1st Sino-German Workshop

Marine Observation, Forecasting and Utilization Over Next Decade

September 7–9, 2011
Qingdao, China
Welcome to the

1st Sino-German Workshop

*Marine Observation, Forecasting and Utilization*

Over Next Decade

September 7 – 9, 2011

Qingdao, China

The 1st Sino-German Workshop on Marine Sciences is jointly held by the Center for Sino-German Cooperation in Marine Sciences and the Key Laboratory of Physical Oceanography, MOE, China, with contributions from the Ocean University of China (OUC), the University of Kiel (CAU), the University of Bremen, as well as research institutions, namely, the Leibniz Institute of Marine Sciences (IFM-GEOMAR), the Leibniz Center for Tropical Marine Ecology (ZMT), the Alfred Wegener Institute for Polar and Marine Research (AWI) and the Center for Marine Environmental Sciences (MARUM).
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**Arrival and Registration, Tuesday, 6 September**

**Wednesday, 7 September**

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<tbody>
<tr>
<td>09:00-09:05</td>
<td>Prof. Dr. Dexing WU</td>
<td>Welcome Speech</td>
</tr>
<tr>
<td>09:05-09:10</td>
<td>Prof. Dr. Justus Notholt</td>
<td>Welcome Talk</td>
</tr>
<tr>
<td>09:10-09:15</td>
<td>Prof. Dr. Lixin WU</td>
<td>Welcome Introduction</td>
</tr>
<tr>
<td>09:15-09:25</td>
<td>Group photo</td>
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**Session Chair: Prof. Dr. Justus Notholt**

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<th>Time</th>
<th>Speaker</th>
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<tbody>
<tr>
<td>09:25-09:45</td>
<td>Prof. Dr. Lixin WU</td>
<td>Mapping Southern Ocean Diapycnal Mixing Using Argo Profiling Floats</td>
</tr>
<tr>
<td>09:45-10:05</td>
<td>Prof. Dr. Jiwei TIAN</td>
<td>Deep Water Circulation in the Luzon Strait</td>
</tr>
<tr>
<td>10:05-10:25</td>
<td>Prof. Dr. Changlong GUAN</td>
<td>Occurrence of Rogue Waves and Statistics of Wave Field</td>
</tr>
<tr>
<td>10:25-10:45</td>
<td>Prof. Dr. Xiaopei LIN</td>
<td>An Asymmetric Upwind Flow-Yellow Sea Warm Current</td>
</tr>
<tr>
<td>10:45-11:00</td>
<td>Coffee break</td>
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**Session Chair: Prof. Dr. Changlong GUAN**

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<tr>
<th>Time</th>
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<tr>
<td>11:00-11:20</td>
<td>Prof. Dr. Yonghong WANG</td>
<td>Magnetic Properties of Muddy Sediments on the Northeastern Continental Shelves of China: Implication for Provenance and Transportation</td>
</tr>
<tr>
<td>11:20-11:40</td>
<td>Dr. Sebastian Hölz, Dr. Andrei Swidinsky</td>
<td>Electromagnetic Methods in Marine Environments</td>
</tr>
<tr>
<td>11:40-12:00</td>
<td>Prof. Dr. Yuguo LI</td>
<td>Electrical Anisotropy in Marine Controlled-source Electromagnetic Exploration</td>
</tr>
<tr>
<td>12:00-14:00</td>
<td>Lunch break</td>
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**Session Chair: Prof. Dr. Lixin WU**

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
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<tbody>
<tr>
<td>14:00-14:30</td>
<td>Prof. Dr. Martin Visbeck</td>
<td>Sustained Ocean Observations in support of Ocean Circulation and Climate Dynamics Research</td>
</tr>
<tr>
<td>14:30-14:50</td>
<td>Dr. Uwe Stöber</td>
<td>Automated Detection of Non-linear Internal Waves in Bottom Pressure</td>
</tr>
<tr>
<td>14:50-15:10</td>
<td>Prof. Dr. Houjie Wang</td>
<td>Hyperpycnal Flows in Estuaries: the Huanghe (Yellow River) Example</td>
</tr>
<tr>
<td>15:10-15:30</td>
<td>Coffee break</td>
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**Session Chair: Prof. Dr. Thomas Jung**

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<tr>
<th>Time</th>
<th>Speaker</th>
<th>Title</th>
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<tbody>
<tr>
<td>15:30-15:50</td>
<td>Dr. Christoph Waldmann</td>
<td>Cooperation in the Field of Ocean Technologies - Identifying Synergies between China and Germany</td>
</tr>
<tr>
<td>15:50-16:10</td>
<td>Prof. Dr. Dongxing Yuan</td>
<td>The Development of Marine Observing Techniques and Instrumentation in State Key Laboratory of Marine Environmental Science</td>
</tr>
<tr>
<td>16:10-16:30</td>
<td>Dr. Emanuel Söding, PD Dr. Avan N. Antia</td>
<td>Marine Research and Infrastructure in Kiel: Cluster of Excellence “The Future Ocean”</td>
</tr>
<tr>
<td>16:30-16:50</td>
<td>Prof. Dr. Thomas Jung</td>
<td>Current and Future Activities in Climate Research at AWI</td>
</tr>
<tr>
<td>17:30-19:30</td>
<td>Banquet</td>
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<tr>
<td>Time</td>
<td>Speaker</td>
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<tr>
<td>9:00-9:20</td>
<td>Prof. Dr. Song SUN</td>
<td>Changing Marine Ecosystem and Ecological Disasters</td>
</tr>
<tr>
<td>9:20-9:40</td>
<td>Dr. Mark Lenz</td>
<td>Invasive Species–Threat and Chance for Coastal Ecosystems</td>
</tr>
<tr>
<td>9:40-10:00</td>
<td>Dr. Herrmann Bange Marita Krumbholz</td>
<td>Trace Gases (N&lt;sub&gt;2&lt;/sub&gt;O, CH&lt;sub&gt;4&lt;/sub&gt;, DMS) in the Ocean</td>
</tr>
<tr>
<td>10:00-10:20</td>
<td>Prof. Dr. Guangxing LIU</td>
<td>Zooplankton Community and Biodiversity in the Yellow Sea and the East China Sea</td>
</tr>
<tr>
<td>10:20-10:40</td>
<td>Coffee break</td>
<td></td>
</tr>
<tr>
<td>10:40-11:00</td>
<td>Prof. Dr. Justus Notholt PD Dr. Thorsten Warneke</td>
<td>Application of Fourier - Transform InfraRed (FTIR) Spectrometry for the Measurement of Water – Atmosphere Exchange Fluxes (in cooperation with Dr. Tim Rixen, ZMT)</td>
</tr>
<tr>
<td>11:00-11:20</td>
<td>Prof. Qinyu LIU</td>
<td>Simulated Response of the Pacific Subtropical Mode Water to globe warming and its effect on climate variability</td>
</tr>
<tr>
<td>11:20-11:40</td>
<td>Prof. Dr. Huiwang GAO</td>
<td>Characteristics of Turbulence in Marine Atmospheric Boundary Layer and Air-sea Mass and Energy Exchange Fluxes from the China Sea to the Northwest Pacific Ocean</td>
</tr>
<tr>
<td>11:40-14:00</td>
<td>Lunch break</td>
<td></td>
</tr>
<tr>
<td>14:00-14:20</td>
<td>Prof. Dr. Jianfang CHEN</td>
<td>Seasonal Variation and Real Time Monitoring of Bottom Water Hypoxia off the Changjiang Estuary</td>
</tr>
<tr>
<td>14:20-14:40</td>
<td>Prof. Dr. Hongbin LIU</td>
<td>Diversity and Distribution of Microbes involved in the Marine Nitrogen Cycle</td>
</tr>
<tr>
<td>14:40-15:00</td>
<td>Coffee break</td>
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<tr>
<td>15:00-16:00</td>
<td>Summary and discussion: workshop outcome and future collaboration</td>
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<tr>
<td>18:00-20:00</td>
<td>Dinner</td>
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## Workshop Schedule

### Friday, 9 September

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<td>Visit National Base for Deep-sea Submersible of China</td>
</tr>
<tr>
<td>12:00-13:00</td>
<td>Lunch break</td>
</tr>
<tr>
<td>14:00-17:30</td>
<td>Visit First Institute of Oceanography, State Oceanic Administration</td>
</tr>
<tr>
<td>18:00-20:00</td>
<td>Dinner and discussion</td>
</tr>
</tbody>
</table>
General Information

Registration

Registration will be on Tuesday, September 6 from 18:00 to 19:00 at the Academic Exchange Center in Qingdao.

Accommodation

Academic Exchange Center
8 Hongdao Road
Yushan Campus, Ocean University of China
Tel: +86-532-82931888
Fax: +86-532-82931007

Venues

1. Accommodation and Registration: Academic Center.
2. The Workshop is held in the Meeting Room on the second floor of Wenyuan Building.
General Information

Transportation

Center for Sino-German Cooperation in Marine Sciences will be responsible for transportation between the airport and the campus as well as other venues for group activities in Qingdao.

If you want to take local city buses, you are advised to have exact change (in most cases 1.00 yuan RMB) since most buses operate with an automatic cash-ticketing system.

Taxis are all air-conditioned and can be easily flagged down along the street in most cases. The initial fare for most taxis is 9.00 yuan RMB, which covers the first 3km. The fare is then 1.40 yuan RMB per km, and then 1.80 yuan RMB between 22:00 to 6:00. After the first 6km, the fare will be 2.10 yuan RMB per km, and then 2.50 yuan RMB per km from 22:00 to 6:00. For some taxis, the fare may reach 1.90 yuan RMB per km. Moreover, 1.00 yuan RMB of fuel surcharge is needed every when you leave the car at your final destination.

Banks and Currency

Money exchange services can be provided at the front desks of hotels with three-, four-, or five-star and the Bank of China. Major credit cards, such as Visa and American Express are acceptable in many big stores and hotels. However, German guests are kindly recommended to prepare some RMB in cash for other occasions where credit cards cannot be used.

Post, Fax and Internet

Mail services and facsimile communication are available in the Secretariat Office. Internet connection is available in your room if you bring your lap-top with you.

Meals

Breakfast, lunch and dinner are available for all registered participants and served in Academic Exchange Center.

Shopping

The major shopping centers are located near the City Hall. Please take Bus 501/321/316 (15 minutes walk to Bus Stop).

CARREFOUR Supermarket
Please get out off the bus at Fu Shan Suo.
General Information

JUSCO Shopping Mall
Please get out off the bus at Yuanyang Square.
Mycal Shopping Center
Please get out off the bus at Xin Jia Zhuang.

Phone Numbers in Common Use in Qingdao

Report to the Police 110
First Aid 120
Fire Alarm 119
Airport 96567
Air Ticket Booking 85775555
Railway Station 95105175
Train Ticket Booking 95105105

Secretariat

The Seventh Sino-German Summer School Secretariat is at Room 302/303 on the second floor of the Academic Exchange Center. The Secretariat will be at your service from 07:00 to 21:00 from September 6 to September 10.
Tel: +86-532-82931888
Extension: 6302/6303

Contact:
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Cellphone: +86-159-5429 0629
sinogerman@ouc.edu.cn
Notice

1. Please read the agenda carefully for timely presence at the programs.

2. Please turn off your mobile phone or leave it mute during the lectures.

3. Please take care of your mini-bar expenses when you leave the hotel. Application has to be made at the front desk before IDD can be opened at your hotel room. The telephone bill is on your own expenses.

4. Please inform the secretariat if you leave the hotel ahead of the schedule.

5. Please leave the postal services and facsimile communication to hotel front desk.

6. Internet connection is available in your hotel room if you bring your lap-top with you.

7. If you had any other inconveniences, please contact the Secretariat.
Prof. Dr. Martin Visbeck

Prof. Martin Visbeck is the deputy director of the Leibniz Institute of Marine Sciences (IFM-GEOMAR), and head of its Research Unit, Physical Oceanography. His research interests cover a wide range of areas such as the role of the ocean in interannual to centennial climate variability, variability of regional ocean circulation, deep water formation in subpolar regions, lateral exchanges by mesoscale eddy processes and sustained global ocean observations. He obtained his PhD in physical oceanography in 1989 and had his Postdoctoral fellowship at Massachusetts Institute of Technology from 1994 to 1995. From 2004, he has become an Adjunct Senior Research Scientist at Lamont-Doherty Earth Observatory, and a professor with the Research Division Ocean Circulation and Climate Dynamics at Leibniz-Institute for Marine Science, KiellFM-GEOMAR. Since 2007, he is the Speaker of the Kiel Excellence Cluster “The Future Ocean”, University of Kiel (CAU) and the Leibniz-Institute for Marine Science (IFM-GEOMAR), KiellFM-GEOMAR. Dr. Visbeck has joined in a number of committees like Chair Programme Committee of World Climate Conference 3 (WCC-3), Member of International CLIVAR Scientific Steering Group, and IOC working group Advisory Body of Experts on the Law of the Sea. Meanwhile, he is very active in domestic academic activities, such as Steuergruppe of BMBF Verbundprojekt "NORDATLANTIK", Mitglied der DFG Senatskommission für Ozeanographie and Member of German National Committee on Global Change Research.

Selection of publications


Sustained Ocean Observations in Support of Ocean Circulation and Climate Dynamics Research

Prof. Dr. Martin Visbeck

Sustained ocean observation have allowed to address new and pressing research concerned with changes in the basin scale ocean circulation and its role in regional and global climate dynamics. In 1999 during the first OCEANOBS’99 conference the international largely physical oceanographic community came together and outlined global plans and aspirations to establish sustained ocean observations in support of research and routine ocean applications. The plans called for a range of remote sensing assets in space to document the time evolution of seas surface temperature, surface roughness and wind stress, sea surface height, sea ice cover and ocean color. To complement the space based observations a range of in-situ networks were proposed. The continuation of high spatial resolution XBT lines, a 5-10 year repeat of a number of trans-basin hydrographic surveys, a coordinated set of open ocean and boundary current moorings (OCEANSITES), a global network of profiling floats (Argo) and a global surface drifter program for SST calibration. All observations were a contribution to the global ocean observing system (GOOS) which provides the ocean observations in support of the mandated global climate observing system (GCOS).

In 2009, a second OCEANOBS’09 conference (www.oceanobs09.net) the accomplishments of the first decade of sustained ocean observations were discussed and plans and aspirations developed to sustain existing observations, complete the plans from 1999 for the physical observing system and include and grow where feasible the observing systems to include more geochemical variable and aspects of the marine biology and ecosystem. OCEANOBS’09 also identified the need to develop a more generic and inclusive Integrated Framework for Sustained Ocean Observations (IFSOO). A group of experts has developed to key elements of such a framework that will be presented.

Ocean circulation and climate dynamics research benefits from long term observations in key locations to supplement the global data base from the Argo network. In order to document long term changes of the oceans meridional overturning circulation a network of deep western boundary current observations was installed over the last decade. Measurements of the strength of the overflows and through flows have provided a glimpse at the rich dynamics of ocean currents. Near surface flows in the tropical oceans provide key information to support the forecast of seasonal climate variability. New frontiers are the ocean below 2000m depth, ocean margins and the connection to the coastal zone.
Lecturers and Abstracts

Prof. Dr. Lixin WU

Dr. Lixin WU obtained his PhD from Peking University, and worked at Center for Climatic Research of University of Wisconsin-Madison for a decade. He moved back to Ocean University of China in 2005 and was honored with a named professorship. He is the chief scientist of the National Basic Research project NPOIMS funded by Chinese Ministry of Science and Technology (973), and leader of the Innovation Team in Physical Oceanography honored by the China National Natural Science Foundation. He is a member of the International CLIVAR Pacific Panel, and Scientific Committee of NPOCE International joint research program, and has chaired and co-chaired several international conferences on ocean and climate. His research interests include dynamics of large-scale ocean-circulation, ocean-atmosphere interaction, decadal climate variability, and modeling global climate system. He and colleagues developed a “Modeling Surgery” framework to understand the roles of ocean dynamic processes in climate variability and changes. His recent interests extend to interaction among water cycle, ocean circulation and climate from a coupled perspective. He has published over 40 articles in journals such as Journal of Climate, Journal of Physical Oceanography, Climate Dynamics, Geophysical Research Letters, etc.

Selection of publications


Mapping Southern Ocean Diapycnal Mixing Using Argo Profiling Floats

Prof. Dr. Lixin WU

The Southern Ocean is thought to be one of the most energetic regions in diapycnal mixing of heat, salt and biogeochemical properties in the world ocean, but it is also the poorly sampled part of the global sea due to the harsh climate and remote location. Understanding the spatial and temporal variation of diapycnal diffusivity in this region is important for assessing and predicting changes of large-scale ocean circulation and climate. The recent development of Argo profiling floats with Iridium communication system affords greatly increased vertical resolution of water column sampling utilized to estimate diapycnal mixing through finescale parameterizations. Here as the first attempt we use high-resolution hydrographic profiles from these floats to demonstrate that the spatial distribution of the turbulent diapycnal mixing in the upper Southern Ocean is controlled by bathymetry via interaction with the Antarctic Circumpolar Current (ACC). The seasonal variation of this mixing is largely stirred by surface wind stress through inertial energy input and is more pronounced in the upper ocean over flat topography. Our study suggests that the accumulation of high resolution profiles from Argo floats in future should significantly advance our understanding of mixing processes in global ocean interior.
Lecturers and Abstracts

Prof. Jiwei TIAN

Dr. Jiwei TIAN is a professor with College of Physical and Environmental Oceanography at the Ocean University of China. Prof. TIAN obtained his MS in fundamental mathematics from the Academy of Mathematics and Systems Science, Chinese Academy of Sciences, in 1984 and PhD in fluid dynamics from the Institute of Mechanics, Chinese Academy of Sciences, in 1992. His research interests are Internal Wave and Ocean Mixing, Abyssal Circulation and Ocean Observation.

Selection of publications


Deep Water Circulation in the Luzon Strait

Prof. Dr. Jiwei TIAN

A set of oceanographic measurements has confirmed the existence of a deep water overflow and revealed its detailed pathway in the Luzon Strait that connects the Pacific deep circulation with the South China Sea throughflow. The results show that deep Pacific water first flows into the Luzon Trough through the Bashi Channel and Taitung Canyon, then passes through a choke point in the central Luzon Trough, and finally enters the South China Sea through three gaps on the western side of the southern Luzon Trough. The intrusion of deep Pacific water suggests a residence time of ~50 years in the deep South China Sea, and further provides a possibly efficient pathway for the Great Oceanic Conveyor through the South China Sea and Indonesian Throughflow.
Prof. Dr. Changlong GUAN

Dr. Changlong GUAN is a professor and dean with College of Physical and Environmental Oceanography at Ocean University of China. Prof. GUAN obtained his B.S. in Physics from Jilin University in 1984, his M.S. in Theoretical Physics from Jilin University in 1987 and his PhD in Physical Oceanography from OUC in 1992. His research interests include dynamics and modeling of wind-generated waves, wave-current interaction in coastal seas, air-sea interaction as well as wind wave-induced mixing in upper ocean. He was a member of Environmental Committee, International Ship and Offshore Structure Congress (ISSC), from 1997 to 2000. His overseas research experiences are composed of visiting scholar in Max Planck Institute for Meteorology, Germany, 10-12/1994, Post-doc, Laboratory of Remote Sensing for Terrestrial Environment, CNRS, University of Toulon, France, 10/1995-08/1996, Senior Visiting Scholar, Dept. of Marine, Earth and Atmospheric Sciences, North Carolina State University, USA, 09/2002-10/2003, as well as invited professors in such institutions as Laboratory of Remote Sensing for Terrestrial Environment, CNRS, University of Toulon, France, 06-08/2001, Laboratory of Physical Oceanography, University of Western Brittany, CNRS, France, 06-07/2002, and Laboratory of Remote Sensing for Terrestrial Environment, CNRS, University of Toulon, France, 07-08/2005.

Selection of publications


Occurrence of Rogue Waves and Statistics of Wave Field

Prof. Dr. Changlong GUAN

Rogue wave is one of the most concerned issues in the ocean wave studies in recent decades, on which the studies are still in a preliminary stage at present. At the moment the Benjamin and Feir (B-F) instability mechanism is considered as the most promising theory to understand the generation of rogue waves due to nonlinear effect. With the laboratory experiment results for one dimensional case, Janssen (2003) proposed the Benjiemin-Feir Index (BFI) on the basis of B-F mechanism, as the measure of occurrence of rogue waves when BFI greater than unity. In the present study, the relation between the Occurrence of rogue waves and statistics of wave field is investigated, by applying the third generation ocean wave model WW3 to simulate the evolution of wave field for six rogue wave events happened historically, of which the moment and location of occurrence are clearly reported. It is found that the values of BFI are all smaller than 0.4 at the moment that the occurrence of rogue waves happened, which is far away from the critical value predicted by Janssen (2003). The scatter diagrams of wave steepness and directional spreading during the processes of the rogue waves occurring, revealed that the rogue waves tend to occur as wave fields are steeper and of narrower directional spreading, and that the occurrence of rogue waves happens roughly at the moment as wave fields evolve at the inflection points in the scatter diagrams. The present study suggested that the generation mechanism of rogue waves is closely related to the directional spreading of the wave field, in addition to the nonlinear stability indicated by the B-F mechanism. The one-dimensional theory is not enough to reveal the generation mechanism of rogue waves.
Lecturers and Abstracts

Prof. Dr. Xiaopei LIN

Dr. Xiaopei LIN is a professor with College of Physical and Environmental Oceanography at Ocean University of China and deputy director of Key Laboratory of Physical Oceanography, Ministry of Education, China. Prof. LIN’s research interest focuses on ocean dynamics and its role in climate change. From November, 2007 to May, 2005, he was a visiting scholar at Woods Hole Oceanographic Institution, USA. Dr. LIN is an adjunct professor at Texas A&M University, USA, and long-term guest professor in Woods Hole Oceanographic Institution, USA, since 2011. He has undertaken a project supported by National Natural Science Foundation of China.

Selection of publications


An Asymmetric Upwind Flow-Yellow Sea Warm Current

Prof. Xiaopei LIN

The winter water mass along the Yellow Sea Trough (YST), especially on the western side of the trough, is considerably warmer and saltier than the ambient shelf water mass. This observed tongue-shape hydrographic feature implies the existence of a winter, along trough and onshore current, often referred to as the Yellow Sea Warm Current (YSWC). However, the YSWC has not been confirmed by direct current measurements and therefore skepticism remains regarding its existence. Some studies suggest that the presence of the warm water could be due to frontal instability, eddies or synoptic scale wind bursts. It is noted that in situ observations used in most previous studies were from the central and eastern sides of the YST even though it is known that the warm water core is more pronounced along the western side. Data from the western side have been scarce. Here we present a set of newly available Chinese observations, including some from a coordinated effort involving three Chinese vessels in the western YST during the 2006-2007 winter. The data show unambiguously the existence of the warm current on the western side of YST. The both current and hydrography observations indicate a dominant barotropic structure of YSWC. The westward deviation of YSWC axis is particularly obvious to the south of 35°N and is clearly associated with an onshore movement of warm water. To the north of 35° N, the YSWC flows along the bathymetry with slightly down-slope movement. We conclude that the barotropic current is mainly responsible for the warm water intrusion while the Ekman and baroclinic currents play the important but secondary role.

The northwesterly monsoonal wind prevails in the winter and is directed against the YSWC. The cross-trough scale is small compared with spatial scale of monsoonal variation, so one can assume, to the first order, that the wind stress is uniform across the trough. The curl of depth-averaged wind stress has opposite signs on the two sides of the trough. Consequently, two oppositely-rotating gyres develop initially and they converge along the trough giving rise to a barotropic upwind flow. But this upwind flow lasts only for a few days as the two gyres evolve and propagate as topographic waves. For a northerly wind, both gyres move westward since the positive (negative) PV flux on the western (eastern) side of the trough pushes the water toward shore (trough). If the bottom friction is negligible, the steady response becomes a large anti-cyclonic gyre over the trough and the upwind current is squeezed toward the shore line. In this case, no YSWC is sustained along or near the trough. This runaway warm current can be arrested by a moderate bottom friction. We therefore propose that the YSWC is actually arrested topographic waves in response to local wind stress forcing.
Prof. Dr. Yonghong WANG

Dr. Yonghong WANG is a professor with College of Marine Geosciences at Ocean University of China. She has received her BS and MS in Marine Geology from OUC and her PhD in Physical Geography from State Key Laboratory of Estuarine and Coastal Research, East China Normal University in 2003. She was a training student in Department of Geography, Hannover University, Germany from 1994 to 1995, financed by DAAD. Prof. WANG was a visiting scholar in Physical Oceanography, James Cook University, Australia (2005-2006), an adjunct professor in Center for Spatial Information Science, the University of Tokyo, Japan (Jan, 2010-Mar, 2010) and a guest investigator in Woods Hole Oceanographic Institution, USA (Sep, 2010- Dec, 2010). Her interest of research concentrates on sedimentary environment of estuary and coast as well as sediment dynamic geomorphology. Since 2005, she has undertaken three national projects and participated in two state programs. From 1999 to 2008, Dr. Wang has published at least 20 articles in academic journals and given talks in international conferences.

Selection of publications


Magnetic Properties of Muddy Sediments on the Northeastern Continental Shelves of China: Implication for Provenance and Transportation

Prof. Dr. Yonghong WANG

Mud deposits are widespread in estuaries and on continental shelves, and contain important information regarding interactions between terrestrial and coastal processes. Magnetic properties of muddy sediments from the northeastern continental shelves of China, including shelves close to Korean coasts, were analyzed using bulk and size-fractionated samples to elucidate muddy sediment sources and transport. Types, concentration, and granulometry of magnetic minerals were determined and all samples were found to be dominated by magnetite. Muddy sediments from the Zhemin coast (off the Zhejiang and Fujian coasts) have the highest magnetic susceptibility (χ) and saturation isothermal remanent magnetization (SIRM) values, while those from the central and southeastern South Yellow Sea and the western Korea Strait have lower values reflecting lower magnetic mineral concentrations. Single domain ferrimagnetic grains dominate the magnetic particles in the central South Yellow Sea, while superparamagnetic (SP) grains contribute significantly to the magnetic grains in the Bohai Sea. SP and coarse multi-domain (MD) grains dominate magnetic grain assemblages in the North Yellow Sea and along the Zhemin Coast. Rock sediment particle size is not a major factor affecting the magnetic properties of the mud deposits in the study area. Rather, terrigenous inputs and hydrodynamic transport processes primarily control the magnetic properties, and sediments from the Changjiang and Huanghe rivers make the most significant contribution. This observation applies to the whole study area, although terrigeneous magnetic mineral concentrations decrease with increasing distance from the river mouths due to both sorting and mixing with other sediments with weak magnetic signatures. Bacterial magnetosomes also play a role in the central South Yellow Sea.
Dr. Sebastian Hölz

Dr. Sebastian Hölz is a scientist at the Leibniz Institute of Marine Sciences (IFM-GEOMAR) in Kiel, Germany. His research focuses on development and implementation of CSEM-equipment as well as development of algorithms for 3D EM modelling. He obtained his PhD at TU Berlin in 2007 after completing the research Geophysical and Geoscientific Investigations in the Ejina Basin, Inner Mongolia, NW China with Focus on Processing of TEM-Data in the Wavelet Domain and on 2D Modeling. Dr. Hölz has participated in a number of field experiments in Pacific Ocean, Mediterranean, China, Chile and Ireland, for example, CSEM experiment at Waiarapa Ridge (New Zealand), MT investigations in Alboran Sea (Spain) and at Cyprus Arc (Cyprus), EM investigations in NW China (Ruoshui Basin) and etc.

Selection of publications

S Hölz & M Jegen: Development of a CSEM system for the electromagnetic study of the North Alex Mud Volcano. EGU meeting, Vienna, Austria.


Dr. Andrei Swidinsky

Dr. Andrei Swidinsky is a postdoctoral fellow with at the Leibniz Institute of Marine Sciences (IFM-GEOMAR), in Kiel, Germany. He obtained his PhD in Geophysics at the University of Toronto, Canada in 2011. His research covers topics such as transient electromagnetic modelling and thermal measurements in marine gas hydrate exploration. He used to be a graduate research assistant at the University of Toronto and taught courses like Introduction to Physics, Physics for Life Sciences, Engineering Science and etc.

Selection of publications
Electromagnetic Methods in Marine Environments - A General Introduction and Some Insight after Five Years of Research at IFM-GEOMAR

Dr. Sebastian Hölz and Dr. Andrei Swidinsky

We would first introduce the use of electromagnetic methods in marine environments:

- introduction into different available methods
- basic physical principles
- exploration and monitoring methods for specific geological targets such as oil / gas / gas hydrate deposits, seafloor sulfides, or possible sites for CO₂ sequestration
- considerations for technical implementation of measurement devices
- experimental design
- logistical considerations

An interesting application of marine CSEM is for gas hydrate exploration: Gas hydrates are a solid ice-like mixture of water and hydrocarbons such as methane. They are found under the permafrost and under the ocean floor. Hydrates are important for several reasons. First, because of their widespread occurrence and hydrocarbon content, they have a potential as a future energy resource. Second, they may play a role in climate change since methane can escape into the atmosphere if hydrate deposits dissociate into free gas and water. Third, because hydrates tend to cement the sediment, their presence may be a geohazard as they can cause seafloor instability or well blowouts if this dissociation process occurs. This is a particular problem for drilling operations which often must avoid shallow hydrate deposits to reach deeper oil and gas. Hydrates are electrically insulating because of their ice-like nature. They displace the conductive sea water in the pore space of the host sediment and increase the bulk resistivity of the rock. Consequently, a method such as marine CSEM, which remotely detects changes in the electrical conductivity of the earth is a useful geophysical tool for gas hydrate exploration.

We present results from experiments, which have been conducted by our working group within the past 4-5 years.
Lecturers and Abstracts

Prof. Dr. Yuguo Li

Dr. Yuguo Li is a professor of Geophysics with College of Marine Geosciences at Ocean University of China. He has received his BA and MS from Xi’an University, China as well as his PhD from University of Göttingen, Germany. Dr. Li has such academic experiences of project scientist in Scripps Institution of Oceanography, UCSD, Postdoctoral fellow in Department of Geophysics, FU Berlin, and research scientist in Institute of Geophysics, TU Freiberg, Qingdao, China.

Selection of publications


Electrical Anisotropy in Marine Controlled-source Electromagnetic Exploration

Prof. Dr. Yuguo Li

The marine controlled-source electromagnetic (CSEM) method has seen a rapid growth in the past decade as an exploration technique for mapping offshore hydrocarbon reservoirs and characterizing gas hydrates. It has the potential to significantly reduce risk in deep ocean hydrocarbon exploration. When interpreting the marine CSEM data, the seabed is usually assumed to be electrically isotropic. However, it is commonly known that the layered sedimentary sequences are capable of producing anisotropy on a macroscopic scale. Ignoring anisotropy in interpreting marine CSEM data may lead to a distorted image of seabed conductivity structures, even misinterpretation. We presented an adaptive finite element algorithm for the marine controlled-source electromagnetic forward problem in anisotropic media. Our numerical modeling shows that an electrical anisotropy has a significant effect upon marine CSEM field responses.
Dr. Uwe Stöber

Dr. Uwe Stöber is a research scientist at the Institute of Environmental Physics (IUP), University of Bremen. He obtained his PhD in physics from the University of Bremen in 2009. His research interests cover a wide range of areas, such as form drag over Stonewall Bank on the Oregon Shelf, detection of non-linear internal waves in bottom pressure, mixing in the Deep Western Boundary Current (DWBC) of the North Atlantic Ocean, dissipation of internal wave energy, measurements of the fine structure using LADCP as well as Thorpe scales from CTD measurements, and hydrothermalism in the water column (plume spreading) in the South Atlantic.

Selection of publications


Automated Detection of Non-linear Internal Waves in Bottom Pressure

Dr. Uwe Stöber

Large amplitude, non-linear internal waves (NLIW) represent a potential danger for offshore structures. While real-time observations with moorings and on-duty personnel are highly cost-intensive, it appears more reasonable to exploit the NLIW’s signature in bottom pressure for automated detection in bottom instruments. Once a wave has been detected, the instrument can send out an alert via an acoustic modem to warn the offshore structure. So far, easy-to-deploy pressure sensors and an algorithm have been developed and tested on data from the New Jersey shelf. The algorithm works in real-time mode with one-hour delay and successfully detects depression waves with a pressure amplitude of at least 250 Pa corresponding to vertical velocity amplitude of 9 cm/s, or a moderately strong wave.
Prof. Dr. Houjie WANG

Dr. Houjie WANG is the deputy dean and a professor with the College of Marine Geosciences at Ocean University of China. He received his BS and MS in ocean engineering from Ocean University of Qingdao (now OUC) and his PhD in marine geology from OUC. Dr. WANG has academic experiences of visiting scholar in such institutions as University of Hamburg, Germany, North Carolina State University, USA, University of New South Wales, Australia, and Geological Survey of Japan. Since 2008, he became deputy director of Institute of Estuarine and Coastal Studies. Currently Dr. WANG has undertaken three major projects, namely, Project from MOST (No. 2010CB951202): Depositional-erosional processes of typical Chinese coasts and their evolution under climate change (2010-2014, PI), NSF of Shandong Province (No. JQ200912): Transformation of Huanghe (Yellow River) System and Impacts on the Sedimentary Framework of the Delta (2010-2012, PI); and Project from NSFC (No. 40876019): Shift of plume behaviors at the Huanghe River Mouth and its environmental implications (2009-2011, PI). The research interests of Prof. WANG include Estuarine and coastal hydrodynamics, Sediment transport and Delta depositional system.

Selection of publications


Hyperpycnal Flows in Estuaries: the Huanghe (Yellow River) Example

Prof. Dr. Houjie WANG

Due to the unpredictable nature and operational difficulty for in-situ observations hyperpycnal flows in estuaries are unusually observed and thus have not been well understood; however, they are commonly believed to play critical role in sediment dispersal within estuarine systems. Here we demonstrated the hyperpycnal flow off the Huanghe (Yellow River) mouth, presented its evolution within tidal cycle and discussed its mechanism based on a cruise off the Huanghe mouth in the flood season of 1995. The hyperpycnal flows off the Huanghe mouth are maintained by high concentration of river sediment and modulated by tides. The hyperpycnal flows start at the slack before high water and during the developing stage the bottom suspended sediment concentration increases rapidly while the salinity drastically decreases (an inverse salt wedge) and the median grain size of suspended particles within the hyperpycnal layer increases, creating a well sediment-stratified water column. Due to the energy dissipation from frictions at the bottom and top of the hyperpycnal flows, they begin attenuating at the slack before low water while the stratification of the water column becomes collapsed owing to the enhanced tidal mixing. As a result, both the sediment concentration and median grain size of suspended particles within bottom layer decreases. As coarser sediment particles are dumped on the seafloor, the hyperpycnal flows are no longer maintained. Such behaviors of hyperpycnal flows are closely associated with the variations of suspended sediment concentration and salinity, as well as the stratification or mixing of water column, which suggests that both river supply and tidal mixing predominantly control the intra-tidal variations of hyperpycnal flows. The hyperpycnal flows contribute much to the sediment dispersal off the river mouth since nearly 90% of the river-laden sediment is delivered to the sea during the period when the hyperpycnal flows on the subaqueous slope are prominent. The high sediment loads delivered from the Huanghe and hyperpycnal flows off the river mouth are chiefly responsible for the rapid accretion of the mega-delta.
**Dr. Christoph Waldmann**

Dr. Christoph Waldmann is a senior scientist at the University of Bremen, MARUM. He obtained his PhD at Kiel University, Germany, in 1985. From 2006 to 2007, he was a Doherty Visiting Professor at Florida Institute of Technology, Melbourne, Florida, USA. His primary area of expertise lies in the development and evaluation of new methods for ocean sciences and the assessment of the collected physical and chemical parameters in coastal and deep sea environments. Being involved in several European Union projects, he is in charge of standards and interoperability concepts related to ocean sciences covering the entire processing chain starting at the individual sensor unit level up to standard data services. In 2009, Dr. Waldmann was the General Co-chair of the IEEE OCEANS 09 in Bremen, Germany. He is also recurrently acting as a Convener of a session on instrumentation for ocean observatories at the EGU. Moreover, Dr. Waldmann has participated in several academic activities as a reviewer, for example, he has been the expert evaluator for the 6th FP and 7th Framework program of the European Commission, national marine research and technology program (BMWi) and journals such as Annals of Geophysics, Journal of Atmospheric and Oceanic Technology.

**Selection of publications**


**Cooperation in the Field of Ocean Technologies - Identifying Synergies between China and Germany**

Dr. Christoph Waldmann

The presentation will cover the state of the art in ocean platforms, vehicles and instruments to identify common areas of interest and cooperation. Germany’s role in the development, use and promotion of ocean technology is presented. Examples of accomplishments during the past years will provide a base for the discussion on future co-operations.
Prof. Dr. Dongxing YUAN

Dr. Dongxing YUAN is a professor of environmental chemistry and monitoring technique with the College of Oceanography and Environmental Science at Xiamen University. She received her BS in chemistry at Xiamen University in 1982 and her PhD at University of Iowa, USA, in 1988. She spent her post-doctoral years in Department of Chemistry, Xiamen University. From 1992 to 1993, she was a visiting scholar in AAS Lab, Perkin-Elmer GmbH, Uberlingen, Germany, focusing on hyphenated technique of FIA-ETAAS for analysis of trace metals. In April, 1999, Prof. YUAN was a senior visiting scholar in Geochemical and Environmental Research Group at Texas A & M University, USA, with a research interest in QA/QC of environmental sample analysis. So far, Prof. YUAN has undertaken five programs of National Natural Science of China, two programs under National High Technology Research and Development Program of China (Program 863), and four research projects at provincial level. In recent years, she was awarded three prizes at provincial level and published over 60 articles, 40 of which were included in SCI.

Selection of publications
Guohe Chen, Min Zhang, Zhen Zhang, Yongming Huang, Dongxing Yuan, On-line solid phase extraction and spectrophotometric detection with flow technique for the determination of nanomolar level ammonium in seawater samples, Analytical Letters, 2011, 44(1-3): 310-326.
Yongming Huang, Dongxing Yuan, Jian Ma, Min Zhang, Guohe Chen, Rapid speciation of trace iron in rainwater by reverse flow injection analysis coupled to a long path length liquid waveguide capillary cell and spectrophotometric detection, Microchim Acta, 2009, 166, 221-228.
Jian Ma, Dongxing Yuan, Ying Liang, Sequential injection analysis of nanomolar soluble reactive phosphorus in seawater with HLB solid phase extraction, Marine Chemistry, 2008, 111(3-4): 151-159.

Development of Marine Observing Techniques and Instrumentation in State Key Laboratory of Marine Environmental Science

Prof. Dr. Dongxing YUAN

The research works of development of marine observing techniques and instrumentation in State Key Laboratory of Marine Environmental Science (MEL) are introduced, including shipboard determinations of trace phosphate, nitrite, nitrate, ammonium, on-field and on-line determination of trace iron, and in-situ determinations of pH, pCO₂, DIC, total alkalinity.
Lecturers and Abstracts

Dr. Emanuel Söding

Dr. Emanuel Söding is the Administrative Manager of the Cluster of Excellence “The Future Ocean” at the University of Kiel (CAU), Germany. He obtained his PhD in Geology/Paleontology from CAU. His research interests are Structural Geology, Sedimentology, Geoinformatics, Marine Geology, and Stratigraphy. His previous employment include Publication (and Data) Manager with the Integrated Ocean Drilling Program (IODP) Management International Inc., Sapporo, Japan, and the Data Manager with the Collaborative Research Project SFB574 of the CAU, Germany. Dr. Soding used to be a Research Associate and a Science Assistant in the ODP JOIDES Office at GEOMAR Research Center for marine Geosciences of the CAU, Germany.

Selection of publications

PD Dr. Avan N. Antia

Dr. Avan N. Antia is the head of the Integrated School of Ocean Sciences in the Cluster of Excellence “The Future Ocean” at the University of Kiel (CAU). She obtained her PhD in Biological Oceanography at the Institut für Meereskunde in Kiel, Germany, in 1991 and had her habilitation in Biological Oceanography at Leibniz Institute of Marine Sciences (IFM-GEOMAR) from 1997 to 2005. She has rich experiences in teaching courses like Introduction to Biological Oceanography, The Oceans’ Biological Pump, Scientific Communication: Experimental Design and Biostatistics and Biological Oceanography. In 2006, she gave a lecture Effects of Climate Change on marine Ecosystems for NATO-ASI Summer School, held in Ankara, Turkey.

Selection of publications
Marine Research and Infrastructure in Kiel: Cluster of Excellence “The Future Ocean”

Dr. Emanuel Söding and PD Dr. Avan N. Antia

The Kiel Cluster of Excellence “The Future Ocean” is a research group in Kiel, Germany, made up of more than 250 scientists from six faculties of the University of Kiel (CAU), the Leibniz Institute of Marine Sciences (IFM-GEOMAR), the Institute for World Economy (IfW) and the Muthesius Academy of Fine Arts and Design. The target of these interdisciplinary groups comprising marine scientists, Earth scientists and economists, as well as medical scientists, mathematicians, lawyers and sociologists is to jointly investigate climate and ocean change, to re-evaluate the opportunities and risks of global change for the oceans and to develop a sustainable system of resource management for the world’s oceans and marine resources. The Future Ocean serves as an example how research can be organized in a multi- and interdisciplinary environment. Since its establishment in 2006 the project has successfully convinced researchers and collaborators, and meanwhile serves as THE case study for the establishment of a modern research infrastructure. Initially just a rough concept, it nowadays is a fully functional working environment for interdisciplinary research. The cutting edge interdisciplinary research is supported by a modern reorganized science support infrastructure which is based on five pillars: 1. the pooling of research infrastructure resources into platforms; 2. International cooperation supporting science mobility and international project support; 3. The development of clear and flexible career paths in research taking into account special needs of graduate students and post-docs during different stages of their career; 4. the exchange of knowledge through a close cooperation with industry and organizations, but also novel public outreach concepts to reach stakeholders, decision makers and last but not least to the general public; 5. A modern, transparent project management. Common projects project retreats, workshops and symposia foster collaboration among scientists, and ensure that members and employees gain additional experience from participation in the cluster, and are aware of their importance for the overall goals of the project.
Prof. Dr. Thomas Jung

Dr. Jung is a professor for Physics of Climate at the Alfred Wegener Institute for Polar and Marine Research (AWI), Bremerhaven and University of Bremen, Bremen, Germany. He used to be scientist and senior scientist at the European Centre for Medium-Range Weather Forecasts, Reading, United Kingdom. Prof. Jung obtained his PhD in physics of climate from the Institute for Marine Research (IFM), Kiel, Germany, in 2000. His research areas include physics of climate with focus on polar regions, climate modeling, weather and climate prediction.

Selection of publications


Current and Future Activities in Climate Research at AWI

Prof. Dr. Thomas Jung

In this presentation an overview will be given of research activities in the climate science division at AWI. The emphasis will be on the sea ice-ocean system. At AWI a finite element sea ice ocean model (FESOM) has been developed that allows employing regionally refined meshed in order to explicitly resolve small-scale oceanic key processes. The power of unstructured modelling will be illustrated for different applications (e.g., explicit simulation of deep water formation). Another high-priority research topic at AWI is data assimilation. Examples will be presented in which data assimilation is used in order to interpret observations (reanalysis) and to understand model deficiencies (model error diagnosis). Finally, an overview will be given about future directions of research.
Prof. Dr. Song SUN

Dr. SUN Song is director and a research professor with Institute of Oceanology Chinese Academy of Sciences. He obtained his BS in Marine Biology from Shandong College of Oceanology (now OUC), his MS and PhD in Marine Ecology from Institute of Oceanology, Chinese Academy of Sciences. From 1992 to 1994, Dr. SUN was a visiting scholar in Australian Antarctic Division Cooperative research in Antarctic krill biology. Since 1990, Dr. SUN has participated in research programs in Marine Zooplankton population dynamics, marine ecology and Antarctic krill biology research as well as the field work of Chinese Antarctic Expedition and Southern Ocean Expedition. He has a number of professional memberships, namely, Chairman of the Marine Ecology Division, China Oceanology & Limnology Society, Vice Chairman and Secretary in general of the China Oceanology & Limnology Society, Chairman of the China CoML, Chairman of the SCOR China, SSC member of the CoML (Census of Marine Life), Member of the POGO, Full member of the Panel on New technologies for Observing Marine Life, and Chairman of the PICES krill working group. The research interest of Dr. SUN is Marine Ecology, especially in the zooplankton population dynamics and Antarctic krill ecology.

Selection of publications


The Changing Ecosystem and Ecological Disasters

Prof. Dr. Song SUN

The coastal ecosystem is changing continuously; it seems in the phase of regime shift. There are many ecological events happened in the recent years: the giant jelly fish bloom, the starfish bloom, the salp bloom and the green algae bloom, one by one, what happened? What cause these ecological events? Is it because the human activities of because the climate change? Based on the cruises data analysis and from the point of the ecosystem dynamics, these questions were discussed. The ecosystem structure, functional groups and the physical and biological coupling model will also be discussed.
Lecturers and Abstracts

Dr. Mark Lenz

Dr. Mark Lenz is a postdoctoral researcher fellow at the Leibniz Institute of Marine Sciences (IFM-GEOMAR). In 2003, he received his PhD by completing the thesis ‘An experimental test of the intermediate disturbance hypothesis: influence of two disturbance types on the structure of established Western Baltic fouling communities’. Dr. Lenz was a research employee at the Zoological Institute at the University of Kiel (CAU) from 1998 to 2001. He participated in the research on the influence of disturbance on the structure of Western Baltic fouling communities, funded by German Science Foundation (DFG).

Selection of publications


Invasive Species – Threat and Chance for Coastal Ecosystems

Dr. Mark Lenz

The number of bioinvasions in the marine environment is currently increasing at an unprecedented rate. This phenomenon is predominantly driven by human activities such as shipping traffic, the culturing of marine organisms and the release of floating litter. They provide, intentionally or unintentionally, vectors for numerous benthic and pelagic animals and plants, which now travel the world’s oceans at a high speed and unrestricted by natural barriers. While many invasions occur almost unnoticed by humans, others alter the face of coastal ecosystems and/or cause great economic damage. The latter made bioinvasions a widely recognized topic among scientists, conservationists, and politicians. As a consequence, many countries established monitoring programs to control invasion gateways, e.g. harbours, to allow the early detection of alien species and to facilitate the timely eradication of localized populations. To scientists, especially two questions are currently a burning issue: What determines the invasiveness of a species and what are the consequences of successful invasions at the ecosystem level? Among the traits which have already been identified as relevant for invasion success are dispersal characteristics, life-history strategies, growth rates, distributional ranges, association with humans and tolerance towards environmental stress. However, further research is needed to complete this catalogue of traits and make it applicable to risk evaluations and management strategies. The assessment of potential effects of invasive species on the structure and functioning of ecosystems is one of the most challenging tasks for invasion ecologists. We have evidence that non-native species can impair or promote, e.g., the diversity and stability of communities in the invaded range. Therefore new faunal or floral elements are not per se a nuisance, but can also improve habitat quality. During this workshop, students will become familiar with a) the various stages of the invasion process, b) the most important vectors for marine species, c) the top ten of globally abundant marine invaders, d) case studies that exemplify the management of bioinvasions, and e) latest research on causes and consequences of bioinvasions.
PD Dr. Hermann W. Bange

Dr. Hermann W. Bange is a marine biogeochemist at the Leibniz Institute of Marine Sciences (IFM-GEOMAR) in Kiel, Germany. He completed his habilitation in “Marine Chemistry” and “Marine Biogeochemistry” at the University of Kiel (CAU) in 2006 and received his PhD at Max Planck Institute for Chemistry, Biogeochem. Dept., Mainz, Germany, in 1994. Since 2009, Dr. Bange has become an Associate Professor (tenure) at IFM-GEOMAR, Marine Biogeochemistry Research Division, Kiel, Germany. He has given lectures on such topics as Oceanic Trace Gases, Biogeochemical Cycles in the Ocean and Marine Nitrogen Cycle at IFM-GEOMAR & the University of Kiel. In 2000, he worked as a visiting scientist at the University of Newcastle, Dept. of Marine Sciences and Coastal Management, Ocean Research Group (Prof. N.J.P. Owens): Investigations of the photochemical production of CH₄ in seawater. His appointments include German National SOLAS Representative, Associated member of the Kiel Cluster of Excellence “The Future Ocean” and Member of the Joint SOLAS/IMBER Carbon Implementation Group. Dr. Bange received Mare Award for Marine Research 1999 for the project “Photochemical production of methane in seawater” in 2000.

Selection of publications

Bange, H. W., et al. (2010), Dissolved methane during hypoxic events at the Boknis Eck Time Series Station (Eckernförde Bay, SW Baltic Sea), Biogeosciences, 7, 1279-1284.
Naqvi, S. W. A., Bange, H.W., et al. (2010), Marine hypoxia/anoxia as a source of CH₄ and N₂O, Biogeosciences, 7, 2159-2190.

Trace Gases (N₂O, CH₄, DMS) in the Ocean

PD Dr. Hermann W. Bange

Nitrous oxide (N₂O), methane (CH₄) and dimethylsulfide (DMS) are atmospheric trace gases which, directly or indirectly, influence the Earth’s climate and chemistry of its atmosphere. The ocean is the dominating source for atmospheric DMS and a major source for atmospheric N₂O, whereas the oceanic emissions play only a minor role for the atmospheric budget of CH₄. The oceanic pathways (i.e. production and consumption) of N₂O and CH₄ are dominated by microbiological processes such as nitrification/denitrification and methanogenesis, respectively. The oceanic pathways of DMS are characterized by a complex interplay of microbiological processes, uptake/release by phytoplankton and photochemical processes. An overview about the distributions, pathways and potential future trends of the oceanic emissions of N₂O, CH₄ and DMS in a changing Earth environment will be presented.
Prof. Dr. Guangxing LIU

Dr. Guangxing LIU is a professor with College of Environmental Science and Engineering and head of the Office of Development and Planning for Academic Discipline Construction at Ocean University of China. Prof. LIU received his BS and MS from Xiamen University and his PhD from Ocean University of Qingdao (now Ocean University of China). His research interests focus on biology and experimental ecology of marine copepods, marine zooplankton biodiversity and community ecology, and marine pollution and its effects on plankton. In terms of academic experiences, Dr. LIU was visiting scholar in such institutions as Department of Marine Sciences and Department of Molecular and Cell Biology at University of Connecticut, USA as well as Plymouth Marine Laboratory and SAHFOS (Sir Alister Hardy Foundation for Ocean Sciences), U. K. He has such social appointments as Member of China CoML Scientific Steering Committee, Vice-Head of Marine Environment Protection Committee, China Society of Environmental Science, and Member of China Society of Limnology and Oceanography. Since 2002, Dr. LIU has at least four projects at national level. From 1994 to 2011, he has published at least 21 papers.

Selection of publications


Guangxing Liu, Lingling Yang, Tingjun Fan, et al., 2006. Purification and characterization of phenoloxidase from crab Charybdis japonica, Fish & Shellfish Immunology, 20: 47-57.

Guang-xing Liu, Dong-hui Xu, 2010. Feeding, egg production and laboratory culture of Schmackeria poplesia (Copepoda: Calanoida), Aquaculture Research, 41 (12): 1817~1826.
Zooplankton Community and Biodiversity in the Yellow Sea and the East China Sea

Prof. Dr. Guangxing LIU

The lecture was based on the study conducted during four cruises in the Yellow Sea and East China Sea. Spatial and temporal variations of zooplankton abundance, biomass and community structure and its relation to currents and water masses over the continental shelf were examined. A total of 859 zooplankton species/taxa and 37 planktonic larvae were identified during the surveys. Copepods, hydromedusae and amphipods were the dominant components among these identified groups. Zooplankton abundance and biomass fluctuated widely and showed distinct heterogeneity in the shelf waters. Six zooplankton assemblages were identified with hierarchical cluster analysis and MDS analysis during this study. Seasonal changes of zooplankton community composition and its geographical distribution were detected, and the locations of the faunistic areas overlap quite well with water masses and current systems. So we suggest that the zooplankton community structure and its changes were determined by the water masses in the Yellow Sea and East China Sea. The result of this research can provide fundamental information for the long-term monitoring of zooplankton ecology in the shelf of Yellow Sea and East China Sea.
Prof. Dr. Justus Notholt

Dr. Justus Notholt is a professor at the Institute of Environmental Physics, University of Bremen. Prof. Notholt graduated in Solid State Physics at the University of Kassel in 1985. In his diploma thesis he studied the structure of amorphous semiconductors using X-ray spectroscopy. He received his PhD degree in Physical Chemistry at the same University in 1989 in the field of Surface Enhanced Raman Scattering, working in the area surface science and electrochemistry. As a postdoctoral fellow at the Joint Research Centre of the EC in Ispra/Italy, he switched to atmospheric science where he advanced a DOAS-system for simultaneous measurements of atmospheric trace gas and aerosol concentrations. In September 1990, he moved to the Alfred Wegener Institute for Polar and Marine Research (AWI). There he began atmospheric trace gas observations in both Polar Regions and developed measurement and analysis techniques for using the moon as infrared light source during the polar night. Furthermore he started ship borne FTIR measurements to obtain the latitudinal variability of atmospheric trace gases. In April 2002 he obtained a professorship at the University of Bremen. His activities now comprise development and application of spectroscopic observations from the microwave via the infrared to the visible spectral region, using ground-based and satellite instruments. Scientific topics are greenhouse gas observations, stratospheric and mesospheric studies, and sea-ice remote sensing.

Selection of publications


PD Dr. Thorsten Warneke

Thorsten Warneke studied physics, mathematics and education at the University of Tübingen (Germany), Oregon State University (USA), Cornell University (USA) and the University of Heidelberg from 1991-1998. He received his Diplom (Masters) in physics and his „I.Staatsexamen“ (High school teaching degree) in mathematics and physics from the University of Heidelberg in 1998. In 2002 he finished his PhD at the Southampton Oceanography Center (UK) on the subject “Characterisation of Plutonium and Uranium isotopes in the environment using mass spectrometry”. For a publication resulting from his PhD work, he received the Masanori Sakuyama Prize, which is awarded every second year to a postgraduate student at the Southampton Oceanography Centre. From 2002-2005 he has worked as a postdoc on remote sensing measurements of atmospheric trace gases using solar absorption Fourier Transform InfraRed (FTIR) spectrometry at the Institute of Environmental Physics at the University of Bremen and since 2005 he is research group leader at the same institute. His research at the University of Bremen focussed on the ground-based remote sensing of atmospheric greenhouse gases. He successfully proposed the establishment of two new solar absorption observatories in two EU projects, which now represent the most important European sites for ground-truthing greenhouse gas measurements from space. Lectures given at the University of Bremen include “Isotopes in environmental physics”, “Infrared remote sensing” and “Nuclear and particle physics”. The first of these lectures was rated as the best lecture of the semester in the student evaluation in 2003. His current research interests are build around the application of Fourier Transform InfraRed (FTIR) spectrometry to environmental research questions. During a recent six-month sabbatical leave at the University of Wollongong (Australia) in 2009, he has expanded his expertise to flux measurements of greenhouse gases and he currently aims to establish this research field at the University of Bremen. He is responsible for solar absorption measurements at several sites, has contributed to 33 peer reviewed publications and is involved as PI in international research projects.

Selection of publications


PD Dr. Thorsten Warneke and Prof. Dr. Justus Notholt
(in collaboration with Dr. Tim Rixen, Leibniz Center for Tropical Marine Ecology, Bremen)

The measurement of the exchange of greenhouse gases between the atmosphere and water bodies (ocean and inland waters) is highly important for the understanding of the global greenhouse gas budgets. Currently employed measurement techniques are usually limited to the measurement of a single greenhouse gas. Here we would like to present a multi-species water-atmosphere exchange flux measurement system based on Fourier-Transform InfraRed (FTIR) spectrometry. In addition we will suggest scientifically interesting applications of such a system.

**FTIR-spectrometry allows the simultaneous measurement of CO₂, N₂O, CO, CH₄ and δ¹³C (in CO₂) in ambient air with similar or better precisions than other state of the art continuous measurement techniques for greenhouse gases (Table 1).** Instrumental developments during the last 5 years have established this technique as a robust and precise technique for continuous greenhouse gas monitoring. While FTIR-analyzers are now frequently used for atmospheric concentration measurements, this technique has not been employed for the measurement of gases dissolved in water. For such measurements we have coupled a FTIR-analyzer to an equilibrator and a reservoir system. For continuous water-atmosphere exchange flux measurements two reservoirs are filled for a period of 15 minutes, one with sample air from the equilibrator and the other one with air from the air overlying the water. These 15 minute averaged samples are then analyzed by the FTIR-trace gas analyzer, while a second set of two reservoirs are being filled.

Applications of this system include ocean measurements on research vessels as well as exchange flux measurements on inland waters (reservoirs, lakes, rivers). An employment of this system on research vessels can be discussed. However, our prime interest are inland waters. The exchange of greenhouse gases between the atmosphere and inland waters has largely been ignored in the terrestrial greenhouse gas balances. Recent studies suggest that emissions of these gases from inland waters can be significant and that there is an urgent need for the quantification of the exchange fluxes of these gases. It would be highly interesting to quantify greenhouse gas exchange for important inland waters in China.

**Table 1**

<table>
<thead>
<tr>
<th>Species</th>
<th>Precision (1σ, 10 min)</th>
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<tbody>
<tr>
<td>CO₂</td>
<td>0.02 µmol mol⁻¹</td>
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<tr>
<td>δ¹³C in CO₂</td>
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<td>CH₄</td>
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<tr>
<td>CO</td>
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<tr>
<td>N₂O</td>
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</table>
**Prof. Qingyu LIU**

Madame Qinyu LIU is a professor with College of Physical and Environmental Oceanography at Ocean University of China. She is director of Shandong Provincial Key Laboratory of Ocean-Atmosphere Interaction and Climate as well as a member of Key Laboratory of Physical Oceanography, Ministry of Education, China. Prof. LIU’s research interests concentrate on large-scale ocean-atmosphere interaction as well as oceanic role in Climate variability and Change. From 2001 to 2008, she has published 93 articles in journals of home and abroad.

**Selection of publications**


Simulated Response of the Pacific Subtropical Mode Water to Globe Warming and Its Effect on Climate Variability

Prof. Qinyu LIU

Based on a set of Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4) models, the solutions between a present-day climate and a future, warmer climate are compared. Under the warmer climate scenario, the North Pacific subtropical Mode Waters (NPSTMW) are produced on lighter isopycnal surfaces and are significantly weakened in terms of their formation and evolution. These changes are due to a more stratified upper ocean and thus a shoaling of the winter mixing depth resulting mainly from a reduction of the ocean-to-atmosphere heat loss over the subtropical region, which is related to weakening northward heat transport by the Kurishio. In the opposite, the South Pacific Eastern Subtropical Mode Water (SPESTMW) is significantly increased in volume. This is because, although the MLD becomes shallower in most parts of the South Pacific, but it becomes deepen in southeast subtropical Pacific and the increased MLD horizontal gradients in SPESTMW formation area, a result of intensified southeast trade winds, plays a major role for increasing SPESTMW under global warming.

The weakened NPSTMW will induce STCC weakens, leaving behind banded structures in SST warming with the characteristic northeast slant as the response of SST to warm climate and less subtropical water through interior pathways towards the equator in the North Pacific thermocline. The increased volume of the SPESTMW possibly contributes to a minimum warming in the thermocline of the western equatorial Pacific under global warming scenarios.
**Prof. Dr. Huiwang GAO**

Dr. Huiwang GAO is a professor and the dean with College of Environmental Science and Engineering at Ocean University of China. Prof. GAO obtained his PhD in Atmospheric Physics and Environment, Institute of Atmospheric Physics, Chinese Academy of Sciences in 1996 and became a postdoctoral fellow in College of Physical Oceanography at OUC from 1996 to 1998. His academic appointments include Member and Deputy Secretary with Chinese Association of Ocean and Limnology, Deputy Director with Qingdao Association of Environmental Protection, Member and Deputy Director of Marine Environmental Protection Association, Chinese Association of Environmental Science and PI of International ADOES (Asian dust and Ocean Ecosystem) Task Team. He has been visiting scientists in such German institutions as MPI for Meteorology/University of Hamburg, IFM-GEOMAR, Kiel University, and IUP, Heidelberg University from 1999 to 2005. In 2006, he went to Italy as a visiting scientist in International Centre for Theoretical Physics for two months. He has a research background of marine and atmospheric sciences especially on the transportation and deposition of atmospheric pollutants (e.g. SO₂, NOₓ, CO, aerosol), marine ecosystem modeling (e.g. annual cycle of nutrients and primary production), and air-sea mass exchanges and fluxes (e.g. momentum, heat and CO₂). He is a founder-member of China SOLAS (a working group of international SOLAS, Surface Ocean-Lower Atmosphere Study). He is active on international collaborations with German and Japanese scientists on nitrogen cycling, dust transportation and deposition, and shallow sea ecosystem modeling. Prof. GAO has published over 100 papers in Chinese and international journals. Most of his research projects are financed by NSFC (the National Nature Science Foundation of China), MOST (Chinese Ministry of Science and Technology), Sino-Japan Cooperation Project and EU foundations.

**Selection of publications**


Characteristics of Turbulence in Marine Atmospheric Boundary Layer and Air-sea Mass and Energy Exchange Fluxes from the China Sea to the Northwest Pacific Ocean

Prof. Dr. Huiwang GAO

In marine atmospheric boundary layer, atmospheric turbulence is one of important ways to cause the exchange of energy and mass. Eddy covariance technique is a direct measure which is widely used to measure the air-sea exchange fluxes of energy and mass. Due to platform motion and potential artifacts associated with high relative humidity in marine atmosphere, it is still a challenge for accurately measuring the air-sea exchange fluxes. During 2005 and 2007, a ship-based campaign was launched from the China sea to Luzon Strait, and the Northwest Pacific. The atmospheric turbulence characteristics in marine atmospheric boundary layer were investigated and the air-sea exchange fluxes were measured on an oceanographic research vessel using an open-path eddy covariance technique.

The band-pass filter and correction of platform motion were used respectively for data processing in order to remove the platform-motion induced wind velocity. The spectrum and cospectrum of wind velocity fluctuations indicate that the platform-motion-induced artifact in wind velocity can be minimized when one of the two methods was used.

For database obtained in the north Yellow Sea in autumn, the normalized spectra of three scalar quantities show dissimilarity in part of the samples, the normalized CO₂ density spectrum was higher than those of water vapor density and temperature in the low frequency zone, which was ascribed to the cross-sensitivity of the CO₂ sensor to water vapor fluctuations. The cross-sensitivity is considered to cause the inaccuracies in the CO₂ flux determination and to be the reason for the long-term standing difficulty with open-path eddy covariance system. Since the high frequency signal should be less affected by the cross-sensitivity, cospectra at a high frequency range from 0.8 to 1.5 Hz instead of the whole range were used to estimate the CO₂ flux to circumvent the instrument cross-sensitivity issue. For those data points suffering from artifacts from cross-sensitivity, the thus estimated CO₂ flux is only one-fifth of that estimated using the cospectra over whole range. However, for those data points in which cross-sensitivity didn’t apparently occur, the estimated flux of CO₂ using the high frequency cospectra agreed well with that estimated using the whole range, indicating that the former approach is valid to estimate the CO₂ flux regardless of the presence and absence of cross-sensitivity.

The preliminary results show that in autumn the north Yellow Sea is the source of atmospheric water vapor and sensible heat, but it is the sink of atmospheric CO₂. The non-linear correlation analysis of water vapor, CO₂ and sensible heat flux with wind speed and atmospheric stability indicate that the wind speed and atmospheric stability play key roles in air-sea mass and energy exchange.
Lecturers and Abstracts

Prof. Dr. Jianfang CHEN

Dr. Jianfang CHEN is the Deputy Chairman of the Academic Committee of Second Institute of Oceanography, State Oceanography Administration (SIO, SOA). He is also the deputy director of Laboratory of Marine Ecosystem and Biogeochemistry, SIO, SOA. Prof. CHEN received his PhD in Paleo-environment studies at Tongji University in 2005 and his research interests extend to Nutrient dynamics, plankton community and geochemical fluxes; Biogeochemical process of settling particles and its effect on paleo-proxies; Coastal eutrophication, algal bloom and hypoxia in Changjiang Estuary and adjacent East China Sea; and the effect of ice cover reduction on biological pump and organic carbon sedimentary accumulation rate in Arctic shelves. Dr. CHEN has been visiting scholar in several foreign research institutions, such as Institute of Biogeochemistry and Marine Chemistry, University of Hamburg, Germany, Geological Survey of Japan (GSJ), Center for Coastal and Atmospheric Research, Hong Kong University of Science and Technology, Chemistry Department, Hong Kong University of Science and Technology, National Oceanography Center, Southampton, UK, and Center for Tropical Marine Ecology (ZMT), Bremen, Germany. Currently, Dr. CHEN has participated/undertaken a number of projects, for example, National Key Technologies R&D Program “Real time hypoxia monitoring in the Changjiang Estuary”, National 908 project “The comprehensive environmental survey in Changjiang Estuary and adjacent East China Sea (908 ST04)”, NSFC project “Effect of Ice cover decreasing on sedimentary organic carbon accumulation and biological pump structure variation in Chukchi Sea and Canadian Basin under global warming” and NSFC project “Diatom bounded C and N isotope as indicators for paleo-biological pump in the South China Sea.

Selection of publications


Seasonal Variation and Real Time Monitoring of Bottom Water Hypoxia off the Changjiang Estuary

Prof. Dr. Jianfang CHEN

Seasonal variation of dissolved oxygen (DO) concentration was analyzed in the Changjiang estuary and adjacent area during 2006 and 2007. In the winter, DO concentration was higher in the outer shelf than that in the coast area and homogeneous in the water column. In the spring, water column stratification, algae bloom and the settling organic matter consumed the preformed low oxygen provided necessary conditions for the development of bottom water hypoxia. In the summer, there was a "low oxygen zone" in the northern of the estuary front, the minimum value was 2.0 mg/L. In the autumn, low concentration patches were observed in the east area of 122.5° E, these maybe the residue of summer hypoxia. Changjiang plume provided inorganic nutrients for phytoplankton growing, Taiwan warm current intrusion offered a low preformed oxygen value, while summer water column stratification prohibited gas exchange between bottom and upper water. On the other hand, the distribution patterns of particulate organic carbon (POC) and total organic carbon (TOC) illustrating terrigenous organic matter maybe no significant contribution to the formation and development of bottom water hypoxia. Because of distinctive spatial and temporal variation of hypoxia in the estuary a real time hypoxia monitoring system has been established since 2010 under the support of National Key Technologies R&D Program.
Ass. Prof. Dr. Hongbin LIU

Dr. Hongbin LIU is an associate professor in the Division of Life Science at the Hong Kong University of Science and Technology, Hong Kong. Ass. Prof. LIU obtained his BS from Shandong College of Oceanology (now Ocean University of China) in 1983, and received his MS in oceanography from the University of Hawaii at Manoa in 1994 as well as his PhD in oceanography at the University of Hawaii in 1997. In previous years, Dr. LIU used to work in several research institutions, such as the Second Institute of Oceanography, SOA, China, Marine Science Institute, Univ. of Texas at Austin, Nagoya University, Japan, Louisiana Universities Marine Consortium and National Taiwan University. His research interests cover a wide range of topics like microbial community structures and microbial food web dynamics, phytoplankton physiology and ecology, zooplankton grazing and trophic interaction, as well as estuarine and coastal ecosystems. Since 2007, Dr. LIU has undertaken seven research projects, focusing on Hong Kong coastal waters. In terms of marine field work, Prof. LIU has spent at least 97 weeks of ship time in places such as the East China Sea, equatorial Pacific Ocean, US JGOFS Arabian Sea, Laguna Madre, Texas, North Pacific and Bering Sea, Gulf of Mexico, Gulf of Alaska and Sea of Okhotsk. As a member of American Geophysical Union, Dr. LIU has also joined in American Society of Limnology and Oceanography. Meanwhile, Dr. LIU has participated in a number of editing and reviewing work for academic journals and publications, such as Journal of Plankton Research, Bulletin of Marine Science, Indian Journal of Marine Science, The ISME Journal, Journal of Oceanography, Journal of Phycology, Limnology and Oceanography, Marine Biology, Marine Chemistry, Marine Ecology, Marine Ecology Progress Series, Marine Environmental Research, Marine Pollution Bulletin, Oceanography, and Pacific Science.

Selection of publications


Diversity and Distribution of Microbes involved in the Marine Nitrogen Cycle

Ass. Dr. Hongbin LIU

Marine nitrogen (N) fixation and anaerobic ammonium oxidation (anammox) represent by far the major N input and loss pathways in marine environments. Together, these two ecologically important N cycling processes could regulate total N contents in the ocean. Previous studies have detected diverse microbes involved in these processes with functional genes based molecular analysis. However, the spatial or/and temporal variations in composition and distribution of these microbial communities in some special environments remain unknown. In this study, the phylogenetic diversity and abundance of diazotrophs were examined along a transect from Pearl River plume to oceanic waters of the South China Sea (SCS) in both summer and winter, where biological N fixation is thought to be an important N source to its oligotrophic surface waters. Highly diverse diazotrophs were recovered, including proteobacteria, cyanobacteria and cluster III diazotrophs, with γ-proteobacteria dominating the entire diazotrophic community. Cyanobacterial diazotrophs were only detected in oceanic stations and the disappearance of cyanobacterial diazotrophs in the plume influenced station was suggested to be driven by low salinity and high nutrient concentrations. Trichodesmium spp. was the most abundant cyanobacterial diazotroph and potentially the most important nitrogen fixer in this environment. Marine oxygen minimum zone (OMZ) represents another habitat for active microbial N transformations, where substantial N loss through anammox occurs. Abundant novel hzo sequences in cluster 2 were detected in the OMZ of the Costa Rica Dome (CRD), with the simultaneous presence of the well-known hzo cluster 1 sequences. The novel hzo sequences were much more abundant and more widespread than cluster 1. More cDNA transcripts of the novel sequences were also obtained, indicating their potentiality to expressing the hydrazine oxidoreductase. The novel cluster 2 hzo sequences are suggested to be more ecologically important due to their higher abundance and wider distribution. This study firstly provided insight on the community compositions and distributions of diazotrophs in SCS and anammox bacteria in the CRD-OMZ, which is essential for understanding and predicting local and global N budget.
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### Annex

**Sino-German Cooperative Projects in Marine Sciences 1991 – 2014**

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<th>Discipline</th>
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<td>Geology</td>
<td>Sedimentation process in the South China Sea</td>
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<td>Deep-sea mineral resources exploration and exploitation</td>
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<td>Monsoon monitoring</td>
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<td>Asia monsoon evolution</td>
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<td>Refraction seismic survey in the South China Sea</td>
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<td></td>
<td>South China Sea: Distribution, formation and effect of methane and gas hydrate on the environment (Siger); SO 177, IFM-GEOMAR</td>
<td>2004 - 2005</td>
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<td>Rift processes in the South China Sea (RISE); SO 197, BGR, Hannover</td>
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<td>The East China Sea Experiment Network; Univ. Bremen, Tongji Univ.</td>
<td>2010 - 2012</td>
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<td>Natural versus anthropogenic controls of past monsoon variability in Central Asia recorded in marine archives (CARIMA); Univ. Bremen, MARUM, ZMAW, ZMT, Univ. Tübingen, BGR, Tongji Univ.</td>
<td>2011 - 2014</td>
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<td>Interglaziale Veränderungen des ostasiatischen Sommermonsuns (INVERS) / Inter-glacial changes of East Asian summer monsoon; MARUM, ZMT, BGR, Tongji Univ.</td>
<td>2012</td>
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<tr>
<td>Biogeochemistry</td>
<td>Land-sea interactions in coastal ecosystems of tropical China (LANCET); ZMT, Universities in Bremen, Hamburg, and Hainan, Hainan Provincial Marine Development Plan &amp; Design Research Institute, OUC, ECNU, SIO Hangzhou</td>
<td>2006 - 2011</td>
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<td>Status of the marine environment of the Gulf of Beibu (South China Sea) and development during the Holocene through alternating natural and anthropogenic influences (BEIBU); IOW, ZMT, Guangxi Mangrove Research Center, Guangxi Marine Environment &amp; Coastal Wetland Research Center</td>
<td>2009 - 2012</td>
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<td></td>
<td>BEIBU-Subproject: The Role of mangroves for the biogeochemical fluxes into the coastal ecosystems of the Gulf of Beibu under anthropogenic change</td>
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</table>
### Sino-German Cooperative Projects in Marine Sciences 1991 - 2014


<table>
<thead>
<tr>
<th>Discipline</th>
<th>Title of Project ; Partners</th>
<th>Duration</th>
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</thead>
<tbody>
<tr>
<td><strong>Biogeochemistry</strong> (cont.)</td>
<td>Impact of ENSO monsoon systems on biogeochemical matter fluxes in the northern South China Sea (SINOFLUX): Univ Hamburg, SIO Hangzhou, Tongji Univ.</td>
<td>2009 - 2011</td>
</tr>
<tr>
<td></td>
<td>Natural versus anthropogenic controls of past monsoon variability in Central Asia recorded in marine archives (CARIMA): Univ Bremen, MARUM, ZMAW, ZMT, Univ Tübingen, BGR, Tongji Univ.</td>
<td>2011 - 2014</td>
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<tr>
<td><strong>Biology</strong></td>
<td>Red tides</td>
<td>1991 - 1999</td>
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<td></td>
<td>Studies on the benthic polychaeta</td>
<td>1991 - 1997</td>
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<td>Research on ecological functions of marine microbes</td>
<td>1996 - 1998</td>
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<td>Ecophysiology of marine and brackish water algae</td>
<td>1995 - 1996</td>
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<td>Land-sea interactions in coastal ecosystems of tropical China (LANCET): ZMT, Univ Bremen, Univ Hamburg, Univ Hainan, Hainan Provincial Marine Development Plan &amp; Design Research Institute, OUC, ECNU, SIO Hangzhou</td>
<td>2006 - 2011</td>
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<td></td>
<td>Integrating Multiple Demands on Coastal Zones with Emphasis on Aquatic Ecosystems and Fisheries (INCOFISH): IFM-GEOMAR, Nanjing Institute of Environmental Sciences (NIES) of SEPA, Nanjing</td>
<td>2005 - 2008</td>
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<td></td>
<td>A Global Information System on Fishes (FishBase); IFM-GEOMAR, Chinese Academy of Fishery Sciences (CAFS)</td>
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<tr>
<td><strong>Oceanography</strong></td>
<td>Marine pollution, monitoring and control</td>
<td>1995 - 2000</td>
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<td>Ocean colour study with remote sensing</td>
<td>1991 - 1999</td>
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<td>Hydro- and thermodynamics of the South China Sea</td>
<td>1991 - 1997</td>
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<td>Study on numerical modelling of physical oceanography in East China Sea</td>
<td>1991 - 1997</td>
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<td>Monitoring of the coastal zone &quot;MERMAID&quot;</td>
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<td><strong>Oceanography</strong> (cont.)</td>
<td>Discovery Modelling Mediation Deliberation – Interface Tools for Multi-Stakeholder Knowledge Partnerships for the Sustainable Management of Marine Resources and Coastal Zones (PASARELAS); IFM-GEOMAR, ECNU Shanghai</td>
<td>2004 - 2007</td>
</tr>
<tr>
<td></td>
<td>Land-sea interactions in coastal ecosystems of tropical China (LANCET); ZMT, Univ. Bremen, Univ. Hamburg, Univ. Hainan, Hainan Provincial Marine Development Plan &amp; Design Research Institute, OUC, ECNU, SIO Hangzhou</td>
<td>2006 - 2011</td>
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<td>Monitoring der marinen Sicherheit mit Multi-Sensor Fernerkundungsdaten (MaMo); Application of multi-sensor remote sensing data for monitoring of marine safety; Küstennahe Satellitenmessungen von Wind- und Seegangsfeldern insbesondere in Sturm- und Taifunsituationen; Bestimmung von Wellenhöhen mittels Radarsatellitendaten; DLR, GAUSS</td>
<td>2009 - 2012</td>
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<td></td>
<td>Research on backscattering based on sidescan sonar and multibeam sonar; IFM-GEOMAR, Institute of Acoustics, Chinese Academy of Sciences, Beijing; SOA Qingdao, Hangzhou; COMRA, GIEC, CAS</td>
<td>2010</td>
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<td>Consequences of global climatic changes on the environmental conditions of Jiaozhou Bay and the adjoining shelf; Univ. Hamburg, OUC</td>
<td>2010 - 2012</td>
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<td><strong>Polar Research</strong></td>
<td>Polar marine ecological studies related to global change</td>
<td>1995 - 1997</td>
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<td>Biological process and biochemical cycle in polar sea ice zone</td>
<td>1996 - 2002</td>
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<tr>
<td><strong>Others</strong></td>
<td>DRAGON Programme: European and Chinese marine monitoring for environment and security system; ESA, MOST</td>
<td>2004 - 2008</td>
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<td>1st DRAGON Programme</td>
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<td></td>
<td>2nd DRAGON Programme: Exploitation of ESA, TPM and Chinese EO data for science and applications development in land, ocean and atmospheric applications (25 projects)</td>
<td>2008 - 2012</td>
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<td></td>
<td>i.a. Theme &quot;Oceanography and Coastal Zones&quot; with Sub-Project &quot;DRAGONESS&quot; - DRAGON in support of harmonizing European and Chinese marine monitoring for Environmental and Security System; OUC, SIO-SOA, SOED, BNU, CLS, GKSS, IAP, IFREMER, NERSC, NMEFC, NRSCC, NSOAS, NZC, ORSC</td>
<td>2007 - 2010</td>
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Cont.

**Sino-German Cooperative Projects in Marine Sciences 1991 - 2014**


- Study of mineral resources in the ocean and in the sea bottom
  - Marine geology and geophysics on the basis of regional studies
  - Polymetallic nodules
  - Sulfides in the Pacific Ocean
  - Geological and biological correlation and comparative study in shore areas

- Methodology and technology for marine pollution monitoring and control
  - Monitoring and control of oil spills, heavy metals, radioactive nuclides, organochlorides and red tides in the ocean

- Polar sea study
  - Life in the Southern Ocean
  - Marine geology and geophysics in the Southern Ocean

- Marine technology
  - Designing, equipping and coordinated planning of RVs and survey ships
  - Technology for measuring platforms, buoys, diving poles, remote sensing and automatic collection of data
  - Underwater simulation

- Miscellaneous
  - Routing of vessels in view of weather
  - Exchange of scientists, engineers and other experts

\*Notes:
This compilation doesn’t claim to be exhaustive.

1st Sino-German Workshop on Marine Sciences

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         Mr. Xia HOU
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