Member of Leibniz Association

Newsletter 2/2016

Leibniz-Zentrum für Marine Tropenökologie (ZMT) GmbH

Leibniz Center for Tropical Marine Ecology

Fahrenheitstrasse 6
28359 Bremen / Germany

Telephone: +49 (421) 23800-0
Fax: +49 (421) 23800-30

E-Mail: contact@leibniz-zmt.de
www.leibniz-zmt.de

CONTENTS

ON EXPEDITION

UNIVERSE IN MICROCOSM

ZMT researchers collect tiny organisms – their miniscule cosmos can reveal how the submarine world will respond to climate change.

Brilliant white sand – when ecstatic holidaymakers stroll along Thailand's beaches they do not realise that they are walking on the sensational legacies of a world-builder. "The sand on tropical beaches around the world is largely composed of the calcified skeletons of foraminifera – single-cell organisms only about six millimetres long," says Claire Reymond of ZMT. "You find these protozoa all over the world and although there are regional differences, they play a significant role in building reefs and coastal sediments."

Combing the beaches

For marine researchers, the geologically ancient 'forams', which reproduce prolifically in their short lifetimes, are the equivalent of the *Drosophila* fruit fly for geneticists: a model organism, in this case for future scenarios. The tiny creatures can easily be cultivated in the lab for different kinds of experiment, according to the ZMT palaeo-ecologist. "On top of that, they are biochemically very sensitive to environmental impact." So, how exactly? "We aim to understand the protein expression of these organisms, which control fundamental mechanisms essential for dealing with environmental stress." One thing is sure: whatever happens to these productive calcifiers when the ocean heats up and the pH value of the water changes, happens to all the other marine organisms that produce calcium carbonate as well – including corals and molluscs. "So we are looking for these inconspicuous organisms and using them to help us understand how reef systems will respond to habitat changes."

Globally-coordinated teamwork

Claire Reymond and ZMT doctoral candidate Marleen Stuhr went on a successful chase in Israel. In cooperation with the Interuniversity Institute for Marine Sciences (IUI) in Eilat (see News p. 6), they collected living foraminifera for the lab at ZMT at a water depth of five metres. Marine geologist Justin Ries of Northwestern University in Boston and Albert Sickman of the Leibniz Institute for Analytical Sciences (ISAS) in Dortmund are just two of those who have come on board for the experiments in Bremen. "Forams are good bioindicators – once we've understood their complex reactions to changed conditions in the lab, we can investigate whether or not this species is already stressed in its natural habitats worldwide," says Claire Reymond – hoping that the fascinating miniature world-builders will continue with their work for a long time to come. "Their architectural style is so diverse and unique! Artists should look at these structures to see these crazy designs evolved over time. It's really a joy."

> READ MORE

A GATEWAY TO KNOWLEDGE

ZMT is opening up valuable new access to Tropics research

Just like the catalogue of an enormous library or the window of a well-stocked specialist store – that is how the digital data portal will work. "We want to show what research data on the Tropics can be found where in the world and guide researchers straight to the sources," says Nils Moosdorf, geologist at ZMT and head of the in-house team developing the new data portal.

Nils Moosdorf and his colleagues want to create a globally recognisable signpost right to the very heart of ZMT – to where Tropics research has been conducted together with partners all over the world for decades. The digital portal will showcase this work and open up access. "Our research data will be available more quickly – for effective, joined-up science."

When the digital gateway has been constructed it will initially lead users directly to ZMT's own data base, which helps the growing institute keep track of what the staff and their partners are currently working on – an important building block for well-coordinated cooperation. Imagine little flags on a globe with data on a ZMT project – be it in Indonesia or Brazil – tucked underneath each flag. "We hope that our research partners will then provide us with digital access to their data," says Nils Moosdorf. The advantage is that the scientific data always remains the property of the countries and brains that have produced the results. For Nils Moosdorf, this is part of ZMT's mission. "The only aim is to benefit cooperation, never to relinquish or control scientific data. It's all about creating valuable access to individual and joint research in the Tropics."

"Our research data will be available more quickly – for effective, joined-up science"

Visible, sustainable, collaborative

If data are too sensitive to be on open display, the portal will simply indicate that this or that study is underway and facilitate contact with the relevant scientists. Anyone interested will then know how to get hold of further information. This could help Tropics research to become ever more interdisciplinary, according to the committed geologist. "We invest so much time and effort in our individual projects – it's important to ensure that such valuable data are visible and sustainable and not just gathering dust somewhere."

This vision goes well beyond providing access to ZMT data. That is just the first step. But the gateway will lead to a much greater pool of knowledge. The portal team intends to pave the way to other institutes or public data bases that hold longitudinal data on levels of rainfall or water temperatures, for example, all of which are important parameters for research in tropical regions. "Ideally, a time will come when all our knowledge about the Tropics will be directly available via the ZMT portal – with precise references if you want to dig deeper."

Green light for data portal

The digital data portal is being developed at ZMT under the direction of the geologist **Nils Moosdorf**, leader of the Research Group on Submarine Groundwater Discharge. All ZMT's scientific sectors are represented in the project team by **Hauke Reuter**, **Alessio Rovere** and **Sebastian Ferse** as well as the leader of IT Infrastructure **Thomas Rau**. The portal will be implemented by **Patric Curry**. The objective is to create an ideal digital structure for the portal in order to achieve maximum exploitation of data in the interests of joint research on tropical coastal systems.

Near future:
ZMT in an additional new office building

AN INSTITUTE IN TRANSITION

Dear Friends of ZMT,
Societies in tropical coastal regions are demanding answers to the consequences of the rapid developments they experience, be they technical, ecological, economic or societal. In our connected, complex world we can only find these answers in an alliance of scientific depth and applicable practices.
More than any other institute in Germany, for decades we have been combining scientific depth with application-inspired research questions to address the dynamics of tropical coastal regions. In order to continue fulfilling our mission in future, we need scientists and the accompanying infrastructure who together can master this ambitious balancing act.
In mid-2015, I therefore felt the need to carefully examine all areas and aspects of the institute and openly discuss what could be done even better. This generated a large number of projects on every different level of the institute. All of them are guided by the same principles:

- to practise greater freedom and more individual responsibility
- to promote and demand inter- and transdisciplinary structures
- to exploit the digital potential
- to strengthen our identity and our self-confidence
- to boost the dialogue and cooperation with our stakeholders

With its continuous process of reflection and development, this approach has become part of our daily working lives. In the following, we want give you an idea of this progress by introducing some of our projects. Would you like to learn more about our development? I would be pleased to hear from you. Let's do good together.

Hildegard Westphal, Director

SPACE FOR NEW IDEAS: "the box"

Room and opportunity for bringing out the best in ZMT scientists

ZMT is growing and needs more space - not only for offices but also for better cooperation and scientific discussions. So ZMT took the chance to create something new just a few minutes' walk from the original main building: "the box" - a place to think out of the box, designed by a group of ZMT scientists for scientists.

One hundred and fifty square metres of open space on the 3rd floor of an additional new office building will be used for creativity, networking, and collaboration. It is a combination of a meeting area with modular furniture and technology for video conferences and presentations, a co-working area with wifi, a lounge for reading and thinking, and a terrace to feed the brain with oxygen. All this is grouped around what is certainly the most important equipment for good work: a coffee machine.

"the box" is an expression of the institute's working ethos. ZMT's science is interdisciplinary and collaborative, and it is only through sharing that understanding and common ideas - the unexpected and the unscheduled - can emerge. In this new, informal co-working space, people can get together to talk - by chance or by agreement - whenever they want.

"the box" will be situated next to science management, the Office for Knowledge Exchange and three research groups which will move into these new premises in July 2016. So the chances are good that "the box" will evolve into an engine of ZMT. And you are cordially invited to come along and contribute.

REFLECTING ON THE BEST WAY FORWARD

Change means starting afresh - Stefanie Bröhl, technician in the biolab, and Agostino Merico, head of Systems Ecology, on the opportunities and potential of the transformation process at ZMT

Why is a transformation process necessary at ZMT?

Merico: Six years ago, a group of new people arrived at ZMT, including a new institute director. At that time, there was a need for organising the institute into disciplinary units such as departments and research groups. Meanwhile, the organisation that was put in place back then has established itself and the institute has grown further with the appointment of new professors and scientists. It now seems appropriate to review certain aspects of our organisation and the way we work together. I believe this is a feeling that is widely shared by most group leaders.

Bröhl: One of my jobs as a biology laboratory technician is to be the point person for everyone who wants to work in the ZMT bio lab. In addition, I also work in a support capacity at MAREE and during field trips. Together with all the new scientists and research groups have come ever more ideas and visions of how the lab could be run. This led to a bit of confusion about management functions and responsibilities, a feeling of vulnerability, which then blocked and weakened the workflow – and nobody wants that.

How are you experiencing things now?

Bröhl: The organisation of work and communication between management and staff are changing for the better. Hierarchical structures are being broken down in favour of more joint decision-making. On the laboratory side we communicated difficulties and drew up a strategy for improving matters, which turned out to be very helpful. Now we have a common guiding principle, more frequent discussions, easier communications. Everyone is trying for more transparency, information and appreciation. This has had a very positive impact on the working atmosphere; people are working more willingly and effectively.

Merico: Trying to clarify and define more precisely the structural organisation of our institute is, in my opinion, only one side of the change process. Over the years it has emerged that our research focus areas and the distinctive multidisciplinary capacities and expertise of our institute are not entirely visible. The work we conduct in the tropics is unique for Germany. But our multidisciplinary approach and our leading role in tropical marine research in Germany do not come across very clearly. We need to define our cross-departmental research, and therefore our scientific structure, more precisely and make these scientific aspects more visible.

What are the advantages of these collective efforts?

Bröhl: Every individual's capacities are strengthened by the human, communicative factor. Communication is absolutely crucial and it is definitely worth focussing energies on it. If everyone experiences it like this, the transformation process in the entire institute is strengthened.

Merico: We are currently reflecting on our scientific and administrative structures and we are trying to figure out what is the best way of working together in the coming years. I think this is an important opportunity, but we need the commitment of everybody. The dimension of the change is fairly big and has long-term implications. The process should lead to a further improved ZMT not only formally, on paper, but also in practice. For our international partners our science and the way we conduct it are the most important aspects. Only the sharpening of our multidisciplinary activities and the definition of new, large-scale research initiatives will enable us to become a visibly leading institute in our field.

INVESTIGATING TOGETHER

Infectious diseases – one of the 21st century's major threats. The ZMT marine microbiologist Astrid Gärdes and the infection biologist Ulrich E. Schaible on the benefits of a research alliance.

Why does research into infectious diseases unite a lot of disciplines?

Schaible: In infectious disease research we are not only dealing with the pathogen that causes the disease in order to find new therapies. Issues like environmental conditions which promote the spread and transmission of the infection have long been part of this package. In the INFECTIONS'21 research alliance, we therefore join biomedicine, natural, environmental and social sciences.

Gärdes: In the alliance, we consider all pathways along which infections can be transmitted – from person to person or via air, water or other organisms called vectors. Because we are a marine institute, we focus on the transmission of pathogens from tropical waters to the world's populations.

How can these pathogens from tropical waters cause global problems?

Gärdes: At ZMT we investigate the impact of stock production in aquacultures on ecosystems, regional society and public health. In tropical coastal seawater, for example, there is a bacterium called Vibrio parahaemolyticus that can cause serious diarrhoeal diseases in humans. Shrimps and mussels filter water and enrich these pathogens in their organisms. Because nowadays up to 80 per cent of the world's shellfish demand is produced in aquacultures on tropical coasts, ever more of these pathogens are finding their way onto our plates.

Schaible: Aquaculture production is often accompanied by enhanced nutrient spillage into the water – think over-fertilisation, which supports microbial growth, including pathogens. Antibiotics are used to prevent it, but they can lead to antibiotic resistance, which makes bacterial infections difficult to treat.

What are the benefits of collaborating in the INFECTIONS'21 alliance?

Schaible: By networking, we synergize to delineate possible transmission paths much better. One of our main goals is to be able to react faster and more effectively to combat infection outbreaks.

Gärdes: In the alliance, many different pathogens are studied and new molecular microbiological methods are developed for the purpose. We initially test our samples from the tropics for pathogens which have not yet been found or tested for in this combination. This is highly valuable with a view to environmental changes in the future.

Schaible: Together, the alliance partners identify new research questions, create new networks and draw their own international partners into the projects, too. Thus the alliance's reach is growing constantly.

Leibniz Research Alliance INFECTIONS'21

Astrid Gärdes heads ZMT's junior research group on Tropical Marine Microbiology. Her team has been part of the Leibniz Research Alliance "INFECTIONS'21 – Transmission Control of Infections in the 21st Century" since January 2015. Fourteen Leibniz institutes and three external partners are involved in this interdisciplinary project that carries out research on the prevention, control, and therapy of infectious diseases.

Ulrich E. Schaible is the spokesperson of the research alliance, Director of the Priority Area Infections and head of Cellular Microbiology at the Research Center Borstel – Leibniz Center for Medicine and Biosciences.

> READ MORE

Excellent brain food

ZMT summer school in Senegal

At the end of April, PhD candidates and post-docs gathered in the coastal town of Saint Louis in Senegal for a week-long summer school on the "Ecology of Eastern Boundary Upwelling Systems (EEBUS)". Organised by the ZMT and funded by the Volkswagen Foundation the lectures and workshops brought together participants from 14 countries in Africa, Europe and the Americas. The summer school covered the physical, biogeochemical and ecological processes in the four major coastal upwelling areas in the ocean – the Benguela, Humboldt, California, and Canary Current Systems. Scientists focused on the similarities between the four systems, whilst reflecting on significant differences concerning their structure, key processes, and productivity with the aim of understanding the systems' reaction to global change phenomena and their impact on global processes.
Its interdisciplinary approach was one of the summer school's main and much-lauded features. Researchers from many different fields (oceanography, marine biology, physics, biogeochemistry, fisheries biology or ecology) shared their expertise and learned from each other. Attendees also commended the lectures and the well-structured group sessions and workshop formats. A film about the summer school is currently in the making and will be featured on the ZMT website soon. **> READ MORE**

Interdisciplinary approach in Senegal

Signed

Collaborative agreement with Israel

More interdisciplinary marine research with Israel – the Leibniz Association has concluded a pathbreaking agreement: in April 2016, the Israeli Interuniversity Institute for Marine Sciences (IUI) in Eilat and the Leibniz Association sealed their intensive cooperation by signing an MoU. In addition to ZMT, five other Leibniz institutes will now work together with this unique marine research institute, which is located on the Gulf of Aqaba in the northern Red Sea and is supported by six Israeli universities and the Weizmann Institute. Together, IUI and the Leibniz institutes will study the resilience of corals to environmental change, and address marine active agents research, oceanography, and ocean-atmosphere interaction. The collaboration will also involve teaching elements, such as methods training and joint doctoral summer schools. Opportunities for collaborating on aquaristics and research diving are also under discussion. ZMT has worked together with IUI since the 1990s when it coordinated the BMBF-funded "Red Sea Program" involving Israel, Jordan, Palestine, Egypt, and Germany. **> READ MORE**

ZMT FACES

Justin Ries is a visiting scientist at ZMT from December 2015 to August 2016. He is leading a project supported by a team of researchers, including Northeastern University graduate student Louise Cameron and ZMT postdoctoral fellow Claire Reymond, investigating the effects of ocean acidification and warming on corals from tropical and sub-polar waters. His work is conducted under the auspices of a Hanse-Wissenschaftskolleg Fellowship, in collaboration with ZMT (the experimental setup is at MAREE), Alfred Wegner Institute, Max Planck Institute for Marine Microbiology, and GEOMAR. Ries is an Associate Professor of Marine Science in the Department of Marine and Environmental Sciences at Northeastern University's Marine Science Center in Boston, Massachusetts. **> READ MORE**

ZMT ALUMNI AMBASSADORS

"Working at ZMT made me more confident about my potential to cooperate effectively with an international scientist in the future." In November 2014, the microbiologist **Mehrnoush Tangestani** came to Bremen for three months, supported by a fellowship from ZMT and the Centre for Science and Technology of the Non-aligned and Other Developing Countries (NAM S&T Centre) in New Delhi. This was a time she would never forget and that she enjoyed telling others about, the Iranian scientist notes.

"ZMT benefits from knowledgeable and keen researchers who dedicate their capabilities to their career and students. Together with access to facilities and cutting-edge technologies in the field of aquatic research, these make ZMT a dynamic place for the students to get involved in high-quality research."

During her stay at ZMT, Mehrnoush Tangestani studied the pathogenesis pattern in juvenile sandfish Holothuria scabra with the symptoms of skin ulceration disease. She successfully evaluated the samples she had brought with her in ZMT's molecular lab. "I'll never forget the valuable help and support that I received from the kind people at BioLab and MAREE." Since 2015, she has been working on her doctorate at the University of Canterbury in New Zealand – she still maintains both scientific and personal contact with her supervisors at ZMT in Bremen. **> READ MORE**

IMPRINT

Responsible: Prof. Dr. Hildegard Westphal, Leibniz Center for Tropical Marine Ecology (ZMT), www.leibniz-zmt.de / Editorial work: Bettina Mittelstraß, www.trio-medien.de / Translation: Lynda Lich-Knight, www.researchcomm.eu / Art work and layout: Kristin Huckauf, www.huckauf-design.de / p. 1: C. Reymond, H. Westphal, p. 2: wikimedia commons, Tom Patterson, C. Gross, p. 3: comkopie, p. 4: I. Burghardt, A. Mayer, p. 5: H.-P. Grossart, U. K. Hainan, A. Gärdes (privat), U. Schaible (privat), p. 6: M. Sabelhaus, M. Naumann, B. Canady, M. Tangestani (privat).