of practical philosophy. As part of ethics, it refers back to general ethical theory. I prefer discourse ethics as general ethical framework because it leaves much room for substantial argument and for transcultural debate. Environmental ethics reflects critically upon pattern of arguments by which humans may justify utilization, interference, protection, and restoration of biotic systems. Such general patterns of reasoning and discourse may justify utilization, interference, protection, and restoration of biotic systems. Such general patterns of reasoning and discourse can be applied and modified with different field of environmental concern, as climate change, biodiversity, forestry, freshwater, fisheries, and marine systems? How can a democratic society organize a fair transformation toward a sustainable post-growth state? How can humans realize the three objective of Convention of Biological Diversity: protection, sustainable use, and fair access and benefit-sharing? How can we reasonably argue about our relationships to the world of nature with respect to perceptions, attitudes, values, commitments, and obligations? Which ethical ideas, concept, rules, guidelines, and objectives define a truly sustainable development? How can a general concept of sustainability be applied to different field of environmental concern, as climate change, biodiversity, forestry, freshwater, fisheries, and marine systems? How can a democratic society organize a fair transformation toward a sustainable post-growth state?

K U R R E N T P R O J E K T S


▶ Verbundprojekt: Bildung eines Forschungsplattform. Entsorgungs-optionen für radioaktive Reststoffe Finanzierung: BMBF

▶ Verbundvorhaben: Energiekonflikt – Akzeptanzkriterien und Gerechtigkeitsvorstellungen von Projektgegnern. Finanzierung: BMBF


▶ BIKOM – Motivational Strength of Ecosystem Services and Alternatives ways to Express the Value of Biodiversity. Finanzierung: EU 7.RP

A B S T R A C T

Environmental ethics is a field of practical philosophy. As part of ethics, it refers back to general ethical theory. I prefer discourse ethics as general ethical framework because it leaves much room for substantial argument and for transcultural debate. Environmental ethics reflects critically upon pattern of arguments by which humans may justify utilization, interference, protection, and restoration of biotic systems. Such general patterns of reasoning and discourse can be applied and modified with different field of environmental policy making. It is assumed, that the non-coercive force of good reasons may create an influence societal attitudes toward nature and even on long-term institutional reforms. This approach shall be tested in the field of marine systems in years to come.

K O N R A D O T T

KONRAD OTT, born 1959, studied philosophy and history from 1982-1986. He received his PhD in philosophy in 1989 and he habilitated in 1995. From 1997 till 2012 he was professor for environmental ethics at Greifswald University, within the interdisciplinary study program ‘Landscape Ecology and Nature Conservation’. As a member of the Environmental Advisory Council, he did scientific policy counseling from 2000 till 2008. In 2012 he was appointed chair for ‘Philosophy and Ethics of the Environment’ at CAU.

M A I N P U B L I C A T I O N S


▶ Ott, K. (2013): How can we reasonably argue about our relationships to the world of nature with respect to perceptions, attitudes, values, commitments, and obligations? Which ethical ideas, concept, rules, guidelines, and objectives define a truly sustainable development? How can a general concept of sustainability be applied to different field of environmental concern, as climate change, biodiversity, forestry, freshwater, fisheries, and marine systems? How can a democratic society organize a fair transformation toward a sustainable post-growth state? How can humans realize the three objective of Convention of Biological Diversity: protection, sustainable use, and fair access and benefit-sharing?

K I E L M A R I N E S C I E N C E
Dieter Piepenburg studied fisheries biology at the Institute of Marine Research in Kiel. He earned his doctorate at the Institute for Polar Ecology of Kiel University in 1988 with a PhD thesis on the sea floor fauna of western Fram Strait. In 1997, he completed his habilitation thesis on the ecology and biology of Arctic brittle stars. Since 2006 he is professor at Kiel University, and since 2014 he is also at the Alfred Wegener Institute (AWI) Helmholtz Centre of Polar and Marine Research in Bremerhaven.

RESEARCH QUESTIONS

- How do climate-driven changes in the ocean (warming, acidification and, in polar regions, sea-ice decline) affect the distribution, composition, diversity and ecosystem functions of sea floor (benthic) communities?
- How do benthos species respond to multiple stress factors in their natural environment in ecologically relevant parameters (e.g. growth, production, metabolism)?
- How does the pelagic-benthic coupling work, i.e., what relationships exist between benthic ecosystem functions and processes in the open water and in sea ice?

CURRENT PROJECTS

2003 – 2015 Academy Projects: ‘Early warning systems for global environment change and documentation in natural climate archives’, Funding: Max Planck Society, Humanities and Literature


MAIN PUBLICATIONS


INTERDISCIPLINARY RESEARCH ACTIVITIES

There is an intense cooperation with the research group Riebesell (GEOMAR) within the Cluster of Excellence ‘The Future Ocean’, for example in the research projects ‘Synergetic effects of temperature, pH and salinity on the metabolism of benthic organisms’ (2007) and ‘Ecophysiological consequences of ocean warming and acidification: Metabolic response of the cold-water coral Lophelia pertusa (Scleractinia) to variations in ambient temperature and pH’ (2008 – 2010), as well as with the research group Kassens (GEOMAR) in the current BMBF Collaborative Project ‘The transpolar system of the Arctic Ocean’ (2013–2016).
Prof. Dr. Martin Quaas

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RESEARCH INTERESTS
- How can sustainability of the ocean be conceptualized?
- What characterizes sustainable management of marine resources?
- How can sustainable management of marine resources be implemented by means of economic policy instruments?
- What are the distributional consequences of sustainable management of marine resources?

CURRENT PROJECTS
2013 – 2017 AWA-Ecosystem Approach to the management of fisheries and the marine environment in West African waters
2013 – 2016 Learning about cloud brightening under risk and uncertainty: Whether, when and how to do field experiments (LEAC)
2012 – 2015 MYRISH–Maximising yield of fisheries while balancing ecosystem, economic and social concerns
2010 – 2013 EIGEN–Efficient inter- and intragenerationally just use of ecosystem services
2009 – 2015 Phase I: September 2009 – August 2012, Phase II: September 2012 – August 2015 BIOACID / BIOACID II–Biological Impacts of Ocean Acidification

MAIN PUBLICATIONS

INTERDISCIPLINARY RESEARCH ACTIVITIES
Martin Quaas closely collaborates with fishery biologists, in particular with Rüdiger Voss and Jörn Schmidt, both working in the research group on Environmental, Resource, and Ecological Economics at CAU, and Rainer Froese, GEOMAR. On questions of climate engineering, he works together with biogeochemical modelers, in particular Andreas Oschlies, GEOMAR, and with meteorologists, including his twin brother Johannes Quaas, University of Leipzig. Using mathematical models in most of his work, he also is in contact with mathematicians like Malte Braack, CAU Kiel. Martin Quaas is doing conceptual work on sustainability with philosophers specialized in environmental ethics, including Christian Becker, Pennsylvania State University, and Konrad Ott, CAU.

ABSTRACT
Martin Quaas main research interest is the sustainable use of natural resources and the environment, in particular sustainable fisheries, climate change, and renewable energy. The research approach is interdisciplinary, combining natural sciences and economics, as no efficient and sustainable use of natural resources is possible without taking the relevant processes and interactions in natural systems into account. Economics is equally important, as first, economic incentives determine how resources are used in a market economy. Second, unlike natural sciences, economics provides sound methods to operationalize normative societal objectives such as welfare and sustainability. Both, incentives and operational normative objectives, play an important role in our research on how to design instruments and institutions for the sustainable management of natural resources. Martin Quaas has published in the major Environmental Economics journals such as Journal of Environmental Economics and Management or Ecological Economics, but also in science journals.

RIGHT: Shadow interest rates for 13 major European fish stocks (Quaas et al. 2012)
Wolfgang Rabbel studied Geophysics at Kiel University. In 1987 he earned his doctorate on a study on seismic exploration of near-surface fault zones. He completed his habilitation in Geophysics in 1994 with a study on the seismic structure of the crystalline part of the earth crust based on investigations at the super-deep continental drillhole ktb (S Germany). In 1995 he became a Professor of Geophysics at the Institute of Geosciences at Kiel University.

RESEARCH QUESTIONS

The research of Wolfgang Rabbel aims at exploring structure and processes of the earth’s interior by geophysical measurements performed at the earth’s surface. Recent research questions include:

- How can we image buried archaeological sites by noninvasive measurements across the shoreline?
- How can we assess and monitor the stability of seafloor sediments by noninvasive measurements?
- How can we assess the energy potential of geothermal reservoirs?
- How do water-driven processes influence the earthquake activity at continental margins?

ABSTRACT

Wolfgang Rabbel is the head of a working group of Applied Geophysics. One major research focus lies on near surface on- and offshore geophysical prospecting applied to archaeological and environmental targets. Special emphasis is put on exploration methods based on analyzing the propagation of seismic waves, especially shear wave and surface waves from which mechanical properties of the subsurface can be deduced. Another methodical focus is on combining different physical approaches (seismic, magnetic, DC current, electromagnetic waves) in order to obtain an optimum image and physical characterization of the near-surface underground. The methods are applied both on- and offshore in order to assess, for example, the mechanical stability of the seafloor, to investigate the geothermal energy potential or to monitor the development of deep reservoirs. Common to many of the research questions is the quest for the role of water (or other fluids) in the crust that control many earth processes including (micro-)earthquake activity, heat transport or magma generation. Recent investigation targets are coastal areas and continental margins of Europe and Latin America.

INTERDISCIPLINARY RESEARCH ACTIVITIES

The research of the Applied Geophysics working group is carried out in close co-operation with international teams of the same field as well as partners from archaeology, civil engineering, geology and volcanology. In Kiel major partners have been scientists of the School “Human Development in Landscapes”, the Geological and Archaeological Surveys of Schleswig-Holstein, and – of course – of the Institute of Geosciences, especially the working groups of Marine Geophysics, Coastal Geology, Hydrogeology and Geohydro Modeling, Seismology, Potential Field and Geoinformation, and Petrology.

MAIN PUBLICATIONS


CURRENT PROJECTS

since 2007 Methodical developments for seismic exploration and evaluation of deep geothermal reservoirs (BMU)

since 2012 Propagation of ramming induced sound through the seafloor (BMU)

since 2012 Geophysical exploration of archaeological sites in shallow water near the shore line (DPFG)

since 2012 Methodical developments for seismic and geoelectrical monitoring of near-surface and deep-energy and mass storage reservoirs (BMU)

LENT: Geoelectrical measurements for prospecting the ancient harbor of Elia near the antique city of Pergamon (Bergama, Turkey)

RIGHT: 3D Hydroacoustic survey of the Viking harbor of Haithabu near the city of Schleswig (North Germany)
KATRIN REHdanZ

KATRIN REHdanZ studied economics at the University of Hamburg. She earned her doctorate in 2004. In 2007, she was offered a position as assistant professor within the Cluster of Excellence ‘Future Ocean’. Until 2012 she was leading the young researcher group ‘Valuing the Ocean’ within the Cluster. Since 2012 she is associate professor for environmental and resource economics at the University of Kiel associated with the Kiel Institute for the World Economy.

ABSTRACT

The dependence of humans on goods and services provided by the environment is strong and manifold. We rely on tangible goods like food and timber but also on more intangible services like water and air quality regulation, nutrient cycling and decomposition, pest pol- lination and flood control. The invisibility of most of these services and the fact that they do not command any price in the conventional economic system encourages inefficient use or even destruction of individual service flows. This in turn not only impacts human well-being, but also seriously undermines the sustainability of the economic system. It raises questions how the trade-off between the use of these resources in production and their preservation for the consumption of ecosystem services should be managed.

One aim of her research in this area, therefore, is to elicit comprehensive values of ecosystem services. Another is to analyse people’s preferences, particularly as they relate to decision making. With these research results she seeks to support societal decisions on a sustainable use of natural resources (e.g. land, water and biodiversity) and to balance market and non-market processes.

CURRENT PROJECTS

2011 – 2015 ‘ACCESs: Arctic Climate Change, Economy and Society’, FP7-Ocean-2010/CP-IP, EC-DC Transport


2012 – 2015 ‘URBES: Urban Biodiversity and Ecosystem Services’, German Federal Ministry of Education and Research and Regulations for the Promotion of Research and Development Projects under the Funding Programme BiodivERsA 2011-15

2012 – 2015 ‘ACCEP T: Determinants of people’s willingness to accept new climate change mitigation options. German Federal Ministry of Education and Research and Regulations for the Promotion of Research and Development Projects under the Funding Programme ‘The Economics of Climate Change’

2012 – 2015 ‘BIOACId II. Biological Impacts of Ocean Acidification’, German Federal Ministry of Education and Research

INTERDISCIPLINARY RESEARCH ACTIVITIES

Within the Cluster of Excellence ‘The Future Ocean’ cooperation exists with a couple of other research groups, for example at the GEoMAR (Biogeochemical Modeling: group of Andreas Ochlios; Environmental Physiology: group of Frank Meiners) as well as at the University (Environmental Ethics: group of Konrad Ott, Environmental, Resource and Ecological Economic: group of Martin Quaas).

MAIN PUBLICATIONS


▶ Narita, D., Rehdanz, K., Tol, R.S.J. (2012), Economic Costs of Ocean Acidification: A Look into the Impacts on Shellfish Production, Climate Change Economics, 3(1) DOI: 10.1142/S2010007812500029.


Till Requate studied Mathematics and Philosophy at Bielefeld University, and received a Ph.D. in Economics in 1989. He held a post-doc position at Bielefeld University from 1990 to 1995, was associate professor at the University of Oldenburg from 1995 to 1998. From 1998 to 2002 he was full professor for Environmental Economics and director of the Interdisciplinary Institute of Environmental Economics at the University of Heidelberg. Since 2002 he is a professor for economics at Kiel University. His major fields of interest are environmental and resource economics, competition policy, and experimental economics. Till Requate was awarded the Eric Kamps prize by the European Association of Environmental and Resource Economics in 2004 and the best health-paper award by the ‘Deutsche Gesellschaft für Gesundheitsökonomie’ in 2012. He also worked as a consultant to governments and NGOs, notably for the World Bank, Oxfam, and Inveniv.

**Research Questions**

- How does countries’ asymmetry in wealth and being affected by global warming impact on their willingness to pay to green house gas mitigation?
- How to design fishery management regulations under age structured fish stocks and multi-species interaction?
- How to design efficient, market based incentive schemes to employ renewable energy? What is the role of marine based renewable energy systems?

**Current Projects**

- **since 2011** An Experimental Study of climate policy negotiations: implications for policy design and impact assessment.
- **since 2010** Design of market based policies to spur the employment of renewable energy sources for electricity (RES-E).
- **since 2009** Behavioural Studies in Exploiting Renewable Resources, notably Fish.
- **since 2007** Design of Fisheries Management Rules.
- **since 2011** The Economics of Exploiting Gas Hydrates.

**Main Publications**


**Abstract**

Till Requate is a specialist in Environmental and Resource Economics. He has worked on the investment incentives of environmental policy instruments under different market forms, using both theoretical modelling and economic experiments. He is currently heading a project on simulating climate policy negotiations with a particular focus ion asymmetry among countries. Prof. Requate also works on fisheries management with a particular focus on multi-species and age-structured management, taking into account how demand impacts on fish exploitation.
Philip Rosenstiel studied medicine in Kiel and Boston and graduated in 2001. He received his MD degree on the characterization of Angiotensin II as a neurotrophic factor in 2003. After graduating he went to the Dept. of Internal Medicine in Kiel for medical training and a postdoc position in Internal Medicine/Mucosal Immunology with Ulrich Fölsch and Stefan Schreiber. Currently, he holds a professorship in Molecular and Evolutionary Medicine.

RESEARCH AREAS

Philip’s main scientific interest is to contribute to an understanding of the complex interactions between human mucosa and the environment in health and disease. The group focuses on the delineation of signaling pathways and cellular responses evoked by physiological and pathological host-microbe interaction in the intestinal epithelium and uses a broad range of model organisms from mice to bivalves to answer the questions.

Of particular interest are events that are mediated via innate immune receptors (nLRs) or involve ER stress and autophagic responses, including:

▶ How does nutritional stress develop into a modified composition of the intestinal microbiota and how is this related to regenerative and immunological function of the metazoan? 
▶ What is the contribution of the host’s genotype regarding the metazoan’s susceptibility towards environmental stress and infections?
▶ How do the observed changes shape inflammatory responses at the intestinal barrier?

CURRENT PROJECTS

2012 - 2016 IHEC DEEP International Human Epigenome Project, RNAsequencing
2011 - 2013 ‘GEUVADIS’ (7th FrameworK, EU)
2010 - 2013 ‘INTERREG IV’ - Deutsch-Dänische Hochtechnologie-Plattform für Innovative Krankheitsforschung’
2010 - 2013 ‘Reactive oxygen species as modulators and effectors of epithelial defense: A role for nOd-like receptors?’
2010 - 2013 SFB 877, SFB 918: ‘Genetische Varianten in der Protein-Degradation’
2008 - 2017 ‘Inflammation Research’ (DFG Cluster of Excellence, CAU Kiel; Member of steering Committee, Coordinator RA o. IBM nOd-like Receptor, Cluster lab VTT Nucleotide Lab)
2009 - 2012 DFG SPP 1389: ‘Host-Parasite Co-Evolution’

INTERDISCIPLINARY RESEARCH ACTIVITIES

Thorsten Riehle, German; Comparative Immunology, Heinrich Schuchardt, CAU, Genome Evolution, Thomas Rösch, CAU, Genomics, Ruth Schmitz-Streit, CAU, Genomics

MAIN PUBLICATIONS


ABSTRACT

The group has contributed some findings that recognition of gut microbiota via the nLRs NOD2 leads to the orchestrated activation of a protective cellular program via the transcription factor NF-κB including chemotactic cytokines and reactive oxygen species. We could demonstrate that low nutritional amino acid availability together with impaired autophagy and ER stress are major factors that may lead to dysfunctional endogenous antibiotic secretion in intestinal epithelial cells and disturbed microbial community structures in the intestinal tract. We could demonstrate that in principle many of these pathways are conserved in marine invertebrates and have recently worked on the crosstalk between specific symbiotic bacteria, epithelial light organ development and immune priming in the bobtail squid. On the technological side, the group develops sequencing and analysis methods to depict functional genomic changes both on the host and microbe side. Special interest was dedicated to the development of low-input methods for RNA sequencing, metabolic labeling of RNA, systematic rescanning of microbes under adaptive stress and metatranscriptomics.
Prof. Dr. Priska Schäfer

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Priska Schäfer studied Geology-Paleontology at the Universities in Giessen and Tübingen. She earned her doctorate in 1975 at the Erlangen University on the topic ‘Paleoecology and carbonate facies patterns of Triassic coral reefs in the Northern Limestone Alps’. Her habilitation thesis in Marburg concerned the paleoecology of brooding patterns in stenolaemate Bryozoa. Since 1989 she holds the professorship for paleontology and historical geology at Kiel University. From 1992-1998 she was leading the collaborative research center SFB313 ‘The Northern North Atlantic: A changing environment’.

MAIN PUBLICATIONS


CURRENT PROJECTS

- The bryozoan Pilastra floracea - Impact of ocean acidification on benthic organisms; implemented in the Cluster of Excellence ‘Future Ocean’
- The bryozoan Pilastra floracea - Impact of ocean acidification on benthic organisms; implemented in the Cluster of Excellence ‘Future Ocean’

INTERDISCIPLINARY RESEARCH ACTIVITIES

Her closest co-operation is with Dr. Helena Fortunato, University Sapporo (Japan) concerning facies and evolutionary patterns of carbonate-producing organisms (bryozans, molluscs, red algae) in Panama as well as on ocean acidification impacting on carbonate skeletons of marine biota. Co-operation with John Beijmer (FU Amsterdam) focuses on sedimentological aspects around Panama. Co-operation with the bio-acid group at Kiel University/Geomar is conducted with respect to ocean acidification.

RESEARCH QUESTIONS

Main research interests of Priska Schäfer focus on biogenic sedimentation in shallow water and oceanic environments, an on the paleoecological and evolutionary responses of marine benthic and planktonic organisms to global change.

Central research questions include:
- How did the formation of the Central American interface effect hydrographic, ecological and sedimentological conditions as well as evolutionary patterns on both sides of the landbridge?
- How are environmental parameters such as temperature, salinity and productivity been documented in the skeleton of marine animals and algae?
- How does ocean acidification effect the skeletal mineralization of marine animals such as bryozans, molluscs and algae?

ABSTRACT

Priska Schäfer is a paleontologist specialized in marine groups such as bryozans, calcareous algae, corals and molluscs. Trained in carbonate sedimentology and facies analysis she always understands the fossil organisms as having lived in a natural environment prone to climatic changes. Such environmental changes are deducted from sedimentological (carbonate facies) and geochemical parameters (rare elements, stable isotopes) as well as skeletal growth (sclerochronology) and evolutionary patterns of marine organisms. Main research areas are the North Sea and Baltic Sea as a model site to study the impact of ocean acidification on bryozoan species as well as the Pacific sector of the central American Isthmus (Panama) to analyze the consequences of the gateway closure (2.6 Mio. yrs. ago) on carbonate production as well as on ecological and evolutionary pathways of organisms in the Eastern tropical Pacific

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Institute of Geosciences

Kiel University
Dr. Jörn Schmidt

Jörn Oliver Schmidt has studied biology at the University Hannover. In 2006 he received his doctorate in fisheries biology at the IfM-GEOMAR in Kiel. Since 2009 he is working in the Department of Economics at Kiel University and is work package leader within several DFG and EU funded projects. He is also German representative in the Science Committee (SCICOM) of the International Council for the Exploration of the Sea (ICES) and second vice chair of the Deutsche Gesellschaft für Meeresforschung (DGfM). Since 2014 he is also co-chair of the ICES Benchmark Steering Group, which should ensure the effective transfer of science into assessment and advice.

Curriculum Vitae

On the aspects of innovative new methodologies, he co-developed ecological-economic models. As official ICES representative he is attending meetings of the ICES Working Group of the Whole for the Regular Process for Global Reporting and Assessment of the State of the Marine Environment, including socio-economic aspects. He is also in the editorial board of the ICES Journal of Marine Sciences.

Main focus of Jörn Schmidt’s work is in fisheries and currently also expanding to general sustainability questions in the oceans. Specific questions are:

▶ How can fisheries assessment and management move from a single species to multispecies and finally ecosystem approach?

▶ How can science be communicated to stakeholders and research questions developed together with stakeholders?

▶ How can innovative tools, e.g. games be used for education and communication purpose?

▶ What are the main characteristics of coupled models and the framework they are applied in if they should be used for practical advice?

Research Questions

The main focus of Jörn Schmidt’s work is in fisheries and currently also expanding to general sustainability questions in the oceans. Specific questions are:

▶ What are the main characteristics of coupled models and the framework they are applied in if they should be used for practical advice?

▶ How can fisheries assessment and management move from a single species to multispecies and finally ecosystem approach?

▶ How can science be communicated to stakeholders and research questions developed together with stakeholders?

▶ How can innovative tools, e.g. games be used for education and communication purpose?

Main Publications


Current Projects

2013 - 2017 PREFACE – Enhancing prediction of tropical Atlantic climate and its impacts
2013 - 2015 AVA - Ecosystem Approach to the management of fisheries and the marine environment in West African waters
2013 - 2015 Marine Spatial Planning Game
2012 - 2015 SOCIODEC – Socio-economic effects of management measures of the future CPFP
2012 - 2016 MPYFISH – Maximising yield of fisheries while balancing ecosystem, economic and social concerns
ABSTRACT

Our main research interests are to understand (i) regulation of nitrogen metabolism on the molecular level in Prokarya (Bacteria and Archaea), (ii) the marine nitrogen cycle, (iii) biofilm formation on living and non-living surfaces in the marine environment, and (iv) host-microbe interactions in marine environments. Aiming to identify novel enzymes and drugs from marine environments we are further mining for novel genes by metagenomic approaches for potential biotechnological and medical use (v). The department provides an interactive and interdisciplinary working environment, in which we work on different scientific questions and aspects in close collaboration with other institutes in Kiel and Germany applying sophisticated and state-of-the-art technologies.

RESEARCH QUESTIONS

- How do Prokarya regulate their nitrogen metabolism on a molecular level? How is nitrogen fixation regulated in marine diazotrophs?
- What are the main players, reactions and process rates in the marine nitrogen cycle?
- How can we use the marine genetic resources concerning potential biotechnological and medical approaches? (metagenomic approaches)
- What are the driving forces for the establishment of the microbiota on a marine host, and what is the benefit for the host?
- How are biofilms formed on living and non-living surfaces? How is high CO₂ and temperature influencing the microbial consortia?
- How is the Prokaryotic immune system (CRISPR) functioning in Methanarchaea?
- How do Methanarchaea interact with the human innate immune system?

MAIN PUBLICATIONS

Birgit Schneider studied Geography at the Free University of Berlin and at Kiel University before moving to the Alfred Wegner Institute for Polar Research in Bremerhaven and Bremen University, where she earned her doctorate in 2002. After working on several positions as a scientist in Kiel and in Gif-sur-Yvette, France, she was offered a Professorship in Palaeoclimate Modelling at Kiel University. Since 2012 she holds a Full Professorship in Palaeoclimate Modelling.

RESEARCH INTERESTS

The research questions of Birgit Schneider are addressing the links between climate, ocean circulation and marine biogeochemical cycles on timescales from the geologic past into the future. In particular the following questions are posed:  

- How can we learn from the geologic past for future climate projections?  
- How do interactions between climate, ocean circulation and biogeochemical cycles in the ocean operate?  
- How can we develop innovative methods to compare models and data, especially for the past when no direct measurements exist?

INTERDISCIPLINARY RESEARCH ACTIVITIES

Birgit Schneider’s research group is tightly connected to other groups working on palaeoclimate modeling, reconstructions, climate modeling and ocean biogeochemical modeling. Consequently, in Kiel Birgit Schneider is working closely together with the groups of B. Schneider, M. Latif, and A. Oschlies. Economic aspects of climate and ocean biogeochemical changes are investigated in collaboration with M. Quaas. On the national and international level she has individual collaborations together with A. Abelmann (AWI, Bremerhaven), G. Leduc (Aix-en-Provence, France), G. Munhoven (Leuven, Belgium), and L. Bopp (LSCG, France). In the framework of the international Paleoclimate Modelling Intercomparison Project (PMIP) Professor Schneider is working with other modelers and paleo proxy developers, e.g. P. Braconnot (LAGEP, Paris), B. Otto-Bliesner (Boulder, US), and D. Lunt (Bristol, UK).

MAIN PUBLICATIONS


CURRENT PROJECTS

- 2012 – 2015 RFB 1143, TP A1: Simulating the spatio-temporal variability of oxygen minimum zones from the Holocene into the Anthropocene
- 2012 – 2015 BioAcid, Phase 2, wP5.2: Sensitivity of the ocean carbon sink to changes in dissolved organic matter cycling and pelagic calcite dissolution under ocean acidification and climate change
- 2012 – 2017 EXC 70, Phase 2: R9, R7
- 2011 – 2014 Climate impact on marine plankton dynamics during interglacials Principal investigator (DFG)

ABSTRACT

In her research she is using climate models that are linking atmosphere, ocean and marine biogeochemical cycles. These models were originally designed to simulate the future climate development. When applied to climate conditions of the geologic past the models can be rigorously tested and validated against data from paleo records. This aims to increase our confidence in the models’ ability to project the climate of the future. On the other hand, Professor Schneider using climate models to serve as a physically consistent background to test hypotheses drawn from paleo reconstructions.

TOP: Trends of annual mean sea-surface temperature (SST) over the Holocene as simulated by the model (shaded), superimposed with reconstructions from U37k (circles) and Mg/Ca (triangles). Bottom: Trends of annual mean sea-surface temperature (SST) over the Holocene as simulated by the model (shaded), superimposed with reconstructions from U37k (circles) and Mg/Ca (triangles).
Ralph Schneider studied Geology and Paleontology at the Universities of Braunschweig, Kiel and Bremen. Earning his doctorate at the Bremen University he worked as a research assistant at the marum in Bremen in marine geology and paleoclimate research. In 2003 he was appointed as a professor in marine geology and paleoclimate research at Bordeaux University, France and moved to Kiel in 2005 were he was appointed as a professor in marine geology and paleoclimate research. Since 2009, he is also scientific director of the Leibniz Laboratory for Radiocarbon Dating and Isotope Research.

Main Publications


Research Questions

- What are the processes that control the link between land and ocean climates in the geological past?
- What is the role of marine biogeochemical cycles for global climate change?
- How can we better disentangle the impact of anthropogenic perturbations from natural climate variability using historical and geological climate proxy records in combination with model simulations?

Current Projects

2008 – 2014 Within the SPP 1266: ‘Interdynamik’ (dFG) we investigate the role of ocean circulation and chemical cycling of nutrients to changes in the loss or supply of oxygen into the Oxygen minimum zone in the southeast tropical Pacific.

2008 – 2014 In the SPP 754: ‘Climate-Biogeochemical Interactions in the Tropical Ocean’ our subproject 6b on Holocene proxy records investigates the role of ocean circulation and chemical cycling of nutrients to changes in the loss or supply of oxygen into the Oxygen minimum zone in the southeast tropical Pacific.

2009 – 2013 The ‘GATEway’, Marie-Curie Training Network (EU) explores the role of the Agulhas Current system, that transports warm water masses around South Africa into the Atlantic for climate change in Africa and Europe.

2009 – 2014 Within the SPP 1400: ‘Monumentality and Social Differentiation’ (dFG) we compare regional climate records for the Baltic and the North Sea as well as from lakes in Schleswig-Holstein with changes in population densities and settlements for the last 8,000 years to learn more about the response of societies in northern Europe to Holocene climate change.

Interdisciplinary Research Activities

My paleoclimate research is carried out in close co-operation with international teams in the same field providing access to paleoclimate archives and data. In Kiel major partners are B. Schneider, A. Oschlies, and M. Latif for the data-model comparison, as well as M. Frank and D. Wünnemann for paleoclimate reconstructions. A new intense collaboration has been established also to the Graduate School Human Development in Landscapes for the correlation of regional climate change with cultural and social development of ancient societies.
Carsten Schulz studied Agriculture at Martin Luther University Halle Wittenberg and the Humboldt University in Berlin, where he earned his doctorate in 2002. After a career station in industry, Carsten Schulz was named junior professor in Aquaculture at the Humboldt University Berlin in 2003. In 2007 he was awarded a professorship in Marine Aquaculture at Kiel University combined with the scientific supervision at a research company called Association for Marine Aquaculture (GMA) in Büsum.

**Research Questions**

- Use of alternative raw evaluation of alternative feed source in fish nutrition for fish feed
- Development of environmentally friendly methods for aquaculture
- Parameterization of the well-being of fish
- Controlled fish reproduction

**Interdisciplinary Research Activities**

Aquaculture covers the whole process of fish production in controlled environments. Therefore, various expertise are needed to develop this sector in a sustainable way. My research in the field of fish nutrition is directly linked with the Institute of Animal Nutrition and Physiology, Institute of Botany and Cell Biology as well as with the Institute of Limnology. The holistic environmental evaluation of aquaculture activities is realized in collaboration with colleagues from the Institute of Geography, Institute of Animal Breeding and Husbandry, Institute of Agricultural Economics and the Research and Technology Center Westcoast. Influencing fish product quality is done in cooperation with the Institute of Human Nutrition and Food Science.

**Abstract**

‘Marine aquaculture’ means the rearing of marine organisms in controlled conditions. In different production systems, fish, shellfish and plants are produced for the food, cosmetics, pharmaceutical and feed industries.

At the university as well as in the GMA, environmentally friendly methods for the fish production are being developed. The focus thereby lies on biological, technological and economical topics and their interactions. In 2009 this led to the founding of the GMA, a modern research company that was equipped according to the most modern scientific and technological requirements.

**Main Publications**


**Current Projects**

- 2013 – 2015 National Centre of Competence Mariculture
- 2012 – 2015 Competence Network Aquaculture
- 2012 – 2015 Sustainable Development Of Aquaculture
- 2011 – 2013 Technological development, planning and construction of a pilot unit for the ecological breeding of king prawns.
- 2010 – 2013 Pathogen reduction and water treatment in recirculating aquaculture systems
- 2011 – 2013 Development of oral application technology for the antibody induced growth enhancement in fish
- 2010 – 2015 Development of feed additives from Blue Mussels (Mytilus edulis)
- 2011 – 2013 AquaBest, Innovative practices and technologies for developing sustainable aquaculture in the Baltic Sea
- 2013 – 2016 Influence of out of season spawning on pike perch larvae fitness
- 2013 – 2015 Development of probiotics for the production of turbot in recirculation systems
- 2012 – 2015 Micro-algae Pavlova sp. as feed organism for early life stages of fish
- 2011 – 2014 AquaKool, Systemic optimization of turbot production in recirculating aquaculture systems
RÜDIGER SCHULZ

Rodger Schulz studied Biology at Kiel University. At the Botanical Institute he earned his doctorate in 1990 on the topic of molecular biology of the greening process in barley. 1993 he worked as a Visiting Research Associate at the Plant Research Laboratory, Michigan State University, East Lansing, Michigan, USA in a project about the structure and function of photosystem I in cyanobacteria. 1996 he completed his habilitation at the Botany/Botany of the Philipps-University, Marburg, in the field of general botany and molecular biology of plants with research on structure, function and adaptation of hydrogenases from oxygenic microorganisms. Since 1999 he is professor for botany and cell biology in the department of Plant Cell Physiology and Biotechnology, and director of the Botanical Institute and Botanical Garden at Kiel University. Between 2009 and 2013 he was elected managing director of the Botanical Institute and Botanical Garden.

RESEARCH QUESTIONS

- What is the molecular, genetic, physiological and biochemical background for solar and fermentative biohydrogen production of organisms with oxygen photosynthesis?
- How can we make use of this natural biohydrogen production of microorganisms biotechnologically for the production of hydrogen in the technical scale?
- How is the worldwide distribution of hydrogen producing enzymes in marine and freshwater environments and what is the ecological role of these enzymes?
- What are the best microalgae strains for production of biomass, bioproducts and bioenergy and how can we grow these organisms most efficient and economically?
- How can we use modeling techniques to reach our scientific and economical goals on the area of microalgae biotechnology faster?

MAIN PUBLICATIONS

Lorenz Schwark studied Geology at Bonn and Aachen University, where he obtained his Ph.D. in 1989. He then moved to Cologne University, founded its Organic Geochemistry Laboratories, received his Habilitation in 2000 and became a Professor in Geology in 2004. In 1997 and 1998 he spent 18 months as a visiting scientist at the Geological Survey of Canada, Calgary. Since 2008 he holds a professorship in Organic Geochemistry at the Institute for Geosciences at Kiel University. In 2012 he was awarded an Associated Professor in the Western Australia Organic Geochemistry and Isotope Centre at Curtin University, Australia.

**Curriculum Vitae**

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**Abstract**

Lorenz Schwark applies organic and isotopic geochemical techniques in geoscience. He has been working on petroleum related subjects, e.g. laboratory experiments on artificial maturation of organic matter, oil and gas expulsion, secondary migration, reservoir filling histories and petroleum biodegradation. For application in climate and environment reconstruction he has studied biomolecules of algae, archaea, cyanophytes and other bacteria as well as land plant waxes. He also investigates the nitrogen cycle. He has reported the oldest occurrence of intact sterols in Devonian, sterenes in Malmian and glycerol tetraether lipids (GdGT) in Toarcian sediments. Organic facies studies have been and will be conducted in Precambrian to Holocene strata, in terrestrial and marine systems, with an emphasis on Toarcian marine black shales in Europe, Canada, Japan and Argentina. Lorenz Schwark practices interdisciplinary work, in particular the application of molecular genetics combined with molecular lipid analysis of microbial biomass and associated processes. This approach has been applied in and currently applied in the investigation of the nitrogen cycle.

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**Research Questions**

The molecular geochemistry work is presently conducted with K. Grice, Curtin University and S. Barnes, CSIRO, Perth, AUS, regarding Organic Matter – Metal Interaction; ‘Evolution of Multispecies Life’ and ‘Exceptional Preservation of Organic Matter in Concretions’; with M. Vandergoes and R. Newnham, GNS, Lower Hutt, NZ, regarding Calibration of the GdGT paleothermometers and ‘Reconstruction of Paleoclimate over the past 40 k.a.;’ with Z. Guibing and L.-M. Zhang, Chinese Academy of Sciences, Beijing, CN, regarding ‘Lipidomics of the terrestrial N-Cycle’; with B. Mayer, University of Calgary, CAN, M. Polgari, Hungarian Academy of Sciences, Budapest, HUN, D. Gröcke, Durham University, GBR and P. Münzberger, Geological Survey, Luxembourg regarding Toarcian Anoxic Events. Lorenz Schwark holds a professorship in Organic Geochemistry at the Institute of Geosciences at Kiel University. In 2012 he was awarded a Professorship in the Western Australia Organic Geochemistry and Isotope Centre at Curtin University, Australia.

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**Interdisciplinary Research Activities**

- How does organic matter in soils or wetlands form and turn over and do soils and wetlands act as sink or source of CO2?  
- How does organic matter interact with metals and can this form ore deposits?  
- What is the role of archaea vs. bacteria in Recent and past environments?  
- How does organic matter in soils or wetlands form and turn over and do soils and wetlands act as sink or source of CO2?  
- How is petroleum formed from biogenic precursors and how is it expelled from source rocks and migrates along carrier beds into a reservoir?  
- How does organic matter interact with metals and can this form ore deposits?  
- What is the role of archaea vs. bacteria in Recent and past environments?

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**Current Projects**

- 2009: ‘Paddy Soil Evolution’ (PO6955 - DFG)  
- 2011: ‘Toarcian Oceanwide Anoxic Event’ (DFG)  
- 2011: ‘Bacterial geo-thermometer’ (GNS – MARSDEN)  
- 2013: ‘Lipidomics of the Terrestrial N-Cycle’ (DFG)  
- 2013: ‘De-cyanobacteria hold an additional CO2 fixation pathway’ (DFG)  
- 2012: ‘Molecular Migration Tracers’ (STATOIL – Industry Project)  
- 2013: ‘Differential nc Expulsion from Source Rock’ (KNST - Industry Project)
Thomas Slawig studied Mathematics at the Technical University of Berlin. In 1998 he earned his doctorate on the topic of Optimal Control for Equations of Fluid Dynamics. In 2000 Thomas Slawig completed his habilitation in Berlin and in 2007 he was offered a Professorship in Algorithmic Optimal Control – CO2 Uptake of the Ocean in the Institute for Information Technology at Kiel University.

RESEARCH QUESTIONS

- How can we improve methods for data assimilation and model calibration in marine research to improve the models themselves?
- How can marine ecosystem and climate models be assessed and improved?
- How can we deal with very complex and computationally expensive simulation models?
- On what hardware will we run our models in ten or twenty years?
- How can we combine the knowledge and experience of marine research, applied mathematics and computer science for the benefit of all three disciplines?

CURRENT PROJECTS

since 2007 DFG Priority Program 1253 ‘Optimization with Partial Differential Equations’, project: ‘Optimal design with bounded retardation for problems with nonseparable adjoints’


2014 ‘Service-Learning in Computer Science’ Perle project University Kiel

ABSTRACT

Applied mathematics and computer science offer a variety of methods and techniques to analyze, assess and improve or accelerate models used in climate and marine research. Since many models are complex partial differential equations, their mathematical analysis requires state-of-the-art techniques from functional analysis. Moreover, the numerical realization of such kind of models on a computer also has several challenges: They range from the analysis and improvement of the used numerical schemes to the exploitation of massively parallel hardware. Recently, the usage of hardware accelerators as graphic cards (GPUs) becomes more and more interesting. The task of parameter optimization or model calibration is to ‘tune’ a model’s parameters in such a way that their results are reasonable and coincide with given measurements. This task is extremely difficult: the models are highly nonlinear, the measurements have inherent uncertainties and some processes described by the models are not well understood. Advanced schemes of algorithmic optimization are used to find the ‘best’ choice of model parameters. This enables researchers to assess the models’ quality and applicability, e.g., for climate predictions. These methods of optimization and optimal control can also be applied to more technical applications, e.g., the design of ships. Thus, interesting interdisciplinary research is possible.

MAIN PUBLICATIONS

Anand Srivastav studied Mathematics and Physics at the University of Münster. In 1988 he completed his doctoral dissertation in Mathematics, with focus on Functional Analysis. Thereafter he changed the research focus to Discrete Mathematics and Optimization and in this respect he was holding postdoc and assistant professor positions at University Bonn, University of Minnesota, New York University, Yale University and FU Berlin, where he completed the habilitation 1996 in computer science, with focus on algorithmic discrete mathematics. Since 1997 he has been professor for Discrete Optimization at the Engineering Faculty of Kiel University, Department of Computer Science. Anand Srivastav is speaker of the research platforms in the cluster of excellence 'Future Ocean'. In 2013 he has been awarded the Indo-German Max Planck guest professorship of the MaxPlanck-Society (MPG).

RESEARCH AREAS
Algorithm engineering, combinatorial and continuous optimization, approximate, randomized, derandomized algorithms for large graphs. Applications to parameter optimization for marine biochemical models, stochastic optimization in resource management and fisheries, graph algorithms for genome assembly of marine species.

RESEARCH QUESTIONS
Parameter Optimization. The goal is to determine a couple of parameters for biogeochemical ocean models such that the model output fits measured data well.

ABSTRACT
Optimization problems appear in many areas of marine science. Among them are the optimization of model parameters for the prediction of marine CO2 production, the modeling and solution of time-dependent stochastic optimization problems in fisheries management, the estimation of population dynamics of fish stocks, but also graph-algorithmic problems in bioinformatics, e.g. genome assembly. The solution of such problems requires highly efficient algorithms, practically as well as theoretically, also coping with Big Data. Efficient and massive parallelization as well as theory building for convergence or optimality proof is a key expertise of the research group Discrete Optimization. Theory from Combinatorics, like Discrepancy Theory, the irregularity from the uniform distribution, but also techniques from modern Computer Science, like Algorithm Engineering, can be used here in a fruitful way.

CURRENT PROJECTS
2009 – 2011 DFG SPP 1307, SPP 714 ‘Engineering Randomisierte Algorithmen für die Linienplanaufgabe’
2007 – 2013 DFG SPP 1307, SPP 714 ‘Engineering Randomisierte Algorithmen für die Linienplanaufgabe’
2012 – 2014 DFG SPP 1307, SPP 714 ‘Engineering Randomisierte Algorithmen für die Linienplanaufgabe’
2013 – 2017 Indo-German Extension of DFG SPP 1307, SPP 714 ‘Engineering Randomisierte Algorithmen für die Linienplanaufgabe’

MAIN PUBLICATIONS
Prof. Dr. Karl Stattegger

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Karl Stattegger studied Geology at University of Graz, Austria. In 1977 he earned his doctorate in Geology and Paleontology. In 1986 after a A. V. Humboldt fellowship from 1983-85 he earned his habilitation in Mathematical Geology at university of Graz. Since 1990 Karl Stattegger has held the professorship in Sedimentology in the Institute for Geosciences at Kiel University with a strong focus on coastal and shelf geology. Since 2013 he is holding the Kiel unesco Chair in Marine Geology and Coastal Management.

RESEARCH AREAS
Most of the research of Karl Stattegger is related to sea-level change, coastal and shelf evolution, river-mouth systems and coastal morphodynamics. Central research questions include:

- Which factors influence to which extent regional sea-level change?
- How can we explain the highly accelerated sea-level rise in the early Holocene?
- How do coastal systems respond to sea-level change, storm occurrence and river discharge?
- How resilient are shorelines to sea-level rise?
- Can we detect early phases of instabilities in subsiding deltas from offshore changes in morphodynamics?

CURRENT PROJECTS
2013 – 2017 The South China Sea Deep Program
2011 – 2014 Land-Ocean-Atmosphere Interactions in the Gulf of Tonkin, Vietnam-China (LORI)
2009 – 2012 Atlantic Margin Integrated Basin Analysis, Morocco (AMIBA)
2009 – 2012 Northern Brazilian River Deltas: River Impacts versus Pristine Discharge (DPR, BAIA)
2008 – 2012 TRIAS – Tracing Tsunami Impacts Onshore and Offshore in the Andaman Sea Region (ITD, Bundle)
2003 – 2011 Land-Ocean-Atmospheric Interactions in the Coastal Zone of SE Vietnam (LORI-Bundle, BMHE)

INTERNATIONAL RESEARCH ACTIVITIES
His coastal and shelf research is carried out in close cooperation with national and international teams in the same field providing access to coastal regions on land and at sea as well as access to data. International partners include J. Syvitzki (CU Boulder, USA), B. Horton (Rutgers Univ., USA), Y. Saito (Geol Survey of Japan, Tsukuba), Z. Liu (Tsing University, Shanghai, China). In Kiel major partners are A. Vafeidis for coastal geomorphology and risk assessment, A. Eisenhauer for sea-level studies and R. Schneider for the paleoclimate link. New collaboration has started with Eduardo-Mundtiane-University, Maputo, Mozambique for capacity building in coastal research.

MAIN PUBLICATIONS
Horst Sterr studied physical geography at Regensburg University. In 1980 he earned his Ph.D. in sciences at University of Colorado, Boulder CO. Since 1982 his research focused on coastal dynamics and coastal risk management. Over the last twenty years he addressed primarily the issues of climate change impacts to coastal systems and coastal societies. After working as a postdoc at the University of Oldenburg from 1991-1998 he took over the chair for coastal geography at Kiel University in 1998 and – along with the coastal geology group – established the coasts at risk research group in the Cluster of Excellence ‘Future Ocean’. Since 2005 Horst Sterr has served as a member of the Commission on Civil Protection of the Federal Ministry of the Interior, an advisory board for risk management to the German government.

RESEARCH INTERESTS
Most of the research of Horst Sterr is related to coastal processes, coastal risks and risk management. Key research questions are:

- What kind of natural hazards are threatening coastal societies around the world?
- What impacts resulting from climate change are to be expected in coastal regions?
- How will / could climate change affect the coastal regions of Germany?
- How can the vulnerability of coastal systems and societies be assessed?
- What strategies are available for coastal adaption and risk management in Schleswig-Holstein?

ABSTRACT
For many years his research has been addressed to vulnerable coastal regions. A variety of natural hazards are threatening coasts around the world and in recent years the influence of climate change has become more and more prominent. Thus, one side of his studies has focused on impacts from accelerated sea level rise and storminess. Quantitative analyses of flood risks and erosion risks have been carried out along the North Sea and the Baltic Sea coasts of Germany. Secondly, an integrative methodology to assess the vulnerability of coastal systems and communities has been developed. Here, promising uses of modern technologies such as remote sensing have been identified. This methodology was tested in the coastal region of Thailand which was strongly hit and devastated by the tsunami 2004. Last but not least a prominent current issue in my research deals with chances and barriers of adaptation to risks in coastal communities. In Kiel Bay I have initiated a project called Kiel Bay Climate Alliance to advise local decision-makers how their communities could adapt pro-actively to climate change in a sustainable ways.

INTERDISCIPLINARY RESEARCH ACTIVITIES
His research is going parallel on a global scale with the work of Prof. A. Vafeidis and relates to the social studies of Profs. Wehrhahn & Abstagger, Prof. Mayerle & Dr. Schwarzer). With respect to socio-economic systems’ vulnerability there are also links to the research of Profs. Requate and Quaas (Institute of Economics). In recent years there have been close cooperations of coastal risk assessment with partners in Argentina (University of La Plata) and in Thailand (Chulalongkorn University, Bangkok). There has been a long liaison with the Potsdam-Institute of Climate Impact Research.

CV

CURRENT PROJECTS
- 2009 – 2012 Baltic Green Belt: management of the Baltic Sea as common resource. Funded by the EU INTERREG IV program.
- 2009 – 2016 Kiel Bay Climate Alliance, funded by BMZ as part of the composite project RADOST, from 2013 to 2016 funded by the Federal Ministry of the Environment (BMU).
Nassos Vafeidis studied Surveying and Rural Engineering at the National Technical University of Athens. He went on to carry out a MSc degree in Physical geography at the University of London (King’s College) where he also earned his PhD (Physical Geography) in 2001. After 7 years of research in the UK (Middlesex, Southampton) and Greece (Aegean) he joined cau in 2008 as a Junior Professor in coastal risk management in the Cluster of Excellence ‘Future Ocean’. Since 2011 he is Professor in Coastal Systems and Hazards, leading the Coastal Risks and Sea-Level Rise research group in the Institute of Geography.

RESEARCH AREAS
Nassos Vafeidis research questions focus on the response of coastal systems to various pressures related to physical processes and socio-economic development. Central research questions include:

▶ How does coastal socio-economic development influence the impacts of processes such as erosion and flooding?
▶ How will coastal nations respond to sea-level rise under different climatic and socio-economic scenarios?
▶ What motivates coastal residents to implement coastal adaptation measures?
▶ How will coastal wetlands develop under accelerated sea-level rise?

ABSTRACT
His main research focus is the assessment of impacts of coastal hazards, with particular emphasis on how these impacts will be exacerbated by rising sea levels and increasing human pressure in coastal regions. Vafeidis’s research to date includes the compilation of global spatial databases for coastal vulnerability analysis and the development of models for assessing the impacts of coastal hazards and accelerated sea-level rise in coastal areas. He is also actively involved in the development and application of the DIVA integrated assessment model and has contributed to the Stern Review on the Economics of Climate Change and to the Fifth Assessment Report of the IPCC.

CURRENT PROJECTS
since 2013 RIBES-AM (EU-funded, Impacts of high-end scenarios of climate change in coastal regions)
since 2013 COASTGAP (EU-funded, Integrated coastal zone management in the Mediterranean)
since 2011 ARCH (EU-funded, Roadmap for integrated management of lagoons)
since 2011 Foresight (commissioned by the UK government, Global environmental migration, Coastal analysis)

INTERDISCIPLINARY RESEARCH ACTIVITIES
His research is undertaken in close co-operation with national and international institutes, focusing on various aspects of coastal research. These include, among others, PIK and the Global Climate Forum, for the work on social and economic impact assessment; the University of Southampton for the physical impacts; CNR-ISMAR, on coastal physical processes; and the University of the Aegean for looking at the response of coastal residents to coastal hazards. Importantly, there is an extensive network of partners within the ‘Future Ocean’ Excellence Cluster.

MAJOR PUBLICATIONS